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Dear Esteemed Readers, Authors, and Colleagues,

I hope this letter finds you in good health and high spirits. It is my distinct pleasure to address you as the Editor-in-Chief of Integrative Omics and Applied Biotechnology (IIOAB) Journal, a multidisciplinary scientific journal that has always placed a profound emphasis on nurturing the involvement of young scientists and championing the significance of an interdisciplinary approach.

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Our journal continues to serve as a hub for knowledge exchange, providing a platform for researchers from various fields to come together and share their insights, experiences, and research outcomes. The collaborative spirit within our community is truly inspiring, and I am immensely proud of the role that IIOAB journal plays in fostering such partnerships.

As we move forward, I encourage each and every one of you to continue supporting our mission. Whether you are a seasoned researcher, a young scientist embarking on your career, or a reader with a thirst for knowledge, your involvement in our journal is invaluable. By working together and embracing interdisciplinary perspectives, we can address the most pressing challenges facing humanity, from climate change and public health to technological advancements and social issues.

I would like to extend my gratitude to our authors, reviewers, editorial board members, and readers for their unwavering support. Your dedication is what makes IIOAB Journal the thriving scientific community it is today. Together, we will continue to explore the frontiers of knowledge and pioneer new approaches to solving the world's most complex problems.

Thank you for being a part of our journey, and for your commitment to advancing science through the pages of IIOAB Journal.



Yours sincerely,

Vasco Azevedo

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THE IMPACT OF STRUCTURE OF BANKS' REFERENCES AND CONSUMPTION ON FINANCIAL OPERATIONS OF COMMERCIAL BANKS LISTED ON TEHRAN STOCK EXCHANGE

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ABSTRACT

The main objective of this study is to evaluate the impact of structure of Banks' references and consumption on financial operations of commercial banks listed on Tehran Stock Exchange. In this study, the ratio of deferred credit and loans, cash coefficient of bank resources and the ratio between long-term to short-term deposits have been considered as independent variables; while return on assets of bank is considered as the dependent variable. Its population consisted of all private and governmental banks of Iran from 2008 to 2014, which size of final sample contains 11 banks (77 year-banks). This study is applicable objectively; its research type it is a post-event research (using past data). The data was collected using library methods, the provided information on website of the Stock Exchange Organization and Rahavar Novin and Tadbirpardaz software. In this study, according to data type and methods of statistical analysis, there is used the method of mix data. In this study, there was used panel data with random effects. Results of data analysis using multivariate regression at confidence level of 95% shows a negative (reverse) impact between assets ratio of deferred credit and loans on rate of return of banks; while there is a positive (direct) impact between cash coefficient of bank resources and ratio of long and short-term bank deposits with return on assets of banks.

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KEY WORDS

Bank resources, bank costs, financial operation, rate of return on assets

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INTRODUCTION

In Iran, the role of financial markets (banks) in financing various economic sectors is far stronger than capital markets (Stock Exchange) [1]. With regard to the obvious role of banks in the country economy, evaluating their performance can have a paramount importance. Profitability is considered as one of factors affecting performance evaluation of banks [2, 3]. Therefore, any organization, company or institution follows achieving certain goals that profit banks and institutions are not excepted, so that they also seek to achieve profitability as their targets and ensure their survival [4]. To achieve the goals and ensure their survival, banks should maximize their profits. Banks' profits will be increased by increasing their revenues reducing costs. Therefore, they consider knowing possible variables affecting them. An important issue in banks is structure of their resources and assets including current and non-current assets as well as their combination [5]. It is certain that banks' sources and consumption, as components affecting profit and loss statements, are affected by internal factors (controllable by bank management) and external factors (outside control of bank management) that understanding them by banking network factors is very important. In recent decades, understanding variables affecting banks' profitability have been considered in economics literature by many economists and financial engineers; while it has not been appropriately considered in the country [6].

On the other hand, the delayed claim is another matter affecting performance of banks, as which it is expected the more amount of delayed claims of banks, the more reduce in revenue and profitability of banks. Over the past few years, one of the most important challenges facing the country banking system has been upward movement of the delayed claims that has become a national challenge due to bank-based monetary and financial market of the country [7]. Therefore, all banks must create the required matching between their maturities of their deposits and assets. If assets are not received at the expected maturity, this matching will be disturbed and as a result, banks will be faced

with problems of liquidity shortage [8, 9]. Banks should increase their interest rates or attempt to borrow from inside or outside market for providing sufficient liquidity to meet the needs of depositors. As a result of the state, banks' costs will be increased and they experience reducing profitability. The result is that declining profitability of banks reduces prices of their shares and their market value because of high level of the delayed claims. Reducing stock value of banks will increase their credit risk that increase risk and reduce bank ratings at the international level. If credit risk is high, it will be difficult to borrow from international sources that it causes reducing the ratio between capital adequacy, reducing access and use of international resources [10]. According to the above-mentioned issues, we will answer to the following main question: what are effects of structure of banks' sources and uses on financial performance of commercial banks listed on Tehran Stock Exchange?

RESEARCH HYPOTHESES

- Amount of the delayed claims will affect banks' return on assets.
- Liquidity ratio of banks will affect banks' return on assets.
- The ratio between short-term and long term deposits will affect banks' return on assets.

RESEARCH CONCEPTUAL MODEL

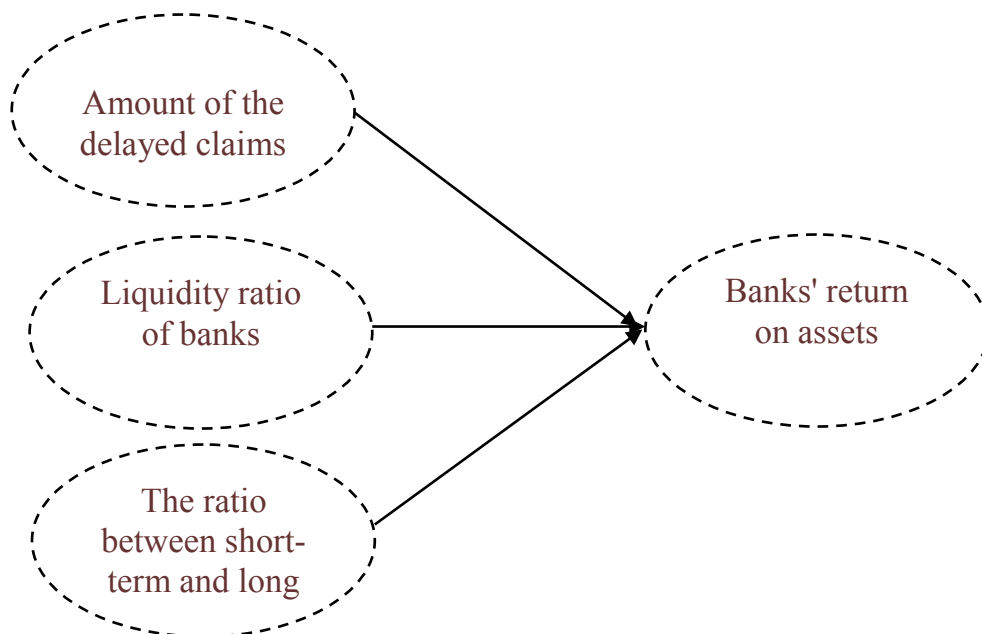


Fig:1. Research conceptual model

METHODS

This research is applicable in terms of classification based on objective. It is a correlation research in terms of methodology and nature. Its population consisted of all private and governmental banks of Iran from 2008 to 2014, which size of final sample contains 11 banks. The required real data for the research was collected using the published financial statements on Tehran Stock Exchange and website of the Central Bank of Islamic Republic of Iran. Until March 29, 2015, there were selected 11 banks as the research final sample size. Therefore, the research required data was collected using computer data banks, referring to library of the Stock Exchange Organization, Central Bank library, using Rahavar Novin software and referring www.rdis.ir, the website of the Stock Exchange Organization (research, development and Islamic studies' management). The banks' financial statements including balance sheet, cash flow statement and notes accompanying the financial statements at the end of each fiscal year (9 March) were used as the research tool. With regard to the existing research literature and its hypotheses nature, we used mix data. We also used descriptive and inferential statistical methods to analyze the research data and test its hypotheses. The classic regression hypotheses were investigated to assess parameters and evaluate the research hypotheses. There are also used EViews7 and SPSS20 to analyze the data, test hypotheses and extract regression model.

RESULTS AND DISCUSSION

Amount of the delayed claims will affect banks' return on assets (H1).

Test Result

According to **Table- 1**, the significance level (sig) for variable of bank delayed claims (0.006) is less than the considered significance level in this study (5%); the absolute value of t-statistic (3.091) for the variables is greater than the obtained t-statistic from the Table with the same degrees of freedom. Therefore, H_0 is rejected at confidence level of 95% and H_1 (amount of the delayed claims will affect banks' return on assets) is confirmed.

Table: 1. Results of regression equation goodness of fit

Sig.	t-statistic	Coefficient	Variable coefficient	Variable
0/192	1/442	0/255	β_0	constant number
0/006	-3/091	-0/961	β_1	The deferred and delayed credits ratio NLP
0/048	2/052	0/734	β_2	Liquidity ratio of banks LR
0/009	3/838	0/132	β_3	Ratio of long-term to short-term deposits LTSD
0/024	-2/897	-0/191	β_4	Saving loses of past loans and credits LLP
0/041	2/458	0/118	β_5	Ratio of total loans and credits to total assets of banks LA
0/043	2/347	0/511	β_6	Ratio of capital sufficiency CAR
8/553	F اماره		0/417	Coefficient of determination
0/004	(P-Value)		0/366	Adjusted coefficient of determination
2/005	Durbin-Watson statistic			

Liquidity ratio of banks will affect banks' return on assets (H2).

Test Result

According to **Table-1**, the significance level (sig) for variable of liquidity ratio of banks (0.048) is less than the considered significance level in this study (5%); the absolute value of t-statistic (2.052) for the variables is greater than the obtained t-statistic from the Table with the same degrees of freedom. Therefore, H_0 is rejected at confidence level of 95% and H_1 (liquidity ratio of banks will affect banks' return on assets) is confirmed.

The ratio between short-term and long term deposits will affect banks' return on assets (H3)

Test Result

According to **Table-1**, the significance level (sig) for variable of the ratio between short-term and long term deposits (0.009) is less than the considered significance level in this study (5%); the absolute value of t-statistic (3.838) for the variables is greater than the obtained t-statistic from the Table with the same degrees of freedom. Therefore, H_0 is rejected at confidence level of 95% and H_1 (the ratio between short-term and long term deposits will affect banks' return on assets) is confirmed.

According to **Table-1**, the significance level (sig) for variable of bank delayed claims (0.006) is less than the considered significance level in this study (5%); the absolute value of t-statistic (3.091) for the variables is greater than the obtained t-statistic from the Table with the same degrees of freedom. Therefore, H_0 is rejected at confidence

level of 95% and H_1 (amount of the delayed claims will affect banks' return on assets) is confirmed.

On the other hand, due to negative coefficient of deferred demands' variable (-0.961), it can be concluded that the delayed demands have a reverse (negative) impact on ROA rate of banks, so that the ROA rate will be reduced 0.961 by increasing one unit in the delayed claims. Lack of repaying debts by borrowers at maturity date will increase credit risk. Credit risk can be defined as the possibility of postponement, doubtful or no-collect some credit portfolio of financial institutions due to internal factors (such as poor credit management, internal control, follow-up and monitor) or external factors (such as economic recession, crisis and ...). How to allocate resources among different activities, assess credit level of customers and proper making-decision are effective to control this risk. Given the fact that facilities generally are considered as the most risky assets for banks, there is also provided ratio of loans to deposits, although this ratio can largely be influenced by observing legal requirements regarding asset allocation [11].

Table:2. Summarize the results of H_1

Independent variable	Dependent variable	Effect	Direction	Result
Delayed claims	Banks ROA rate	Yes	Negative	Confirmed

According to **Table-1**, the significance level (sig) for variable of liquidity ratio of banks (0.048) is less than the considered significance level in this study (5%); the absolute value of t-statistic (2.052) for the variables is greater than the obtained t-statistic from the Table with the same degrees of freedom. Therefore, H_0 is rejected at confidence level of 95% and H_1 (liquidity ratio of banks will affect banks' return on assets) is confirmed.

On the other hand, due to positive variable of banks' resource liquidity coefficient (0.734), it can be concluded that banks' resource liquidity coefficient has a direct (positive) impact on ROA rate of banks, so that the ROA rate will be reduced 0.734 by increasing one unit in banks' resource liquidity coefficient. Liquidity is one of the most important characteristics of bank resources. Using short-term funds in long-term investments will risk banks that holders of investment accounts may request their funds that it will force banks to sell their assets. Bank must have sufficient liquidity to meet the demand of depositors and lenders to attract the public confidence. Banks require effective asset and liability management system to minimize non-compliance maturity in assets and liabilities and optimize their return [11]. These results are consistent with the obtained results by [12].

Table: 3. Summarize the results of H_2

Independent variable	Dependent variable	Effect	Direction	Result
Liquidity coefficient	Banks ROA rate	Yes	Positive	Confirmed

According to **Table-1**, the significance level (sig) for variable of the ratio between short-term and long term deposits (0.009) is less than the considered significance level in this study (5%); the absolute value of t-statistic (3.838) for the variables is greater than the obtained t-statistic from the Table with the same degrees of freedom. Therefore, H_0 is rejected at confidence level of 95% and H_1 (the ratio between short-term and long term deposits will affect banks' return on assets) is confirmed.

The structure of banks' deposits has a significant effect on their ROA rate. Banks that attract more visual deposits than others will be more profitable. Banks want to collect the diffused funds in the society using their marketing and special policies. Accordingly, they allocate more shares of deposits to themselves, especially visual deposit. Compared with other competitors, bank deposit structure should be designed in a manner that can increase motivation and interest of clients to select them, which it is a type of marketing and advertisement [11].

On the other hand, due to positive variable of the ratio between long-term to short-term deposits (0.132), it can be concluded that the ratio between long-term to short-term deposits has a direct (positive) impact on ROA rate of banks, so that bank ROA ratio will be increased 0.132 by increasing one unit in the ratio between long-term to short-term deposits. These results are consistent with the obtained results by [12].

Table: 4. Summarize the results of H₂

Independent variable	Dependent variable	Effect	Direction	Result
The ratio between long-term to short-term deposits	Banks ROA rate	Yes	Positive	Confirmed

CONCLUSION

The impact of internal and external factors on financial performance of commercial banks in Iran by comparing both public and private sectors. The impact of bank's sources and uses structures on liquidity risk of commercial banks in Iran. Review strategies to increase financial performance in the Islamic banking system with emphasis on bank's sources and uses structures

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None.

FINANCIAL DISCLOSURE

None declared.

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INVESTIGATING THE IMPACT OF ELECTRONIC WORD OF MOUTH ADVERTISING ON PROMOTING BRAND EQUITY FROM CONSUMERS' PERSPECTIVE (A CASE STUDY OF TABRIZ SEPAH BANK)

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ABSTRACT

The main purpose of this study is to investigate the impact of electronic word of mouth advertising on promoting banks' brand equity based on Keller model which includes six dimensions of brand resonance, brand judgments, brand feelings, brand imagery, brand performance and brand salience. This study is applied-survey research and its statistical population includes the corporate clients of Sepah Bank in Tabriz city, who have macro-financial interactions with this bank; because their views play a significant role in brand equity of bank financially and competitively. The data obtained from 50 questionnaires collected from senior managers of companies were analyzed by correlational analysis and partial least squares method. The findings show that electronic word of mouth advertising has the highest impact on Sepah bank's brand resonance, has the least impact on brand judgments but doesn't impact on brand feelings. Finally based on the results some suggestions are presented to bank directors and future researchers.

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KEY WORDS

word of mouth advertising, brand equity, partial least squares method.

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INTRODUCTION

Cyber space provides new tools for marketers to improve the efficiency and effectiveness of marketing communications and new approaches to acquire and maintain customers. One aspect of cyber space is online interpersonal influences (Stephen et al, 2008). Interpersonal influences of individuals in online environments are effective on customers' evaluations and decisions about purchasing a product or brand. Electronic word of mouth (e-WOM) advertising includes a variety of media forms and different types of websites in which there is access to online customers' ideas and revisions [1]. Online reviews of customers about product has attracted increasing attention of researchers [2]. Research on word of mouth advertising is a relatively new issue and has evolved over the last ten years. Some researchers have combined the evolved theories in order to describe the phenomenon of electronic word of mouth communication [3]. The importance of (e-WOM) advertising in relation to the services and innovation disseminations is highlighted. Specific features of services i.e. intangibility, non-changeability and inseparability of production and consumption, encourage customers to pay more attention to others opinions and advices- especially when they consider the advisor independent of service provider- and consequently service buyers in their own decision making trust in word of mouth advertising [4]. The main purpose of this study is to investigate the impact of electronic word of mouth advertising on the dimensions of brand equity from the perspective of Sepah bank corporate clients in Tabriz city based on Keller model. Therefore, the main issue of this study is followed in two parts. At first, the theoretical framework of electronic word of mouth advertising and brand equity dimensions of Keller model are examined and secondly this model in service sector of public banking system is investigated. This study seeks to answer the question of whether Sepah bank corporate clients who have macro -financial interactions with bank, are helpful in strengthening brand equity of bank through online word of mouth advertising or not?

In this study e-word of mouth advertising is word of mouth advertising in electronic environment, in other words it is word of mouth advertising in order to purchase or receive service online. For the first time about 40 years

ago, the term word of mouth advertising was published in Fortune magazine by William White in his classic study of marketing. Although it has been discussed in the social networks of sociology in detail, but in recent years it has been the main focus of marketing researchers due to the clarification of its significant effects on consumer behavior [5]. Word of mouth advertising can be both positive and negative, but the present study deals with positive word of mouth advertising. The definition of word of mouth advertising is about a context in which one express positive points about the electronic service to others [6]. Many marketers consider positive word of mouth advertising as one of the most powerful marketing communications, especially when the person is familiar and trusted [7]. Word of mouth advertising to the services is usually more important than the goods. Services are typically experimental in nature and hence it is difficult to evaluate them before purchase. The service features (such as being intangible, heterogeneous and inseparability of production and consumption) makes customers to pay attention to others' perspectives for before purchase evaluation. As a result, usually perceived risk when purchasing services is more in comparison to purchasing goods. Therefore, it is more likely that service customers would trust in word of mouth advertising in their purchase decisions [8]. Managers have been interested in word of mouth advertising, since they consider as an important stimulus on consumer behavior [9].

Brand Equity

Brand equity is the final ideal or value addition that a product creates through brand. Brand equity is like as an asset for the company which increases business cash flows [10]. Brand equity can help customer to interpret, process and store large amounts of information about product and brand. It can also affect the confidence of consumers in the purchase decision since they have experienced it before and are fully familiar with its brand and features [11]. In the literature of brand there are two main methods for assessing brand equity, one of them is financial method which is done based on factors like stock assessment, the current value and etc... , and the other is done through end users [12]. In this context, the emphasis is more on brand equity from the perspective of the customers. Awareness of customers' perspective about the dimensions of brand equity, assists banks in optimizing marketing plans, especially in the field of brand management and advertising effectiveness and supports spending resources for market share growth and brand expansion [13]. Perceiving customers' needs and demands and implementing suggestions for their satisfaction, is the heart of successful marketing. Therefore, Keller introduce a model called customer -based brand equity. According to this model, the brand equity is resulted from the differences of customers' responses in relation to knowledge about brand [14]. In this research, it is focused on customer -based perspective. Several studies have attempted to evaluate brand equity and different methods have been proposed for this [15]. One of the most well-known models of evaluating customer-based brand equity is Keller model which was introduced in 1956. The advantage of this model over other models is that it has a pyramid like shape and specifies the starting point of branding and peak branding that the dimensions of brand equity are connected like stair. In brand equity model of Keller, brand salience is the starting and basis point of branding and brand resonance is in the top of pyramid and is the ultimate goal of brand equity. In Keller model, brand salience is an indicator that measures brand awareness. Brand salience measures the fact that "how many times and to what extent a brand is recalled in customer's mind in different situations? The brand that there is more deep and broad awareness about it in consumers' minds would benefit from a high level of salience. Brand salience is an important first step in achieving brand equity [1].

Brand performance: it is related to how a brand acts successfully in market [16]. Brand performance index describes how product or service can respond to functional needs of customers well [1].

Brand imagery: Based on this, imagery refers to the intangible and invisible aspects of brand. Powerful brands create meaningful images in customers' mind. A strong and reputable brand image increase brand differentiation and has a positive impact on buyer behavior [17].

Brand judgments: it includes customers' individual beliefs and evaluations about brand which is formed by juxtaposing all of performances, associations and mental images [1].

Brand feelings: it is the emotional reactions and responses of customers toward brand. Brand feelings are also associated with social actions that are created in brand impact [1].

Brand resonance: The final step of model relies on creating a final relation between customer and brand. Brand resonance is an index which shows the extent or depth of the customers' mental proximity with a brand and the activities shaped in the impact of this loyalty sense in customer behavior [18].

The Impact of E-word of mouth advertising on Brand Equity Dimensions

In general, very little research has been done on the impact of electronic word of mouth advertising on different aspects of brand equity. [19], by examining the effects of a certain type of electronic word of mouth advertising- the exchange of customer to customer technical knowledge- on customer's perceptions of value and customers' loyalty intentions concluded that exchanging customer to customer technical knowledge impacts on customers' perceptions of product value, possibly of recommending products and purchasing service to others, but has no impact on purchase intentions of customer. Another study showed that e-online reviews of consumers about a product undermines brand equity [20]. Companies mainly consider e-word of mouth advertisings by three objectives that their realization cause the maintenance and achievement of brand equity: 1) the increase of available products and services' sales or newly introduced products and services through an inexpensive means of acquiring and retaining customers, 2) the improvement of customer satisfaction and 3) the achievement to ideas for developing new product and presenting new service where customers provide suggestions about new products and services [21].

Research Conceptual Model and Hypotheses

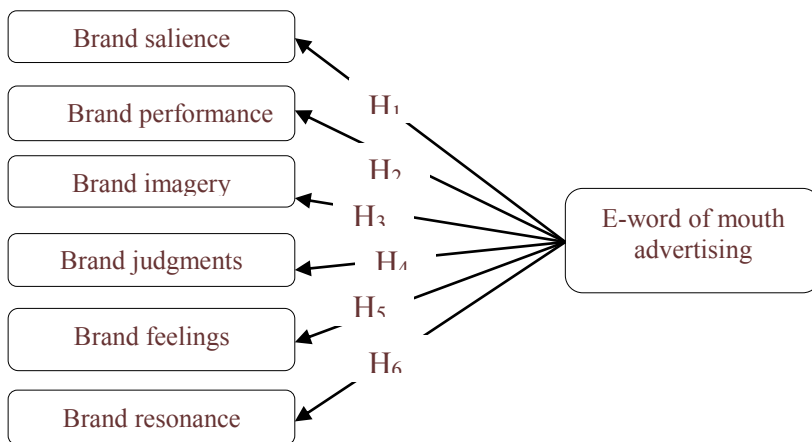


Fig:1. A conceptual model of research

By examining similar patterns, the conceptual model of present study which consists of six hypotheses was developed in **Figure- 1**. According to this model, the e-word of mouth advertising has a positive effect on brand salience, brand performance, brand imagery, brand judgments, brand feelings and brand resonance.

Figure- 1. A conceptual model of research

According to the conceptual model, the research hypothesis is as follows:

First hypothesis: e-word of mouth advertising impacts on brand salience.

Second hypothesis: e-word of mouth advertising impacts on brand performance.

Third hypothesis: e-word of mouth advertising impacts on brand imagery.

Fourth hypothesis: e-word of mouth advertising impacts on brand judgments.

Fifth hypothesis: e-word of mouth advertising impacts on brand feelings.

Sixth hypothesis: e-mouth of mouth advertising impacts on brand resonance.

MATERIALS AND METHODS

The statistical population of this research includes all the corporate clients of Sepah Bank in Tabriz, who have macro-financial transactions with the bank, since their views play an important role in promoting the brand equity of the bank financially and competitively. A total of 50 companies were selected as sample. Considering that the surface structure of the conceptual model is organizational, the responses of one person within the organization are collected with other responses and model test and analysis has been conducted based on the number of companies (n = 50). Due to the large geographical distribution of companies and time limitations, sampling was done based on the convenience and availability of access to the companies. To

gather data and test the model, a closed questionnaire with 24 questions and a five-point Likert scale was used. The questionnaires were completed through visiting managers of companies who were as possessors of key information due to holding specific knowledge about the studied phenomenon. To measure specific variables of research standard scales were used. For this purpose standard questions were translated and were reviewed and modified by the views of several academic experts. Therefore, the questionnaire has content validity. Cronbach's alpha coefficients for all latent variables were higher than 0.7 threshold level, which indicates the prepared questionnaire has the proper reliability.

Table- 1. Scale, questions, alpha Cronbach and the source of questionnaire questions

RESULTS

Demographic analysis of sample shows that about 85 and 15 % of respondents were male and female respectively. About 82 % of respondents were under 40 years old and 18 % were over 40 years old. 67 % of respondents were graduate students and 23 % had post-graduate or higher degree. To test the conceptual model of research the PLS was used which is a variance-based path modeling technique and provides the simultaneous investigation of theories and measures (Azizi et al, 1390). This method is used where the sample size is small and variables' distribution is not normal.

External Model

In PLS models two models are tested. The first model includes external model which is the equivalent of measurement model in structural equations. The second model is internal model which is the equivalent of structural model in structural equation models. Common fitness indexes in PLS measurement models are presented for the seven latent variables of the study in **Table- 2**. Three important indexes of fitness are: the extracted average variance, the composite reliability and factor loadings. As seen in Table 2, items related to e-word of mouth advertising (E-WOM) accounted for 65 % of the variance in their own construct. Brand salience (BS) items accounted for 50 % of the variance in their own construct. Brand performance (BP) items accounted for 54 % of the variance in their own construct. The items of brand imagery (BI) accounted for 57 % of the variance in their own construct. The items of brand judgment (BJ) accounted for 53 % of the variance in their own construct. Brand feelings (BF) items accounted for 53 % of the variance in their own construct and brand resonance (BR) items accounted for 55 % of the variance in their own construct.

Table: 2. The primary results of measurement model

variable	index	AVE	CR	FL	variable	index	AVE	CR	FL
E-WOM		0.65	0.73		BI		0.57	0.63	
	E-WOM ₁			0.581		BI ₁			0.536
	E-WOM ₂			0.665		BI ₂			0.545
	E-WOM ₃			0.698	BF	BI ₃			0.799
	E-WOM ₄			0.590		BF ₁			0.846
	E-WOM ₅			0.642		BF ₂			0.746
BS		0.5	0.75		BJ		0.53	0.77	
	BS ₁			0.568		BJ ₁			0.742
	BS ₂			0.711		BJ ₂			0.756
BR		0.55	0.78		BF		0.53	0.76	
	BR ₁			0.518		BF ₁			0.901
	BR ₂			0.896		BF ₂			0.779
	BR ₃			0.770	BF ₃	0.339			

Internal Model

After testing the external model, it is necessary to provide internal model which indicates the relationship between latent variables. Using internal models, we can examine research hypothesis. The internal model of research was conducted by the application of PLS-Graph software. The tested conceptual model is presented in Figure 2.

The determination coefficient of two sub-model is presented in the dependent variable of each sub-model. The determination coefficient for the impact of e-word of mouth advertising on brand salience is equal to 0.335, on brand performance is equal to 0.253, on brand imagery is equal to 0.310, on brand judgments is equal to 0.251, on brand feelings is equal to 0.309 and on brand resonance is equal to 0.23. The calculated path coefficients along with t-values are shown in Table 3. According to the results of Table 3, all the hypotheses are supported.

Table- 3. The results of partial least squares for hypotheses

Table: 1. Scale, questions, alpha Cronbach and the source of questionnaire questions

variable	The number of questions	alpha Cronbach	Source of questions
Brand salience	6	0.808	(2009) Lapel et al.
Brand performance	3	0.783	(2006) Ekas and Negu
Brand imagery	3	0.767	⋄(2009) Lapel et al.
Brand feelings	3	0.725	⋄(2009) Lapel et al.
Brand judgments	3	0.755	⋄(2009) Lapel et al.
Brand resonance	3	0.782	⋄(2009) Lapel et al.
e-wom advertising	3	0.825	(2011) Bambur and MaghnuId

Table :2. The primary results of measurement model

variable	index	AVE	CR	FL	variable	index	AVE	CR	FL
E-WOM		0.65	0.73		BI		0.57	0.63	
	E-WOM ₁			0.581		BI ₁			0.536
	E-WOM ₂			0.665		BI ₂			0.545
	E-WOM ₃			0.698	BF	0.54	0.78	BF ₁	0.846
	E-WOM ₄			0.590		BF ₂	0.746		
	E-WOM ₅			0.642		BF ₃	0.601		
E-WOM ₆	0.653	BJ	0.53	0.77	BJ ₁	0.742			
BS			0.5	0.75		BJ ₂	0.756		
	BS ₁				0.568		BJ ₃	0.674	
	BS ₂	0.711			BF		0.53	0.76	BF ₁
BS ₃	0.820	BF ₂	0.779						
BR		0.55	0.78			BF ₃			0.339
	BR ₁			0.518					
	BR ₂			0.896					
	BR ₃	0.770							

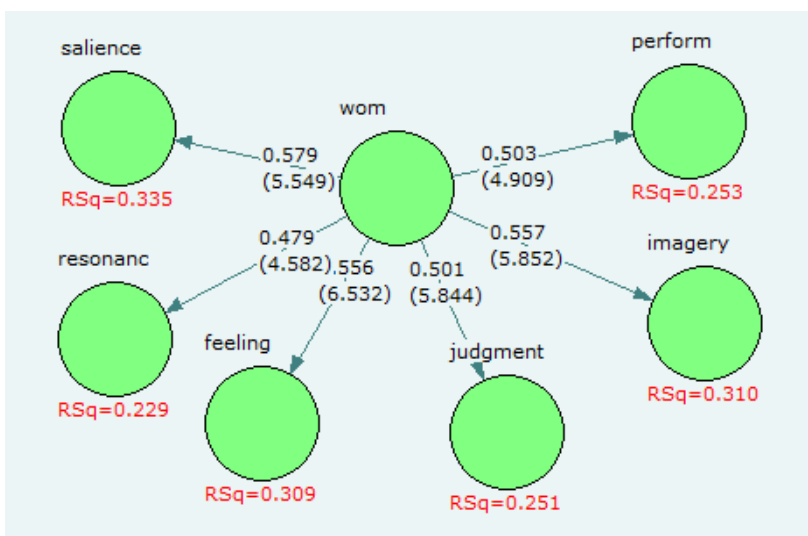


Fig: 2. Tested model resulted from partial least square software

DISCUSSION AND CONCLUSION

The results showed that the e-word of mouth advertising has a positive high effect on brand salience ($\beta = 0.579$). The findings of this study are in line with [22] and [23] study results. In other words, the rise of e-word of mouth advertising increases brand awareness and improves satisfying customers' needs. E-word of mouth advertising has a high positive effect on brand performance ($\beta = 0.53$). The findings of this study have found similar conclusions along with the results of [20] studies, which have examined the social networking. E-word of mouth advertising has a significant impact on the effectiveness and efficiency of services. According to the results, the e-word of mouth advertising has a high positive effect on brand imagery ($\beta = 0.557$) which is consistent with the results of [20] study. E-word of mouth advertising is effective in the examination of customers' past experiences for using banking service. E-word of mouth advertising has a high positive effect on brand feelings ($\beta = 0.501$) which is consistent with the results of Lapel and et al (2009) studies. According to the results, the e-word of mouth advertising is effective in providing security to customers and their social acceptance. E-word of mouth advertising has a high positive effect on brand judgments ($\beta = 0.501$) which is consistent with the results of [20] studies. This advertising can be effective in creating competitiveness for bank in relation to rivals and increasing credit, approval and acceptance for bank by customers. Finally, the e-word of mouth advertising has a high positive effect on brand resonance ($\beta = 0.479$) which is consistent with the results of [20, 22] and [23] studies. Creating loyalty in customers and sense of belonging to bank can be the ultimate goal of brand equity from the perspective of Keller model which in this study has had a significant relationship.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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FINANCIAL DISCLOSURE

None declared.

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AN EXAMINATION OF EFFECTS THE BUSINESS INTELLIGENCE ON STRATEGIC DECISIONS

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ABSTRACT

Nowadays, scientific management organizations need to make good use of ICT tools such as business intelligence systems. The main objective of this study was to investigate the relationship between systems, business intelligence and strategic decision support systems. Business Intelligence is a tool and not as a product or a system, but as a new approach in enterprise architecture based on speed in data analysis, to make strategic decisions and accurate business intelligence in minimal time and with maximum quality possible. In this research, conceptual model of the impact of strategic decisions designed business intelligence and with questionnaire prepared and distributed among the business intelligence experts in the ICT Department of the Ministry of Industry, Mine and Trade and the Association of Iranian e-commerce, the validity of the model was evaluated. To analyze the results of the assessment factor analysis, correlation analysis and structural equation LISREL and SPSS software were used. Results show that business intelligence to improve strategic decisions and strategic decisions on aspects such as efficiency, effectiveness, agility, flexibility and integration. At the end of the study based on hypotheses, suggestions for extending the use of business intelligence in organizations as well as future research are done.

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KEY WORDS

Business Intelligence, Strategic Decision Making, Decision Support Systems, Online Analytical Processing, Competitive Intelligence, Data Mining

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INTRODUCTION

The term Business Intelligence was revived by Gartner Group in the mid-1990s. However, the term has become very popular recently and is rooted in the 1970 MIS reporting systems. At that time, reporting systems, static, two-dimensional analytical capabilities were lacking. In the early 1980s, the concept of executive information system (EIS) was emerged. This concept reached computer support systems to senior managers and executive board level. This systems have dynamic and multi-dimensional reporting (Ad- Hoc or based on demand) forecasting, trend analysis, detailed examination, access to the key elements. By the mid-1990s, many of commercial products had these features. Then some new products under the name of business intelligence were emerged. Nowadays, all point concluded that all information needs of executives in an information system is based on business intelligence [1]. Therefore, the original concept of executive information system was changed to Business Intelligence. By 2005, business intelligence systems have the capabilities of artificial intelligence and high analytical capabilities.

Problem Statement

In this study aimed to investigate the effect of **BI** on an enterprise's strategic decisions. Organizational strategic decisions are decisions that are made in low number and long period, but are associated with high volumes of data and processes. The decision taken at these level of issues are non-structured and often done by senior managers and results are long-term impact of macro path [2]. According to what was said business intelligence is an umbrella concept including the architecture, tools, databases, applications and business performance management methodology and make better decisions. Therefore, in this study we examined the effect of BI on organizational strategic decisions.

In order to evaluate the impact of business intelligence on strategic decision making in the organization, the press - Response - Support in business was used.

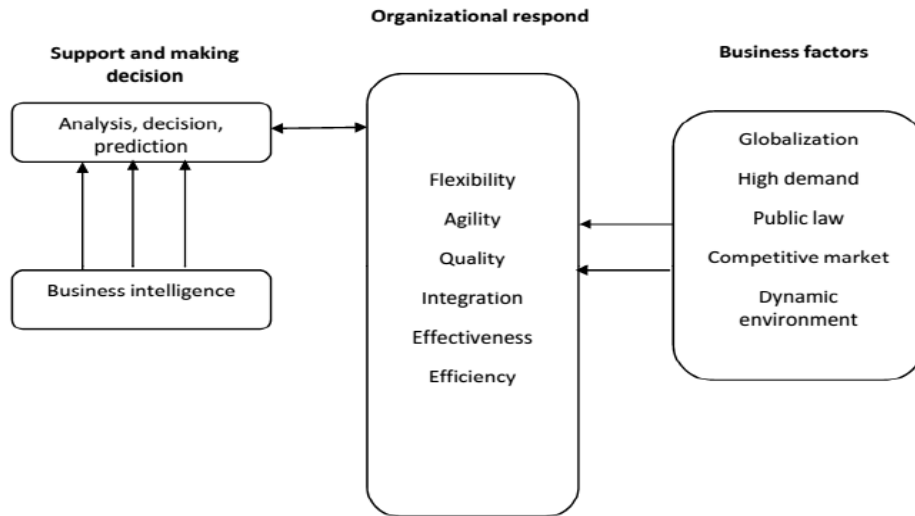


Fig. 1. Pressure – Respond-Business support Zaman, 2005

According to this model because of the dynamics of the environment, there is a pressures on the organization and provides opportunities for them to influence the strategic decisions. Business Intelligence Systems acted as automated and intelligent systems to support organizational decisions and improve the organization's response and can affect the flexibility, alignment with the objectives of decision, speed and accuracy of decisions, agility, integrity, effectiveness and efficiency of decision-making [3]. The term Business Intelligence was emerged by Gartner Group in the mid-1990s. However, the term has become very popular recently and rooted in MIS reporting systems in the 1970s. At that time, reporting systems were lack of static, two-dimensional and analytical capabilities. In the early 1980s, the concept of executive information system was emerged. This concept reached computer support systems to senior management and executive board level. These systems are dynamic and multi-dimensional reporting capabilities forecasting, trend analysis, and access details and status were key success factors.

By the mid-1990s, many of these features were commercial products. Then some new products under the name of business intelligence was emerged. Nowadays, they have concluded that all information meet the needs of executives in a business intelligence-based information system [4]. Thus, the original concept of executive information systems, changed to business intelligence. By 2005, business intelligence systems had artificial intelligence capabilities and analytical abilities [3]. The modern approach to business intelligence in organizations is so that organizations must act wisely and pay attention to aspects of management and business intelligence organization has become necessary.[5]

LITERATURE REVIEW AND RELATED WORKS

To review the literature review, internal and external research examined the results in Table- 2, are provided. Table- 2 history of study

Author	Explanation
Internal history	
Abolghasem Zadeh, Fereidoon (2010)	Business Intelligence is not a tool or a product, or system, but also as a new approach to enterprise architecture based on intelligent, accurate and fast data analysis for business decisions in the shortest time possible is raised and a set of skills, technologies and systems is applied that for gathering, storing, analyzing and providing efficient access to the data warehouse is used to help organizations correct decision. Thus, the BI can empower us to determine all the factors affecting the organization.

Dehghani, Mohammad Javad, Jadidi, Laleh (2011)	Use of Business Intelligence at a strategic level can kind of process optimization to enhance the overall efficiency of the organization and contribute together. These systems on some important features of financial and other important parameters are focused on increasing the efficiency of the organization.
Hosseini, Seyyed Mehdi, Rostami, Fatemeh (2011)	Business intelligence strategy for making strategic decisions and leads to decisions and increase their quality is integrity.
External history	
Moss & atre (2003)	We also have a set of consolidated business intelligence and decision support databases that provide access to business data to enable business communities.
Chang ,E. (2006)	Business intelligence improves the accuracy of decision-making and operation of the information contained in the business territory to the optimum.
Ariyachandra, T., & Watson, H(2006)	Business intelligence system used for the extraction of structured data and unstructured knowledge is used and efficiency and effectiveness of decision.
Williams and Williams (2007)	Business Intelligence continuously improves performance and increases the profits of the results of decisions.
Wise, L. (2007)	Business Intelligence broadly includes data warehouse and reporting, analytical processing, performance management and predictive analysis that will increase and improve decision-making quality decisions as well.
Oracle. (2007)	Business intelligence tool to support decisions that lead to improved decision-making at all levels of management will be results.
Olszak and ziemba (2007)	Business Intelligence is a set of concepts, methods and processes that are aimed at not only improving business decisions, but also supports the realization of the strategy of the organization.
Hostmann, B. (2007)	Business Intelligence organized and systematic processes for obtaining, analyzing and disseminating information to support effective decision-making and strategic.
Jourdan et al.(2008)	Business intelligence and forecasting the development of enterprise information and improve decisions in tumultuous global business environment can be helped.
Inmon, B. (2008)	Management philosophy and business intelligence tool that helps management and monitoring information aimed at effective decision-making.

Research Model

Many models in business intelligence applications, business intelligence tools that any impact of architecture and business intelligence strategic decisions not examined. According to the above in the background check, as well as business intelligence model, the model based on the model of pressure - response Toyota was designed. Conceptual model, which was explained to evaluate the offer and assumptions is shown in **Figure- 2**. Based on the model pressure - response Toyota due to the dynamic environment pressures entered the organization and provides opportunities for them to influence the strategic decisions. Business Intelligence Systems is an automated and intelligent systems support organizational decision-making and improve accountability organizations are and can affect flexibility on alignment with the objectives of decision, speed and accuracy of decisions, agility, integrity, effectiveness and efficiency of decision-making and improve strategic decision-making [3].

Figure 2 illustrates the conceptual model, which is based on the Pressure - response Toyota model designed the show, structural equation modeling to verify the validity of this model is that a new method for checking and validation, is used in the results section.

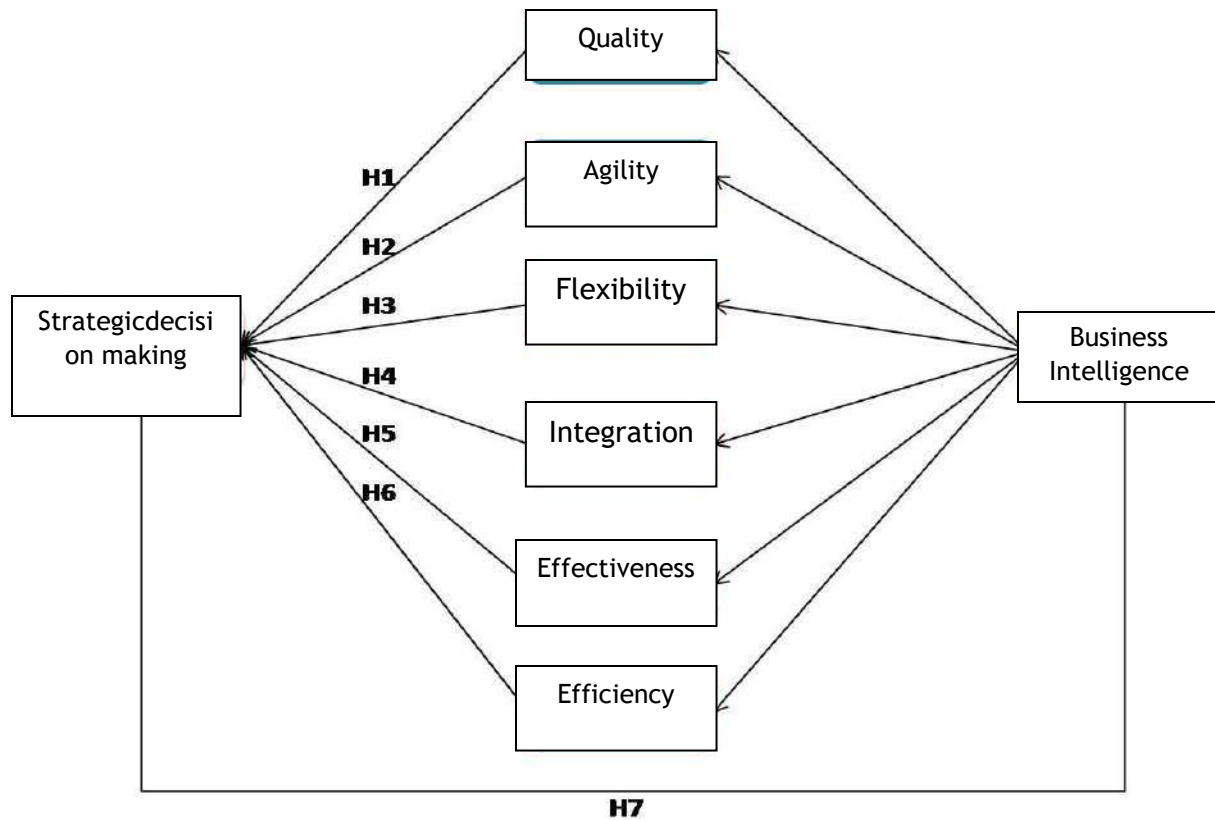


Fig:2. Model of Study

Anatomical models and variables

Based on the model the conceptual model Pressure - response Toyota and was designed by reviewing previous studies. Components and variables in this model are:

Independent variable

- **Business Intelligence:** Business Intelligence is a concept of umbrella including architecture, tools, databases, applications and business performance management methodology in the covers and make better decisions.

Dependent variable

- **Strategic decisions:** decisions that it cannot adopt and implement independent and independent of the environment carried out in a vacuum. In fact, funds that strategic decisions are distinguished from other decisions include: [6]

1. Eccentricities and lack of structure
2. The importance and special
3. High Complexity
4. Visit a few

From the definition of strategic decisions and to compare it with other decisions, it is clear that these decisions over other types of decisions need to decide their creativity and creative directors the power to plan and deliver the environmental conditions are unknown, they can make those decisions as well. [7] It is obvious that strategic decisions are unconventional and unstructured. [8]

Moderating variable: This variable relationship between independent and dependent variables are affected.

- **Quality:** That more favorable decision quality and increase the satisfaction of all stakeholders.
- **Flexibility:** flexible decisions adapted with their environment in a variety of conditions and aligned with other organizational decisions.

- **Agility:** Agility decision in the sense of making a decision with speed, accuracy further.
- **Integration:** integration decisions using common resources reduces complexity and makes it easier to achieve goals.
- **Performance:** effective decision resulted in the decision making process has been shortened and costs reduced decisions.
- **Effectiveness:** the effectiveness of decisions leading to optimal decisions and achieve its objectives. [3]

Validity and reliability of the questionnaire

Its purpose is to assess the validity of the problems and possible ambiguities in question and discovered the structure of the questionnaire and so on. First, the validity and accuracy of inventory items, was distributed among a number of experts and after assurance the results of the experts, a questionnaire was distributed in the population studied. (Association of Iranian e-commerce and Technology Department of the Ministry of Industry, Mine and Trade)

In this study, validity or reliability of the questionnaire using Cronbach's alpha. Cronbach's alpha reliability coefficient ranges from zero usually means lack of positive lasting until full reliability are a means and whatever resulting number is closer to a positive number increases the reliability of the questionnaire. SPSS software was used to calculate the Cronbach's alpha reliability calculated for the sample of 20 was estimated to be 0.889, which recognizes reliability. [Table-3]

Reliability Statistics	
Cronbach's Alpha	N of Items
0.889	28

METHODS

Research is based on objective, is applied research and the research method was correlational method. According to the study, the analysis of the effect of BI on an organizational strategic decisions and because there are many experts in Iranian Scientific Society of e-commerce and also the implementation of business intelligence projects Technology Department of the Ministry of Industry, Trade and Mines make up the population of this study. The number of members of this community of 650 people. In this study, the sampling of simple random sampling method is used. Also sample volume of the sample was used to determine the sample size estimate was 242. Due to widespread population and consequently the complexity of the sample and for faster access to the data in this study, a questionnaire was used to collect data. Based on the model research hypotheses raised in this study include the following:

1. Business Intelligence to improve the quality of strategic decisions effectively.
2. Business Intelligence causing agility to make strategic decisions.
3. Business Intelligence to provide flexibility to make strategic decisions.
4. Business Intelligence led the integrity strategic decisions.
5. Business intelligence improves the effectiveness of strategic decisions.
6. Business intelligence improves the efficiency of strategic decisions.
7. Business intelligence to improve strategic decisions.

RESULTS

Research results are presented in both descriptive and inferential statistics results. Descriptive statistics were part of the community in terms of frequency, mean and standard deviation is paid. Inferential statistics to analyze the results using correlation analysis, factor analysis and structural equation is discussed. Factor analysis confirm or refute the model's components. Correlation analysis of the relationship between the variables studied and it gives strength and weakness. Structural equation, the general structure of the model, the relationship between and goodness of fit in both the standard and the significant estimates are reviewed and analyzed. The following is a summary of research results.

Summary Results of descriptive statistics, demographic data

In this study, 242 samples were examined demographic data in table format given below.

Table: 4 Summary Results of descriptive statistics, demographic data

Percent	Frequency	Variable	
60.7	147	Men	Gender
39.3	95	Women	
4.1	10	21-25	Age
66.9	162	26-30	
28.9	70	30 and more	
29.3	71	BA	Education
57.9	140	MA	
12.8	31	P.H.D	

Summary Results of descriptive statistics research variables

The following table summarizes the results of descriptive statistics variables shown.

Table: 5. Results Descriptive statistics research variables

Standard deviance	Average	Number of question	Variable
1.44	3.02	3	Integration
1.03	2.90	2	Flexibility
1.43	2.34	3	Agility
1.40	2.87	2	Quality
1.29	3.50	2	Effectiveness
1.10	3.64	2	Efficiency
1.90	2.98	6	Business intelligence
1.41	3.22	6	Strategic making decision

Summary results of inferential statistics

It should be noted that in order to reduce variables and consider it as a latent variable, load factor must be greater than 0.3 is obtained. Exploratory factor analysis results are shown in the table below.

Table: 6. Summary results of exploratory factor analysis

Results	Factorial loading	Variables	Dimension	Questions
Questions measure related variables correctly	0.621	Cost	Efficiency	1
	0.761	Process		2
Questions measure related variables correctly	0.630	Objective recognition	Effectiveness	3
	0.596	Optimization		4
Questions measure related variables correctly	0.501	Desirability	Quality	5
	0.698	Satisfaction		6
Questions measure related variables correctly	0.714	Speed	Agility	7
	0.643	Accuracy		8
	0.668	Accuracy		9
Questions measure related variables correctly	0.721	Alignment	Flexibility	10
	0.537	Compatibility		11
Questions measure related variables correctly	0.730	Resource	Integration	12
	0.602	Complexity		13
	0.584	Accessibility		14
Questions measure related variables correctly	0.565	Efficiency	Business intelligence	15
	0.587	Effectiveness		16
	0.711	Quality		17
	0.866	Agility		18
	0.711	Flexibility		19
Questions measure related variables correctly	0.850	Integration	Strategic decision making	20
	0.612	Efficiency		21
	0.766	Effectiveness		22
	0.669	Quality		23
	0.516	Agility		24
	0.757	Flexibility		25
	0.575	Integration	26	

The following table approve or reject the results of the relationship between variables shows:

Table: 7. Confirmatory Factor Analysis Summary

Results	Confirmatory factor	Standard confirmatory factor	Apparent variable	Hidden variable
Confirming the relationship	2.87	0.43	Cost	Efficiency
Confirming the relationship	5.80	0.59	Process	Effectiveness
Confirming the relationship	3.99	0.48	Objective recognition	Quality
Confirming the relationship	3.04	0.41	Optimization	Agility
Confirming the relationship	4.87	0.76	Desirability	Flexibility
Confirming the relationship	8.93	0.86	Satisfaction	Integration
Confirming the relationship	6.87	0.56	Speed	Business intelligence
Confirming the relationship	7.87	0.55	Accuracy	Strategic decision-making
Confirming the relationship	6.94	0.87	Accuracy	
Confirming the relationship	2.87	0.75	Alignment	
Confirming the relationship	5.80	0.43	Compatibility	
Confirming the relationship	4.98	0.46	Resource	
Confirming the relationship	5.23	0.76	Complexity	
Confirming the relationship	6.29	0.65	Accessibility	
Confirming the relationship	3.04	0.34	Efficiency	
Confirming the relationship	4.57	0.57	Effectiveness	
Confirming the relationship	4.19	0.49	Quality	
Confirming the relationship	6.62	0.32	Agility	
Confirming the relationship	6.82	0.41	Flexibility	
Confirming the relationship	7.81	0.43	Integration	
Confirming the relationship	2.43	0.39	Efficiency	
Confirming the relationship	3.54	0.61	Effectiveness	
Confirming the relationship	4.33	0.44	Quality	
Confirming the relationship	6.54	0.57	Agility	
Confirming the relationship	4.93	0.54	Flexibility	
Confirming the relationship	4.90	0.45	Integration	

In the following figure the final research model in standard mode and a significant number (t-value) and also summary results of structural equation modeling to hypotheses shown.

As the following table shows the results of path analysis, business intelligence, direct and positive impact on performance. ($r = 0.34$, $t = 6.78$) Also the results the analysis of the data shows that business intelligence has a direct and positive impact on effectiveness. ($r = 0.45$, $t = 9.43$) Business Intelligence is a significant direct effect on the quality. ($r = 0.46$, $t = 7.33$)

Path analysis results between business intelligence and agility shows that this effect is significant. ($r = 0.34$, $t = 9.42$) The results also show the impact of flexible business intelligence ($r = 0.43$, $t = 8.32$) and impact on integrity business intelligence ($r = 0.63$, $t = 10.32$) is significant.

Performance direct and positive impact on strategic decisions. ($r = 0.43$, $t = 7.63$) Also efficacy direct and positive impact on strategic decisions. ($r = 0.47$, $t = 6.37$) Results of the analysis path between two variable quality and strategic decisions show that this is not a positive and significant impact and there is no relation between quality and strategic decisions. ($r = 0.21$, $t = 1.22$)

The results also show the impact of strategic decisions agility ($r = 0.38$, $t = 8.31$) and the impact of strategic decisions is significant flexibility. ($r = 0.55$, $t = 10.51$) Structural equation modeling results show that integrity is the direct and positive impact on strategic decisions. ($r = 0.58$, $t = 11.30$)

Table: 8. Summary results of structural equation modeling

direct impact	Coefficient in standard level	Significant level	Approve or rejection
The impact of strategic decisions on the performance of business intelligence	0.34	6.78	Approved
Business Intelligence effect on the effectiveness of strategic decisions	0.45	9.43	Approved
Business Intelligence effect on the quality of strategic decisions	0.21	1.22	Rejected
Business Intelligence Agility effect on strategic decisions	0.34	9.42	Approved
Business Intelligence flexibility effect on strategic decisions	0.43	8.31	Approved
The effect on integrity business intelligence strategic decisions	0.63	10.32	Approved
The effects of business intelligence to improve strategic decisions	0.56	9.83	Approved
$\chi^2 = 77.54, Df = 27, P\text{-Value} = 0.00162, RMSEA = 0.063, GFI = 0.902, AGFI = 0.939, NFI = 0.959$			

The results of structural equation analysis shows that all hypothesis confirmed and only business intelligence effect on the quality of strategic decisions have been rejected. The final version of the research results is shown in the following figure.

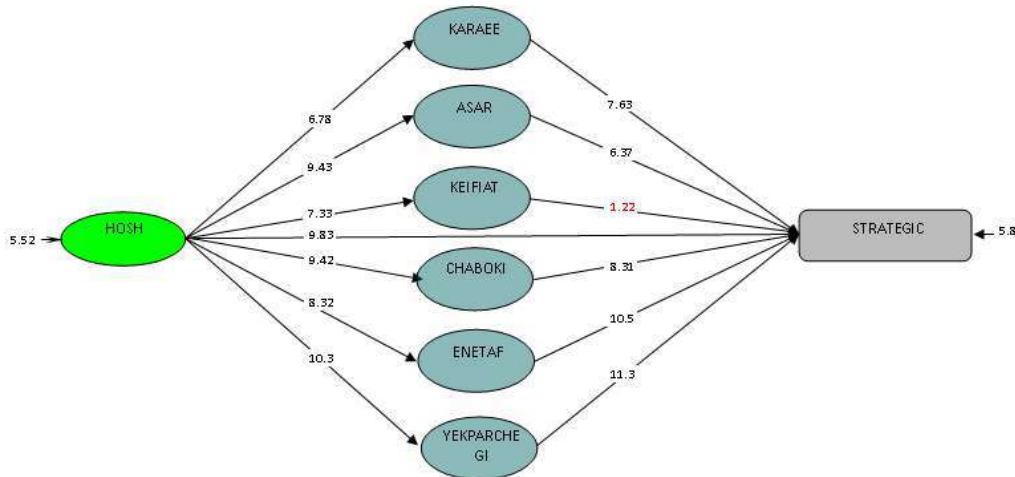


Figure 3: Final model of research

CONCLUSIONS AND RECOMMENDATIONS

Make decisions that are consistent with organizational goals, is possible only by having the right information. The purpose of business intelligence solutions to provide access to useful information, at the right time, to help better decision-making. Amount of preparation the organization is an important factor for decision-making regarding the use or non-use of business intelligence. Business Intelligence to help extract the appropriate information from the data collected by different software systems design.

In this study we sought to evaluate the effect of BI on an organizational strategic decisions. In order to evaluate the impact of business intelligence on strategic decision making in the organization of the press - response - Support business and we bounce, according to research requirements, the conceptual model was developed.

Parts of the model that will measure the impact of business intelligence on strategic decisions include six component that include: efficiency, effectiveness, quality, flexibility, integrity and agility. A questionnaire designed to assess the models and the members of the IT Department of the Ministry of Industry, Mining and Scientific Association e-commerce, with business intelligence projects and projects of this deal were distributed, and the results were analyzed.

Use of Business Intelligence at a strategic level can be a way to help increase overall efficiency and process optimization together. These systems on some important features of financial and other important parameters are focused on increasing the efficiency of the organization. It is obvious that the system in these areas should be extended processes outside the organization.

Business intelligence through the influence of the decision, including efficiency, effectiveness, agility, flexibility and improved integrity with the organization's strategic decisions. After the analysis consisted of seven that hypothesis, six hypotheses have been approved and only a hypothesis was rejected. The following suggestions to develop hypotheses based on the use of business intelligence in making strategic decisions to the managers recommended:

First hypothesis: business intelligence improve the quality of strategic decisions effectively

Quality strategic decisions can be monitored through two variables compliance and satisfaction. Based on the result of factor analysis of these two variables well measure the quality of decision-making, effects of business intelligence to improve the quality of strategic decisions have been rejected. For this reason, it is recommended:

1. Business Intelligence concepts training courses for senior executives and other employees.
2. The use of customer relationship management, data mining and online analytical processing to improve the quality of strategic decisions.

Second hypothesis Business Intelligence causing agility to make strategic decisions

Agility strategic decisions are monitored through three variable speed, accuracy and precision. Based on the result of factor analysis to measure these variables as well as agility decisions. The effects of business intelligence to improve agility strategic decisions approved. For this reason, it is recommended:

1. Pervasive use of business intelligence across the organization in order to make optimal decisions at the executive and operational levels.
2. The use of data warehouse tools to enhance agility and base-line analysis of organizational decisions.

Third hypothesis: business intelligence provide flexibility to make strategic decisions

Flexibility strategic decisions through the convergence of two variables placed to monitor conformity. Based on the result of factor analysis of these variables as well as the flexibility to weigh decisions. The effects of business intelligence to improve the flexibility of strategic decisions approved. For this reason, it is recommended:

1. Using the Balanced Scorecard to enhance organizational flexibility.
2. The use of data mining, text mining, business intelligence tools to identify challenges, opportunities and adapt to environmental changes.

Fourth hypothesis: business intelligence led to the integrity strategic decisions

Integrity strategic decisions through share common resources change, complexity and placed monitored access. Based on the analysis of the measured variable as well as integrity decision. The effect of improving the integrity business intelligence on strategic decisions is confirmed. For this reason, it is recommended:

1. The use of enterprise resource planning systems (ERP), to develop integrity in the organization.

Fifth hypothesis: business intelligence improve the effectiveness of strategic decisions

Strategic decision-making efficiency and efficiency goals through two variables can be monitored. Based on the result of factor analysis of these variables as well as measure the effectiveness of decision-making. The effects of business intelligence to improve strategic decision-making efficiency is approved. For this reason, it is recommended:

1. Analysis of institutional position and use some of the tools needed according to preference and an organizational need.
2. Monitoring purposes and smart decisions in order to align an organizational goals and strategies.

Sixth hypothesis: business intelligence improve efficiency strategic decisions

Strategic decisions to achieve cost and process efficiencies through two variables can be monitored. Based on the result of factor analysis to measure these variables as well as the efficiency of decision-making. The effect of improving the efficiency of business intelligence on strategic decisions is confirmed. For this reason, it is recommended:

1. Analysis of cost - benefit organizations deploy business intelligence systems.
2. Reengineering business processes to improve organizational processes.
3. Identify the key success factors in the implementation of business intelligence across the organization.

Seventh hypothesis: business intelligence to improve strategic decisions

Business intelligence through the impact on the efficiency, effectiveness, flexibility, agility, integrity and quality of decision-making improves strategic decision-making. Factor analysis and structural equation illustrates this issue. For this reason, it is recommended:

1. The use of business intelligence approach to an organizational strategic decisions.
2. The development of business intelligence applications within the organization in order to improve decision-making

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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EVALUATION OF AUDIT FEES AND FREE CASH FLOW

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ABSTRACT

Audit fees companies with free cash flows can be changed according to agency problems. This study shows how the hypothesis of free cash flow of a company increases the audit fees. The point of this research is to determine whether there is a meaningful connection between free cash flow and audit fees. Therefore in order to determine the connection, the data's have been collected from fifty companies who are members of the Tehran Stock Exchange during the years 2008 – 2013 together from the Tehran Stock Exchange site. The statistics techniques are used for hypothesis test, regression of different kinds. The present research shows three hypothesis with respect to high free cash flow, debt and dividend, out of which the audit fees have been paid. The result shows that the companies with high free cash flows pay higher audit fees. Alternatively the result shows the companies with debt and small dividends pay less audit fees.

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KEY WORDS

Audit, debt, cash flow

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INTRODUCTION

One of the factors affecting changes in audit fees to compensate for the additional risk and audit efforts based on free cash flow agency problems. There are complex documents on the relationship between audit fees and free cash flow are agency problems. The purpose of this research is to better understand the factors. Are agency problems free cash flow audit risk and trying to show the different audit fees? Companies with high free cash flow and high growth outlook can show this growth potential in the domestic investment. This will allow capital market to show less research and review with these companies. Alternatively it is required companies with high free cash flow and high growth outlook to have very active auditors [16]. Managers in high free cash flow companies prefer to show negative investment in net present value (NPV) rather than to pay dividends [13]. Gul and Tusi point out a positive factor in connection between free cash flow agency problem and audit fees for companies with low income. They also have shown that the higher debt will weaken the positive relationship. Companies often use debt to mitigate the problems of free cash flows agency, thereby reducing the funds available to managers.

Capital reduction or dividends has increased, the mechanism are well equipped to manage cash surplus, however dividends paid may be less efficient than debt [18]. Jensen monitoring hypothesis debt understands that the higher cost of debt assumption of free cash flow agency reflected in audit fees is adjusted. In companies with high growth and low debt levels to avoid the problems of lack of investments and shortages of some debt related to monitoring the activities of auditors lead. Where the dealers are usually larger companies that are clearly beyond the duties of auditors and debt surveillance audit of financial statements is more important not to expand.

Companies with high free cash flow and low growth have high audit fees. Free cash flow supports and represents the idea that the auditors recognize as the agencies problems. For example the possibility of manipulating the accounts and financial statements of companies with free cash flow rising and higher growth has higher audit fees [7], while this relationship may be due to manipulation of financial statements, it is also estimated that this reflects the lack of transparency of investment managers on projects with positive net present value with an increasing complexity in the size of some projects with positive growth.

This study examines the variability of audit fees in excess of free cash flow deals with companies. The aim is to better understand the mix evidence that has existed in various researches. Increase in audit fees to compensate for the extra risk free cash flow is due to agency problems. For example, the audit fees for companies with high free cash flow and poor growth outlook must be higher, because the assumption is that high free cash flow and low

growth prospects encourage management till the free cash flow is an unwise investment and covering such behavior by manipulating financial statements [10].

In order to analyze the creation of value for shareholders, companies free cash flow is specially very important because managers can identify opportunities for growth through appropriate, these funds can therefore be invested in positive projects so the shareholders will highly benefit from this but it should be noted with regard to the conflict of interest between managers and owners, specially managers of net flows in projects with positive business units will not invest.

It is possible that some of the managers will want to invest in projects with positive net present value, in order to satisfy their personal investments in short periods. Jensen in 1986 was the first person to implement this idea. Jensen forecasted the free flow cash costs are in the projects related to negative net present value investments. According to him the unit managers with high free cash flows and low growth, will manage earnings to meet their personal interests. Therefore it is expected that free cash flow can be regarded as an incentive to manage earnings. Increase in audit fees to compensate for the additional risk that free cash flow is due to agency problems.

For example, audit fees for companies with high free cash flow and low growth prospects should be higher, because it is assumed that management encourages high free cash flow and low growth prospects till free cash flow as unwise investment and to cover such behavior by manipulating financial statements [15]. Regular cash effects should be free flow cash for firms with high and low growth is outstanding, also companies with high free cash flow and high debt imposes a lower risks because some contractors are debt free cash flow less continuity [2].

Companies often use debt as a key for controlling the problems and to represent the free cash flow and thereby also reduce the funds available to managers. However, a decrease in capital or dividend increased also good mechanisms for managing extra cash; however, dividends paid may be less efficient debt [12]. It shows the debt ratio represents the relationship and complexity of the entity's operations through the financing of outside ownership. The increase in debt due to the emphasis between management and creditors representing, the audit services and fees may apply for these services increases [21].

In this study we used the model proposed audit fees and the dummy variable free cash flow in two states such as higher or lower to assess whether companies with high free cash flow have higher audit fees, in this model the other factors are controlled on audit fees.

The main hypothesis of this study includes the following:

First hypothesis – There is a significant relationship between free cash flow and audit fees.

Second hypothesis – There is a significant relationship between debt / free cash flow and audit fees.

Third hypothesis – There is a significant relationship between dividend / free cash flow and audit fees.

MATERIALS AND METHODS

Since this study sought to examine the relationship between the independent variable free cash flow, debts, dividends and the dependent variable is the audit fee. This research is to study the correlation and regression analysis was used to examine the relationship between these variables. In the study, companies based on free cash flows are divided in to two parts and based on the audit fee model and variable dummy free cash flow and the theory of growth opportunities, dividends and debt are used.

The model used to test the first hypothesis is as follows:

On the first hypothesis, the test T is used to compare the two groups at a time to determine which group has the most audit fee logarithm and the model regression below is used:

$$\text{Audit fee} = \alpha + \beta X + e$$

Review of Literature

Jaggi (2005) said free cash flow due to increased risk creates damages to the value of investments. He also suggested that the conflict between the interests of shareholders and managers in firms with high free cash flow and low growth prospects may be more severe. Many of the results of the use of free cash flow for investment and financing activities were investigated. Zaree (2005) examined the impact properties of audit fees for audit firm and employer. The study of factors affecting audit fees from the perspective of the audit firm's partners has been investigated. The results showed the affects it has on industrial expertise of audit firm to audit fees because the qualified auditors do their audit procedure in less time and with more confidence, so therefore the quality of these auditing institutions are higher than other audit institutions. One reason is that managers with free

cash flow of the companies' resources may be wasted on extravagant projects and relegated to the adjusted value of the companies' financial statements to manipulate [2]. Effort and increased audit risk as a result of the manipulation that led to higher audit fees. The nature of the commitments may force the auditors and audit risks to increase the audit fees [6]. It also raises questions about the credibility of the management [2]. Similarly the auditors may identify the audit as a potential for management earnings as a risk factor [4]. When companies with high free cash flow and low costs reflect the high representative, companies with high free cash flow and high growth may also prefer high agency costs and therefore justify additional audit. For example, companies with high free cash flow and high growth can fund internal growth opportunities and may be subject to less careful consideration of capital market [10]. Companies with high growth can also be more difficult to audit. They have a higher ratio of market value to intangible assets at their disposal and thus have a higher value, the recognition, measurement and auditing are more difficult as [21]. Suggested, it may be difficult to notice in companies with high growth that the behavior of the management can be opportunistic, in particular it can increase audit fees. The companies with high free cash flow and high growth tend to have lower levels of debt [9], the lack of care and control of debt, potentially creating additional audit work. Simunic (2008) examined the effects of several variables on fees. Initial investigations on audit fees in developed countries such as USA, Australia, UK were carried out and it was followed by other countries with respect to measures affecting audit fees. Audit fees are higher for audit firms with financial problems in the field of advanced technology [12]. Gaver (2009) believe the quality of the auditing standards generally accepted audit work carried out investigation to accept the audit report, and empirically demonstrate the fraud audit reporting standards by increasing audit fees reduced. Stulz (2006) research result obtained from twenty different countries study compare the result was that increased losses resulting from increased quality of service and the auditors addressed. The auditors also for the development of audit, remuneration more requests. Great audit institutions are different ways to increase your reputation. This provides them with higher audit fees [14]. Audit of the expected quality of service may mean quality of service is less well-known audit company, but due to the early harvest buyer, price increases famous institutional audit services [4]. Research in the field of market power, a wide range of relative exclusivity and distinction to describe the service providers and the fee is higher [15]. A study on the causes of litigation against auditors concluded that increased audit fees, legal claims arising from loss decreases [22]. Auditors in a more competitive market fee to cover expected future losses our customers demand [20].

Theoretical framework

FCF: free cash flow is a measure to measure the performance of companies' shows that the company's cash expenditures required to maintain or expand after performing assets at its disposal. Free cash flow is important in the sense that it allows companies to seek opportunities to increase shareholder value will. Without having cash, develop new product, conduct business education, cash benefits paid to shareholders and debt relief is not possible. Information about the cash flows of business unit to provide a basis for users of financial statement to evaluate its ability to generate cash in the unit and the unit needs to apply these funds is useful. The economic decisions taken by users require the ability to create business unit cash, timing and ensure that it is [21].

Debt: The relationship of agency debt and complexity of the entity's operations outside of property financing through the shows. The increase in debt due to the emphasis on the relationship between management representatives and creditors may demand for audit services and the right of these services requires increased [11].

Dividend: Dividend policy The Company can indicate whether or not the actual reported earning and operating performance of the business unit is a fair offer. In fact, the directors took the decision to increase dividend payments or they feel they significantly affect the accounting method is not working and is unlikely to reduce the dividend in the future. In this context, profit sharing not only a sign for future profitability is also a good indicator of the quality of earnings. The dividend is expected to be an effective way of monitoring the executive management for their help, the earnings less tempted.

Audit fees: Auditor economic benefits funded through fee from the contract signed with the employee income. Auditors for audit services pricing various factors, and much research has been done in relation to the identification and assessment of these factors. The basis for determining the remuneration of the auditors, audit officer working life that is commensurate with the progress billing. Hourly rate of remuneration of the auditors on the basis of experience and skills and thus bear the responsibility that is different. According to the survey done by auditing fees included fees and other direct costs and overhead allocation of direct labor hours in total is estimated to amount Rial [3]. In less developed countries, audit fees based on level of activity and audit features auditors determined of audit fees in most of these countries complexity and volume of operations and the size of the company that audits the financial statements of the company have been investigated [8]. The independent auditors to monitor and reduce the increasing pressure faced by audit fees. This has caused the auditor and the work to facilitate this work investigates the relationship between accounts to pay fees, factor effecting audit fees will be divided in two groups. CPA firm is the first group and the second group features, Characteristics of the employer or the company that gives the CPA firm invited [5].

In this study we have chosen the following companies who are eligible and amongst members of Tehran Stock Exchange.

- 1) The companies who were accepted before year 2008
- 2) The company during the financial year to be examined
- 3) Data about the company is available
- 4) The company is a corporate member of the Tehran stock exchange. Since the variable remuneration of the research is

to audit the company in the sample, this variable in the general and administrative expenses has been disclosed according to this study 300 company has been chosen between years 2008 to 2013.

Data	Variable
Free Cash Flows	Free Cash Flows: Former benefit before tax gain *(1-tax rate) +current years amortization payments-fund expenditure-funds increase or decrease/ book value of shares owners rights.
Dividends Benefit	Each share s Division benefit: Profit dividing / spread shares amount
Debt radio	Whole property = whole due
Investing Growth Opportunity	Growth opportunity ; book values of shares owners rights – shares owners market value

Research data are classified as follows:

In this research the relation between Dependent Variables (Audio fees) and independent variables (Free Cash flows, Dept ratio and dividend benefit) would be analysis. In this paper we use Pearson correlation coefficient factor & single variable regression for Data analysis. Former data in former of files in expanded Excel software designed & done & then SPSS used for data analysis. Kolmogroph-Esmirenoph (Normalizing Data test):

HO= Data are Normal
H1= Data are abnormal

Table: 1. Normalizing Data test

Observed amount	Meaningful level	HO
300	333.0	Confirmed

RESULTS

First hypothesis testing Conclusion:

HO: Between Free Cash flows (FCF) & Audit fees there is no meaningful relation.

H1: Between Free Cash flows (FCF) & Audit fees there is a meaningful relation.

For testing this analysis we used Non parametric Eta correlation coefficient.

Table 2.: Correlation taste between Cash flows (FCF) and Audit fees

Scale	Variable	Value	Meaningful level	HO
Ranking	FCF	839.0	0090.0	Rejected

When an element has level or nominal scale & the other element has distance or comparative scales, the Non parametric Eta correlation coefficient.

This index expresses that with knowing a certain variable, how the predicted errors for the other variables would be decreased. With attention to gained conclusion from table 2, for the sake of meaningful level that is less than 0.50, SO HO rejected & H1 confirmed. According to level of (Sig = 0.009), There is meaningful correlation between Audit fees & FCF in accepted Companies in Tehran stock Market. FCF value is equal to 839.0, it means FCF can describe 839.0 of changes in dependent variable (Audio fees).

Second hypothesis test:

H0: between dept / FCF & Audit fees there is no meaningful relation.

H1: between Dept / FCF & Audit fees there is a Meaningful relation.

For testing this hypothesis we estimate this regression model:

$$1) \text{ audit fees} = a + \text{BDA} + e$$

DA= Dept ratio

Regarding to those Companies divided to up & down levels as to FCF, table 3 is related to down level Companies FCF, table 3 is related to down level Companies FCF.

Table: 3. Correlation between Audit fee and debt ratio in down class of free cash flow

HO	Dorbin Watson	Sig	Determine coefficient	Correlated coefficient	dependent Variable	Independent Variable	Regression Equation
Reject	012.0	0	120	346.0	Audit fees	Dept ratio	1

Regarding to **Table -3** results, with having a meaningful level is less than 05.0 so H1 confirmed & HO rejected. According to correlation coefficient about 346.0 in significant level 95%, there is a positive & meaningful relation between audit fee and debt ratio in accepted companies in Tehran stock market. Determination factor(R) is 120.0, means that dept ratio variable can express up to 120.0 of Changes in dependant variable (Audit fees) singly.

Now in up level of FCF the relation between Audit fees &dept ratio will be express. **Table- 4** is related to up level free Cash flow of Companies.

Table: 4. Correlation between Audit fees &dept ratio in up level of free Cash flow

HO	Dorbin Watson	Sig	Determine coefficient	Correlated coefficient	dependent Variable	Independent Variable	Regression Equation
rejected	971.0	000.0	314.0	560.0	Audit fees	Dept ratio	2

Regarding to **Table- 4**, with having a meaningful level less than 05.0 , so HO reject and H1 would be Confirmed. According to correlation coefficient 560.0, in significant level 95% between about fees &dept ratio there is a positive & Meaningful relation in Tehran stock markets accepted Companies. Determination factor is 314.0, means that dept ratio variable can express up to 314.0 changes of dependant (Audit fees) variable. Regarding to upside table, correlation coefficient in up FCF levels is more than down level; this element shows a higher correlation between Audit fees &dept ratio in upper level of FCF.

Third hypothesis test:

H0: there isn't any meaningful relation between dividend benefit / FCF & audit fees

H1: there is a Meaningful relation between dividend benefit / FCF & audit fees

For testing this hypothesis we estimate this Regression model:

$$2) \text{ Audit fees} = \text{alfa} + B \text{ Div} + e$$

Reference to companie s division two levels (up & down) about FCF, this table is related with down leved of FCF in companies .

Table: 5. Correlation between Audit fees & dividend in down level of free Cash flow

H0	Dorbin Watson	sig	Determine coefficient	Correlated coefficient	dependent Variable	Independent Variable	Regression Equation
Rejected	862.0	000.0	111.0	333.0	Audit Fees	Division Benefit	3

Regarding to table 5 results, with having a meaningful level less than 05.0 so H0 reject and H1 would be confirmed. Reference to correlation coefficient 333.0 in significant level 95%, there is a Meaningful & positive relation between division benefit & Audit fees, in Tehran Stock market accepted Companies. Determination Factor is 111.0, means that Division benefit can express 111.0 changes of dependant variable (Audit fees) singly.

Now in upper level of FCF, the relation between Audit fees and division benefits would be expressed. **Table- 6** is related with upper level of FCF in Companies.

Regarding to **table- 6** result, with having a meaningful level less than 05.0, so Ho reject and H1 is confirmed. According to correlation coefficient equal to 471.0, in significant Level 95%, there is a Positive relation between division benefit and Audit fees, in Tehran stock market accepted Companies. Determination factor is 222.0 means that Division benefit can express 222.0 units of changes of dependant variable (Audit fees).

Table: 6. Correlation between Audit fees & dividend in up level of free Cash flow

H0	Dorbin Watson	sig	Determine coefficient	Correlated coefficient	dependent Variable	Independent Variable	Regression Equation
Rejected	146.2	000.0	222.0	471.0	Audit Fees	Division Benefit	3

Regarding to up side table result, correlation coefficient in upper level of FCF in Companies, is more than down levels. This shows that, there is a higher correlation between Audit fees & division benefit in upper levels of FCF.

Meaning fullness of Regression Equations test (F test)

In this sector, the regression equations meaning fullness would be tested by variance analysis in this way.

Table : 7. ANOVA table

significant level	F Statistic	Squares Average	DF	Total Squares	Regression Equation	
(a)000.0	145.18	719.1	1	719.1	Regression	1
		095.0	133	598.12	Residual	
		-----	134	317.14	Total	
(b)000.0	512.74	249.6	1	249.6	Regression	2
		084.0	163	671.13	Residual	
		-----	164	920.19	Total	
(c)000.0	557.16	585.1	1	585.1	Regression	3
		096.0	133	732.12	Residual	
		-----	134	317.14	Total	
(d)000.0	581.46	4279.4	1	427.4	Regression	4
		095.0	163	493.15	Residual	
		-----	164	920.19	Total	

Dependant Variable: Audit fees.

- (a) Predictors: (fix Variable): Dept ratio in down level FCF.
- (b) Predictors : (fix Variable): Dept ratio in upper level FCF.
- (c) Predictors : (fix Variable): Division benefit in down level FCF.
- (d) Predictors: (fix Variable): Division benefit in upper level FCF.
- (e) Independent variable: Audit fees.
- (f) As you see in table 7, meaningful level in all equations is less than 05.0, so all the Regression equation are meaningful.

Fee predictive model offer by each variable (Test T)

After we understand that all of the regression equation is meaningful by test F, Now we want to check which variables factor is against 0 and what its amount. For doing this test, the coefficients tables was used, regarding to each independent variable, dividend predictive bi variable model offered that you see in fallow.

significant level	T statistics	Standard factors		Non standardized factor		Regression Equation	
		Beta	Standard deviation	Variable coefficient			
000.0	409.54		38.0	082.0	Fix variable (a)	1	
000.0	260.4	346.0	033.0	142.0	Dept ratio		
000.0	783.44		046.0	058.0	Fix variable	2	
000.0	632.8	560.0	053.0	455.0	Dept ratio(c)		
000.0	556.70		030.0	141.2	Fix variable	3	
000.0	069.4	333.0	001.0	000133.0	dividend(d)		
000.0	919.67		033.0	248.2	Fix variable	4	
000.0	825.6	471.0	001.0	000183.0	dividend(e)		

Dependant variable: Audit fee

- (g) Previsions (fix variable): Dept ration in down FCF
- (h) Previsions (fix variable): Dept ration in upper FCF
- (i) Previsions (fix variable): Division benefit in down FCF
- (j) Previsions (fix variable): Division benefit in upper FCF
- (k) Independent V: Audit fees

As we see in table 8, all variables factors are against 0. Regarding to Alfa and B result, we can reference to any changeable variables, a bi variable prediction model in Audit fees like following:

- 1) Audit fees $i = 2.082 + 0.142 DA + e_i$
- 2) Audit fees $i = 2.058 + 0.455 DA + e_i$
- 3) Audit fees $i = 2.141 + 0.000 DIV + e_i$
- 4) Audit fees $i = 2.248 + 0.000 DIV + e_i$

CONCLUSION

As is clear from the above hypothesis and result between free cash flow and audit fees and there is a significant positive relationship. Companies with high free cash flow and free cash flow high risk than companies with low risk and high risk of a more rational use of free cash flow do not have to use more cash and assets [5]. On behalf of the companies, which are usually larger and duties of auditors and supervision are clear debt extends beyond the audited financial statement, is more important. Audit fees for companies with free cash flow, free cash flow if investment managers are unreasonable and cover up some of the financial statement to manipulate behavior, they will be high [10].

As the above hypothesis, and the result have been determined. A significant positive correlation between debt and audit fees, and this is on the top floor more free cash flow and also according to the results of the variable debt is adjusted free cash flow that will reduce audit fees, firms with high free cash flow growth opportunities tend to have less debt. Companies often use debt to adjusted free cash flow difficulties and Agencies, and thereby also reduce the funds available to administrators [19]. Debt reduction in audit fees in companies with high free cash flow and low growth has direct relationship [21]. Debt reduction in the amount of excess cash in the hands of managers is, due to poor management of free cash flow to additional audit resources audit additional resources need to be increased audit fees and additional costs due to reduced profits for the benefit of shareholders is, due to the high free cash flow and reduce costs, agency costs create free cash flow is represented by a decrease in audit fees.

As the above assumptions and result specified between free cash flow and dividend and audit fees and positive relationship exists; also according to the result of the variable dividend free cash flow adjuster that audit fees will increase. The result show that dividend has the role of regulators is to free cash flow. Cash dividends is a factor authentication, in that case, funds under management and reduced investment unusual increase agency costs do not prevent, after the results, with an increase in free cash flow and reduced dividends representing costs, audit fees will decrease.

As you can see the debt ratio and dividend and positive relationship with the audit fee and according to the result obtained to reduce audit fees are. Dividend similar debt on which the interest as soon as a commitment is, with the exception that the dividends of debt more flexibility. Also, the pyramid finance the debt and interest free cash flow after dividends paid, with respect to these points may give better control mechanisms in force managers to pay cash is coming [8].

According to the result of the research, the following suggestions can be provided:

- 1 - According to the result of research that companies with high free cash flow and financial risk, the assets of other companies may hold more cash, and it is suggested that managers in their investment decisions are carefully otherwise it should increase audit fees.
- 2 - Since debt and dividends and dividend cash out methods are like debts, on which interest is mentioned as a commitment is announced, the difference is that dividends of debt have more flexibility, also in the pyramid financing, first the debt and the interest on free cash flow dividends will be paid. Managers should note that debts may be better controlled by a mechanism in force that managers will pay cash in future.

The following suggestions are offered for the future researchers:

- 1 – If possible, future researchers in the industry to examine the relationship between free cash flow and pay audit fees because the analysis of a particular industry will provide useful information for trade investors.
- 2 – In many developed countries the amount of audit fees are disclosed but in Iran it is not required to disclose the audit fees. Examining the reasons for non-disclosure of audit fees and advantages of exposing the audit fees could be the subject of the future research.
- 3 – Factors affecting audit fees from the perspective of a major shareholder of the company is an important topic for future research. It is suggested for future research to explore the impact of these factors.

CONFLICT OF INTEREST

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REVIEW AND PRIORITIZATION OF EFFECTIVE FACTORS ON LOCATING ATM BY USING ANALYTICAL HIERARCHY PROCESS

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ABSTRACT

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KEY WORDS

Decision Making, Location, Analytical Hierarchy Process, AHP Technique

The locating science determines a proper place(s) for activities or services. The present research has two main purposes one of which is achieving the highest market share and the other minimizing the distance of customer's access to ATMs, and it attempts to determine the criteria of optimal location of ATM station for the case study of Shahr Bank in the spatial realm of the district 7 of the large city Tehran. In this respect, in order to determine the criteria for the customer to select a bank, a questionnaire was developed with the AHP method with four factors duration of travel, waiting time, qualitative level of services, validity and safety, and the questionnaire was randomly distributed among the members of the statistical population including 60 persons in 5 branches of the banks of the district 7 and the related information was collected. In this stage of the research, it was specified that two factors of duration of travel and waiting time have the highest ranks.

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INTRODUCTION

Locating is one of the industry engineering sciences focusing on which leads to the reduction of costs and success of the industrial units. Locating centers [locating buildings and centers] is defined as selecting a location for one or more centers by considering other center and the available constraints; in such a way that a special purpose becomes optimal. This purpose can be the cost of transportation, providing fair services to the customers, taking the largest market in one's hand and so on. Doing location studies requires specialties including research in the operation, methods of decision making, geography [geology and climate], engineering economy, computer, mathematics, marketing, and city designing sciences and so on.

Spending so much money in order to create economical firms and also paying attention to relations and facility in accessibility are indicative of the importance of the issue of accurate location and determining the proper spatial situation for this group of those who are active in economy in such a way that it is possible for the majority of citizens to use these firms easily and accurately. This necessity becomes more tangible when the process of increase of population and subsequent to it growth of the city and increase of the cost of the location and also lack of a uniform distribution of the population in various sections of the city are considered. Banks, as a part of the economical firms which have a daily interaction with people, are especially sensitive for selecting the proper location in order to maximize their share of the market and to increase customers' satisfaction through quick accessibility [9] Factors such as population density, farness or closeness to the main street, distance from branches and ATMs of the branches of this bank or the others, distance from special places such as business complexes and centers and also value of the land are the effective criteria in locating in the domain of banking.

Accordingly, the present research reviews the locating criteria as its main purpose and locates the ATMs of Shahr Bank in the district 7 of the municipality of Tehran in their case study. Location science determines proper location[s] for activities and services. The oldest theory in this regard is traced back to the theory of Pier do Dermeh [1600]. He wanted to solve an issue with this content that there are three points in space and a forth point is supposed to be found the sum of the distance of which with those three points is minimum. Then, Weber in 1909 presented a more complex method. He determined proper locations for industrial activities. In 1826, Fan

Tanen suggested a model for analyzing agricultural models and Hetling reviewed the location of supplying goods based on spatial competition in 1926. In his model, there were two suppliers along the linear path and through competition along with this line selected the location of their activity in a place in which the prices would be moderated and the maximum profit would be obtained. [1]

In 1993, Walter Crystaller attempted to express the spatial design of the cities and villages of the Southern Germany. His researches became the infrastructure of many geographers who were interested in the locating science in such a way that the researches of 1960s and 1970s have been focused on his work. The mentioned theories were the infrastructure of the locating science and spatial analyses. Most of these researches are traced back to the period before computers were used. In this period, calculations and modelings are done manually and there were basic constraints in constructing more complex models; but through introducing computers with high speed and strong software in the field of spatial modeling, the possibility of complex spatial issues were created and some researchers could model more complex issues such as Walter Izard, Leon Cooper, Charles Royle, Michelle Titz and Lewis Hakimi.[2]

One of the people that have done valuable researches in the field of spatial sciences is Tabler. He created and developed a model for spatial analysis of the distribution of the urban population in America. The results of his researches have been the intellectual and strategic infrastructure of many of the next quantitative models. His theory has been named the first law of geography. According to the first law of geography, objects are related to one another but things that are closer to one another have a stronger relationship with one another in comparison with those that are not close to one another [3]

Location is the center of cautious and voluntary actions of people [4]. Increase of demand for the employment of a special location is due to the cautious performances and occurrences of people which lead to the increase of competition in people, institutes and firms for establishment in a certain location. As the capitalist economy view and approach to location as economical goods develop, competition for the establishment in the most appropriate location is intensified and selecting the most appropriate location was considered as the main purpose of economical activities [4] Appropriateness of a special place for activity of a service depends on some factors to a large extent which are selected and evaluated during locating that service. In this respect, numerous and various factors which affect locating decision can be named [2].

At the time of establishing a device for the services of the bank, numerous factors shall be considered including spatial situation, price of land, path quality, access to the important hubs and centers of the city, safety, models of development and services [5]. In order to identify the criteria associated with locating this kind of services, it is necessary to first consider the effective assumptions and principles on the patterns of spatial behavior of the customers and managers of the relevant organizations; therefore, the patterns of spatial behavior can be considered as a set of behavioral relationships based on which a customer goes for a facility with the intention of receiving a service or a company provides its services in a certain place. According to the definition above, there are two different dimensions in the patterns of spatial behavior such as customer and company or the managers of the company providing services [6].

For an economical firm providing proper services, high quality of services, operation speed and competitive prices are important but all of these are influenced by the location factor because if the location of the business unit is selected improperly, all of the factors are overshadowed and its positive impacts are faded; thus proper location creates a strategic advantage for the company in comparison with the competitors. Therefore, establishing an economical firm in proper locations and in the best possible condition leads to the prevention of loss of capital [by considering the constraint of capital and time which is always apparent] as well as development of required business and also cycle of goods/services provided for customers is improved and the firm is in a desirable condition [7].

In the banking industry, like other industries, in addition to the competition concerning cost of presenting services, there are other competitive factors the most important of which is how the service is provided for the customer [8]. Among these, the number and location of the establishment of ATMs are especially important because they determine the rate and easiness of the accessibility of bank services, cover more regions and more potential customers are in the range of attraction of bank and on the other hand, the relevant costs including movement cost for reaching the closest branch reduces and therefore the number of times the customers go to banks will be

increased and they will use more services and therefore the profitability of the banks increases by taking the fees of transactions into consideration.

Shahr Bank is an effective economical firm in the area of bank services of the country with the number seven thousand and nine hundred billion rials capita in the July of 2014 and this bank was officially launched in 2009 and therefore can be called a young bank. Various reasons including increase of profitability, prevention of the loss of capita., having more market share, increase of efficiency, project of organizing and reviewing again has led it to put the establishment of its bank branches in his program. Among these, ATMs and self-bank devices are also especially considered. Nonetheless, no research has yet been done on the effective factors on accurate location of these branches.

Given the items expressed, the purpose of this research is to determine the effective factors in the respect of establishing ATMs so that the authorities would make an effective decision in this regard by considering other information. For this purpose, the required geographical location is considered based on the official divisions. In this research, according to the definition above and the suggestion of the authorities of the bank, district 7 of the city Tehran is studied as the pilot region.

Determining the location of the financial firm is a key step towards financial firms because the results of this decision become apparent in the long run and have crucial effects from the economical, environmental and social dimensions and so on. One of the aspects of the impacts within an organization will be its direct impact on the profitability of the financial firm and from the dimension of outside of the organization, building a big financial firm in a region can affect various economical, social, cultural and environmental conditions and so on. Determining the location of the financial firm has an important in the rate of preliminary investment at the time of its foundation economically. Also, at the time of using it, this decision making has a key impact on the final price of the goods/service [research center of development of technology of university Jihad, 1990]. In addition, establishing one or more industrial units in the optimal locations and in the best conditions possible not only improves the cycle of materials and services for the customers, but the financial firms are put in a desirable condition. Decisions associated with selection and learning location features of a center can have a great impact on the ability of achieving and preserving the competitive advantage [9]. In reviewing jobs with quick returns, it has been specified that more than 50 percent of them are bankrupted in the first year and about 30 percent of them are bankrupted after two years and go to have another job. Although in the beginning of launching these jobs, all of the aspects of presenting services are reviewed, but not paying attention to the important issue of the location of firm causes the productive unit not to reach the required profitability and therefore its purpose [10]. Doing proper and accurate location studies will have social, environmental, cultural and economical impacts on the region where the location of it is as well as its economical impact on the performance of the industrial unit. In addition, regional features are also considered as effective key factors in determining the location of the locating issues. By considering these sayings, the necessity of the present project is specified.

RESEARCH MODEL

Estimation of the AHP model in order to determine the effective factors on locating the ATM device, now with one of the most famous multivariate decision making methods [MADM] called AHP, we determine the effective factors on locating the ATM device. When there is a considerable difference between the factors written in the AHP questionnaire and the probability of the overlap of the numbers is low and since the probability of the presence of significant numbers for the concept of the degree of possibility is low, the traditional method must be used and therefore, in this research, the traditional method of AHP has been used instead of the fuzzy method. AHP is a multivariate decision making process and there is at least three different levels in each mode in such a way that elements of each level are related to one another. The first level called "purpose" has been specified and as its name shows, it is related to the purpose of the decision maker of processing the model. The second level is related to the criteria and in that the criteria which are involved in the decision making process are reviewed. The third level is associated with the options in which elements out of which the selection is done or those that are ranked in order of preference are mentioned.

In this research, the first level which is "purpose" shows the ranking of the effective factors on the location of the ATM. The second level which is "criteria" includes an overall criterion for achieving an optimal model for competing in the selection of the ATM. The third level is "options" which includes the four factors the duration of travelling till reaching the location of the ATM, the time of waiting in the line of the ATM, qualitative level of the

services provided by the ATM, validity and safety of the ATM. These four factors have been selected based on the previous researches. It can be said that in total, all of the previous researches have somehow considered these four overall categories. These factors are explained in more details as we go on.

Duration of travel until reaching the location of the ATM device

This factor is important because in cases when the distance between ATMs is long, the customer shall spend a certain amount of time and therefore cost for reaching the location. Consequently, at the time of selecting one of the two devices with similar conditions, they prefer to spend less time and cost for reaching the devices.

b-The time of waiting in the line of ATM.

One of the most tiring stages of each work is spending a certain amount of time for achieving the purpose. Waiting in the ATM lines are important until the customer prefers to travel a distance instead of wait in the line of an ATM to reach an ATM with no other customer and he/she won't need to wait in a long line anymore.

Qualitative level of the services provided by the ATM

Some of the services of the bank are only done by certain ATMs. For instance, if the customer needs to change his/her password or attempts to receive the second password for the credit card, he or she shall go to the ATM of that same bank. Also, in other cases, such as immediate electricity bill, the bill can only be paid by a certain bank. Thus, selecting a device in some cases depends so much on the type of the service which can be provided by the ATM.

Validity and safety of the ATM

Due to many bank robberies in the recent years, the internet accounts and also customers in front of the ATMs, the importance of this factor has become more apparent. The safety factor can be affected by the presence or absence of surveillance cameras and also location of the device in crowded places with traffic or vice versa. In addition, in cases where a device shows an error of execution one time or more, due to customer's lack of trust, this device will be eliminated from the list of ATMs of a customer and perhaps this lack of confidence in a device would be transferred to others as well.

METHODS

The present research is a descriptive research of the survey kind in terms of its method. It is descriptive because it describes a situation or condition in detail. Also, the method of the present research is an experimental research in terms of purpose, because the result of the research can be of help for managers and employees of the studied organization and even other governmental organizations. Ultimately, the research is a field study in terms of data collection. About the data collection method in this research, it can be said that the library data collection method will be used in terms of the theoretical principles of the research. The research questionnaire will be of the researcher-made type and it is designed based on the AHP method. The statistical population of the research includes the elites of the banking industry, especially employees and managers of Shahr Bank which have been filled out based on the accessibility of the maximum rate of the sample volume possible. It is necessary to explain that bank managers and employees respond to the questions of the questionnaire as the bank customers. According to the information of the manager, public relations of Shahr Banks in the domain of the district seven of Tehran, 70-80 employees are active. The cause of approximation of the number of employees is the movement of managers and CEOs of the branches of Shahr Bank. According to the Morgan table, which has been presented below, the minimum number of the sample volume for this number of population is about 60 persons. Accordingly, 65 questionnaires were prepared in total and then distributed among the statistical population and a number of 60 questionnaires were completely filled out which have been used in this research. Since in this research the most important data collection tool and measurement of variables is the questionnaire, the validity of the questionnaire is especially important for the validity of the research. For this purpose, three type of validity were considered: content, construct and face validity. And its validity was confirmed and the reliability is calculated through Cronbach's alpha method by using SPSS software easily. As the results show, Cronbach's alpha of the AHP questionnaire is equal to 0.896 which is very desirable.

RESULTS AND DISCUSSION

Execution of the AHP method:

The Analytical Hierarchy Process [AHP] is a decision making method in which the decision maker [or the decision making group] is enabled to form their required issue and according to the obtained structure, they do some comparisons in order to determine the priority of the options mentioned in the decision making. AHP requires paired comparisons and the decision makers starts his/her work by drawing the overall hierarchy of his/her decision, and specifies the hierarchy of factors and various options which

shall be considered in the decision. Then, the paired comparison is done which ends with the determination and evaluation of the factors. In this method, the advantages of this method is using it in the decision making with the qualitative criteria. The other advantage of this method is structuring the issue of decision making with forming the hierarchy. Classifying the criteria from top to bottom causes the complex issues to be reviewed systematically by the AHP. Now, the application of AHP is more seen in the decision making of the socioeconomical systems of assignment of sources, evaluation of performance, determination of the sequence of the work and other things. This method is a decision making method which enables the decision maker to form the required issue and do some comparisons based on the obtained structure in order to determine the priority of the options mentioned in the decision making. This technique was first mentioned by Thomas Saati in 1980. Another advantage of this method is using it in the decision making with qualitative criteria [11]

Stages of using the AHP method

In using the AHP method for the decision making issue, there are four basic stages as follows [11] Forming the hierarchy and the classification of the required issue has this order: at the top of the hierarchy there is the great and overall purpose of the decision making issue and in lower levels there are attributes and criteria which are somehow effective on the quality of the purpose [if necessary, the criteria can be divided into more detailed subcategories] and finally, the options and selection of the decision making are in the last level. This situation creates an overall and standard framework which will be similar for all issues despite the type of the issue. The number of the levels depends on the complexity of the issue. Since the principles of the AHP model is based on the paired comparisons, Dr. Sa'ati suggests that if possible the number of the factors at each level wouldn't be more than 9 factors. Of course, this isn't necessarily considered as a constraint for this method [11]The second stage includes paired comparisons of the factors written at any level of hierarchy in responding to the realization of the purposes o meeting the needs of the purpose or the factors of the higher level. These comparisons are written in a matrix called "paired comparison matrix". This matrix has two main properties. First, the diameter of this matrix is the number one and second, preferring some factors has a reversible property. In relation with the determination of the nominal rate of the preference of a factor, it might be imagined that some numbers can be considered for these comparisons. However, in the AHP model, it is discussed that direct assignment of such weights absolutely practically will lead to the incompatibility of calculations with the obtained results. For instance, it is possible that as Dr. Sa'ati says, we select the lowest of the n factors and objects we are comparing [in terms of the studied attribute] and for instance we give the coefficient 1 to it and weigh the rest of them in relation with the unit [lowest factor]. In his opinion, although this process might be completely accurate in theory and logically, but the application of this method is almost impractical and the obtained results will not be reliable and compatible. Therefore, he suggests the relative and paired comparisons for this purpose and in order to avoid the application of the single and absolute numbers, a 9-degree scale has been used the accuracy of which has been proved based on a optometric experiment in physics. In the third stage of the process of the paired model, the relative weights of the factors are calculated at each level. The methodology of this calculation is as follows. If the comparer could know the actual weights of n factors being compared, then the relative paired comparisons matrix of the factors will be as follows.

$$A = \text{Matrix} - \begin{bmatrix} W_1/W_1 & W_1/W_2 & \dots & W_1/W_n \\ W_2/W_1 & W_2/W_2 & \dots & W_2/W_n \\ \dots & \dots & \dots & \dots \\ W_n/W_1 & W_n/W_2 & \dots & W_n/W_n \end{bmatrix}$$

this case, the relative weights can obviously calculated through each of the matrixes of A. on other words, matrix A was a 1st degree matrix and the following equation is seen [Azar and Rajabzadeh, 2002, p64]:

$$A \cdot W = n \cdot W$$

In which, $W = [w_1, w_2, \dots, w_n]$ is the vector of actual weight and n factors with elements. In the matrix algebra, $n \cdot W$ in equation [1] are respectively called "special Eigen value" and "right Eigen vector" of matrix A. In the AHP model, it is argued that since the judge does not know anything about the vector W [components of this vector $[w_1, w_2, \dots, w_n]$ are not specified in it], therefore he/she is not able to determine the relative paired weights of matrix A with a 100 percent accuracy. Thus, matrix A, which is the outcome of his/her personal judgment, is logically incompatible. Estimation of the vector W, which is shown by w^* , can be calculated through the equation below [2]

$$\hat{A} \cdot \hat{w} = \lambda_{max} \cdot \hat{w}$$

In which \hat{A} is the paired comparison of the factors which are presented by the decision maker [respondent]. λ_{max} is the largest "special Eigen value" of matrix \hat{A} and \hat{w} is the "right Eigen vector" of matrix \hat{A} and it is an estimation of the actual rate of the vector w^* . In addition, the rate of λ_{max} can be considered as an estimation of n. Professor Sa'ati has shown that always $\lambda_{max} \geq n$. The closer λ_{max} gets to n, the degree of compatibility of the matrix A increases and based on this attribute, a scale called CI or "scale or degree of compatibility" and CR "compatibility ratio" are calculated as follows:

$$CI = (\lambda_{max} - n) / (n - 1)$$

In which CI is the average of the degree of compatibility of the random variables [Azar, 2005, p 81]. As an empirical law, if $CR \leq 10\%$ the matrix A is acceptable [judgment of the decision maker about preferring the factors compared] and otherwise, the written things in A more than A is incompatible which leads to reliable results. In this case, it is necessary for the paired comparisons to be repeated until an acceptable compatibility ratio [lower than or equal to 10%] is reached by the decision maker. Sa'ati showed that estimation of W vector can be obtained from the repeated calculation equations and this algorithm is now available in a software called Expert Choice or a similar software and that is how the degree of compatibility of the paired comparison matrix can be calculated as well. In addition, it must be considered that the special Eigen value method is only of the methods of estimating the W vector and there are also other methods but none of them are as known as this one and they have not been used. The final stage of the process of the AHP model includes the determination of the relative importance of each of

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the options of decision making in relation with the overall purpose and criteria of the considered issue. For this purpose, relative weights of the factors at the Kth level [overall purpose of the issue] are calculated as follows:

$$C(1, K) = \prod_{i=2}^K B_i$$

In which, $C[1, K]$ is the relative combined vector at the Kth level in relation with the factors of the first level and B_i of a $n_i \times n_i$ matrix the rows of which form the vector w_i . n_i is the number of the factors of the i th factors and in fact it is n in the equation $A.W=n.W$ and i in the equation is only to show the level [12, 13].

CONCLUSION

In this research, it has been attempted to recognize the effective factors on selecting an ATM device from the perspective of the customer. In this respect, a questionnaire was developed based on the AHP method and four factors duration of travel, waiting time, qualitative level of services, validity and safety were reviewed as the factors for selecting a device. The questionnaire was randomly distributed among the members of the statistical population including 60 persons in 5 branches of the banks of the district 7 and the related information was collected. After collecting the data, the data was analyzed in the software special for the AHP method which is Express Choice and the results showed that the two factors of duration of travel and waiting time have the highest ranks. Therefore, the research model accepted these two factors as the factors for the customer to select the ATM.

CONFLICT OF INTEREST

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ORGANIZATIONAL SUSPICION REINFORCING ORGANIZATIONAL CONFLICT

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ABSTRACT

Suspicion is one of the dangerous ethical diseases. Those who mistrust dust covered their heart mirror will not see others beautiful and will remain weak in understanding the facts. Suspicion refers to organizational change, in the sense of pessimism about the success of efforts to change. In fact, the outcome of suspicion not only decline social capital in organizations and society but also reduces participation in organizational activities. This phenomenon of reduced performance and organizational effectiveness in strengthening suspicions provides a positive feedback. Conflict is one of the consequences of suspicion. Conflict is part of human life and wherever is interactive, conflict existed. Conflict is a fact of human history were familiar with, but unfortunately because of mismanagement, conflicts of militancy and hostility has become changed and due to an unfortunate history of conflict and human societies have to look at it as a negative phenomenon. In this article we have tried to explain the concept of organizational suspicion and organizational conflict addressed and examined the role of one over the other.

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KEY WORDS

organizational suspicion, conflict,
organizational conflict*Corresponding author: Email: m.beheshtifar@yahoo.com

INTRODUCTION

One of the possible grounds for suspicion formation is lack of information on key issues in the organization (areas of rumor) and with imperfect information and negative images speak about one another., especially when the members of an organization in a culture bred without an objective consideration of the facts and evidence that's easily accept invalid this can be strengthened. Learning objective thinking and verify their assumptions and judgments about others is result of social interaction and in this context is very important. Other possible causes may be one of the judge's staff about managers, other possible causes may be one of the judge's staff about managers that the promotion of personal relationships and support networks unjustified managers are harvested and the eligibility criteria are not necessarily the main reason they are promoting. The performance of these managers fail and lack of qualifications in the field show the kind of misgivings Suspicion in the sense of disbelief, having negative feelings and behavior and with negative emotions or belief aligned.

On the other hand, one of fundamental problem in management organizations is facing the organizational differences that any manager allocates considerable time to solve them. The necessity of contradiction, just as the need for air, must build and live with it, not put it away. It should be noted that the differences that remain unresolved, leads to people's resistance gradually and solve them at the next opportunity will be more difficult and when fully suppressed, causing reactions are associated with aggression (Ahmadi, 194: 2004). Conflict is an integral part of human life, reviewing and superficial historical events, current events and cultural products (stories, novels, stories, videos, etc.), which represents the corner of the realities of social life, shows how conflict is one of the most prominent and important aspects of life forms. Ddaneyls (2008) in a study knows suspicion an effective means for conflict and believes that suspicion causing conflict in the organization. In this article the role of suspicion and the factors that cause conflict in your organization are examined.

Social, organizational and individual life always is facing with conflicting and stretching forces. Wherever there is opposition, there is conflict. Although life is contrary to human creation (the conflict between Cain and Abel), but only in recent years been seriously considered by scholars research. Conflict is an issue that people think more than anything else (except God and love) is busy The importance of conflict and the need for effective management has led the study organizational conflict interested by entrepreneurial and managerial experts. In the

meantime, according to the perception of conflict in the organization can help managers to provide conditions that people experience less conflict.

The fundamental point is attitude towards conflict and dealing properly with it and recognizes its right or wrong, based on the reasons and causes it and proposed solution for optimum utilization of its sound Conflict is including part of human life. Wherever there is opposition there is also conflict For this reason, it is important that the conflict be managed rather than suppressed and not be allowed to escalate conflict and out of control.

In fact, pessimism is a variety of suspicion intent to others without any or adequate reasons and can have a variety of organizations and society. This does not mean that people with bad intentions do not exist, but in the sense of having a negative attitude about the motives of others without evidence is required. This suspicion encompasses beliefs, negative emotions and extreme distrust caused by disbelief to the benevolence of others. Such suspicions is about managers overall or about senior executive's intent of an organization on implementing measures and organizational changes. The importance of this issue is that an atmosphere of mistrust and actually produce a movement motivated and active participation in organizational change and initiatives destroyed. Participation in organizations acts need to feel and believe in confidence to the ability of managers and in most circumstances to ensure good management is supportive of change. Some organizational changes may never fail similar experiences in the past failed because it changes or de facto managers of commitment and promises in the past claimed to be joined to the truth. In many of these cases, it may be the main cause of bad managers not good, but lack the necessary capabilities for effective leadership of organizational changes. Researchers have conducted various studies on this phenomenon at the organizational level. Some research shows that the incidence of this phenomenon probably had not nature of the character and there is more social learning. Past research search the possible origins of this issue at factors such as the following and empirical evidence for these cases have been identified in various studies 1 - Ambiguity in communication or the lack of effective and transparent corporate communication patterns; 2 successive failures of organizational performance management and continuous decline; 3 Impaired psychological contract between an individual organization; 4 Executives high salaries compared to other employees; 5-harvesting of severe injustice in the organization; 6. Reduce the number of manpower with speed and large number.

Suspicion like a pest acted in an organization and would ruin the power of organization. Suspicion of the true and honest performance among staff is less than other corporate persons and causes of apathy, secrecy, conflict, mistrust, anti-social and deviant behaviors. If employees have the ability to resolve conflicts and somehow in conflict because of suspicions they manage conflicts and its power and organization in order to improve their performance and will be able to succeed.

What is suspicious?

Suspicion literally means mistrust, bad imagination, fantasy and bad thoughts about others. In other words, suspicion, it is human behavior and speech of others, thoughts and fantasies wrong and its effect, and it could be a reality. For example, a man is seen talking to a woman came to her and two together have illicit relations, they chat, romance and action, with the person, deal a wicked man, and do malfunction and envious of him stripping assurances. In such a case, suspicions about others and it are such a bad idea, malicious, suspicious and malicious. Suspicion means having sense of evil imagination, fantasy and bad thoughts about someone. In other words, suspicion is that the man, about the behavior and speech of others, thoughts and fantasies and its unfair and it could take effect, for a look at reality.

Suspicion realm is: God suspicion, mistrust and dislike of people, their suspicion

The first two types of attributes of vice and sin in Islam is a great and it has been censured. Toys suspicions suspects are: being in positions of slander, Companion bad guys and villains and the person suspicious is the weakness and internal abnormalities, haste, lack of faith

SUSPICION TERRITORY

Mistrust in God: God suspicion, as the despair of God's great mercy, very big sin, is considered. The Holy Prophet (SAW) said: the greatest sins are suspicion in God. Humans need divine punishment, be afraid, but not of the mercy of God, disappointed, he should perform their duties, act is sincerity, fear of their sins, and yet the Lord of

forgiveness hope. Imam Reza (AS) stated: think yourself, think well in God now because He says: I have to think I'm a believer than myself, if you think good to me, good, bad, and if I had to guess, he'd be behaving badly.

B) Suspicious to people: people are suspicious of a man than the people who really do without it have done wrong and think evil thoughts and to give it effect. This type of suspicion, such as Type I (suspicion of Allah) ugly traits and such is a sin. Ali (AS) said: suspicion man righteous, the worst sin and the ugliest oppression

C) Self-suspicion: suspicion to himself, that man has always carried himself against God and His law be the culprit. This kind of suspicion, unlike the first and second types, not only guilty, but the outstanding attributes and the benefits of pure believers, because it can try more in the way of obedience and worship of God and a man of pride and neglect keeping.

Imam Ali (AS) said: O servants of Allah! Learn the believer, morning to evening, and the night does not deliver, unless your breath, suspicious and constantly reproach him that he expect more of his work.

WAYS OF FIGHTING SUSPICION

To overcome the suspicion, there are ways to describe it explains:

A) Amend breath: suspicion of infected people, evil and ill-wisher. Corrupted and infected individuals compare others by themselves, and they see their vices reflection, hence, all as yours and your character is known, assumed that all like her. To combat this situation before anything suspicious person must pay to correct its faults, so if compared with others, the suspicion does not suffer. On the other hand, note that others should not assume as their own, because they may have higher and better morale. Hence, do not deserve their bad criterion, and to the brethren could be wrong. One way of fighting with suspicion is self-correction. Imam Ali (AS) said: Blessed is the man that evil itself dissuade him from the evils of the people.

B) Muslim work carries out properly: Certain people appear general rule a Muslim, not a bad thoughts and evil do not give up and not to the devious and the verdict of Islam from many vices and abominations clean. Hence, Muslims observe things from each other, as far as possible and justification must carry it on their health and refrain from carrying out deeds and words each over evil. This is another way of fighting with suspicion. Ali (AS) said: Working brothers give it their best, to make way justify that close to you. And never to speak of (mouth) brother comes out, if this is not the bad thought about it, the interpretation of goodness.

C) avoid hasty: One way to combat the suspicion is that if man is not judged immediately heard something about your Muslim brothers and not effect, but wait until it's confirmed or denied it to him. If assurance is confirmed, then effect on it. The Prophet (pbuh) said: Whenever I think "bad", (and do not realize it demonstrates and later) do not judge. Imam Ali (AS) said: O people! All the brothers knew their knowledge and religion, rock solid step in the right path puts in words and deeds, not words (bad) people listen to him.

D) Thinking on suspicion losses: another way of fighting with suspicion, thinking about the individual and social harms.

The concept of conflict

Throughout history human life has never been free of conflict and no one can claim that it has not been or will not be met. However, with age and history of the conflict in human life, in recent years more attention has been behavioral scientists and managing organizational behavior. In dictionary Persian conflict means getting annoying each other, with both the opposition and the difference is significant. Although there is no conflict or not, something that depends on our conception and perception. So the existence of the conflict depends on the assumption, and this is one of the common definitions of the term is provided. Conflict occurs when there is no agreement in a social situation on basic matters or emotional opposition is causing friction between individuals or groups. By a process in which a conscious effort will be done to counteract the efforts, however, by blocking her way, as a result of desperate to be on track to achieve their goal or increases a means of interest rate.

Conflict is the confrontation, the conflict differ disturb each other and together and in this encounter in a way that everyone is trying to prove his righteousness or be victorious over the other

Robbins is about the conflict of definitions, including behavior that is contrary to the behavior of individuals in order to neutralize dissent. The conflict arises when an individual or group feels that his opponent is aggressive or hostile, or is in opposition, or the conflicting actions flow. The relationship between conflict and the perception is significant, because a conflict exists when people do not understand it. Thompson knows each behavior by the members of an organization oppose the conflict with the other members Conflict is to satisfy the needs of a reasonable person in the faces or in their pursuit of hopes deceived ones.

The views expressed in the concept of conflict

It is very reasonable to say that the existence of the conflict to the conflict in role and the groups and organizations existed; in one of the schools argued that the conflict must be avoided. According to the school of thought that is supposed conflict is the destruction of the traditional view. The other two known human relations view, it argues that conflict is a natural and unavoidable result that occur in groups and do not necessarily harmful it is called, but it has the potential to be a positive force that can be made. The third view is the basis not only of conflict in the group is a positive force, but argues that conflict is essential and very necessary and increase the effectiveness and success that the school is known Interactionism view. The main role of this way of thinking about conflict is the phenomenon forcing leaders to maintain a certain level of conflict in the group work and kept the conflict to the extent that the hold group alive, creative and critical. There are three perspectives in conflict:

A) The traditional view: in the traditional view it has been assumed that conflict is bad. Synonyms of the word conflict have a negative charge, such as rebellion, defiance, destruction and irrationality that should be avoided. The view that "conflict is bad", resulting in a simple way it should be considered based on the behavior of people who are causing the conflict. Because any kind of conflict must be avoided, so should only be considered due to conflict and to improve the performance of groups and organizations, the destructive practices remedied. Although the result of research conducted in recent years confirms this view that these measures will improve the Group's performance, but people still accustomed to the same old and outdated view look to this phenomenon. In this view, a conflict is deemed unnecessary and harmful in the organization which urgently needs to be resolved and if conflicts occur, the director sees it as a personal failure

B) Human relation view: those who watched the conflict phenomena from the perspective of human relations argued that conflict is normal in groups and organizations.

Since it is natural and inevitable phenomenon was a source of conflict, therefore recommended that the school should accept its existence. Fans of the school to its existence and proof that they were spoken; they believed that it is impossible to eliminate conflict and that there are many cases of conflict of interest groups, and improves performance. Human relations perspective (about the conflict theory) of the last years of the 1940s to the second half of the 1970s was common.

C) Interactionism view: current conflict theory revolves around the view it is known to interact school (Ghasemi, 386: 2003). In this view, not only conflict is inevitable, but also for health organizations is required. In other words, conflict is not good but not bad though and depends on how the operation is run. Please with this view, attempts the existence of a conflict to minimize the negative impacts and maximize the potential positive effects of the conflict of interest.

The process of conflict

A study of the pattern of conflict between organized groups observed, content and organizational factors determining the potential conflict between groups. Resonance characteristics of the specific relationships between groups, causing conflict occurs between groups and special events that lead to failure and frustration people are also amplified. At this stage is to understand the behavior and perception of the conflict, leading members of the group, can be caused through conflict management created the effectiveness of the organization. This is a dynamic process that can react with the senior executives continue to benefit the organization. Conflict process consists of five steps below knows:

First stage: potential objections

The first stage will provide the conditions that create conflict. These conditions should not necessarily lead to conflict and include the following concepts:

1. **Communication:** Survey results show that problems in the interpretation of speech, exchange of information and the presence of immature noise in the communication channel each for the dam or barrier to communication and the precursors of conflict phenomenon.
2. **Structure:** The term structure includes the following variables, the size or magnitude group, the expertise of things that can be assigned to group members, border responsibilities, practices or leadership style, pay and reward systems and dependency groups to each other, research shows the size or large groups and are the specialty risk of worsening conflict. Also it inversely related to years of service and conflict with each other. As members of the younger and more employees are moving, the greater will be the possibility of conflict
3. **Personal variables:** the right of the causes personality and behavioral features, mood value systems that are unique and different in each individual.

It should be noted in order to avoid a repetition of the arguments explaining these variables is fully referenced in individual behavior.

Second stage: Understand and emergence of conflict

These conditions would fail, will provide the possibility of realization of potential opposition. This situation can only become that one or both parties to the conflict, damaged or become aware of it. But conflict does not mean that aspect of our personal data. When man becomes emotionally involved and both sides suffered anxiety, stress and hostility that disagreement and incompatibility is perfectly sense

Third stage: plans or intentions

Intend to do, ie, space between thought and feeling on the one hand and on the other hand his is apparent behavior. Here plans or intentions; namely, the decision to do specific manner, in other words the person must know how to react other than your own behavior and be aware of the intention of the other party. A lot of contradictions and conflicts that arise in a group, another group are accused of having intent or bad faith. Apart from that there is the intention or the intention of the person and his behavior. So, what one does reflects the intention of him.

Stage IV: behavior

Most people when they think about the conflict or opposition protesters to conduct their attention. Perhaps this behavior is a manifestation of the conflict. This includes tools opposition, action and reaction and opposition parties. At this stage of the conflict virtually overt act and type of work is such that the intention or the intention is different.

RESULTS AND CONCLUSION

There is an obvious conflict and practices recourse to it (or find a solution) leads to clear results. This result can be constructive, which means that the existence of a conflict of enhanced performance group. On the contrary, it is possible to block opposition groups and thus bring destructive.

Conflict in organizations is considered normal can never completely remove it, and not necessarily bad. Conflict has positive aspects and leads to the creativity, innovation and changes it. If organizations are to be kept away from conflict, apathetic, inert and are reluctant to change. However, all conflicts are not particularly helpful or constructive. When managers talk about the problems they conflict mainly to the impact of conflict and resolve issues arising from that point. It is true that conflict management involves both stimulation techniques and methods of resolving conflict are disagreements. Among the factors influencing the conflict is suspicion in the organization. In fact, suspicion of intent and pessimism without any or adequate reasons and can have a variety of organizations and society. This does not mean that people with bad intentions do not exist, but in the sense of having a negative attitude about the motives of others without evidence is required. This suspicion encompasses beliefs, negative emotions and extreme distrust to the benevolence of others. Such suspicions may have an overall, managers or senior executives of an organization intent on implementing measures and organizational

changes. The importance of this point is that the atmosphere of mistrust and actually produces a movement motivated and destroys active participation in organizational change and initiatives.

CONFLICT OF INTEREST

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FAMILIARITY AND PREFERENCE OF IRANIAN EFL TEACHERS IN USING POST-METHOD CONCEPTS

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ABSTRACT

The field of language teaching has been always in transition. One of the most remarkable transitions in English Language Teaching is the demise of the concept of method, and its replacement by Kumaravadivelu's post-method based pedagogy which liberates us from the limitations of methods. The methods are mostly criticized, because they were normally "top-down". Teachers had to acknowledge to one especial theory underlying the method and apply it in their own practice. We still observe teachers having top-down views toward teaching. The principled teaching practice is based on the parameters of particularity, possibility, and practicality, but it has not been qualified by all the scholars. That's why this research tries to verify its real emergence in Iran as an EFL context by means of a questionnaire. The reliability of the instrument was calculated by Cronbach alpha reliability estimation calculations. The participants were 90 male and female teachers of English in the English language institutes and schools in Shiraz, Iran in 2014. The result of the study questioned the feasibility of a post-method based pedagogy and its appearance into Iranian context. The outcome of this study can be useful to teaching theorizers and the policy makers of the educational system. They can benefit from this study to adjust their educational requirements to the reality of classrooms and accelerate the appearance and acceptance of modern paradigms in line with the international practices. Moreover, it can help teachers to better appreciate the concepts of post-method with the aim of judging the plausibility of it.

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KEY WORDS

language teaching, Post-method condition, method, principled approach, possibility, practicality, particularity, macro-strategies, micro-strategy

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INTRODUCTION

Throughout the history learning a foreign language was a common phenomenon among the people. Nowadays that English is known as an international language, the importance of learning this language has been increased for the sake of comprehensible communication among nations. Crystal stated that "English is the global language" Therefore, this language is the global lingua franca. Lingua franca can be defined as "a language that is used for communication between different groups of people, each speaking a different language"

Furthermore, in Iran this fundamental importance of learning and teaching English is admitted by the educational system, and among the Iranian people this language has gained a prominent role. The evidence for this claim is the increasing demands of the Iranian nation for learning the language. Despite the awareness of its significance, our educational system has not been entirely successful at keeping up with the international endeavor and challenge. We might have also been behind schedule concerning the transitions that the second language teaching profession has been experienced.

The field of language teaching and learning has been evolving since thousands of years ago since its inception [1]. For English language teaching this evolution generally starts with GTM, and then we have DM, ALM, and finally CLT. Although they have different goals, assumptions, and teaching techniques what they all have in common is the belief that "if the language learning is to be improved, it will come about through changes and improvements in teaching methodology Seeking out for the best method was practically useless [2] English methodology has recently experienced another transition [3]The other term for this transition is the "post method condition" [4] Some researchers like All wright Prabhu and Stern have argued against the very concept of method and the limitations it imposes on learners and teachers. Therefore, a number of scholars have suggested new frameworks for this new era in English language teaching and methodology. But the methods are not rejected completely by the scholars and practitioners. As Pica discusses in his article about the integration of "tradition and transition" in this millennium. Therefore the methods are not completely dead; they are still being used by many all around the world. But the fixed roles and characteristics of teachers and learners are changed.

There is increasing concern of the importance of the post-method concepts for foreign language learning; however, most teachers continue to use the old approaches and methods in the EFL (English as a Foreign Language) context of Iran. The post-method principles are insufficiently used or not used at all. There is not much research done on the effect of this revolution from method to post-method principles in Iran as an EFL context. Furthermore, there have been conflicting ideas about the true appearance of this transition or evolution from method to post-method pedagogy and the real practicality of post-method based instruction. Consequently, some studies have been carried out to prove or disprove either side's claims. But are Iranian teachers really familiar with post-method principles? Thus, this article aims at searching into the nature of roles and characteristics of English teachers and learners in an EFL context to see to what extent the essential principles of a post-method pedagogy have been realized or are on the way to implementation, and also to examine how much the Iranian teachers are familiar with the rules and principles of the post- method era in Iran.

This section presents a review of the literature relevant to method and post-method era. As a result, the most prominent studies conducted on these issues are reported.

Language teaching methodologies in Iran

Iran belongs to the expanding circle of Kachru's World Englishes Model. The expanding circle includes "regions where the performance varieties of the language are used essentially in EFL contexts" [18] Therefore, teaching English is a difficult task to accomplish in such an EFL context. Public schools and language institutes are the two mainly different educational contexts in which English is taught in Iran [5].

The educational system of Iran is now considering teaching English language from primary school level. Though being able to recognize the need for providing students with English competency, the quality of English education in schools is not acceptable and has actually acted ineffectually. Therefore, most of the pupils with the intention of gaining a better English fluency and proficiency have to take English classes in private language institutes. In these institutes, textbooks are the main teaching materials. There are three main different levels of age range: Kids, young adults or teenagers, and adults. New English students who seek to enter these private institutes are evaluated by means of placement tests and also oral interviews to decide upon their accurate level of proficiency or ability. Course evaluation is based on mid-term, final exams, and also class activity. The syllabus is prepared in advance, and its application procedures are clarified in teacher training courses (TTC) which are carried out by the institutes. The flexibility of guidelines and principles differ from institute to institute depending on the management board.

Farzin-nia stated that the first formal English language institute was founded in 1925 in Iran as Iran-America society [18]. After the revolution ILI (Iran's Language Institute) which is affiliated to Center for Intellectual Development of Children and Young Adults was founded in 1979. ILI is the most prominent and powerful institute in the region. Persian, English, French, Spanish, German and Arabic are taught in this institute. However, English continues to be the most desired language to be learned in Iran.

From methods to post-method

There are different ways of defining methods. Edward Anthony defined method as "an overall plan for the orderly presentation of language material" in his hierarchical model consisting of approach, method, and technique. Afterward, Richards and Rogers modified the definition of method by revising it as an umbrella term which includes the concepts of approach, design, and procedure. According to Richards and Rodgers, "a method is theoretically related to an approach, is organizationally determined by a design, and is practically realized in procedure". Oller also indicated that methods include "programs, curricula, procedures, demonstrations, modes of presentation, research findings, tests, manners of interaction, materials, texts, films, videos, computers and more". The definition adopted by most researchers is what Brown puts as: "virtually all language teaching methods make the oversimplified assumption that what language teachers 'do' in the classroom can be conventionalized into a set of procedures that fits all context". For Kumaravadivelu a method "consists of a single set of theoretical principles derived from feeder disciplines and a single set of classroom procedures directed at classroom teachers".

The 20th century was the most dynamic period and witnessed many changes and innovations of different varieties of language teaching methods and approaches. Between the 1950s and the 1980s are the most active period of

changes and developments of language teaching methods and approaches. The various approaches and methods to foreign language teaching which often had very different characteristics were emerged during this time. In the 1950s and 1960s the Audio-lingual Method and Situational Language Teaching experienced their period of greatest popularity. However, both were substituted by the Communicative Approach. Throughout the same period other methods could also catch some attention, though not as great as the methods just stated above. Nevertheless among these still well known methods were the Silent Way, the Natural Approach, and Total Physical Response. In the 1990s, Content-Based Instruction, Task-Based Language Teaching, and Competency-Based Instruction were introduced. Other approaches like Cooperative Learning, Whole Language Approach, and Multiple Intelligences, which were initially developed in general education, were extended to foreign language teaching. In conclusion, in the 1990s applied linguists and language teachers turned away from the view that newer and better approaches could solve the problems in foreign language teaching and searched for different ways for understanding the nature of language teaching. Richards and Rodgers call this period the post-methods era [38]

Kelly and Mackey were among the scholars who began criticizing against the concept of method In the 1960s. These criticisms reached their climax in 1980s, ironically while scholars were searching for the best method or what Richards and Rodgers name “the language teaching problem” The ineffectuality of this was clarified in detail by Prabhu in the widely read article: “There Is No Best Method” “Century old obsession”, “misguided” and “interested knowledge” were the well-known labels used to reveal the deficiencies of the methods. “The Death of the Method” was an article which disclosed more the growing disappointment with the methods.

After a century of methods and approaches in language teaching we have what Kumaravadivelu coined, and afterward referred by Brown and Richards and Rogers as “the post-method era” in which they are involved in the negotiations of language teaching without stating the word method or approach. Brown Pennycook and Stern (1985) are some examples of scholars who grieve for the “century-old obsession” with the search for the ultimate best method. For Kumaravadivelu method “has had a magical hold on us” Brown makes many references to the death of methods—“we lay to rest . . . methods” “recently interred methods” and “requiem for methods” Brown’s lists 12 “relatively widely accepted theoretical assumptions” about L2 learning and teaching in his “principled approach” Richards’ notion of effective teaching is based on the best practices approach for developing methodological and practical rules from the study of classroom practices and procedures used by proficient and capable teachers.

Kumaravadivelu’s declaring the emergence of what he calls “post-method condition” followed by the announcement of the demise of the concept of method Kumaravadivelu indicates a framework of 10 macrostrategies based on “current theoretical, empirical, and pedagogical insights” As said by Kumaravadivelu, “a macrostrategy is a broad guideline, based on which teachers can generate their situation-specific, need-based microstrategies or classroom techniques macrostrategies are theory neutral as well as method neutral”. In fact, a method-neutral approach was the alternative to method or in Brown’s words “a principled approach” Efforts to develop method-free frameworks has resulted in emergence of Stern’s three dimensional framework (1992), Allwright’s Exploratory Practice as mentioned before Kumaravadivelu’s macro-strategic framework and Brown’s principled teaching.

The framework adopted in the present study is Kumaravadivelu’s framework .His framework is based on three pedagogical principles of practicality, particularity, and possibility The practicality parameter assumes that the relationship between theorists having their professional theories and practitioners generating their personal theories must be dialectical and make it possible for teachers to make their own theory of practice and engage in what Prabhu calls “teachers’ sense of plausibility” The second one emphasizes the need for a context sensitive language instruction which takes into consideration the linguistic, socio-cultural, and political particularities. The last principle deals with the empowerment of teachers and students to help the identity formation and social change. Social justice and change are embarked on by critical pedagogy through exposing the biased political foundations of education [14] Moreover, Post-method pedagogy has tried to change the roles of both learners and teachers. Once the learners were supposed to be “passive recipients of knowledge”, but now they are becoming “active and autonomous players”, and the teachers who used to be “transmission models or passive technicians are assuming the role of reflective practitioners or even transformative intellectuals”. On the other hand, post-method pedagogy faced two types of barriers on its way to implementation: Pedagogically about the abolition of deeply fixed transmission model of teaching, and ideologically dealing with issues like marginalization and self-marginalization.

Over the past few decades, there is a lack of agreement in understanding some basic concepts in language teaching. While there seems to be enough evidence supporting the emergence of post-method condition, some famous figures have hesitated about its existence. The actual emergence of post-method in reality and the main body of research which has so far focused on are mostly theoretically oriented aspects of post-method which causes this dilemma. Moreover, Akbari's criticism against post-method is that it is far from reality and is just at the level of discourse or theory. He considers that post-method is unbelievably difficult for teachers (2008). Thus, it failed to achieve its parameters of practicality and possibility.

Post-method perspectives seem to support abandoning methods in general. These perspectives do not take into account the facts indicating that in spite of the limitations it imposes on teachers and learners, the concept of methods is still an important one for classroom teachers [31]. In addition, Liu proposed frameworks that are not an alternative to method but an addition to method. These facts are evident in several editions of books broadly used in MA methodology courses and teacher training programs in journal articles and several conference presentations. Moreover, they pay no attention to the idea that methods are significant for "understanding what TESOL professionals do". Bell also claims methods are not dead in teachers' opinions, rather method and post-method are complementary. Larsen-Freeman considers that the study of methods is priceless to teacher education, because "methods serve as a foil for reflection that can aid teachers in bringing to conscious awareness the thinking that underlies their actions. By becoming clear on where they stand, teachers can choose to teach differently from the way they were taught, and these macro-micro strategies form a method. Nunan argues that "the way to overcome the pendulum effect [in language teaching] is to derive appropriate classroom practices from empirical evidence on the nature of language learning and use and from insights into what makes learners tick". Bell also concludes that "method and post-method together can liberate our practices." Moreover, Pica argues about the "integration of important components of older and more recent methods and a reconceptualization of them". Adamson also proposes that by providing the principles that lay the basics of a teacher's knowledgeable choice can make an influential contribution to the improvement of "teachers' principled eclecticism or pragmatism" in post-method contexts. Subsequently, methods and post-method concepts can be complementary, and they can both improve the language teaching methodology we use in classes.

Since little attempt has been devoted to practicing and training aspects of post-method pedagogy, the present study aims at examining the degree to which post-method concepts have been able to make its way into an EFL pedagogical context like Iran.

.Empirical studies done

Liu selected a sample of 448 EFL teachers randomly to investigate the degree of their familiarity with methods, their method use, and their preference of a special method. A multidimensional theoretical framework was suggested to conceptualize language teaching methods in post-method era. In another study, Hazratzad&Gheitanchian chose 594 Iranian EFL teachers to search any possible relationship between teachers' positive or negative attitudes towards post-method and their students' achievement. Although it was expected that the positive attitudes of teachers towards post-method pedagogy would cause better achievement amongst their students, the results revealed that there existed no correlation. In another research, Razmjoo, Ranjbar, and Hoomanfar chose 254 teachers of English in the private institutes of Shiraz, Iran. This study shows that there is a long distance to the genuine appearance of post-method concepts, particularly its possibility and practicality parameters.

Objective of study

Given that the role of post-method concepts has been underestimated, and the research conducted in Iran has failed to consider it as a beneficial means to teach English as a foreign language. This study tries to investigate the present situation of Iran's English language learning and teaching context to observe to what degree the transition from method-based pedagogy has been observed in this EFL context. This study also tries to examine the emergence of post-method teaching in line with learners' roles and in learners' lives; furthermore, it attempts to search the manifestation of post-method principles in teachers' lives and also in their attitudes.

Research questions

Based on the objectives of the study, the following research questions were proposed:

- 1) To what extent do our teachers have the necessary features of a post-method teacher?
- 2) To what extent are our English learners true post-method learners?
- 3) To what extent have the parameters of practicality, particularity, and possibility emerged in Iran’s private language institutes and public schools?

Significance of the study

English language teaching is significance in the eye of both the educational system and the society in Iran, so this study will be significant in promoting teaching principles to improve English learning in an EFL context like Iran. Those who can benefit from the information obtained from this study are the policy makers, theorizers, language-planners, textbook developers, curriculum designers, learners, and also teachers. This study can provide us with an insight into objectives, activities, textbooks, and tests concerning language teaching and learning in Iran. It can also pave the way so that the transition might be feasible to allow us make up for any deficiencies compared to the international tendencies specifically in raising socio-political awareness and empowerment of the learners or teachers. Also this study can make us aware of the demands of accepting a context-specific approach toward teaching English and make our academic circles more and more conscious of the most recent trends in teaching. On the other hand, it can make researchers in the field to rethink, and reconsider their claims by providing information about an EFL context.

MATERIALS AND METHODS

Participants

The participants of the study are from a variety of social, economical, and educational backgrounds. They were 90 (33males and 57 females). The overall age range was between 23 and 33 years of age, with a mean of 26.47(SD=2.92). They had from 1 to 15 years of teaching experience with an average of 5.03.23 teachers held an M.A. degree and the rest had B.A. degree in Teaching and Literature. All participants completed the same questionnaire. They were all general English language teachers from institutes and public schools in Shiraz, Fars province (a large city in Iran).

Instruments

This research is a quantative one, and it was conducted by administering a questionnaire. The questionnaire consists of 22 items, and the participants were asked to answer the items which were based on the Likert scale. This questionnaire was based on the principles of particularity, practicality, possibility, the role of teachers, and the role of learners which are the main principles of post-method pedagogy.

The participants’ responses are between the range of 22 to 110 and the neutral score of 66. The maximum score of 110 implies the highest degree of agreement to concepts of a post-method based pedagogy. The minimum score indicates the lowest degree of agreement to post-method principles which equaled 22.

The validity and reliability of the instrument is conducted by the researchers who designed the questionnaire. A pilot study was conducted in order to determine the validity of the instrument. They randomized all the 22 items of the questionnaire and distributed them among 154 teachers of institutes. **Table-1** illustrates that the data collected from the pilot study which was analyzed to determine the validity coefficients in terms of factor analysis [3]

Table: 1. Confirmatory Factor Analysis of the Questionnaire

1	The parameter of particularity (Items 5, 7, 13 & 17)
2	The parameter of practicality (Items 3, 11, 14 & 19)
3	The parameter of possibility (Items 2, 4, 10, 15, 16 & 20)
4	The role of teacher in post-method based pedagogy (Items 1, 6, 9 & 21)
5	The role and contribution of learners in the learning process (Items 8, 12, 18 & 22)

Using SPSS, Cronbach alpha (CA) was estimated to determine the reliability of the questionnaire. On the whole the internal consistency of the questionnaire was 0.888 based on the data collected (as cited in Razmjoo, Ranjbar&Hoomanfar, 2013).

Data Collection

Data collection was done by distributing the questionnaires among teachers. The objectives and procedures of the questionnaire were explained for the participants before requesting them to answer the questions. After the familiarizing procedure the questionnaires were distributed among them. They had enough time to go over the questionnaire and answer them. They were supposed to fill it out and return the questionnaires either via e-mail or in person. 84% of the questionnaires were returned. Each questionnaire was assigned a number both to keep the anonymity of the respondents and to follow-up on non-respondents. The participants' confidentiality was guaranteed.

Data Analysis

To facilitate data entry and data analysis, a code book was developed to specify the question numbers, variable names, and values of the variables. Based on this code book 30 valid data were entered into the SPSS v.21. The data collected was analyzed through descriptive statistics (e.g., minimum, maximum, mean, and standard deviation) and inferential statistics (e.g., correlation).

RESULTS

In this part the outcome of the study are presented and clarified. Each items of the questionnaire were checked in percentage to express the teachers' idea about the rules representing post-method pedagogy. We have to be careful about the items number 1, 3, 4, 7, 8, 10, 12, 17, 19, 20 and 21 which were negatively stated, and for analysis their results should be reversely scored.

Table: 2. Basic Descriptive Statistics

	N	Minim um	Maxim um	Mean	Std. Deviation
Total	90	66	99	82.13	9.493
Valid N (listwise)	90				

N=Number Std. D= Standard Deviation

Table- 2 shows the measures of central tendency and dispersion for the 30 MA and BA teachers of TEFL and literature. The minimum and the maximum are 66 and 99 respectively and the mean and standard deviation are 82.13 and 9.49 respectively, too. Since the mean is less than half of the standard deviation over the neutral point, we can conclude that teachers don't have a positive attitude toward post-method principles. The distribution of the data is in the form of a quasi-normal curve as **Figure- 1** depicts.

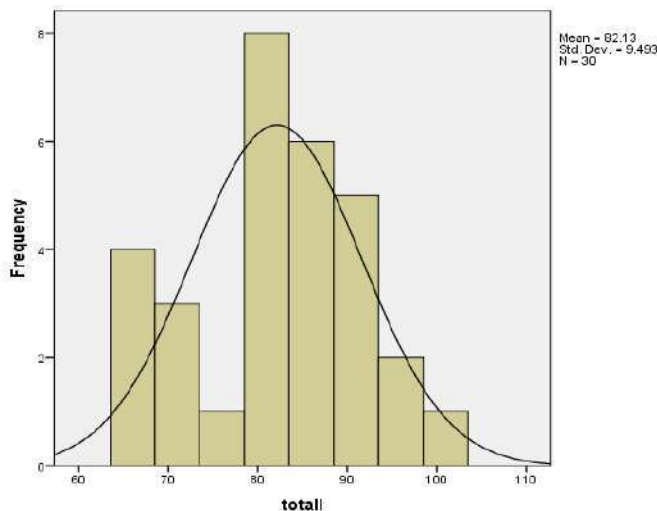


Fig: 1. Display of answers to the questionnaire

Table: 3. Teacher Attitude in Terms of Frequency (F) and Percentage (p)

Item	SA+A		U		D+SD	
	F	P	F	P	F	P
1. My role is to transmit knowledge without altering the content.	18	26.7%	6	6.7%	60	66.6%
2. I give learners institutional, political, social and cultural awareness.	12	80%	12	13.3%	6	6.7%
3. I can't generate my own theories to teach in class.	6	6.7%	18	20%	66	73.3%
4. I am not interested in the sociopolitical context and its power dimensions.	18	20%	15	16.7%	57	63.3%
5. My teaching is in line with the notion that every class context is unique.	69	76.6%	6	6.7%	15	16.6%
6. My role is to help students gain a sense of ownership of education.	78	86.7%	3	3.3%	9	10%
7. My teaching does not vary from context to context.	18	20%	3	3.3%	69	76.6%
8. My learners don't have a role in pedagogic decision making.	9	10%	15	16.7%	66	73.3%
9. I have a fair degree of autonomy in pedagogic decision making.	51	56.7%	12	13.3%	18	30%
10. I'm not interested in sociopolitical issues in my classes.	21	23.3%	9	10%	60	66.7%
11. I observe, analyze, and evaluate my teaching to generate my own theories.	72	80%	9	10%	9	10%
12. My learners don't search for language beyond the classroom.	12	13.3%	30	33.3%	48	63.4%
13. My teaching is sensitive to a particular group of learners in a particular institutional or socio-cultural context.	69	76.7%	3	3.3	18	20%
14. I generate my own theory of teaching.	81	90%	6	6.7%	3	3.3%
15. I try to tap the sociopolitical consciousness of learners as change agents.	57	63.3%	39	33.3%	3	3.3%
16. I try to bring about social, cultural, and political change and transformation.	60	66.6%	15	16.7%	15	16.7%
17. I don't adjust my teaching to the particular conditions of different contexts.	21	23.3%	3	3.3	66	73.3%
18. My learners are active and autonomous.	75	83.3%	9	10%	6	6.7%
19. I'm not interested in making my own theory of practice.	15	16.7%	3	3.3%	72	80%
20. I don't encourage learners to investigate how language as ideology serves vested interests.	15	16.7%	12	13.3%	63	70%
21. The system doesn't recognize my role to teach autonomously within constraints of institutions, curricula, and textbooks.	51	56.6%	15	16.7%	18	26.6%
22. My learners explore the Internet and bring to class their own topics.	66	73.4%	6	6.7%	18	20%

In **Table- 3**, in order to have a better image or idea of the respondents’ answers to the items, the first two (strongly agree and agree) and the last two (disagree and strongly disagree) were added up together.

Post-method principles are not seriously appreciated or implemented in Iran. For example, roughly one third of teachers agree with the subsequent items representing post-method principles (see **Table- 2**): Item 2, 14, 5, 9, and 18.

Table: 4. Teacher Attitude Regarding the Five Principles of Post-method

Principles	SA +A		U		D+SD	
	F	P	F	P	F	P
1. Particularity (Items 5, 7, 13 & 17)	45	49.9%	6	5%	39	47.45%
2. Practicality (Items 3, 11, 14 & 19)	42	48.35%	12	10%	36	41.65%
3. Possibility (Items 2, 4, 10, 15, 16 & 20)	36	44.9%	21	26.6%	33	28.5%
4. Teacher role of (Items 1, 6, 9 & 21)	51	57.5%	9	16.7%	30	25.8%
5. Learner role (Items 8, 12, 18 & 22)	39	45%	15	16.67%	36	38.33%

Table- 4 reveals teachers’ attitudes about the principles of post-method based pedagogy. The particularity parameter which considers the importance of context is identified by at least half of the Iranian teachers. Almost half of Iranian teachers declare that their roles are in line with those of a post-method teacher. Since the statistical percentages are uniformly distributed among the items, there is no unified agreement over the existence of post-method learners. Another point is that only 44.9% agree with possibility parameter which demonstrates the teachers’ reluctance to bring about socio-political change or transformation. Mostly they do not want to get involved in issues which might put in danger their life or position. At this point one can conclude that the two principles of particularity and possibility are contradictory but not complementary.

Actually, the particularity parameter is ironically defeating its own rationale by claiming to contextualize teaching practice, because contextualization of the parameter of possibility is sometimes unusual and impractical in lots of contexts. The practicality parameter which emphasizes the significance of involving teacher generated theories of practice in pedagogy has not received much acceptance, since this is difficult and demanding for the teachers, they must be experienced ,proficient or skillful enough to be able to generate their own theories or because of the restrictions imposed upon institutions or books.

The heavy dependence on proficiency and experience of teachers is interesting evidence to the previous criticisms of the post-method, because of its the correlation between teachers’ experience and their agreement with the principles of post-method. The correlation between the practicality principle and teacher experience was examined using Pearson product-moment correlation coefficient. There was a strong positive correlation between the two variables, $r = .66$, $n =90$, $p < .0005$. That means high level of teaching experience leads to an ability or tendency for making theories of practice.

The results support Akbari’s claim that teachers who are at the third stage of Fuller’s three stages of teacher development will have the ability but not necessarily the enthusiasm to act based on the post-method pedagogy (2008). In fact it is the experience that provides the teachers with the ability to make their own theories of practice which are modified and re-modified based on their teaching analysis and assessment of classroom activities by means of their own sense of plausibility.

The results of the study increase uncertainty about the emergence of some principles of post-method especially possibility and practicality. It also validates the criticisms on post-method regarding its practicality. The post-method advocates are called over again to reconsider some of the main principles of their theories and reflect deeper about their theories possibility consistent with the restrictions and requirements of real language classrooms and the institutional, social, and political contexts.

CONCLUSION

This study attempted to prove the appearance of post-method based pedagogy and the extent of its manifestation and materialization in some English institutes and schools of a prominent city of Iran, i.e. Shiraz. The present study increased uncertainty about the real appearance of post-method based pedagogy and the perfect and faultless realization of all its principles. Actually the existence of post-method pedagogy on the principles of particularity, practicality, and possibility and particularly the last two principles in the EFL country of Iran seems impractical and far reaching. A high level of contextualization or elimination of some parts is needed perhaps at the expense of modifying the whole principles. Since the present study focused on English teachers and students as a sample of the expanding circle of Kachru's World Englishes, the issues can as well be observed in many other parts of the world. The insights achieved from this study are also valuable to the educational systems, policy makers, and a host of academic individuals involved in or influencing language teaching practice. Teachers, theorizers, and language planners can also count on the results of this research. For example, the teachers can be aware of the latest developments in language teaching practice and revising their teaching acts based on new paradigms. Also the others can reexamine the rationales and foundations of their theories to make changes necessary to cause a more rational and practical transition.

Because probability sampling was not feasible due to lack of time and economical resources, non-probability sampling was conducted. One type of non-probability sampling is called Convenience sampling which involves "using available cases for the study" was applied [6]. Therefore, the first limitation of this research derives from the sampling procedures, and the second one is the small size of the sample, which makes it difficult to generalize the results. Finally, the results of this study were based on the quantitative data collected from participants through using questionnaire. Interviews might have been conducted to collect more comprehensive information from teachers.

In the present study the data were gathered only from MA and BA teachers of Teaching and Literature, a further study can be carried out by collecting data from more sophisticated English teachers of universities, which might give a better inspiration for the curriculum developers when devising new programs to develop language teaching pedagogy. Thus, we need more research studies at this level to improve our understanding of the essence of language teaching, and in addition we need a more comprehensive data analysis to study the language instruction.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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THE EFFECTS OF ORGANIZATIONAL HEALTH COMPONENTS ON THE WORK ETHICS OF IMAM ALI HOSPITAL STAFF IN ZABOL CITY

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ABSTRACT

Organizational Health plays an important role in the success of the organization's mission, implementation of strategies and plans, and eventually in achieving organizational goals. The current study aimed at investigation of the effects of organizational health on the work ethics of Imam Ali hospital staff in Zabol City. The current study is of applied type in terms of objective and has a descriptive-survey nature. The statistical population of the study included all the employees of Imam Ali hospital in Zabol who were 550 persons. The sample was calculated as 225 employees using Morgan Table. The field data collection method was chosen for data collection among the several data collection methods. The instrument used for field data collection was the structured questionnaire whose validity was confirmed by the professors and reliability was confirmed Cronbach's alpha. The data analysis was done through statistical tests and SPSS. The research findings indicated that there is a positive relationship between the work ethics components and organizational health of Imam Ali hospital staff.

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KEY WORDS

Work Ethics, Health Components, Staff, Imam Ali hospital

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INTRODUCTION

The concept of work and its role in human social and civic life is clear to everyone. Human life in the society is so ingrained in work. Human work is not only mixed with his knowledge and experience, but also it is manifested as a cultural and valued task [1]. Human capital as the most important factor in the organization's productivity, by using their talents and abilities, can help the organization in achieving its goals [2]. One of the most important factors in positive behaviors that lead to success in the workplace is the work ethic. Work ethic relies on the sense of responsibility, commitment and reliability of the person to function, duties, and responsibilities assigned. In other words, it provides a self-regulatory mechanism for doing the tasks in which people, without direct or indirect supervision from the outside, do the tasks both quantitatively and qualitatively [3].

Work ethics is one of the qualities that lead the staff to passionately and voluntarily put their abilities, talents, and expertise for achieving the organizational goals without control [2], [4]. In other words, work ethics is the sincere consent and commitment to the work a person does in a way even if there is no one supervising him, there will be no shortcomings imposed in terms of activities and duties [5]. One of the fundamental problem of our society in order to achieve organizational health is the poor work ethics among a considerable proportion of the workers of the country. Several factors contribute to the creation of this problem which seems to have a cultural base, among which the social, organizational, and individual are most important. The concept of positive organizational health in an organization, draws attention to the conditions that facilitate the growth and development of the organization, or cause the organization dynamism.

The work ethics should be common among the society members and human resources of the organizations. So, on the one hand, work ethics become natural, innate and universal in people and on the other hand, the use of existing facilities will be maximized at lowest cost and in the shortest time. The researcher of the current study aimed at investigation of the effects of work ethics components on organizational health of Imam Ali Hospital staff in Zabol City.

MAIN HYPOTHESIS

The work ethics components has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

SECONDARY HYPOTHESES

Hypothesis 1: competence has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

Hypothesis 2: order and discipline has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

Hypothesis 3: Conscientious has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

Hypothesis 4: self-control has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

Hypothesis 5: trying to succeed has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

Hypothesis 6: precaution in decision-making has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

CONCEPTUAL MODEL OF THE STUDY

According to review of literature and summers, Allen, and Meyer's model (1991) and Mohseni's Model (2008), the theoretical framework was made. The work ethics indicators (traits of conscientiousness): these traits are the exact indicators of characteristics of a good employee or worker and include competence, discipline, conscientious, trying to succeed, self-control, and precaution in decision-making (Costa & McGray, 2002).

Competence: Employee's competence means the minimum time and energy consumed for the maximum job done. Order and discipline: Those with the discipline do their duties with integrity, are strict and demanding in performing their duties, and have a regular program for their own affairs. The undisciplined people are not able to organize.

Conscientious: Conscientious is the conscious organizing. Several factors affect the employees' conscientious such as Job satisfaction and organizational commitment. The more satisfied the employees are, the more they will be conscious (Torabian, 2010).

Trying to Succeed: Those who try to succeed are highly motivated and work so hard to achieve their goals. Having work motivation and directing the healthy motivation are among the requirements of correct use of human resource. Self-control: by this trait we mean ability to start and continue the duties in order to complete them in spite of ennu and confusion.

Precaution in Decision-making: This trait is related to the tendency of people to think before acting since decision-making is so important in people's fate and perhaps making a wrong decision bring irreparable consequences for the person.

METHODS

The current study is of applied type in terms of objective and has a descriptive-survey nature. The statistical population of the study included all the employees of Imam Ali hospital in Zabol who were 550 persons. The sample was calculated as 225 employees using Morgan Table. The field data collection method was chosen for data collection among the several data collection methods. The instrument used for field data collection was the structured questionnaire whose validity was confirmed by the professors and reliability was confirmed Cronbach's alpha. The data analysis was done through statistical tests and SPSS.

RESULTS

Multiple Linear Regressions and the Main Hypothesis

Main hypothesis: The work ethics components has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

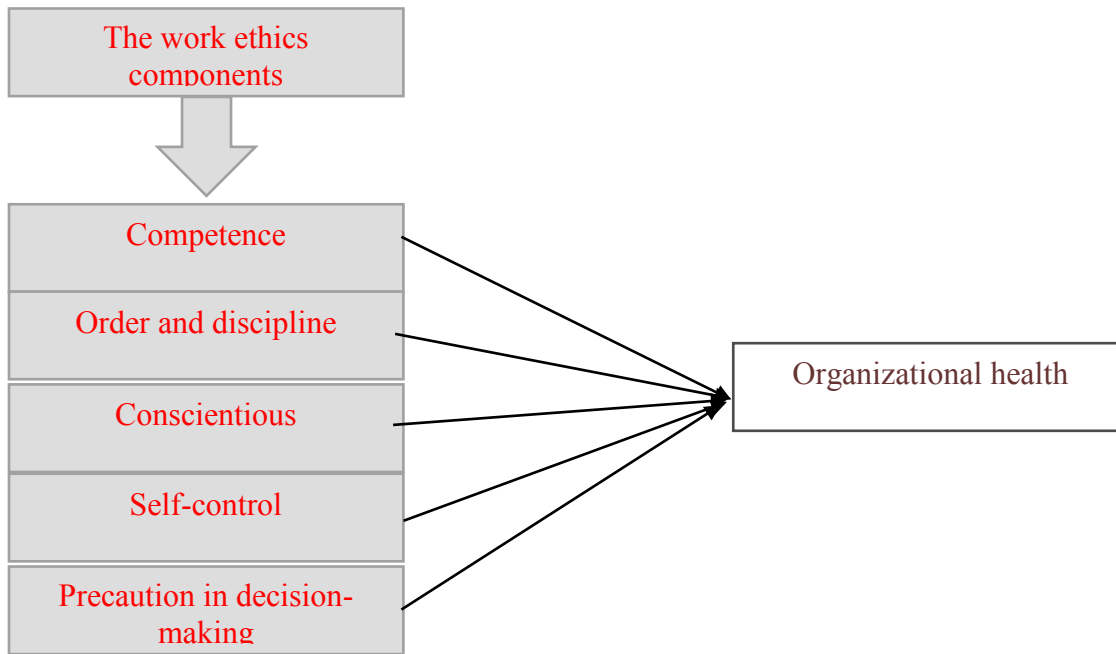


Fig: 1. the research model

H₀: The work ethics components hasn't positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

H₁: The work ethics components has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

Table: 1. A summary of the model in regression

Model	R	R Square	Adjusted R Square	Std.Error of the Estimate
1	0.763	0.625	0.803	0.4375

Table- 1 shows a summary of the model. The correlation coefficient (R) between the variables is 0.763 which indicates that there is relatively strong correlation between the independent variables and the dependent variable (organizational health), however the Adjusted R Square value was 0.803 which indicates that 81.3% of the total changes in organizational health rates are related to the six mentioned independent variables. In other words, the independent variables will be able to estimate more than half of the variance in the dependent variables of organizational health.

Table: 2. Information on the model (ANOVA) fitness in the regression

Sig	F	Model
0.000	156.324	1

According to **Table- 2**, Regarding the significance of F test (156,324), in the error level of less than 0.01, it can be concluded that the regression model of research composed of six independent variables and the dependent variable (organizational health), is a proper model and the independent variables can estimate the changes in organizational health.

Linear Regression, Hypothesis Testing, and their Impact on the Dependent Variable

Hypothesis 1: competence has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

H₀: competence hasn't positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

H₁: competence has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

The linear regression was used in order to evaluate the effects of "competence" independent variable on organizational health. The results are shown in **table- 3**.

Table: 3. Information on the linear regression of independent variable "competence"

Unstandardized Coefficients		Standardized Coefficients	t	Sig.	MODEL
B	Std. Error	Beta			
1.186	0.51		6.698	0.000	competence
541.	.045	5.72	10.187	.000	

Regarding the **Table- 3**, the t-value is lower than the error level of 0.05 and the competence variable with the regression coefficient 0.725 has a significant effect on organizational health.

Hypothesis 2: order and discipline has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

H₀: order and discipline hasn't positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

H₁: order and discipline has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

The linear regression was used in order to evaluate the effects of "order and discipline" independent variable on organizational health. The results are shown in **table- 4**.

Table: 4. Information on the linear regression of independent variable "order and discipline"

Unstandardized Coefficients		Standardized Coefficients	t	Sig.	MODEL
B	Std. Error	Beta			
1.657	0.76		6.137	0.000	order and discipline
123.	.070	.487	1.564	.000	

Regarding the **Table- 4**, the t-value is lower than the error level of 0.05 and the order and discipline variable with the regression coefficient 0.487 has a significant effect on organizational health.

Hypothesis 3: Conscientious has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

H₀: Conscientious hasn't positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

H₁: Conscientious has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

The linear regression was used in order to evaluate the effects of "Conscientious" independent variable on organizational health. The results are shown in **Table- 5**.

Table: 5. Information on the linear regression of independent variable "Conscientious"

Unstandardized Coefficients		Standardized Coefficients	t	Sig.	MODEL
B	Std. Error	Beta			
1.567	0.78		7.898	0.001	Conscientious
214.	18.0	759.	.2436	001.	

Regarding the **Table- 5**, the t-value is lower than the error level of 0.05 and the competence variable with the regression coefficient 0.759 has a significant effect on organizational health.

Hypothesis 4: self-control has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

H₀: self-control hasn't positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

H₁: self-control has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

The linear regression was used in order to evaluate the effects of "self-control" independent variable on organizational health. The results are shown in **Table- 6**.

Table: 6. Information on the linear regression of independent variable "self-control"

Unstandardized Coefficients		Standardized Coefficients	t	Sig.	MODEL
B	Std. Error	Beta			
0.823	0.62		0.543	0.400	self-control
	87.0	18.0	67.0	1.392	

Regarding the **Table- 6**, the t-value isn't lower than the error level of 0.05 and the self-control variable hasn't a significant effect on organizational health.

Hypothesis 5: trying to succeed has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

H₀: trying to succeed hasn't positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

H₁: trying to succeed has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

The linear regression was used in order to evaluate the effects of "trying to succeed" independent variable on organizational health. The results are shown in **Table- 7**.

Table: 7. Information on the linear regression of independent variable "trying to succeed"

Unstandardized Coefficients		Standardized Coefficients	T	Sig.	MODEL
B	Std. Error	Beta			
	0.045		0.0987	0.080	trying to succeed
.987	12.0	098.	0.0056	80.0	

Regarding the **Table- 7**, the t-value isn't lower than the error level of 0.05 and the trying to succeed variable hasn't a significant effect on organizational health.

Hypothesis 6: precaution in decision-making has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

H₀: precaution in decision-making hasn't positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

H₁: precaution in decision-making has positive and significant effect on organizational health of Imam Ali hospital staff in Zabol city.

The linear regression was used in order to evaluate the effects of "precaution in decision-making" independent variable on organizational health. The results are shown in **table- 8**.

Table:8. Information on the linear regression of independent variable "precaution in decision-making"

Unstandardized Coefficients		Standardized Coefficients	t	Sig.	MODEL
B	Std. Error	Beta			
1712	0.23		50609	0.000	precaution in decision-making
254.	017.	.581	7342.	.000	

Regarding the **Table- 5**, the t-value is lower than the error level of 0.05 and the precaution in decision-making variable with the regression coefficient 0.581 has a significant effect on organizational health.

CONCLUSION

The literature related to conscious have been concerned and studied from different aspects. For example, in theology, it has been a manifestation of faith, or in philosophy and psychology, it has been regarded as a theoretical concept dependent on the individual conscience, thoughts and feelings is people (safari, 2012). Work ethics and social discipline are among the important psychological, value, and normative factors affecting the productivity in social production. The higher the level of work ethics in man and society and the extent to which the social order rules in the society and people believe it, accept it, and follow it, the way for the increase and promotion of productivity is paved. Organizations also, in order to achieve a balance in relations between employees, customers and shareholders, consider the commitment to social responsibility both in values and in their results. Today, organizations are assumed as living entities that have an identity independent of their members in a way by this new identity they can affect the employee's behaviors. This character and identity can have organizational health or organizational disorders (Seyed Javadein et al, 2010). Therefore, it is expected that works ethics as a contextual and significant factor, affects organizational health. Based on this fact, the current study aimed to evaluate the work ethics components effect on organizational health. The results indicated that there is direct and significant relationship between work ethics and organizational health. On this basis, the results of the current study can be compared to the related literature.

The results of Mohammadi's work (2008) which aimed at evaluation of relationship between quality of working life and organizational health in Kurdistan province high school teachers from the perspective of teachers indicated that there is a positive and significant relationship between the working life quality and organizational health in the mentioned high schools. On this basis, the current study supports the "competence" as a component of work ethics studied in the research model.

CONCLUSION

Practical evaluation of the skilled members productivity by managers and hospital officials. Creating a culture of punctuality and task orientation by hospital administrators among all employees. Invisible monitoring of the performance of individuals and inclining them to proper models. Sufficient attention to proper planning before starting any task in all hospital activities processes

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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THE SURVEY AND ANALYSIS OF THE SPATIAL CHILLING EFFECTS EXERTED BY SPRING HOUSES IN IRAN'S WARM AND DRY CLIMATES

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ABSTRACT

One of the challenges of the today's residential architecture is the optimized use of the renewable energies. In line with this and to achieve appropriate designing patterns the survey of the traditional architecture which is designed consistent with the climate can be helpful to the designers in reaching to this objective. Since, a great part of Iran is located in the dry and warm climate one of the most important climatic accomplishments obtained by the Iranian traditional architecture is the use of some elements for the purpose of exerting a chilling effect on the temperature welfare and comfort. Among such climatic elements are the pleasant and favorable spaces called springhouses. The survey of the way such spaces work and the effect they have on the comfort of the residents determines the way these spaces are taken into practical use for the purpose of creating a chilling effect in the today's designs. In the present study we have made use of interpretive-historical methodology and the analyzed sample in the current study is the springhouse situated in Shiraz's Foroogh Al-Malek House. And the data has been collected based on a documentary method accompanied with the field studies and observations. And the researcher also measured the temperature and humidity for two consecutive days in various points in the springhouse in three different occasions of morning, noon and evening and finally the researcher came to this conclusion that the existence of a springhouse assists in cooling the space. The current study is seeking to figure out that how helpful to the temperature comfort of the residents can be the establishment of a springhouse in the warm and dry climates and that can finally result in the emerging-saving effect in the warm and dry climates.

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KEY WORDS

springhouse, spatial cooling, energy optimization

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INTRODUCTION

In ancient Iran the architecture moves towards water and it settles down in the water bodies periphery, but in the Islamic era the water finds an applied function in architecture and the architects consciously attempt to dominate over the nature and give it order. In fact, in this era the water is manifested inside a geometrical containment in the majority of the buildings and it can be stated that the architecture centrality and unity has been shaped into the water. In such a manner that the water has appeared in the center of the summerhouses, gardens and mosques and so on and in the warm and dry regions the scarce and life-bestowing water causes the formation of the water-reserves, caravansaries, shoals, frigs and springhouses and it demonstrates itself in other forms. Due to the creation of beauty, comfort and an environment replete with joy and pleasure causes the human being to gather around and accumulate in such regions with water. The physical role played by water in the architecture and the effect of the water streams on the buildings and its special effects and the psychological and mental influences cannot be simply ignored. Besides this idea, another use cases enumerated for water in traditional architecture in adapting the architecture with the warm and dry climates has been for the purpose of adjusting the air inside the houses and the traditional architects have made an intelligent use of water and its features in engineering the spaces. On the other side, nowadays, the designers forgetting to make use of the past architecture elements and concepts and by taking advantage of the modern technology and suffering from extravagant costs and creation of disturbing noises have tried to make the environmental conditions more appropriate and getting it to reach to a comfortable level, while it is clear that should for any reason such devices endure malfunctions the life in such buildings become so extensively difficult. Therefore, in order to reduce the inefficient use of the fossil energies and more polluting of the cities, elimination of the green and natural areas and to reduce the physical and psychological harms in relation to the application of too much of the technology it is better to spend the best of the efforts in reusing the climatic factors and establishing the disrupted relationship between the human and the nature. Iranian traditional architecture has

provided and invented logical methods and reasonable and convenient solutions for presenting the human comfort conditions and getting reconnected to the nature. In fact, it can be stated that such climatic methods in the traditional architecture can be considered as an alternative to the mechanical equipments for cooling the environment and now in this crisis that the nonrenewable energies are declining and dying out and according to the vastness of the dry and warm climatic conditions scattered in a substantial part of the Country of Iran we can save energy consumption besides and plus making use of the mechanical equipments to a great extent. And one such method in saving the energy is the application of the springhouses which is a healthy and fruitful synergy between the human beings and the nature and through getting the water present in the environments of the houses we can provide the grounding for the natural cooling of the space. In the current article we deal with the survey of the springhouses functions and the change they cause in the warm and dry climates temperature.

Water in Iranian architecture

Aside from the life-donating role played by water in the life of the human beings, it can be of a great importance as a sacred element. The manifestation of water in Iranian architecture can be traced back into two periods before Islam and the post- Islam era.

Water in pre-Islam architecture

Water is one of the most sacred natural elements for the ancient Iranians. Based on the ancient Iranian mythical beliefs, water has been created in the second period of the sextuple period and the “proper season” for its creation has been said to be in the middle of Tir (June). Based on such beliefs, the water has been created after the sky and before the creation of the other creatures. Ancient Iranians considered water as one of the sacred Lords and it was sanctified and revered. The water is a symbol of purity, fertility, daily food and aliment, luminosity, well-being and benediction, science and knowledge, healthiness, clear and prosperous future and so forth In pre-Islam era the role of water was more of an abstract role, the praying establishments (Anahita temple and fire-temples) were built near water and with paying so much respect to the water. The water and the fire were peacefully made in one’s another adjacency and celebrated their unification, for example Azar Gashsb fire-temple and Kavyan fire-temple (Firooz Abad), water and fire are contradictory metaphors which are being regarded as the constituting elements of the entire universe along with wind and soil. Water and fire are the sufficient and required conditions for continuing life and striving. Both of them can be devastating while being life-giving. Besides the role of water in the fire-temples the Ilamese engineers had reached to advances in transferring water to the dry areas and also water refining processes.

Water in Islamic era architecture

In Islamic era the role of water finds an applied practical use in the architecture. The architectures of this period have consciously tried to dominate the nature and give it order. Before Islam the architecture hastily dashed towards water and settled down beside water streams. After Islam, the architectures brought water inside the buildings through realizing the physical laws of the water behavior and understanding its role, exemplification and relationship with the mankind. The water was organized into geometrical shapes and containments in the majority of the Islamic era buildings and it can be claimed that in that era the architectural centrality and unity are shaped in water. In this way, the water entered our buildings and construction to the extent that a clear separation cannot be imagined in practice between water and the constructed structure. In desert and dry regions in Iran, the scarce and life-bestowing water caused the creation of water reservoirs, caravansaries, shoals, fridges, springhouses and so forth. In the sections to come in the current study we deal with the survey of a special format of buildings which provides the residents with a pleasant environment in the hot summers and it is indicative of the Iranian architecture genius in establishing a peaceful relationship with the nature.

The effect of water presence in architecturing space

The artificial buildings and spaces cause the human beings to get away from the nature and that is because the humans have tried to somehow protect themselves from some of the natural factors and on the other hand to provide themselves with a more humane territory, such characteristics have caused the human beings to reside in a more alienate environment and take refuge inside an environment with more cold and artificial qualities. Therefore, the need for some sort of linkage between the architecture and nature is what has been deemed necessary and such a theme has been thought over and contemplated in the iranian architectural arts and garden-

making processes via the use of water which is considered somehow as being sacred, invaluable and rare. Such a use has been in a way that the link between architecture and the peripheral landscape has been made probable through this common feature and factor and the springhouse space which has been made for the same purpose is regarded as some sort of a buffering and semi-open space between the open and closed or the internal and external space



Fig:1. A sample of a fountain in Kashan's Fin Garden [5]

Changing the climate via water

The temperature and the special heat capacity of the water is higher in respect to the other masses on the earth. Due to the same reason the water has more capacity for storing heat in comparison to the average heat absorption capacity of the other masses on the planet earth. Generally speaking, the existence of the water resources causes equilibrium in the air temperature. As the existence of water in the regional climate can entice equilibrium between the night and day temperatures, inside the buildings it can also reduce the temperature fluctuations as the creator of a microclimate. On the other hand, the air heat capacity is very low and the air has a very low heat storing potential. But due to the presence of the water vapor particles, the moisturized air can better store the heat. Thus, in wet areas the difference between the day and night temperatures is lower than the regions with dry climate. Therefore, in microclimates passing the air over a moist surface causes the peripheral environment to cool down and through circulating and directing this cold air towards the rooms and the living rooms the comfort conditions can be provided. One architectural texture typology that has been created to make use of the element of water for cooling down the spaces in the warm and dry cities is springhouse.

Warm and dry climates

One of the pertinent and highlighted features in such climates is the warm and dry air in summer and cold and dry weather in winter, low precipitation level, very low air humidity, low vegetative cover, the high difference between the diurnal and nocturnal temperature and also as a result of being distant from the sea level the amount of the air humidity being very lower than the human comfort threshold. Also, the sun radiations and the heat in summer cause a scorching and warm ambient air to be formed. Thus, according to the fact that a vast area of Iran has been situated in the warm climate in the traditional architecture of this land spatial chilling and cooling are of great importance. The traditional architects have deployed numerous architectural solutions and elements to create temperature comfort and convenience. Among such elements we can point to the springhouses. So by devising a springhouse inside the residential spaces of such climates we can bring about an increase in the humidity in the biological spaces inside the buildings and placing and directing the entire opening and orifices towards the moisturized and temperate space of the springhouse has set the grounding for the creation of a microclimate which is thought to be appropriate and convenient for the human comfort in dry and warm climates

Spring house

Springhouse is a space for spending summers and it is usually made in an octagonal shape. In between such a space a small pond is made and it is usually made with eight angles therefore the reason for calling it an octagon and the existence of cold water inside the space causes the ambient air to become moisturize and cold and

subsequently reduces the temperature during the hot summer days. Springhouse is a closed and covered space and it takes its light from the rooftop and in some of the springhouses high and lofty windbreakers are built to get the cold air entered the interior space of the springhouse. The springhouse functional system is in this way that the water poured on the surface of the pond by a fountain and through the moving winds the cold air is circulated and causes the peripheral air to cool down.

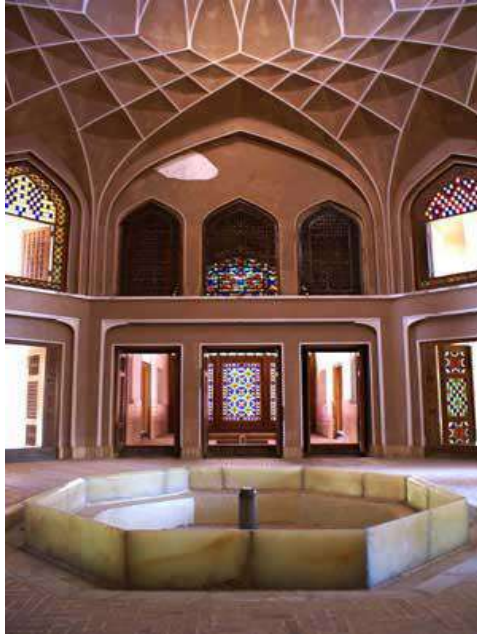

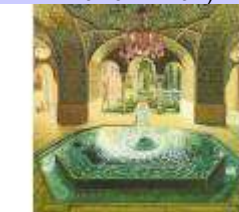





Fig.:2. springhouse in Yazd's Dowlat Abad garden (source: www.parks.tehran.ir)

The role of water in the springhouse

Table:.1. the role of water in springhouse (source: AlboGhabish et al, 2013: 6)

No.	Perspective	Explanations	Images
1	Symbolic aspect (water sacrosanctity)	The symbolic aspect of the water has been highlighted in springhouses through making the springhouse's roof higher than the adjacent spaces and placing the pond in the center of the building and the reflection of the highly versatile and elegant works in the water of the pond and enhancing the feeling of radiation	Figure.3. Mowstowfi House in Basharooeyeh 
2	The spiritual role (influencing the spiritual aspect)	The presence and the sound of the water cause a sort of tranquility in the human being	Figure.4. Golestan palace spring house (by Master Kamal Al Molk) 

3	Alignment with the nature	Drawing water into the buildings due to the close relationship between the human beings and the nature	<p>Figure.5. springhouse in Kashan's Ehsan House</p> 
4	The use of reflectivity feature	Sometimes water has been used as a mirror and doubles the house aesthetic manifestation	<p>Figure.6. Haj Agha Ali springhouse in Rafsanjan</p> 
5	Applied and functional presence (from climatic point of view)	The use of water for the purpose of its chilling effect through evaporative coolness	<p>Figure.7. Kashan's Fin Garden springhouse</p> 

The reasons behind building springhouses

In the past, the architecture were thoughtful of making spaces in which the people could have access to relatively comfortable places in the summers and its warm weather inside the cities, such spaces besides providing the people with the ability to tolerate the warmth enabled them to attend to their occupational affairs and prevented them from leaving the cities incumbently to escape the air high temperature and seek refuge and rusticate inside the more temperate summer-quarters or countries, therefore a new element was added to the homes which was specially invented and used for the summer and hot seasons and that was springhouse. Thus, the springhouses were capable of providing the home dwellers with a pleasant space in hot air conditions and they rapidly found popularity and as a result of their favorable characteristics and due to being easily and readily buildable they became widespread and the buildings were equipped with a device that could provide them with pleasant weather in the hot seasons of the year.

The general features of the springhouses

1. Two to four rooms were built in the periphery of the springhouses with wooden doors which were opened to the springhouses.
2. The rooms' floors were about one meter higher than the springhouse space.
3. The springhouse light was supplied through windows and sometimes the orifices inside the roof.
4. There were opening spaces which were exposed towards the front yards.

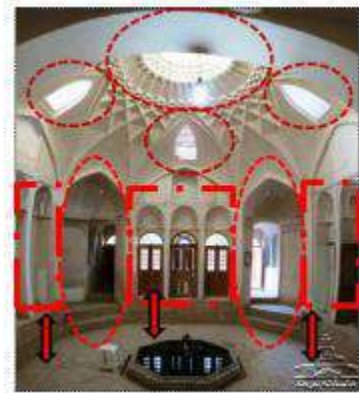


Fig..8. springhouse features (source: the author)

The use of favorable winds in the springhouse

In this regard, the study theme should be surveyed from two perspectives:

Firstly, the wind entering the house should be a summer-favorable wind and it should not be bringing dust, pollution and so on with it; furthermore, it should be considered from the perspective of the rate and the way it enters and the way it circulates into the inner spaces. The form and the pattern of the air movement inside a room is influenced by two factors of the quality of the air pressure around the building and the moving air inertia inside the whole building. When the window is designed to be placed inside the wall opening to the direction of the wind the pressure inside the room is increased to some extent to equalize with the air pressure in the exterior section of the window. If another window is also designed and used in the opposite to wind wall (the area under suction), the internal air pressure of this section is also decreased to the extent that it create equilibrium with the air pressure in the exterior part of the window. In both of the cases the average air pressure of the inside and outside stabilizes.

Table. 2. The favorable wind usability analysis in springhouse (Source: authors)

Subject	Explanations	Image
Figure.9. the wind-orientated springhouse openers (source authors)	The opening space towards the front yard should be oriented in the direction of the favorable winds. And this wind usually blows northwestern to south eastern	
Figure.10. the effect of the orientation and the type of the window opener (source: the authors)	The wind-oriented opener and the external window in the direction of the low pressure air causes the air moving in this space to pass over a surface of the water and the created cold air can be directed towards the rooms.	
Figure.11. window dimensions (source : the authors)	The smaller the dimensions of the window, the higher the speed of the wind, therefore it is better for the inter-room windows to be of smaller dimensions to act as a channel	

		Considering the constant volume of the air, movement of the wind through a smaller space causes the wind speed to increase
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In fact, the springhouses are oriented towards the optimum and favorable winds in order for the wind to enter directly to the space and after circulating appropriately and passing over the water it can be transferred to the peripheral rooms through windows which have been designed in proper places and with proper dimensions and sizes.

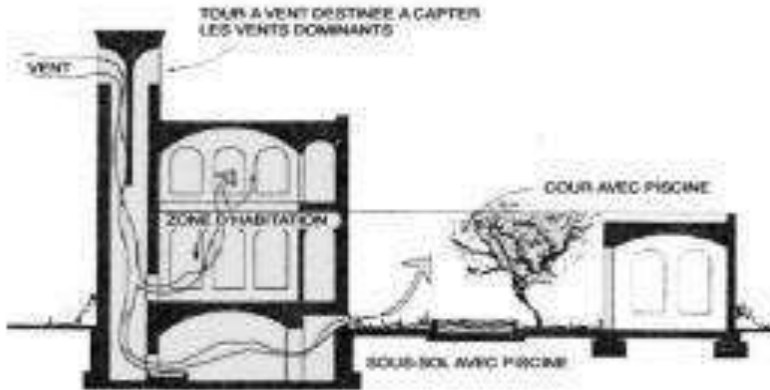


Fig: 12. The movement direction orientation of the favorable winds (source: www. Details dararchitecture.com)

Introducing the analytical sample

The city of Shiraz

The city of Shiraz is located along the longitude of 30° and 02' and latitude of 27° and 32 ', in a region with 1071 meters elevation from the free sea level in a dry and warm climate [8]



Fig: 13. Shiraz's latitude and longitude coordinates (source: authors)

Generally, in order to reach to a comfort condition in every region there is a need to establish a proportion between the temperature and the humidity. The wind speed is also effective in creating such a condition. Since the city of Shiraz is in the warm and dry climatic conditions and because it has dry summers, through the use of direct cooling and evaporation we can approximate the air temperature to comfort conditions. One of the very widely used methods for the purpose of evaporative cooling of the space is the use of springhouse inside the buildings.

Forrogh Al-Malek house location

One of the historical neighborhoods in the city of Shiraz is the black stone (Sang-e-Siah) locality. In this neighborhood among the Qajarieh traditional houses three homes have springhouses and in this project Forrogh Al-Malek House was selected among the three houses because of being qualified for getting a clear understanding of the building and its appropriate conditions for the purpose of analysis and measurement of the temperature and humidity.

Forrogh Al-Malek House


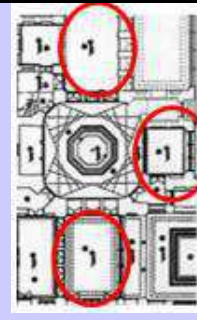

Forrogh Al-Malek House belongs to the late Qajarieh era and it is located in one of the old textures of the city in Sang-e-Siah neighborhood, behind the holy shrine of Imamzadeh Bi Bi Dokhtaran. The building was constructed in 1931 by Forrogh Al-Malek Ghavami on a 1020 square meter area. The building was built in three levels of basement, ground floor and the first floor for residential uses and it has two exterior and interior sections with two separate yards, alcove, springhouse, bathroom, kitchen parts, etc. the exterior section of the building was used by the family members for living and the interior section was used by the servants. One of the most splendid sections of the building is the very spectacular springhouse which is placed along the northwestern diagonal of the building, the springhouse has been built based on an octagonal plan and also there is an octagonal pond in the middle. The springhouse has an alcove with two pillars which connects the exterior section to the interior one.



Fig.:14. Forrogh Al-Malek House in Shiraz (source: author)

The location of the springhouse in Forrogh Al-Malek House in Shiraz

Table: 3. the location of the springhouse, adjacency and access

The springhouse position	Springhouse adjacency	Access to the yard
<p>The building's western frontier</p> 	<p>It has a three-direction access to the room</p> 	<p>It has three opener directed towards the yard, one opener towards the exterior yard and another one towards the interior yard</p> 


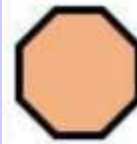

The masonry applied in building Forough Al-Malek springhouse

Table:4. The built body

The masonry used in the body	Walls colors	Windows and doors material	Springhouse's floor alignment to the yard/ cm	The ratio of the adjacent rooms' springhouse area	The masonry used in the floor
Brick + stone	Light cream	Wood	+60	1.4	Stone

The roof shape and the springhouse's geometrical shape in Forough Al-Malek House

Table: 5. the type of the roof used and the springhouse shape

Springhouse image	Roof type	Windbreaker	Springhouse shape	Pond shape
	Dome-like	No windbreaker		Octagonal 

The direction of the wind movement in Forough Al-Malek Home Springh

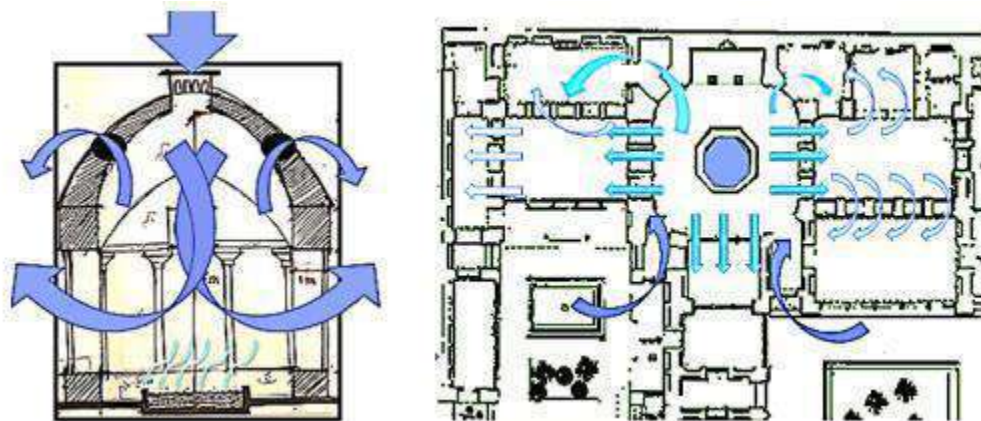


Fig:15. The wind direction and humidity orientation in Shiraz's Forough Al-Malek Home (Source: the author)

MATERIALS AND METHODS

The study methodology was in this way that the data measurement was conducted in two days with an identical temperature and humidity three times every day. In such a way that firstly on the first day the temperature and the humidity were measured with the empty pond (three times in the morning, noon and afternoon) and then on the second day the temperature and the humidity were measured with a full pond in those three times of the day and in various points in the springhouse space. The temperature and humidity data measurement method was through taking advantage of the data logger device. The device application methodology should be in a manner that it should be placed in a 5.1-meter height from the ground level and without making hand contact the temperature and the humidity of the environment should be measured in the points indicated on the plan.



Fig:16. The full and empty pond images in Forough Al-Malek Home’s Springhouse

The point selection order for measuring the temperature and humidity in springhouse and the peripheral spaces on Forough Al-Malek home plan

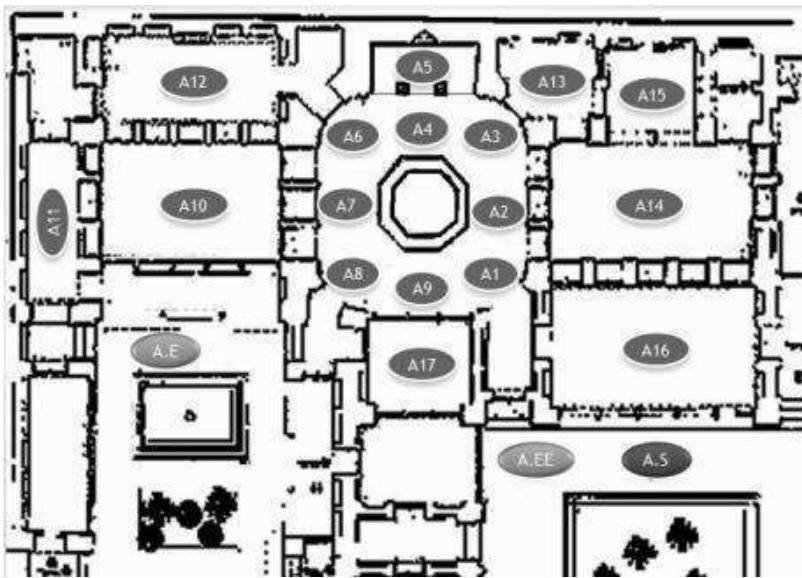


Fig:17. The point selection order on Forough Al-Malek home plan (source: the author)

1. Temperature analysis in various points in the springhouse
 - a) Morning time analysis

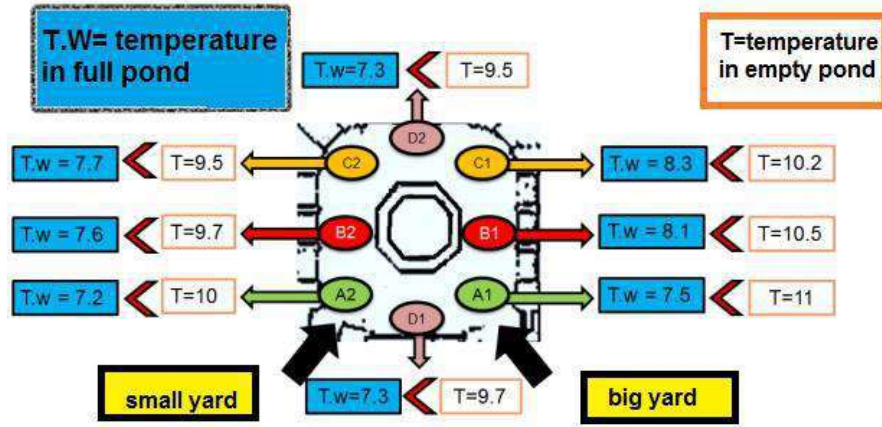


Fig.:18. The inter-springhouse points' temperature rate with full and empty pond (source: the author)

b) Noon-time analysis

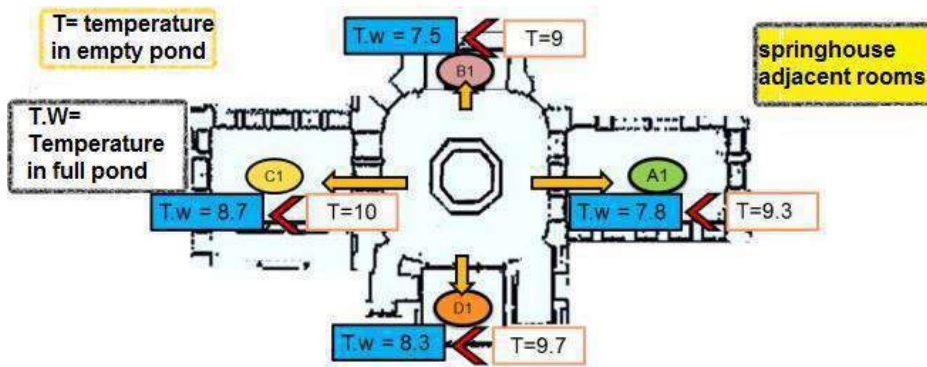


Fig: 19. the temperature rate in the adjacent rooms to the springhouse with empty and full pond (source: the author)

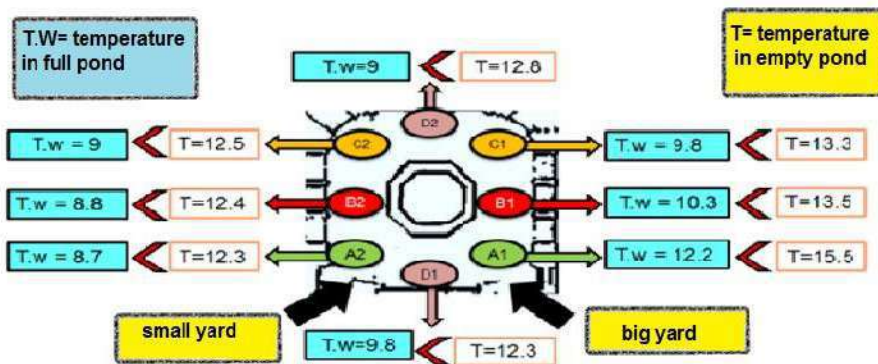


Fig:20. The temperature rate in points inside the springhouse with empty and full ponds (source: author)

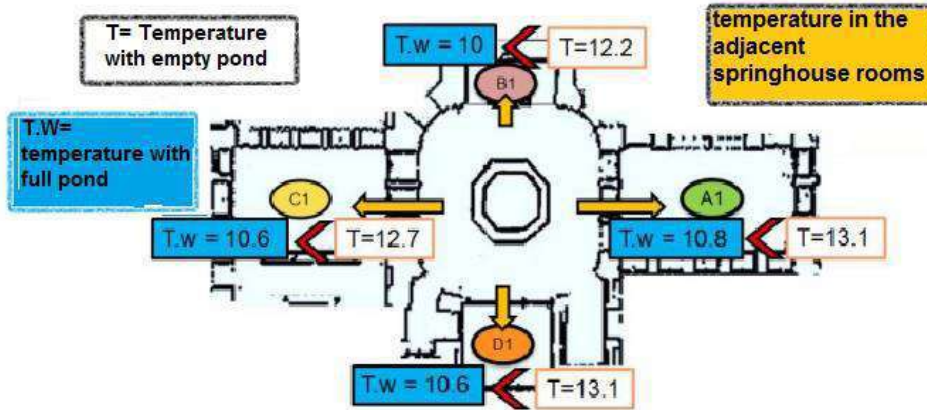


Fig: 21. the temperature rate in the springhouse adjacent rooms various points with empty and full pond (source: the author)

c) Afternoon time analysis:

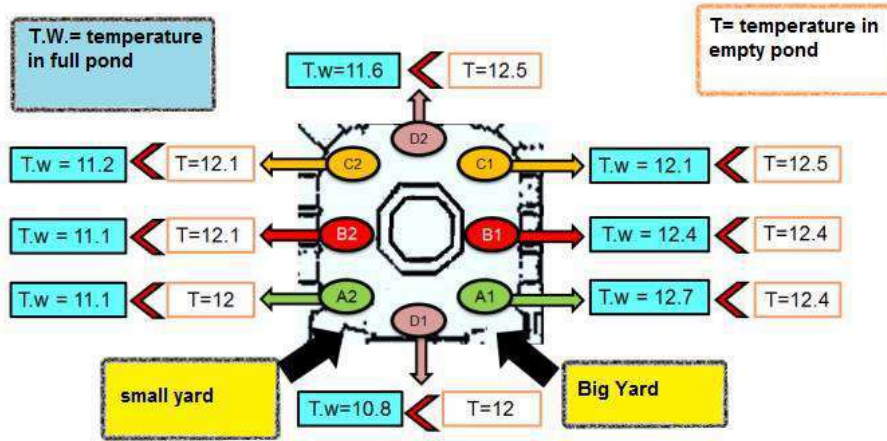


Fig:22. the temperature rates in springhouse various points with full and empty pond (source: the author)

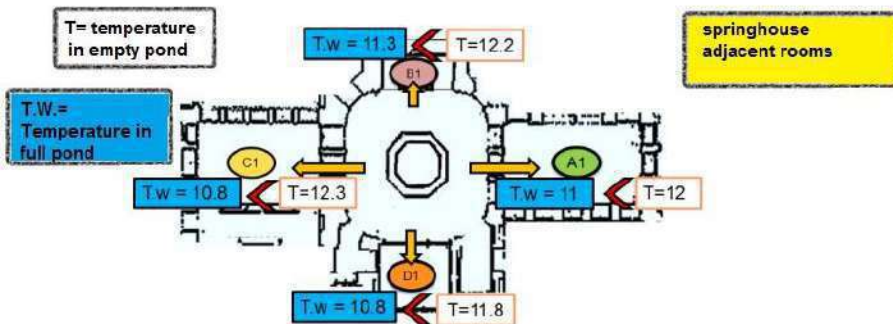


Fig: 23. The temperature rates in various points in springhouse adjacent rooms with empty and full pond (source: the author)

The humidity analysis in various points in the springhouse

a) Morning time analysis

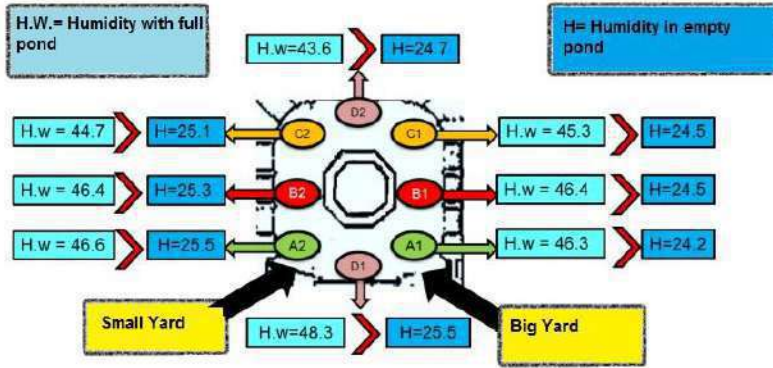


Fig:24. the humidity rate in various points in the springhouse with empty and full ponds (source: the author)

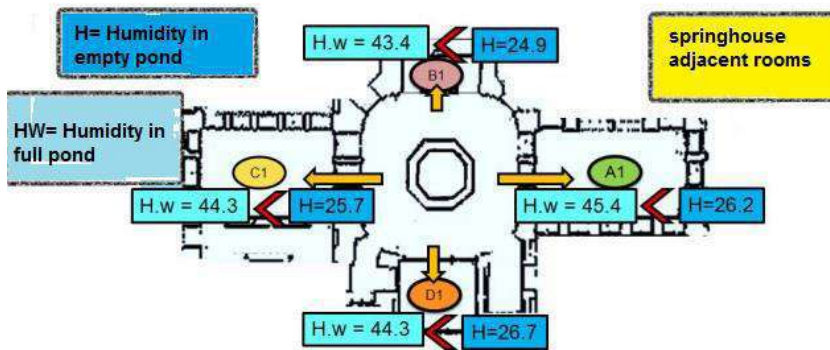


Fig: 25. The humidity rate in various points in the springhouse adjacent rooms with empty and full ponds (source: the author)

b) Noon time analysis

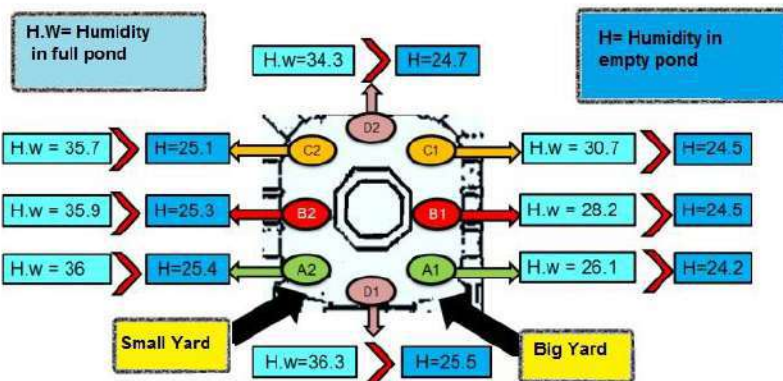


Fig: 26. The humidity rate in various points inside the springhouse with empty and full pond (source: the author)

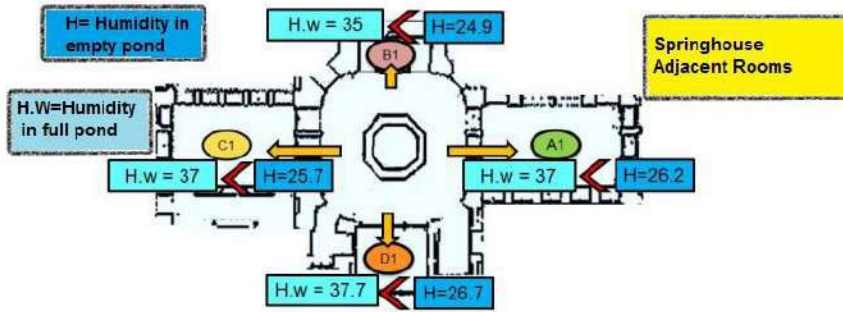


Fig: 27. The humidity rate in various points in the adjacent rooms with empty and full pond (Source: the author)

c) Afternoon time analysis

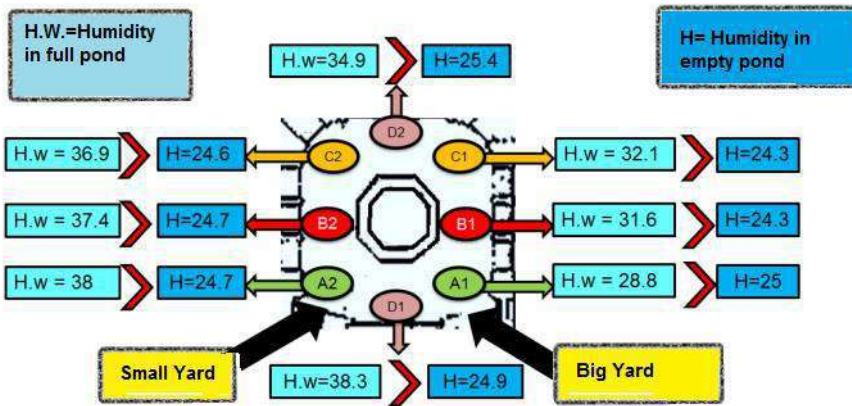


Fig:28. Humidity rate in various points inside the springhouse with empty and full pond (source: the author).

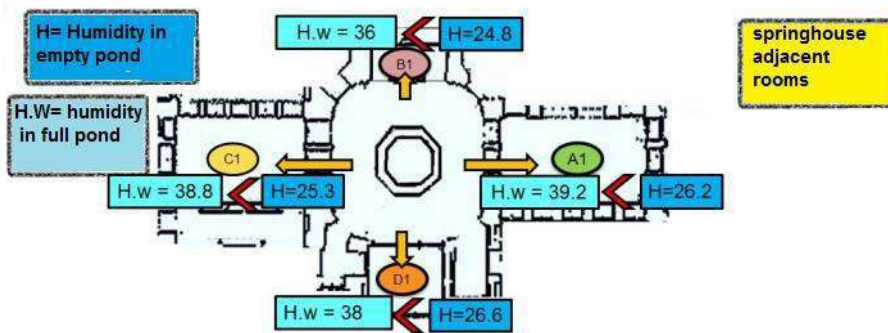


Fig:29. The humidity rate in various points in the adjacent rooms to the springhouse with empty and full pond (source: the author)

CONCLUSION

a) Analytical and comparative temperature rates conclusions

The results obtained from the temperature diagrams in three morning, noon and afternoon times are explained as below:

In morning time

1. The temperature in the entire points in the springhouse is lower with the full pond than the time it is empty.
2. The points A1 and A2 are located beside the door opening to the yard and their temperatures, with empty pond, is more than the temperature in the points opposite to these two points due to being exposed to the sun. Also, when the pond is full, though all of the temperatures witness a decline but due to the presence of a direct blowing by the wind in these points the temperatures become less than their opposite points.
3. Points A1, B1, C1 due to being along the door opening to the yard and because of being exposed to the sun for a longer period of time in the big yard in contrast to the small yard their temperatures are usually more than the temperatures obtained for the points A2, B2, C2 both with full and empty ponds and the latter points are located along the small yard which is conversely exposed to more shade.
4. Because the adjacent spaces are 1-meter higher than the springhouse and the hot air moves upward the temperature for this section is more than the temperature for the springhouse both with empty and full pond.
5. The spaces which are exposed to direct sun such as D1, C1 are found to have a higher temperature rate both in empty and full pond.

At noon time

1. At noon time, also the temperature in the entire points in the springhouse and the adjacent rooms are less than the temperatures with full pond in contrast to the empty pond.
2. The longer the points get away from the entrance to the big yard and move towards the small yard their temperatures decrease both with empty and full ponds.
3. Room A1 has been connected to five doors leading to the room which opens to the big yard and the room C1 is adjacent to the small yard and at noon times the big yard is exposed to the direct sunlight but the small yard has an indirect sunlight and due to the same reason the temperature in A1 is higher than C1.

In the afternoons:

1. In the afternoons also the temperatures for the entire points in the springhouse have been found to be lower with full pond in respect to the empty pond.
2. In the afternoon due to the existence of more shade and the lessening of the sun light intensity outside the temperature inside the springhouse has been shown to indicate smaller variations and differences with empty and full ponds.

Final conclusion regarding temperature in three times, (morning, noon and afternoon)

1. Generally speaking, the temperature is lower in the entire points and during the entire hours of the day than the temperature with empty pond.
2. The closer we get to the noon the springhouse temperature both with full pond and empty pond gets higher than the morning and evening temperatures.
3. The spaces exposed to the direct sunlight have higher temperatures both with empty and full pond.
4. The points in the vicinity of the big yard have higher temperatures in respect to the points besides the small yard.

The humidity analysis and comparison results

The results obtained from the analysis of the humidity diagrams during three morning, noon and evening times are as follows:

In the morning:

1. The humidity in the entire points in the springhouse and the adjacent rooms with full pond is more than the humidity with empty pond.
2. During the morning time with empty pond, the humidity rate in points A1, B1 and C1 is lower than the

humidity in the points A2, B2 and C2 which are in a closer distance from the small yard enjoying more shade in respect to the big yard which has to suffer more of the sun light.

3. In the morning time, due to the reason that the sunlight has not reached to its full scale the air humidity is higher with full pond in points which are located in closer distance from the entrance doors to the yard as a result of being cooler but in the points which are in a far distance from the entrances and are therefore relatively warmer the humidity is lower.

At noon

1. At noon times, the humidity is higher with the full pond in the entire springhouse points in comparison to the empty pond.

2. At noon time with the full pond, the humidity rate in the points A1, B1 and C1 due to the higher rate of the sunlight in these points is more approaching to the humidity value when the pond is empty but the humidity rate in the points A2, B2 and C2 which are closer to the yard is higher with full pond in comparison with the empty pond.

3. The humidity in the entire adjacent rooms to the springhouse is higher with full pond than the humidity with empty pond.

4. The humidity rates in the springhouse adjacent rooms at noon and in the morning when the pond is empty are identical but with the full pond the humidity rate gets to a higher level at noon times.

In the afternoon

1. In the afternoon time the humidity rate in the entire points in the springhouse and in the adjacent rooms is higher with the full pond than the humidity with the empty pond.

2. In the afternoon times also the humidity rate is lower in the points closer to the big yard than the humidity rate in the points closer to the small yard.

3. The humidity in the adjacent rooms is higher in the afternoon in contrast to the humidity rate at noon.

Final results of the humidity analysis in three times, (morning, noon and evening) :

1. The humidity rate with the empty pond does not show much variations during the various hours (morning, noon, afternoon) but with full pond the humidity is higher in all of the points during the entire hours of the day and night.

2. The presence of openers or orifices to the yard which assists to the air movement is of an influence on the humidity rate.

3. In every point the humidity rate is higher with full pond during the mornings and at noon the humidity is reduced as a result of the increase in the temperature and in the afternoon the humidity again reaches elevated levels due to the decrease in the temperature. So, the temperature variations are effective on the humidity.

4. The humidity in the entire adjacent rooms to the springhouse are more with full pond than the humidity with empty pond.

Final results regarding the analysis and comparison of the temperature and humidity in the entire points:

Generally, when the pond is full of water the temperature goes down and the humidity is increased. So, it can be concluded that in the dry and warm regions the favorable and pleasant weather can be achieved through only using a pond full of water and without needing to make use of the other energy forms.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

ACKNOWLEDGEMENTS

None.

FINANCIAL DISCLOSURE

None declared.

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THE EFFECT OF STRATEGIC FLEXIBILITY AND ORGANIZATIONAL LEGITIMACY ON GREEN MANAGEMENT PERFORMANCE IN COMPANIES OF ARAS FREE TRADE ZONE

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ABSTRACT

The present study aims to investigate the impact of strategic flexibility and organizational legitimacy on the performance of green management in companies of Aras Free Trade Zone. This is an applied research in terms of the purpose and a descriptive survey in terms of nature and data collection method. A researcher-made questionnaire was used to collect statistical data. The data was analyzed through partial least squares analysis and via visual PLS software. Results show that organizational support on green management operations, strategic flexibility on organizational support and green management, legitimacy on green management and competition, flexibility on competition and green management operations on competitiveness make a significant and positive impact.

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KEY WORDS

strategic flexibility, organizational legitimacy, green management performance, organizational legitimacy, organizational support

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INTRODUCTION

Today, green management as a known strategy is employed by companies and institutions (Molina et al., 2009). Companies are trying to implement green management as a precursor to business ethics and social-organizational responsibility. From the perspective of business ethics, green management can improve organizational performance if companies can protect their natural environment. From the perspective of corporate social responsibility, green management can help environmental performance to meet the expectations of stakeholders, such as government, shareholders, employees, consumers and community members [1] Both views require that companies implement green activities (green design, green production and green marketing) not only to meet the objectives but to create a better community. But, behaviors of business ethics depend on the culture and are applied differently in various cultures. However, most of researches on green management have been done in developed countries and the outcomes will be different in other countries and developing countries. Such researches are important of two terms: first, different developed economies and enterprise systems lead to environmental

turmoil and creation of challenges for institutions and companies [2] The turmoil and challenges may cause ambiguity about the green management and companies' confusion in accordance with green management. Second, today there are many global and international markets, but these companies suffer from environmental problems. Various pressures are imposed on green management through the company's operations. Considering the conditions and limitations in today's competitive economy requires consideration of green management and its profit for companies [2] Recently, studies on green management are increasing; for example to adapt resource allocation based on view to investigate the impact of organizational capabilities on environmental performance, Judge and Elenkov conducted a research in 2004. Delmas and Toffel examined compatibility based on institutional theory to describe pressures and institutional actions which impact green management. Although the studies have discussed organizational adaption in domestic (i.e. allocation of resources based on view) and external perspectives (i.e., institutional theory), there are few studies that have evaluated a combination of these two perspectives. Organizational resources capital levels in green management should have flexibility to meet commitments of the resources. Strategic flexibility is defined as dynamic capability that enables institutions to form and allocate the

resources and capabilities quickly and effectively to respond to environmental changes. Institutions with high strategic flexibility can employ, coordinate and develop the entire organization to direct the green management properly in line with the strategic flexibility. Institutional theory may help organizations to describe organizational legitimacy in line with green management activities since expectations from organizational capabilities and legitimacy are affected by cognitive, normative and legal institutions. These three variables are proposed as dimensions of organizational legitimacy. All the dimensions offer value, normative and belief systems to companies in relation to green management activities Manguk et al. acknowledged that to study the role of organizational legitimacy can help to understand how competitive advantage environmental strategies operate. In such circumstances, companies in order to deal effectively with the changing circumstances in the market and to be competitive against rivals should have competition capabilities. In this way, companies will provide survival context in a turbulent environment and also will have a better performance and will retain in the market. The flexibility provides the competitive capabilities for the company. Companies that are flexible strategically, have operational flexibility. So, strategic flexibility empowers the company to pursue alternative practical ways and various strategic options. As a result, companies benefit from the variety of products to make a profit and to enter into different markets.

In addition, the strategic flexibility changes the company's position in the market through changing plans or abandoning the company's current strategy. In the changing environment of companies' activities, organizations try to improve their operations in order to survive and achieve better position compared to other companies. Manufacturing companies play an important role in the development of a society and improvements in quality and innovation in the production leads to economic growth. On the other hand, small and medium companies have grown among the production companies and play an important role in the production cycle of the country. Therefore, important variables investigation is important in small and medium enterprises. Thus, the present paper aims to analyze the impact of strategic flexibility and organizational legitimacy on the performance of green management in companies of Aras Free Trade Zone and to answer to the question that " How flexibility and legitimacy impacts on companies' green management performance?"

Green Management

According to the literature on green management, green management acts as a set of strategic actions designed to develop economic plans, trading and using products to achieve sustainable development by organizations. The definition just provided refers to a specific green management which can be including the environment preservation, wise use of the resources, reducing the extent to which the natural resources are consumed in the direction of producing the finished products and reusing the commodities for expanding and developing their recycling, elimination of the dangerous material in production processes which may be harmful to the individuals and things of the like.

Green management process is completely different from the traditional management and it involves complicated social processes with its concomitant uncertainties and long-term investments. Marcus and Fremeth assert that although the consumers are inclined to make use of a wide spectrum of the green products but the green management output does not lend itself to ready and easy measurement during a specific and given period; as the production and increase in the competition are deemed as being time-consuming through the application of green management activities. For instance, green management has always been urged to be in accord with the environmental standards exerted and enforced by the governments Applying the environmental standards is firstly in need of considerable investment amounts in environmental processes and technologies, since the companies cannot easily comprehend the value of the green management value and they cannot be of the belief that while green management is a sort of public commodity preserving and reserving the environment, preventing from its pollutions and destructions and the optimum use of the resources as well are the most important goals for accomplishing the sustainable development. Unfortunately, ignoring the same critical theme has faced the country with various environmental crises. It can be recklessly stated that many of the environmental crises are rooted in cultural problems and the necessity to modify the attitudes and the bioenvironmental behaviors in various sectors and levels of the society is vividly tangible in this respect. Achieving such a far-fetched objective requires research, education and training and having access to the precise and exact information, since correct planning and bioenvironmental management and taking such factors into consideration in development decision-making should be based on the information and awareness of the realities and competencies

Under the title of the sustainable development and economical growth, the UN expresses that “the sustainable human development means that regarding the later generations we are ethically and morally obliged to perform at least as good as we were treated by the previous generation”. Such a development also means that to avoid incurring the later generations with a social debt we are required to make sufficient investments and finally sustainable human development means that the resources should be used in such a manner that the next generation is not incurred with bioenvironmental debts through our excessive deployment and exploitation of the land productive and endurable capacity. It has been for some time that the green management program has been launched. In such a program it is necessary for the individual state-affiliated organizations to become competent and equipped with all of the basic qualifications of a green organization. An organization can be entitled as a green organization in the community when it can keep on sustainably performing its activities in line with efficient and optimum use of the resources and the raw material and without spending superfluously Strategic flexibility:

Strategic flexibility supports the adaptive consumption of the resources and reconfiguration of the processes and it has been found to have the necessary capability for rapid reacting and responding to the environmental changes. Strategic flexibility allocates the resources flexibly to development, production, sales or distribution of the products and it backs up a modular and flexible designing for the products, the production of wide spectrum of the products, product line marketing and redefining the production strategies Flexibility can be considered as the index bridging the gap between the system and its external environment for welcoming uncertainty, the system’s dynamicity degree and also as the ability to change and comply Also, strategic flexibility can be defined as the ability of the company for changing its stance in the market through changing its programs and/or discarding the current strategies. Hitt, Keats and De Marie (1998) reason that the most critical component needed for the organizations in surveying the competitive space is the strategic flexibility and it has been defined as the ability of the organization for rapid predicting and accepting the environmental variations and finally acquiring competitive advantage. Strategic flexibility is the organization’s ability for the purpose of rebuilding itself from inside and also the company’s relations with its external environment Based on such a definition, strategic flexibility is a concept which can be consisted of both the internal and external situations. Therefore, the companies which are seeking to acquire strategic flexibility should be parallelly attending to and assessing of the factors related to the organizational environment.

Organizational legitimacy

Organizational legitimacy is a broad term and it has been shown to considerably influence the organizational processes in an indirect manner. Nowadays, many of the researchers believe that the staff members can be successful in their perception and recognition of the organization and its activities in case that they regard their managers and superiors as legitimate individuals.

In the recent decade, the experimental and theoretical literature has been concentrated on the mutual effects between the complex organizations and the peripheral environment and Thompson and Mac Ewen claim that intrinsically the organizational objectives are assumed as dynamic entities which are in need of constant interaction between the environment and the organization. As a result, the organizations should adopt strategies for taking over the environmental problems and safeguarding their survival. One of the pressures imposed on the body of the organizations which is also recognized to be a threat and the organizations should be responding and accountable for such incurred pressures in respect to the environment and their stakeholders and they should be conducting consistent behaviors in this regard, is the acquisition and preservation of organizational legitimacy. In fact, organizational legitimacy is an important motivation at the heart of the simultaneous adaptation which manifests itself in the form of exhibiting creative behaviors and this is the motivating force which stimulates the organizations to increase their performance level and conduct creative behaviors. The issue is important in that when the organization loses its legitimacy or its legitimacy is reduced it is in fact deprived of the environmental supports and the support enforced by its stakeholders. Also, losing organizational legitimacy and social and political support can lead to a reduction in the responsibilities, cutting down the environmental resources, reconstruction and extermination of the state organizations. For the same reason, the organizations should demonstrate creative behaviors to simultaneously adapt themselves.

Historically, the legitimacy concept has been first dealt with by Max Weber. Max Weber is a social theorist has made references to the importance of legitimacy in the power system and the same topic was later used for the organizations.

Parsons developed the partial legitimacy concept and emphasized that the organizations should legitimately apply for the limited resources and the objective which is pursued by them should be congruent to the values of a wider social environment in which they operate. The concept of legitimacy which emphasizes on the organizational objectives consistency with the social activities was later appeared in the works performed by Peffer et al. The concept of legitimacy can be looked upon as both a source and a theme in line with the prevalent environmental norms and regulations. As we know, the organizations are part of a broader system of the society where they perform their activities. The society holds the organizations responsible for performing some activities and it grants them with independence to consume the natural resources. In return, the organizations provide the society with services and productions; therefore, the efforts spent by the organization for finding legitimacy are governed by social conventions which are established between the organizations and the community. In this regard, Digan states that the organizations can keep on striving if the society grants them legitimacy. So, legitimacy is considered as a source on which the organizations depend to survive. In reality, legitimacy is the organizational operations evaluation by its external founders and such an evaluation takes place corresponding to the rules, cognitive cultural and normative systems of the society. The concept of legitimacy is situated in the border line between the organization and the environment. Consequently, in such a changing environment one of the objectives looked for by any organization is to acquire legitimacy and exhibiting that their performance is perceived as being qualified, appropriate and fitting. The dimensions studied under the title of organizational legitimacy are as follow: normative legitimacy, legal legitimacy and cognitive legitimacy.

STUDY BACKGROUND

Foreign backgrounds

Yang et al in 2015, in a study on strategic flexibility, green management and competition in an emergent economy and through blending the dynamic capability perspective and the organizational theory, have dealt with this important theme that how the companies in emergent economies respond to the green management pressures. The survey of the data compiled for 272 Chinese companies indicate that strategic flexibility exerts a positive effect on the green management methodologies and the organizational support tends to offset such a relationship through corroborating this positive effect. On the other hand, this study offers a rich interpretation of the relationship between adapting the green management methodologies and competitive methods through revealing the intermediation role played by the organizational legitimacy. Such findings present important functions in explaining the idea that how the companies in emergent economies combine the internal strategic flexibility with the external organizational support in order for the green management strategies to be enforced, while they in return improve their legitimacy in competitions.

Kortmann et al in 2014 in a study on the relationship between strategic flexibility and operational efficiency via the operational competencies intermediary role came to this conclusion that the mass and innovative customization ability plays an absolute intermediary role between the strategic flexibility and operational efficiency.

Kingos and Akdogan in 2013 in a study on the strategic flexibility, environmental dynamicity and innovative performance dealt with the survey of the relationship between the strategic flexibility, environmental dynamicity and innovative performance by making use of the data collected from 69 companies in Kiserie, Turkey. In their study, they found that there is an empirical support regarding the positive relationship between strategic flexibility, innovative performance and environmental dynamicity.

Internal backgrounds

Azbari et al in 2015 in a study entitled “the survey of the strategic flexibility effect on the companies’ market performance through an intermediary role played by open innovations in the small and medium sized companies in industrial estate in the city of Rasht and they came to the conclusion that strategic flexibility positively and significantly influences the open innovations and also that the open innovation influences the companies’ market performance.

GhorbanNejadMaleki et al in 2011 in a study entitled “designing the organizational legitimacy pattern for creating an optimum mental image to successfully implement the organizational strategies by taking advantage of a factor analysis method” came up with the conclusion that regarding the organizational legitimacy for the time being the

Iranian petroleum and oil products national company has an unfavorable legitimacy and it has to be improved in terms of the following cases: the operational do's and the don'ts should be more observed, the cultural do's and don'ts should be more attended to. Operational do's and the don'ts should be more observed, the cultural do's and don'ts should be more attended to.

Muharram Nejad and Azar Kamand in 2006 in a study on the survey of the green management status in non-governmental sector in Aseman Airline Company assert that the green productivity management execution and compilation in every state and non-state institution is accompanied with bioenvironmental, economical and social accomplishments. To perform the above cited study, the authors dealt with the survey of Aseman Airline Company status from the perspective of water consumption and the energy carriers and then the bioenvironmental pollutions and they came up with some solutions in the end.

METHODS

The present study is an applied research from its objectives point of view and it is a descriptive-survey research in terms of the nature of the study and the data collection methods. Generally, to collect the information required for the study in compiling the study background and theoretical bases there has been made use of library and internet methods including books, articles and the international case studies. Also, to evaluate the status quo of the companies and to survey the study hypotheses we have taken advantage of the field study methodologies and questionnaire tools.

In the current article, we have made use of the structural equations modeling based on the partial least squares by taking advantage of VISUAL PLS software to test the study hypothesis and validate the indices validity and reliability. Since in the model studied here the most complicated factor has been shown to be consisting of five indices there is a need to select at least 50 sample volumes based on the stated principles. To ensure more of the accuracy of the results obtained, we have taken 90 companies as the study sample volume into consideration from the small- to medium-size companies located in Aras Free Trade Zone and 120 questionnaires were administered to the aforementioned companies. Of the entire questionnaires distributed 112 questionnaires were completed correctly and returned which were found worthy of further investigation, therefore the total number of the study sample volume was reduced to 80 companies. There was made use of the small- to medium-size companies' managers to complete the questionnaires and for conducting the organization-wide analyses two questionnaires were administered to each of the companies and the two questionnaires mean was taken as the mean score for the companies. The reliability and the validity were undertaken for the measurement models. To evaluate the reliability for the measurement models we have taken advantage of the Cronbach's alpha method, composite reliability (CR), factorial weights coefficients and to evaluate the validity we have made use of convergent scale (AVE) and divergent validity. To assess the content validity after reviewing a comprehensive body of the literature related to the subject and designing the preliminary framework the obtained questionnaire was evaluated by the professors and the experts of the field and the necessary modifications were carried out.

RESULTS

Findings analysis

As it was stated before, to analyze the data we have made use of the structural equations modeling with the partial least squares method approach and through the use of the VISUAL PLS software to investigate the study conceptual pattern. Also, we have taken advantage of the SPSS software to investigate the descriptive statistics. In the following parts, we deal with the survey of the findings obtained from the data analysis.

Variables descriptive analysis

In this section, the descriptive statistics present us with information regarding the smallest data, the largest data, mean and standard deviation collected from the statistically sample, respectively. The results related to the collected data regarding each of the study variables have been given in the following [Table-1](#).

Table: 1. variables' descriptive analysis

Variable	Mean	Standard deviation
Organizational support	3.37	0.97
Strategic flexibility	3.22	1.15
Green management operations	3.43	0.99
legitimacy	3.54	1.02
Competition	3.42	1.15

Measurement model evaluation

To assess the measurement model fitness we made use of the index reliability, convergent validity and divergent validity tests. Reliability assessment is conducted via two scales of Cronbach's alpha method and composite reliability. In the mean time, there has been made use of the abbreviations to indicate the variables in all of the tables and analyses in the following format: organizational support (OS), strategic flexibility (SF), Green management performance (GMP), legitimacy (L) and competition (C).

To determine the reliability which is indicative of the internal consistency and the measurement precision and accuracy there is usually made use of Cronbach's alpha method. This is while composite reliability can be a better scale than Cronbach's alpha method in structural equations modeling, since in calculating the Cronbach's alpha coefficient regarding each of the components the entire indices should be inserted to the calculations with an equal importance, while the indices with higher factorial weight are more important in composite reliability calculations. This latter issue causes the components' composite reliability rates to be a more realistic and more precise representative scale than the Cronbach's alpha. Therefore, to better and more accurately assess the questionnaire reliability, Cronbach's alpha and composite reliability were calculated. Also, if CR value is found to be higher than 0.7 for each of the components then it can be stated that there is an appropriate internal stability in the measurement models. The following **Table-2** is indicative of the reliability rates for both of the above-mentioned methods.

Table: 2. reliability rates

Construct	Composite Reliability	AVE	Cronbach Alpha
OS	0.872587	0.695699	0.796366
SF	0.874469	0.529227	0.842245
GMP	0.786637	0.567006	0.768419
L	0.802998	0.560759	0.717684
C	0.920092	0.701056	0.889957

According to the evaluations performed and based on the above table, the composite reliability coefficient value (CR) and Cronbach's alpha for the entire studied model dimensions were found to be larger than 0.7, so it can be claimed that the questionnaire is of an acceptable reliability. Also, the extracted AVE variance rate is above 0.5 for the entire study components and indices, therefore it can be concluded that the measurement model possesses an acceptable fitness.

Divergent validity

To study the measurement model divergent validity we have taken advantage of Fornell and Larker's scale. Based on this scale, acceptable divergent validity in a model is indicative of the idea that a component in the model is in a higher rate of interaction with the indices in respect to the other components. This divergent validity is said to be in an acceptable level when the AVE for each of the components is calculated to be bigger than the common variance between that component and the other components existing in the model. In PLS the evaluation of the issue is carried out through running a matrix the tables of which contain correlation coefficient values between the components and AVE square roots based on each of the variables. The aforementioned matrix has been illustrated in **Table-3**.

Table: 3. divergent validity

	OS	SF	GMP	L	C
OS	0.833				
SF	0.514	0.727			
GMP	0.206	0.718	0.752		
L	0.217	0.291	0.259	0.748	
C	0.432	0.654	0.632	0.218	0.837

As it is clear from the above table based on Fornell and Larker’s method, the square value obtained in the present study in the tables residing on the main diagonal of the matrix is higher than the correlation coefficients obtained from the tables beneath the main diagonal, so it can be stated that in the current study, the constructs (the hidden variables) in the model are in a higher level of interaction with their indices in contrast to the other constructs, to put it differently, the model divergence has been discovered to be in a suitable limit..

Table: 4. The study hypotheses test results

	Sample average	Standard error	t-value	result
Green management performance->organizational support	0.3155	0.0222	14.0758	confirmed
Strategic flexibility->organizational support	0.3642	0.0819	4.5194	confirmed
Green management performance->strategic flexibility	0.2052	0.0455	4.3954	confirmed
Green management performance>legitimacy	0.6100	0.0390	15.8356	confirmed
Competition->legitimacy	0.4281	0.0573	7.6814	confirmed
Competition->strategic flexibility	0.4460	0.0386	11.3392	confirmed
Competition->Green management performance	0.1490	0.0361	4.0124	confirmed

According to the above **Table-4** and diagram, because the t-value is larger than 1.96 for all of the hypotheses then it can be stated with a 95% confidence level that the entire study hypotheses are confirmed.

The survey of the entire model significance

The scale which has been used for the evaluation of the structural model is R2 the value of which has been calculated as being equal to 0.67, 0.33 and 0.19 for the endogenous hidden variables and these values have been, respectively, classified as considerable, medium and weak for the internal path model. In the current study, R2 has been obtained to be of the following values: 0.83, 0.13 and 0.91 and it can be stated that the model is enjoying a somewhat goodness of fitness. Tanaan House et al.introduced the general goodness of fitness (GOF) to evaluate the model fitness. According to what Tanaan House et al opine, the GOF index in PLS model is considered to be a general solution to the model’s general goodness of fitness problem and the same as the fitness indices it also acts corresponding to the covariance-based methods and it can be used for the survey of the general credibility evaluations and PLS model quality assessments. The index acts in a similar manner like LISREL goodness of fitness model and the value for this index ranges from 0 to 1 in such a manner that the values closer to 1 are indicative of the model’s appropriate and suitable quality and they can be computed according to the following equation:

$$GOF = \sqrt{\text{average(AVE)} * \text{average(R2)}}$$

In the present study, GOF has been found to be equal to 0.6. Therefore the model’s general goodness of fitness can be said to be in an acceptable level.

DISCUSSION AND CONCLUSION

The current study has been conducted with the objective of surveying the effect of the strategic flexibility and

organizational legitimacy on green management performance in Aras Free Trade Zone companies. In the current study, besides the aforementioned variables two extra variables to wit organizational support and companies' competition have also been applied. That was because it has been made clear that the companies can take advantage of legitimacy under the shade of organizational support and to take measures in a competitive environment in line with their flexible strategies. The t-value for the first hypothesis which evaluates the organizational support effect on the green management was found to be 14.07. Therefore, it can be asserted with a 99% confidence that organizational support programs exert a positive and significant effect on the green management performance in the companies from Aras Free Trade Zone. The t-value for the second hypothesis (the strategic flexibility effect on the organizational support) was 4.51. Since this value is found to be more than 2.56 then it can be stated with 99% confidence that the strategic flexibility positively and statistically significantly influences the organizational support. The third hypothesis with a t-value of equal to 4.39 is also suggestive of the positive and significant effect exerted by strategic flexibility on the companies' green management performance. The positive and significant effect by the organizational legitimacy exerted on the companies green management performance is also confirmed with a 99% confidence level and a t-value of 15.83. the fifth hypothesis evaluates the organizational legitimacy effect on the competition between the companies and the accuracy of the just mentioned hypothesis can be confirmed as well through obtaining a t-value of 7.68. In the sixth hypothesis the positive and significant effect of the strategic flexibility on the organizational competition with a t-value of 11.33 was also confirmed. Also, the green management performance effect on the inter-organization competitions was confirmed through obtaining a t-value of equal to 11.33. Also, the green management performance effect on the inter-organization competitions was confirmed with a t-value of 4.01. All of these hypotheses have been previously confirmed in the prior studies but independently. Kortmann et al in 2014 in a study dealt with the survey of the strategic flexibility effect on the acquisition of technologies and its subsequent deployment in gaining competitive advantage. Also, Yang et al in 2015 investigated the strategic flexibility, green management and companies' competition effects and they have come with this saying that organizational support plays an intermediary role in the relationship between the strategic flexibility and green management performance. Moreover, the current study results are reflective of the existence of an intermediary role played by legitimacy on the relationship between organizational competition and green management performance which is also confirmed. Since the strategic flexibility has been found to be effective on the organizational support and organizational legitimacy the managers are recommended to be seeking to find accepted state standards in order to be able to gain governmental supports through acting conformant to such standards and to be able to accomplish their productive and manufacturing trend to its final point in a best of the ways possible. Besides, the presence of the strategic flexibility in the organizations studies and researches stems from the business ethics. Through a higher rate and more intense involvement in the current subject matter one can overcome the uncertainty phenomenon which is intrinsic in such issues and consequently the weaknesses resulting from the lack and scarcity of the organizational resources can be accordingly resolved. Strategic flexibility helps the organizations to come up with an on-time and rational response in reaction to the environmental variations in such a competitive and intensely dynamic environment. It is in this case that the companies can showcase ethical and moral responses to the social and environmental issues in line with gaining competitive advantages. Also, according to the organizational legitimacy role and the effect it has on the organizations it is necessary to preserve and increase the organizational legitimacy in order to be able to elevate the organization's capability in enforcing and implementing the production and manufacturing programs, strategies and the processes. The results obtained in the present study are reflective of critical managerial hints and remarks. First of all, the results indicate that strategic flexibility like the dynamicity competency exerts a pertinent and accentuated effect on the green management performance; therefore, the managers are expected to feel the importance of the current topic in an environment full of competition activities and to present applied and practical strategies for it. Based on this, the institutions should attempt a great deal of sufficient effort in allocating the extant resources and readjustment of such allocation efforts in producing new products in such variable conditions. The existence of such attempts in manufacturing institutions can bring about a positive development therein. Secondly, in confrontation with the environmental concerns, doubles the necessity for the existence of such organizational supports and requires the companies to pay attention to the programs such as technology and market support programs. Thirdly, the results of the present study indicate that putting green management performance into practical use can improve the organizational legitimacy and competition; therefore, the companies should be aware of the organizational legitimacy since it can be regarded as a competition stimulating factor.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None declared.

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ASSESSING THE RELATIONSHIP BETWEEN MULTIPLE INTELLIGENCES AND LEADERSHIP STYLES AMONG SENIOR MANAGERS OF BANK BRANCHES IN KAZEROUN DURING 2014-2015

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ABSTRACT

This study is conducted aimed to assess the relationship between multiple intelligences and leadership styles (transformational - transactional) among senior managers of bank branches in Kazeroun. The present study is descriptive survey research regarding the nature and method, and regarding the purpose, it is applied. The study population included all managers and employees of the banks in Kazeroun, who are 381 people, where 56 managers and 125 employees have been selected. To collect the data about the theoretical framework and literature, library research was used. To gather data to test the hypotheses, two questionnaires of transformational-transactional leadership style and Multiple Intelligence Assessment Questionnaire by Gardner were used, to analyze the data, correlation and structural equation method, and to test the hypotheses, Pearson correlation, and multivariate regression analysis were used. Moreover, t-test was used to assess the level of indices. The results showed that, there is a significant relationship between the multiple intelligences and the choice of transactional and transformational leadership styles, and in examining the relationship between different aspects of multiple intelligences, except for the relationship between logical-mathematical intelligence and intrapersonal intelligence, the relationship between intelligences and the choice of transformational-transactional leadership style is significant.

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KEY WORDS

Multiple Intelligences, transformational- transactional leadership style, Kazeroun banks

INTRODUCTION

Successful leaders are the ones that have a positive and strong character, an analyst, creative, and innovative mind, and have the ability to pursue the ideals of improvement in order to achieve their goals. Among the features of successful leaders is having high intelligence [1]. There are different definitions of intelligence: for example, in the definition of intelligence, Gage and Berliner say, "Intelligence means getting the points quickly, good understanding, the ability to solve problems and quick understanding of concepts [2]." One of the features of intelligent individuals is possessing the talent to adapt to different situations. An intelligent and successful leader in addition to having strength to adapt and to solve problems, through vision, has focus and continuity in using the abilities to achieve a desirable goal [3]. Given the importance and necessity of transformational, creative, and thoughtful leaders to raise the high-level needs and expectations of members and to promote the institutional needs, the need to managers able to stimulate the ability and intelligence of themselves and the members, regarding the conditions, to attain the objectives seems more tangible [4].

Gardner stated that, "The dominant intelligence in a manager has a significant effect on the quality of his relationship with subordinates and his leadership style, because they are partners in general dimensions of human relationships. Instead of thinking about intelligence, intelligent behavior must be analyzed, and intelligent behavior should be based on knowledge and information in its most general sense- gained formally or informally [5,6]."

Intelligence plays an important role in leadership and is effectively defined in relation to the perception of the leader towards the followers and environmental factors. In fact, the association between intelligence and the leader is defined in the ability to achieve success through definite standards that give it cultural and social aspects. The great interest in multiple intelligences and the leadership is visible in various theories of intelligence, including emotional intelligence, successful intelligence and practical intelligence, but this is not limited even to these theories. The relationship between intelligence and leadership is thus: effective leaders have not only multiple forms of

intelligence, but also these properties may make leaders effective in a series of leadership positions, because they have the adaptability to diverse social and interpersonal situations [7].

Leadership styles have different types. In this study, transactional and transformational leadership styles are studied, which have recently found more importance. Transactional leaders determine what is needed by subordinates to achieve their and organization's goals, classify them, and help subordinates to ensure that by the adoption of the necessary efforts and receiving rewards based on performance, they will reach their goals. In contrast, transformational leaders encourage subordinates to work beyond what is substantially expected from them [8].

Now, according to what was presented, the researcher tries to answer the following question: Is there a significant relationship between multiple intelligences and leadership styles [transformational- transactional] among senior managers of bank branches in Kazeroun?

LITERATURE REVIEW

Transformational Leadership

Brones put this concept forward and Bass [1985] raised it. In its definition, it is stated that transformational leaders are those who inspire their followers, classify them, and lead them in a way to ensure meeting organizational goals .Insight, inspiration, and courage are the words that explain transformational leadership. These are the people who will make bankrupt organizations boom, like Jack Welch in General Electric. Transformational leaders have high-level goals and ideas they lead organizations to a future very different from their past. They can have subordinates act with very high morale and leave profound effects on their organization. In this study, the focus will be more on this kind of leadership and its components.

Servant leadership: Robert Greenleaf [1970] raised the servant leadership discussion. Servant leadership stresses that the primary responsibility of the leader in serving the organization is as a link among the leaders and founders The great leader is considered as a servant and this simple fact is a big key. The first responsibility of a leader is defining and marking the truth and the last is thanking. Among these two, the leader must be a servant, and a debtor. This progress and development summarizes a servant leader.

Transformational leadership qualities

Table: 1. Characteristics of transformational leadership [Bass, 1990]

Fundamental traits	Combined and mixed traits
Favorable effect or charismatic impact	Trust Respect vision Risk sharing Modeling
Inspirational motivation	Commitment goals Enthusiasm
Intellectual stimulation	Rationality Problem solving
Individual consideration	Personal attention Coach

Transformational Leadership history

One of the concerns of organizations and researchers in the past four decades has been leadership, and it has been tried to actualize this phenomenon through a series of academic criteria. One of newest personalized approaches to study leadership based on transactional transformational leadership model is generated by Bass and operationalized by Bass and Oliva. James McGregor Burns was the first to use the terms transactional and transformational leaderships in his book called "leadership." His initial interest was political leadership. However, his terms were fast used in the field of business management, and for the first time, a distinction between transformational and interactional leadership was made. Transformational leaders increase the needs and motivations of followers and cause prominent changes in the individuals, groups, and organizations. Transactional leaders aim at the current needs of the subordinates and pay special attention to barter [pay-for-performance, mutual support and mutual transactions] Based on the theory of transformational leadership, a leader requires the use of local actors to perform the necessary tasks for the organization to achieve its desired objectives. In this regard, the aim of the transformational leader is to ensure that the path to achieve the goals is clearly perceived by the actors inside. He should alleviate the potential obstacles within the system and encourage actors in achieving predetermined goals. After Burns, Bernard Bass developed this model with a combination of transformational and transactional leadership and stated that both styles could be connected to achieving the desired goals and objectives. Bass's theory is the qualitative classification of Burn's theory of transformational leaders against transactional ones. Transactional leadership is as a series of transactions bargaining between leaders and followers, while transformational leadership is something more than motivation in return for optimum performance. In fact, they nurture the followers, intellectually stimulate, and inspire them to increase their personal interests in return for higher collective purpose. As Bass says, unfortunately most empirical studies less focus on transactional leadership, while forerunners and transformationalists are transformational in the world. Bass sees transformational leader as a person that promotes awareness and interest in the group or organization, increases ensuring the individuals and groups, and tries to satisfy subordinates to success and growth compared to existence trying to attract them more to success and growth. These leaders seek new ways of doing business, new and efficient opportunities, and prefer effectiveness to efficiency. Transformational leaders lead subordinates to standards performance and established goals, and emphasize empowering the staff more than dependence. In terms of Bass, transactional leader is the one who prefers leader-member transactional interface; in fact, the leader meets the needs of the followers in return for their performance in meeting the basic expectations. This leader acts better in risk avoidance, ensures the subordinates, and allows them to achieve their objectives. The third component is known as non-transactional or non-intervention-oriented leadership, which is a "remiss" style in leadership where there is a negative relationship between the follower's function.

Table: 2. Comparison of transactional and transformational leadership [Bass, 1990]

Transformational leadership	Transactional leadership
Charisma: magnificent image, with heartfelt respect based on trust among followers - Inspiration: making ideals and raising new purposes - Intellectual stimulation: this increases insight of the followers. - Humane observations: personally tackles the problems and pays attention to the staff and as a coach	- Contingent rewards: payment of bonuses based on the performance of the contract and actualizing them Management based on exception [active]: working according to standards and regulations in the event of deviations, corrective measures Exception-based management: intervention when standards are not met. - Unfettered: Leadership is reduced and not tangible.

Transformational leadership elements

Creating strategic vision

Transformational leaders crush through the dreams. They picture a vision of a real and attractive future that links staff together and directs their energy towards the common goal of the organization. Outlook is the essence of transformational leadership and displays it. They picture a future for the organization and the working unit that is finally displayed by members. Research shows that the outlooks are the most important part of transformational leadership. They picture the future as clear and accessible for employees and represent goals achievable.

The transfer of the viewpoint

In transfer of point of view, if we know the outlook as the very essence of transformational leadership, transformational leaders convey concepts, and describe the importance of goals for employees. By creating a framework and a conceptual model, transformational leaders lead the entire organization towards purposes, for which they use metaphors, symbols, and stories: for example, "hamburger diplomacy" that was used by George Cohen for the operation of McDonald in Russia.

Modeling the outlook

Transformational leaders not only speak about their views, but also enact them. By getting out of manager wear and icon and doing something, they convert words into action. As employees and stakeholders are seen as executive directors' guards, in modeling, managers must be careful to be consistent in their words and deeds, since they are the model of the staff. In addition, trust is due to adaptation of one's actions.

Establishing commitment towards the outlook

The actualization of an outlook requires employees' commitment. Transformational leaders create this commitment with different styles. Their words, symbols, and stories bring a contagious enthusiasm that gives passionate people the view as if it were their own. Leaders show their ability by setting out and making their outlook as law and standing on the same position, and their persistence and compatibility reflect a thought of honesty, trust, integrity, and unity. Finally, by involving employees in forming the outlook of the organization, leaders create commitment and loyalty.

Gardner's theory of multiple intelligences

When we hear the term "intelligence," we usually conceive of the concept of intelligence quotient [IQ]. Intelligence is usually defined as intellectual potential, what we are born with, something that is measurable and a capacity that is difficult to change, but in recent years, other approaches have been created about intelligence. One of views is the theory of multiple intelligences presented by Howard Gardner, a psychologist at Harvard University. According to this theory, traditional psychometric views of intelligence are very limited and weak. Gardner first introduced his theory in his book "Frames of mind: The theory of multiple intelligences" in 1983. In his idea, all humans have different types of intelligence. In his book, he introduced eight different types of intelligence and gave the possibility that there is a ninth type as "existential intelligence." According to Gardner's theory, to get all the potentialities and talents of an individual, one should not only pay attention just to IQ but also assess his intelligences, such as musical intelligence, intrapersonal intelligence, visual-spatial intelligence, and verbal-languages intelligence. Gardner's theory has faced criticism from psychologists and educators. Critics argue that Gardner's definition of intelligence is too broad and extensive, and eight types of intelligence he has defined indicate only talents, personality traits, and abilities. Of other weaknesses of the Gardner's theory, the lack of backup scientific research can be noted. Nevertheless, the theory of multiple intelligences has become very popular among psychologists.

In this section, we are introduced with eight different intelligences that Gardner has defined.

Verbal intelligence: the ability to understand words and the quality of the people's performance in combining them to create a useful language.

Logical-mathematical intelligence: the ability to see factors and relationships that are apparently unrelated in the world around us so that we can apply them in a rational and logical way.

Musical intelligence: the ability to detect modulations, songs, other musical signs, and their combination in a reasonable and clever way.

Spatial intelligence: this is the ability to think about the visual qualities of the world, and using and converting them into creative solutions.

Bodily-kinaesthetic intelligence: the ability to control body movements and gripping objects subtly and the skill to mix these movements.

Intrapersonal intelligence: the ability to access and understand the inner self [emotions, reactions and desires].

Interpersonal intelligence: the ability to notice and distinguish between individuals with regard to the interests and feelings

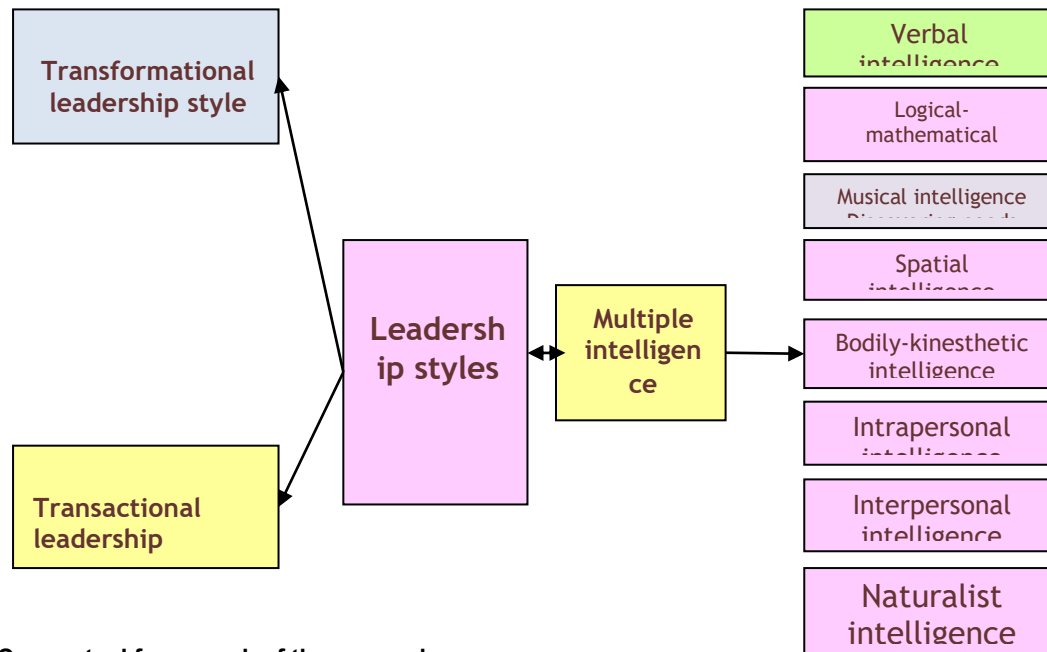


Fig: 1. Conceptual framework of the research

METHODS

This research is descriptive and correlational and descriptive. The study population of this study included all employees and managers of the banks in Kazeroun in 2015, who are 381 people. Of this population, 118 are senior managers and 263 are employees that based on principle of stratified proportional allocation and based on the size of class of each class, 56 of the managers, and 125 employees were selected as the sample. In order to gather data and to examine the hypotheses, multiple intelligence assessment questionnaire based on Gardner's theory and researcher made questionnaire of transformational-transactional leadership styles were used, and to analyze statistical data, regression coefficient and multivariate analysis of variance were used.

RESEARCH HYPOTHESES

The main hypothesis:

There is a significant relationship between multiple intelligences and leadership style [transformational-transactional] of senior managers of bank branches in Kazeroun.

Sub-hypotheses:

1. There is a significant relationship between verbal intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.
2. There is a significant relationship between logical-mathematical intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.
3. There is a significant relationship between musical intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.
4. There is a significant relationship between spatial intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.

5. There is a significant relationship between bodily-kinesthetic intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.
6. There is a significant relationship between intrapersonal intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.
7. There is a significant relationship between interpersonal intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.
8. There is a significant relationship between naturalist intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.

Data analysis

The main hypothesis: There is a significant relationship between multiple intelligences and leadership style [transformational-transactional] of senior managers of bank branches in Kazeroun.

Table 3. Correlation test

		Multiple Intelligence	Leadership Styles
Spearman's rho	Multiple Intelligence	Correlation Coefficient	1.000
		Sig. [2-tailed]	0
		N	56
	Leadership Styles	Correlation Coefficient	0.233
		Sig. [2-tailed]	0.083
		N	56

Spearman correlation coefficient output value of 00.000 as the P-value indicates the existence of a significant relationship between multiple intelligences and transformational- transactional leadership style at 95 percent level. Moreover, given that the correlation coefficient for two variables is 0.223 and the significance number [sig] observed [decision benchmark] is less than the standard significance level [$\alpha=0.05$], there is a significant relationship between these two variables.

First sub-hypothesis: There is a significant relationship between verbal intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.

Table 4. Correlation test results

		Mental verbal intelligence	Leadership Styles
Spearman's rho	Mental verbal intelligence	Correlation Coefficient	1.000
		Sig. [2-tailed]	0
		N	181
	Leadership Styles	Correlation Coefficient	0.514**
		Sig. [2-tailed]	0.000
		N	181

** . Correlation is significant at the 0.01 level [2-tailed].

Spearman correlation coefficient output value of 00.000 as the P-value indicates the existence of a significant relationship between verbal intelligence and transformational- transactional leadership style at 95 percent level. Given that the correlation coefficient for two variables is 0.514 and the significance number [sig] observed

[decision benchmark] is less than the standard significance level [$\alpha=0.05$], there is a significant relationship between these two variables.

The second sub hypothesis: There is a significant relationship between logical-mathematical intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.

Table 5. Correlation test results

		Logical-mathematical intelligence	Leadership Styles
Spearman's rho	Logical-mathematical intelligence	Correlation Coefficient	1.000
		Sig. [2-tailed]	0
		N	181
	Leadership Styles	Correlation Coefficient	0.017
		Sig. [2-tailed]	0.816
		N	181

Spearman correlation coefficient output value of 00.816 as the P-value indicates the lack of a significant relationship between logical-mathematical intelligence and transformational- transactional leadership style of senior managers of banks Kazeroun at 95 percent level, which means that the hypothesis H_0 at 95% level cannot be rejected.

The third sub-hypothesis: There is a significant relationship between musical intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.

Table 6. Correlation test results

		Musical intelligence	Leadership Styles
Spearman's rho	Musical intelligence	Correlation Coefficient	1.000
		Sig. [2-tailed]	0
		N	181
	Leadership Styles	Correlation Coefficient	0.474**
		Sig. [2-tailed]	0.000
		N	181

Spearman correlation coefficient output value of 00.000 as the P-value indicates the existence of a significant relationship between musical intelligence and transformational- transactional leadership style of senior managers of banks in Kazeroun at 95 percent level, which means that H_0 is not confirmed at 95% level. Given that the correlation coefficient for two variables is 0.474 and the significance number [sig] observed [decision benchmark] is less than the standard significance level [$\alpha=0.05$], there is a significant relationship between these two variables.

Fourth sub hypothesis: There is a significant relationship between spatial intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.

Table: 7. Correlation test results

		Spatial intelligence		Leadership Styles
Spearman's rho	Spatial intelligence	Correlation Coefficient	1.000	-0.706**
		Sig. [2-tailed]	0	0.000
		N	181	181
	Leadership Styles	Correlation Coefficient	-0.706**	1.000
		Sig. [2-tailed]	0.000	0
		N	181	181

Spearman correlation coefficient output value of 00.000 as the P-value indicates the existence of a significant relationship between spatial intelligence and transformational- transactional leadership style of senior managers of banks in Kazeroun at 95 percent level, which means that H_0 is not confirmed at 95% level. Moreover, given that the correlation coefficient for two variables is -0.706 and the significance number [sig] observed [decision benchmark] is less than the standard significance level [$\alpha=0.05$], there is a significant relationship between these two variables.

Fifth sub hypothesis: There is a significant relationship between bodily-kinesthetic intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.

Table: 8. Correlation test results

		Bodily-kinesthetic intelligence		Leadership Styles
Spearman's rho	Bodily-kinesthetic intelligence	Correlation Coefficient	1.000	-0.253**
		Sig. [2-tailed]	0	0.001
		N	181	181
	Leadership Styles	Correlation Coefficient	-0.253**	1.000
		Sig. [2-tailed]	0.001	0
		N	181	181

Spearman correlation coefficient output value of 00.001 as the P-value indicates the existence of a significant relationship between bodily-kinesthetic intelligence and transformational- transactional leadership style of senior managers of banks in Kazeroun at 95 percent level, which means that H_0 is not confirmed at 95% level. Moreover,

given that the correlation coefficient for two variables is -0.253 and the significance number [sig] observed [decision benchmark] is less than the standard significance level [$\alpha=0.05$], there is a significant relationship between these two variables.

Sixth sub hypothesis: There is a significant relationship between intrapersonal intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.

Table 9. Correlation test results

		Intrapersonal intelligence		Leadership Styles
Spearman's rho	Intrapersonal intelligence	Correlation Coefficient	1.000	-0.035
		Sig. [2-tailed]	0	0.642
		N	181	181
	Leadership Styles	Correlation Coefficient	-0.035	1.000
		Sig. [2-tailed]	0.642	.0
		N	181	181

Spearman correlation coefficient output value of 00.816 as the P-value indicates the lack of a significant relationship between intrapersonal intelligence and transformational- transactional leadership style of senior managers of banks Kazeroun at 95 percent level, which means that the hypothesis H_0 at 95% level cannot be rejected.

Seventh sub hypothesis: There is a significant relationship between interpersonal intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.

Table 10. Correlation test results

		Interpersonal intelligence		Leadership Styles
Spearman's rho	Interpersonal intelligence	Correlation Coefficient	1.000	0.635**
		Sig. [2-tailed]	0	0.000
		N	181	181
	Leadership Styles	Correlation Coefficient	0.635**	1.000
		Sig. [2-tailed]	0.000	0
		N	181	181

Spearman correlation coefficient output value of 00.000 as the P-value indicates the existence of a significant relationship between intrapersonal intelligence and transformational- transactional leadership style of senior managers of banks in Kazeroun at 95 percent level, which means that H_0 is not confirmed at 95% level. Moreover, given that the correlation coefficient for two variables is 0.635 and the significance number [sig] observed [decision benchmark] is less than the standard significance level [$\alpha=0.05$], there is a significant relationship between these two variables.

Eighth sub hypothesis: There is a significant relationship between naturalist intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun.

Table: 11. Correlation test results

		Naturalist intelligence	Leadership Styles
Spearman's rho	Naturalist intelligence	Correlation Coefficient	1.000
		Sig. [2-tailed]	0
		N	181
	Leadership Styles	Correlation Coefficient	0.696**
		Sig. [2-tailed]	0.000
		N	181

Spearman correlation coefficient output value of 00.000 as the P-value indicates the existence of a significant relationship between naturalist intelligence and transformational- transactional leadership style of senior managers of banks in Kazeroun at 95 percent level, which means that H_0 is not confirmed at 95% level. Moreover, given that the correlation coefficient for two variables is 0.696 and the significance number [sig] observed [decision benchmark] is less than the standard significance level [$\alpha=0.05$], there is a significant relationship between these two variables.

CONCLUSION

The main hypothesis

Spearman correlation coefficient output showed a significant correlation between multiple intelligence and transformational-transactional leadership style of senior managers in Kazeroun banks at 95 percent. Therefore, it can be said that, the relation between these two variables is in the same direction and positive. The results of this hypothesis are consistent with the results of KarimiJavid entitled "The relationship between the skills of managers with their multiple intelligences in high school principals of Hamadan. The results are somewhat consistent with the research by Leila Sadeghi entitled "The relationship between multiple intelligences and transformation and transactional leadership styles of high school principals in Isfahan.

First sub hypothesis: Spearman correlation coefficient showed a significant relationship between verbal intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun at 95% level. The results of this hypothesis are consistent with the results of the study by KarimiJavid entitled "The relationship between the skills of managers with their multiple intelligences in school principals of high school in Hamadan. The results are somewhat consistent with the research by Leila Sadeghi, entitled "The relationship between multiple intelligences and transformation and transactional leadership styles of high school principals in Isfahan.

The second sub hypothesis: Spearman correlation coefficient output indicates the lack of a significant relationship between logical-mathematical intelligence and transformational- transactional leadership style of senior managers of banks Kazeroun at 95 percent level, which means that the hypothesis H_0 at 95% level cannot be rejected.

The third sub-hypothesis: there is a significant relationship between musical intelligence and transformational-transactional leadership style of senior managers of banks in Kazeroun. The results of this hypothesis are consistent with the results of the study by KarimiJavid entitled "The relationship between the skills of managers with their multiple intelligences in school principals of high school in Hamadan. The results are somewhat consistent with the research by Leila Sadeghi entitled "The relationship between multiple intelligences and transformation and transactional leadership styles of high school principals in Isfahan.

The fourth sub-hypothesis: According to the test outcome of Spearman correlation coefficient, the value indicates a significant relationship between spatial intelligence and transformational- transactional leadership style of senior managers of banks in Kazeroun at 95 percent level, which means that the hypothesis H_0 at 95% level cannot be confirmed. The results of this hypothesis are consistent with the results of the study by KarimiJavid entitled "The relationship between the skills of managers with their multiple intelligences in school principals of high school in Hamadan. The results are somewhat consistent with the research by Leila Sadeghi entitled "The relationship between multiple intelligences and transformation and transactional leadership styles of high school principals in Isfahan.

Fifth sub hypothesis: Spearman correlation coefficient test output indicates a significant relationship between bodily-kinesthetic intelligence and transformational- transactional leadership style of senior managers of banks in Kazeroun at 95 percent level, which means that the hypothesis H_0 at 95% level cannot be confirmed. The results of this hypothesis are consistent with the results of the study by KarimiJavid entitled "The relationship between the skills of managers with their multiple intelligences in school principals of high school in Hamadan. The results are somewhat consistent with the research by Leila Sadeghi entitled "The relationship between multiple intelligences and transformation and transactional leadership styles of high school principals in Isfahan.

Sixth sub hypothesis: According to the test outcome of Spearman correlation coefficient, there is no significant relationship between intrapersonal intelligence and transformational- transactional leadership style of senior managers of banks in Kazeroun at 95 percent level, which means that the hypothesis H_0 at 95% level cannot be rejected. The results of this hypothesis are consistent with the results of the study by KarimiJavid entitled "The relationship between the skills of managers with their multiple intelligences in school principals of high school in Hamadan. The results are somewhat consistent with the research by Leila Sadeghi entitled "The relationship between multiple intelligences and transformation and transactional leadership styles of high school principals in Isfahan.

Seventh sub hypothesis: Spearman correlation coefficient test output indicates a significant relationship between interpersonal intelligence and transformational- transactional leadership style of senior managers of banks in Kazeroun at 95 percent level, which means that the hypothesis H_0 at 95% level cannot be confirmed. The results of this hypothesis are consistent with the results of the study by KarimiJavid entitled "The relationship between the skills of managers with their multiple intelligences in school principals of high school in Hamadan. The results are somewhat consistent with the research by Leila Sadeghi entitled "The relationship between multiple intelligences and transformation and transactional leadership styles of high school principals in Isfahan.

Eighth sub hypothesis: Spearman correlation coefficient test output indicates a significant relationship between naturalist intelligence and transformational- transactional leadership style of senior managers of banks in Kazeroun at 95 percent level, which means that the hypothesis H_0 at 95% level cannot be confirmed. The results of this hypothesis are consistent with the results of the study by KarimiJavid entitled "The relationship between the skills of managers with their multiple intelligences in school principals of high school in Hamadan. The results are somewhat consistent with the research by Leila Sadeghi entitled "The relationship between multiple intelligences and transformation and transactional leadership styles of high school principals in Isfahan.

Suggestions

1. Development of multiple intelligences is the main condition for the development of a new generation of citizens for the future of society in technological, economic, social, political, cultural, and learning aspects. Therefore, to develop the variety of Gardner's multiple intelligence, appropriate training and information measures such as books and magazines of management, assemblies, and in-service training should be done.
2. By development of multiple intelligence of managers, their skills increase as well. Technical skills have a significant relationship with visual- physical space – kinesthetic intelligences, so that the managers with broader level of visual- physical space – kinesthetic intelligences are more competent in the preparation and timely implementation of programs, staffing, employment prospects, and guidance of staff.
3. The results showed in people with IQ, there is a significant relationship between verbal intelligence and transformational-transactional leadership style, so it can be recommended that people who have appropriate verbal-language intelligence be used in organizations and management positions that need transactional-transformational leadership style.
4. Managers who have logical-mathematical and intrapersonal intelligences on a broader level are more capable in the field of making logical decisions, order in doing things, and evaluating program effectiveness. Thus, according to relationship between managers' skills and multiple intelligence, it is recommended that in selection and training managers focus on the relationship between multiple intelligences and leadership.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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CO-WORD ANALYSIS: A STUDY ON LEXICAL SHARING BETWEEN SUSTAINABLE DEVELOPMENT AND KNOWLEDGE MANAGEMENT

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ABSTRACT

Sustainable development is a process that ought to be in harmony both with current and future needs regarding exploitation of resources, direction of investments, orientation of technological development, and institutional changes. It is an aspect of human development that aims to expand human capabilities. Development of human capabilities, together with social and cultural maturity of humans, is due to knowledge and information. Therefore, in order to achieve sustainable development, distribution of knowledge across all social strata is emphasized. Furthermore, O'Dell and Grayson (1998) define knowledge management as a strategy of distributing knowledge among people and organizations and ensuring that right knowledge will be available to the right people at the right time. A brief study of texts reveals that there are NOT common lexical boundaries between sustainable development and knowledge management. Thus, in order to assess the co-word frequency between the two concepts, the present article used co-word analysis to explore words common to PNU undergraduate texts in sociology, particularly sociology of development and library and information science, with regard to knowledge management. The resultant graphs show that there is no lexical sharing between the two concepts. Another purpose of this study was to extract the common keywords.

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KEY WORDS

Co-Occurrence Analysis, Co-Word Analysis, Knowledge Management, Sustainable Development

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INTRODUCTION

The era in which only money, land and strength of arms, were known as the capital, has come to an end. Knowledge, nowadays, is one of the most important human capitals being in people's minds. Unlike other resources, knowledge is infinite. When used more, it will be increased. In the age of knowledge where knowledge is one of the most important capital is the human being. In the age of wisdom, knowledge is one of the most important capitals of the human societies. As a result, societies require different management approaches to preserve, transmit and distribute knowledge. The approach of knowledge management strategy focuses on people as sources of knowledge. Knowledge management tries to reveal intangible and implied assets. For example, Davenport and Prusak believe that knowledge is derived from the people and is located in the minds of people. In another definition, Amin and colleagues state that knowledge management is the process and technologies for capturing, sharing and using collective knowledge in order to make optimal decisions at the right time. O'Dell and Grayson also believe that knowledge management is a strategy that should be developed in an organization to ensure that the knowledge reaches the right people at the right time and those people share the knowledge and information to improve the performance of their organizations [1]. According to the definitions provided in the field of knowledge management, theorists in the field realize the issue of sharing and distributing of knowledge as the essential issue and one of the key points in the approach of knowledge management. However, as defined by the World Bank (2003), knowledge assets, are the most important ingredients of the development and knowledge is a developmental tool [2]. The current Societies regard knowledge as the foundation for their development and attempt to share and distribute it; in the issue of access to distribution strategies in the context of cultural knowledge and its sharing with communities

we are faced with the fact that the most successful Societies are the most developed ones. Development, including individual, group and national, is a multi-directional process that changes functionally in society, culture, economy, politics, management, and environmental aspects of a nation in the micro and macro levels [3]. The common term of "sustainable development" also has its own definitions, such as the concept of sustainable growth and successful development. A more general definition of the concept of sustainable development can be acquired from the World Commission on Environment and Development. The report suggested a set of legal principles to achieve sustainable development for developing countries: "Sustainable development as a process, is necessary for improvement. It is the basis for improvement of conditions and elimination of the social and cultural shortcomings". Perhaps, among the definitions of sustainable development, this definition is the best one: "Sustainable development requires continuous supplies and increase in individual satisfaction with the quality of human life". Thus according to the definitions, we may state that: "Sustainable development is a process that is the basis and prerequisite for progress; it is without destructions and risks and focuses on all economic, social, cultural and environmental aspect. [4]". When one talks of sustainable development, s/he means a development that regards human survival and complete prosperities. The principle of Connection is very important in sustainable development and is in an interaction with the whole chains of dynamic processes, human resources, natural resources and the hardware system of community; it attempts to create the present and future interaction between man and nature, justice, and prosperity within and between generations [5]. Nowadays, societies are trying to reach out and establish a society based on sustainable development indicators. One of the components of sustainable development is the equitable distribution of benefits. In general, the situation of the sustainable development is favorable and based on the data-driven character of contemporary societies, we cannot overlook the elements of fair distribution and knowledge. Accordingly, in order to achieve sustainable development, different strategies about the sharing and distribution of knowledge in the field of knowledge management have been created. [4]. And this indicates that the interaction between the two fields of knowledge management and sustainable development, is bilateral but certainly each of them has its own functions and components. For this reason, understanding the concepts used in these two areas and determining their relevance or combination is important. So that the experts of these two fields would be able to closely consider the impacts and roles of each field on the other.

What is the co-word analysis?

One of the issues discussed in this article is the extraction of common key words of both fields of sustainable development and knowledge management which is associated with the term co-word analysis. So this analysis needs to be elaborated. In fact, co-word analysis is a science technique through which we can identify conceptual relations between scientific domains and studied texts and documents and in this way, we may achieve the relationship between ideas in the subject areas. The co-word analysis is based on the assumption that areas of research can be considered through the patterns used in publication words. In this index, the key words in the title, abstract or text documents are checked. Also, the co-occurrence of Keywords, shows the cognitive Connection between the event and a set of documents. This method was developed by Courtial, Callon and Turner in the 1980s, as an alternative to citation and co-citation approaches used in realization of sciences.

Co-occurrence of two or more than two terms in a document or in different documents, is the criteria for action; Words may be descriptor keywords or words in context. This approach is based on three assumptions: a) the words used in the scientific literature are carefully chosen by the authors, b) The use of different words in the text requires some non-trivial relations between the words, c) Repetition of the co-occurrence of words in the texts by different authors, means that the relationship between these words is important in the studied science. This method is used as a measure to determine the most important research topics in areas of science, with a focus on high-frequency words; the frequency of a word is considered as an indicator of the importance of attention or emphasis on the word or idea. [6] Some concepts are used in explaining the knowledge management and sustainable development which can be linked with a quantitative studies and determine their limit to a certain extent.

Objective: The aim of this study is to determine the relationship of words or their limits quantitatively between two areas of knowledge management and sustainable development. Or in other words to what extent the two areas share concepts. Since knowledge and its management are among the basic components of developed (according to the World Development Report) we want to show that to what extent the researchers have referred to sustainable development and knowledge? So three questions will be answered in this study:

1. What are the basic concepts of the field of sustainable development in articles?
2. What are the basic concepts of knowledge management in articles?

3. What are the shared used concepts from the perspective of the authors of books and articles in two areas of knowledge management and sustainable development?

Literature review

Subject searching on the website of the National Library of Iran was conducted to find authored or translated books in the field of sustainable development and knowledge management, however, the result was not satisfactory. Also searching in the databases for shared articles regardless of publication period in the field of sustainable development and knowledge management was done, the websites were: Noormags Database (<http://www.noormags.ir/>), Scientific Information Database (SID) (<http://sid.ir>), Comprehensive Human Sciences Portal (<http://www.ensani.ir>) and Iranian Research Institute for Information Science and Technology (<http://www.irandoc.ac.ir/>). These searches showed that only two articles have been written in Iran in the field of sustainable development and knowledge management that investigate the impact of these two fields on one another. But the discovering of the conceptual relationships, clustering and creating scientific maps, have been done in different fields of research with the method of co analysis. Among them, Kokabi and Ahmadi (2014) determined the relationship and boundaries between knowledge management and information management; their results have shown that the shared terms in knowledge management and information management are in a very low level. Through co word analysis and clustering, investigated IT management in Iran for the purpose of evaluation, policy and mapping of the area and compared it with the global situation. Their results suggested that the distribution of knowledge in the main sub fields of this course in Iran, has been uneven.[7]

METHODS

In the co words analysis, the counting of the Keywords is done in three scientific ways: 1.a thesaurus is used containing each set of words with definitions and relationships between them, 2. indexing documents is used through which a series of texts are considered and indexed, 3. Using keywords and concepts of the creators of documents. The population of this study consists of 8 books from library books and 300 articles of Payam Noor University of Tabriz in knowledge management and sustainable development. Total documents including books and articles in two areas are equal, and are in Persian.

The first step: four books in the field of sustainable development in sociology with a volume of approximately 1,000 pages and 4 books on knowledge management from information sciences with an approximate volume of 700 pages were evaluated and discussed.

The Second step: At this step, definitions and theories presented by the theorists of the areas were considered and fundamental keywords were extracted; the content of books were analyzed and the key words were extracted. 154 keywords in the field of knowledge management and 276 keywords in the field of sustainable development were extracted.

The third step: After reading books and extracting key words, the authors of books in the field of knowledge management, frequent keywords in the field of knowledge management and sustainable development were identified which are stated in the table below.

Table: 1. Basic concepts used in the books on teaching basic concepts of knowledge management

1 - shared interests	19. Joint capital	38. - Strategy
2. Knowledge sharing	20. Performance	39. The knowledge-based organizations
3. Communication Networks	21. Development of Assets	40 - Knowledge
4. Knowledge intermediaries	22. The source of economic development	41 competitive organizations
5-cultural knowledge	23. Knowledge Creation	42 - Communication Technology
6. Share knowledge	24. Intellectual Property	43 -Competitive stable
7. Data	25. tacit knowledge	44. competitive advantage
8. The effective transfer of knowledge	26. Explicit knowledge	45. software movement
9. Knowledge Transfer	28. Organizational Intelligence	46. Librarians
10. Sharing of knowledge	29. Economic Development	47. Information
11. Dissemination of knowledge	30. Knowledge workers	48. Technology
12. Distribution of knowledge	31. strategic decisions	49. Information Technology
13. The rapid and effective cooperation	32. solving systematic issues	
14. Effectiveness	33. The decision of knowledge	
15. The sharing of information.	34. Trust	
16. Leadership		

17- effective management 18. Culture	35. Evaluation 36. strategic assets 37. Knowledge Management	
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Table: 2. The basic concepts used in the books on teaching basic concepts of sustainable development

1. Literacy 2. Health 3. Training 4. Development Indicators 5. Income 6. Life expectancy 7. Stability 8. environment 9. Cycle Technology 10. planning needs 11. Globalization 12. Planning 13. Collaboration 14. The consensus orientation 15. Urban Development	16. Security 17 - Human Development 18. Inequality 19. Gender Equality 20. Tourism 22. Culture 23. sustainable rural development 24. Sustainable Urban Development 25. Rural Development 26. Social relations 27. Globalization 28. System 29. Economics	30. Discipline 31. tolerance 32. Intangible public service 33. Social Solidarity 34. Social capital 35. Entrepreneurship 36. human skills 37. Education for Sustainable Development 38. Environmental Ethics 39. The commitment 40. Social changes 41. Poverty and unemployment 42. Sri natural source 43. Citizens' Rights 44. Liberalism 45. Developmentalism	46. Sustainable economic value 47. Local Governments 49. triangle Contributions 50. Social survival 51. Social issues 52. The segregation of class 53. Tourism 54-market 55. The stable revenue 56. Cultural changes 57. Financial Systems 59. specialization 60. Human Rights 61. Urbanization
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Then the extraction of keywords of articles started and after analyzing it was identified that the frequent keywords of articles are the basic concepts of studied books.

RESULTS

Results and analysis of data

Determination of the keywords used in any science is one of the ways through which we can identify the fundamental concepts of each scientific field. So the question 1 and 2 of the study were presented to identify the fundamental key words used in the two fields. **First question: What are the basic concepts of the field of sustainable development in the papers?**

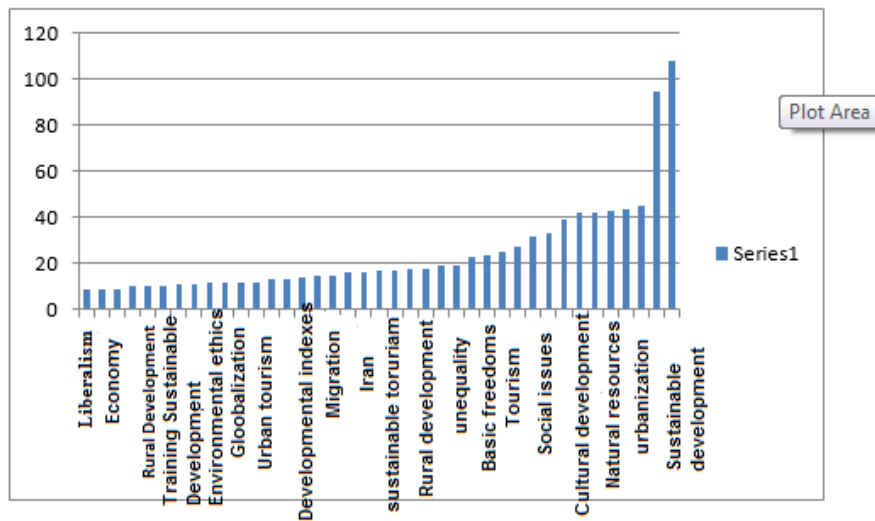


Fig 1: most frequent keywords used in articles in the field of sustainable development

194 words out of 276 keywords related to sustainable development had a frequency of 1 or 2. This indicates that these are the least important ones in the prepared sample. Out of the remaining 62 cases, 17 cases had a frequency of 3 or 4. Based on the sample size still it can be said that these cases didn't have had a considerable frequency.

Keywords with a frequency of 9 are considered high frequent including 20 Keyword. These key words, are the basic concepts related to sustainable development issues and have being used in the papers in this field; among these key words the following are more high frequent: requirements of planning, sustainable development and development. Due to the frequency of key words it seems that the most general and basic concepts have been regarded by writers of these articles. It can be deduced that the papers have only considered general topics and issues of sustainable development and have not investigated the problems precisely and experimentally.

The second question: what are the basic concepts of knowledge management in articles?

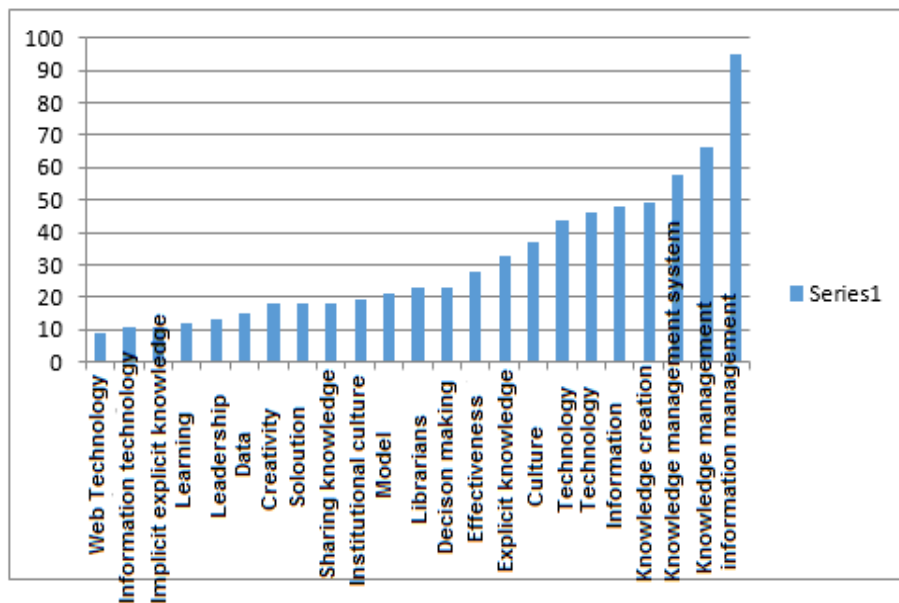


Fig 2 : the most frequent keywords extracted from articles in the field of knowledge management

As the fig2 shows, in the field of knowledge management, 23 Keywords out of the 154 words are the most frequent concepts and authors have pointed out to them. All Keywords can be are related to the basic concepts of

knowledge management and management, and there is no keywords that indicate the experimental studies of the researcher.

The third question: What are the shared used concepts from the perspective of the authors of books and articles in two areas of knowledge management and sustainable development?

Basically for determination of the shared keywords of two fields, the use of matrix mapping and co-occurrence software are required which are designed to be used in the field of scientometrics. An example of such software, is the software of bibexcel.exe. It is a bibliometric tool being developed at the University of Umea of Sweden. This specialized tool is created for bibliometric data management and making maps that can be compared with software such as Excel, SPSS, USI note, and PJAK. [8]. But the meta-analysis of the articles showed that there is no shared keywords in the field of sustainable development and knowledge management. Also no connection was observed between sustainable development and knowledge management; thus, this study didn't use the software in the case study. But to measure and achieve more accurate results, this study should be performed again on a wide scale.

RESULTS

in this study, the basis for the frequent vocabulary number was (9). The frequency of keywords extracted from articles and books, in two areas of sustainable development and knowledge management and the data review showed that a relatively large number of keywords are shared in two subject areas; authors have used them as keywords of sustainable development and knowledge management (276 cases In the field of sustainable development and 154 cases in the field of knowledge management). But according to the number of keyword's frequency only 20 keywords in the field of sustainable development and 23 keywords in the field of knowledge management were identified. The authors have used them with high frequencies of 9 and actually have regarded them as the most fundamental concepts in the field. What is significant is the overlapping of frequent high Keywords in these two areas and the extracted key words of the books. These words are mentioned in table1 and table 2. The overlap of the high frequency key words used in articles and basic concepts extracted from the books indicates that authors have only discussed the basic concepts in the field of sustainable development and knowledge management and have not considered the advanced discussions in their articles. However, as stated previously in order to achieve accurate results, the research must be done on a larger scale.

DISCUSSION

Professor "Frederick Harbison says: "Human resources constitute the main foundation of national wealth, capital, and natural resources. Humans are active agents who aggregate capital, exploit the natural resources, socio-economic and political organizations and move forward national developments. Clearly, when a country is not able to develop the skills and knowledge of its people and exploit the economy effectively fails to develop anything." [9]. Also, according to the Outlook of the Islamic Republic of Iran in 2025 one of the clauses concerning the development of the country is obtaining advanced knowledge, capability in science and technology, based on human resources and social capital in the national production. [10]. In accordance with human development's indicators which are presented each year since 1990 by the World Bank, knowledge is considered as one of the components of and human indicators of development (HID) [11]. The main objective of the research is the extraction of shared Keywords of sustainable development and management and creating the scientific map of shared words in these two fields. Meta-analysis showed no shared keyword in these two fields, meaning that researchers of sustainable development and knowledge management have not regarded the sharing of keywords as a requirement for sustainable development in Iran. No connection between sustainable development and knowledge was identified, so the study didn't use software bibexcel.exe. for the determination of co-occurrence of words

CONCLUSION

The hypothesis that the use of knowledge improve the results and achievements is postulated in individual and collective human behavior. The issue of development is one of the key issues of countries in today's world. The concepts of knowledge and training exist in almost all indicators of development in modern societies. According

to the results of the research and the importance of development it is proposed that the authors of books and articles seriously review the issue of sustainable development and knowledge and through applied and basic researches overcome the shortcomings of these two areas.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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THE RELATIONSHIP BETWEEN EMOTIONAL AND ORGANIZATIONAL CITIZENSHIP BEHAVIOR OF STAFF VOCATIONAL TRAINING

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ABSTRACT

The aim of this study was to investigate the relationship between emotional intelligence and organizational citizenship behavior in technical and vocational training of Tehran area. The research is applied and the purpose of data collection is considered one of the descriptive surveys. To conduct a field survey in this study population consisted of all staff of the vocational training of Tehran area that were 150 Person, who's all numbers have been used. To determine the sample, according to the sample of 108 persons. In addition to the extensive literature survey data collection tool was a questionnaire which its validity by experts and its reliability was confirmed by Cronbach's alpha. For the analysis of the conceptual framework to assess the relationship of Pearson correlation, regression analysis was used to assess the effects of variables. The findings of the study to address the question of the relationship between emotional intelligence and organizational citizenship behavior has demonstrated that emotional intelligence and its components, which include self-awareness, self-management, social awareness and relationship management with organizational citizenship behavior according to the coefficient the correlation obtained ($R=0.85$) There.

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KEY WORDS

Emotional Intelligence,
Organizational Citizenship
Behavior, Vocational Training
Organization of Tehran.

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INTRODUCTION

One of the important aspects of organizational culture excellence is to study the behavior of employees in the organization. Studying the behavior of individuals in the workplaces has been long the focus of scholars of management science and psychology. With the advent of organizational behavior in the early 1960s, this subject was considered more seriously. Many previous studies have tried to classify the behaviors and causes of them. Issues such as perception, motivation, and job attitudes and such are as those addressing the origins of many human behaviors in the workplace. Explaining the citizenship behavior as an extra-role behaviors of employees, one can say that the organizational citizenship behavior has been among the subjects drawn the attention of social psychologists and sociologists in addition to the behaviorists in the past two decades. Emotional intelligence is the newest development in the context of understanding the relationship between thought and emotion. The term was first introduced by Salovey & Mayer. Meyer and Salovey [1997] considered emotional intelligence as an entity involving the ability of accurately detecting others' excitements and emotions and responding appropriately to them as well as stimulating, organizing and controlling the own self emotional responses. Emotional intelligence is associated with understanding of one self and others, communicating with others, adjustment and adaptation to the surrounding environment, which is needed to successful meeting of social needs, and is considered as a tactical ability in individual performance. While cognitive intelligence has a long-term and strategic capability, emotional intelligence makes it possible to predict success; since it shows how one immediately applies his knowledge in different situations. In other words, emotional intelligence refers to individuals' differences on perception, processing, formulation and the use of emotional information [1]. In the current competitive conditions, the rates of participation, obedience and loyalty of employees to the organization are of utmost importance. Accordingly, the studies' results indicate that the employees need voluntary spirit of duty, altruism, respect and courtesy for the proper functioning and its strengthening. One of the new, growing and relevant concepts on such extra role behaviors is the "organizational citizenship behavior", which has drawn the attention of organizations' researchers and managers as an effective factor in the organizations.

The important issue with regard to employees' contact with many visits by the clients during working time is that they need to have appropriate behaviors to build trust and meet their clients' satisfaction. Therefore, staff interaction with each other and communicating properly with clients is an issue to be addressed for followed corporate profitability and productivity. The main issue in this study was to determine the relationship between emotional intelligence and citizenship behavior.

MATERIALS AND METHODS

This was an applied research in terms of objective, by using a surveying method of descriptive-correlational type. The study population consisted of all employees in Tehran Technical and Vocational Training Organization by a total number of 150, which were selected as samples by the census of everyone. However, only 108 questionnaires were complete to be extracted. Due to the small sample size, it is difficult to generalize the findings to other organizations. For, the sample cannot be confidently considered as the representative of the society. **Table- 1** reflects the state of sample and sampling in the study population.

Table: 1. Description of demographic variables

Demographic variables	Definition
Gender	Ratio percentage of men and women in the studied organization
Age	In this study, the age groups were classified as 20-30 years, 30-40 years, 40 -50 years and over 50 years
Education level	Classified as associate's, bachelor's, master's and PhD degrees
Years of service	Classified as under 5 years, 5 to 10 years, 10 to 15 years, 15 to 20 years and over 20 years

In this study, Podsakoff et al. standardized OCB questionnaire [24 questions] and Goleman emotional intelligence questionnaire [19 questions] were used. At beginning of the questionnaire, some questions about demographic variables of the population were asked. The questionnaire was graded based on the Likert scale [Strongly agree, agree, no opinion, disagree and strongly disagree] from one to five. On validity of the questionnaire, despite the fact it was standardized, the validity was again assessed and approved by technical experts with a formal approach. The reliability was calculated using Cronbach's alpha for the OCB as a 78% and as 77% for emotional intelligence seeming to be at optimal levels

RESULTS

Incidence of inappropriate behaviors in organizations depends on identifying internal variables due to history of lower attention and further sustainability of their impacts, which also is to strengthen the policies and use organizational measures. One of the internal variables capable of directly or indirectly influencing such behaviors is the "emotional intelligence" of employees.

Employees with high levels of emotional intelligence are more successful in adjusting and managing their emotions and others to create positive interactions. Therefore, higher organizational citizenship behavior would be associated with higher job performance. Structure and behavior of organizational citizenship to identify, manage and evaluate the employees extra role behaviors who are working in the organization due to whom behaviors, the organizational effectiveness would increase. On the other hand, the emotional intelligence is a skill that their owner can control their emotions [self-awareness], improve it [self-management], understand their impacts [empathy] and behave in ways to enhance their and others' morale [2].

The concept of emotional intelligence was first used by "Papen" [1984] in his treatise that has not been published. A few years later, Meyer and Salovey conceptualized it in the scientific communities. This type of intelligence has drawn much attention in recent years in both scientific and practical aspects. Cheeriness believes that although the term of emotional intelligence has not been used directly, but there is a long history of trying to help improving emotional intelligence and social and emotional capabilities of employees [3]. However, one may say that historically, emotional intelligence is a new concept that has been introduced in recent years and used in contrast to cognitive intelligence. This type of intelligence is a non-cognitive one rooted in the concept of social intelligence, and was introduced for the first time by Thorndike [1920]. According to Thorndike, emotional

intelligence is the significant ability of people to management to act wisely in human relations. He considered the intelligent behavior consisting of objective intelligence [skills of building and using tools and means], abstract intelligence and social intelligence [understanding people and the ability to act creatively in human relations]. Gardner and Stromberg were among those believing that intelligence not only involves cognitive abilities but also covers how to experience and express the emotion [4]. According to Gardner, intrapersonal intelligence involves the intelligence capability of a person to deal with own self and express a complex and quite distinct set of emotions, while interpersonal intelligence includes the individual's intelligence ability of dealing with others, feeling and distinguishing between ethics, motivations and their intentions.

After Gardner, Salovay and Meyer [1990] were among the first defined emotional intelligence is as a subset of social intelligence. The defining elements included the ability to control their emotions and others and recognize emotions and excitements in themselves and others. In 1990, Bar-on also raised the concept of emotional quotient. He believed that emotional intelligence reflects our ability to "successfully cope with others, combined with inner feelings" [5]. Danie

I Goleman, a behavioral science expert, was first one who introduced concept of emotional intelligence into the realm of organization [Travis Bradbury, 2006]. He believed that cognitive intelligence includes at best only 20% of successes and 80% of successes depend on other factors. The fate of people in many situations depends on the skills forming the EI. In fact, emotional intelligence determines the failure of people with high IQ and also the unexpected success of people with an average IQ. Goleman knew emotional intelligence consisting of self-awareness, management and emotions control, self-motivation, empathy, manipulation and managing relationships. In general, the emotional intelligence abilities in accordance

with Daniel Goleman's emotional intelligence competencies model are displayed in the form of four individual and social abilities of self-awareness, self-management, social awareness and relationships management [6]. Studying the behavior of 600 managers, organizational issues specialists and MA students, Goleman presented his model in 2001 entitled as emotional network capabilities. His initial model contained of 5 dimensions and 25 components that he reduced in later years to 4 components and 20 features as functionality as Table-2. [7].

Table:2. Proposed components of emotional intelligence by Daniel Goleman

Self / Individual Merits		Others / Social Competencies
Recognition	Self-awareness [emotional self-awareness, self-assessment, self-esteem]	Social awareness [empathy, SOA, organizational awareness]
Adjustment	Self-management skills [self-control, trustworthiness, conscientiousness, adaptability, success-seeking, initiative]	Social skills [managing relationships, developing relationships, influence of communications, conflict management, leadership, structural borders changes, group coordinating and collaboration]

Emotional intelligence based on personality traits according is given in Table-3 [9]

Table: 3. Bar-On hybrid model of Emotional Intelligence

Emotional Intelligence	A. Intrapersonal Emotional Intelligence	1. Emotional self-awareness	Recognition and understanding of own feelings
		2. Decisiveness	Expressing feelings, ideas, thoughts and defending the personal rights in a constructive way
		3. Self-esteem	Self-awareness, understanding, acceptance and respect for self
		4. Self-actualization	Realizing own potential talents
		5. Independence	Self-command and self-control in personal thinking and action, and freedom from emotional dependency
	B. Interpersonal emotional intelligence	1. Empathy	Ability to be aware of others feelings and understanding the admiration of those feelings
		2. Accountability	Person's ability to present himself as a helpful and productive member with feelings
		3. Interpersonal Relationships	Ability to establish and maintain mutually satisfying relationships, emotional closeness, intimacy and kindly interaction
	C. Emotional intelligence to deal with pressure	1. Tolerating stress	Resistance against adverse and stressful events
		2. Impulse control	Person's ability to resist against tensions or temptations and control own emotions
	D. EI compatibility	1. Problem Solving	Diagnosing and defining the problem and establishment of effective solutions
		2. Reality testing	Evaluation and conformance between what is experienced objectively and subjectively
		3. Flexibility	Adjusting thinking and behavior when changing situations and conditions
	E. Emotional intelligence of general mood	1. Optimism	Satisfaction with own life, making themselves and others happy
		2. Vitality	Looking at the bright sides of life and maintaining a positive attitude even in the face of adversities

E

Experts believe that emotional intelligence has come quickly nowadays to the focus of companies and organizations and its importance has sometimes become more than cognitive abilities and technical knowledge. Managers found that in this way, internal consistency and personal and corporate balance will increase. In the recent decade, the researchers have conducted many studies on the relationship between emotional intelligence and organization and management mechanisms, and evaluated issues such as the relationship of this concept with the following factors: employees' performance [10], leadership effectiveness [11] and [12], management effectiveness [13], working group and teams performance [14], change management transformational leadership conflict management and quality of service.

In the case of organizational citizenship behavior, some researchers like Borman [1991], Brief and Motowidlo [1986] suggested to consider other criteria such as extra role behaviors and counterproductive behaviors of staff in evaluating the performance of employees in addition to the performance assessment. These studies are mainly divided into three types. Some of them are concentrated on the implications of organizational citizenship behavior, which address organizational performance, organizational effectiveness, organizational success, customer satisfaction, customer loyalty, social capital, etc. Another part of the research is focused on predicting and experimentally testing of contributing factors of organizational citizenship behaviors. In this context, factors such as job satisfaction, organizational commitment, corporate identity, organizational justice, trust, leadership types, the relationship between leader and follower, etc. have been proposed. A small number of studies have been also focused exclusively on the concept, scope and new definitions of organizational citizenship behaviors or have generated standardized scales with the help of factor analysis method to measure this concept [7]. The OCB has been conceptualized by using the term urban citizen in the political philosophy. In 1991, using modern philosophy and political theory, Graham studied several items of behavioral beliefs and tendencies combining with each other and they called the signs of active citizenship, which included three major associated parts of the urban civic responsibilities:

1. Respecting the structures and regular processes and complying with the law

2. Loyalty
3. Participation [2].

From Apple Bam's perspective, organizational citizenship behaviors are a set of voluntary and optional behaviors that are not a part of the individual's official duties; however, they are carried out by him and effectively improve the organization's roles and duties [Apple Bam et al., 2004]. This definition focuses on three main features of citizenship behavior. First, such behaviors must be voluntarily and not a preset task and not a part of the official duties of the person. Second, the benefits of this behavior have organizational aspects, and third, the citizenship behavior has a multifaceted nature. In another definition of organizational citizenship behavior provided by Brightman, it is referred to as a volunteer ongoing commitment to the objectives, methods, and ultimately, to the success of the organization, and an organization established based on participation and appropriate actions of its employees would benefit from this advantage [8]. In another definition, the OCB is defined as a behavior beyond the job roles, which has not been officially recognized by the reward system directly and clearly, while this behavior promotes the effective performance of the organization in general [4]. Perhaps, one can say that the most prestigious classification provided about different dimensions and components of organizational citizenship behavior is the one by Organ [5]. Organ described the following five dimensions as organizational citizenship dimensions:

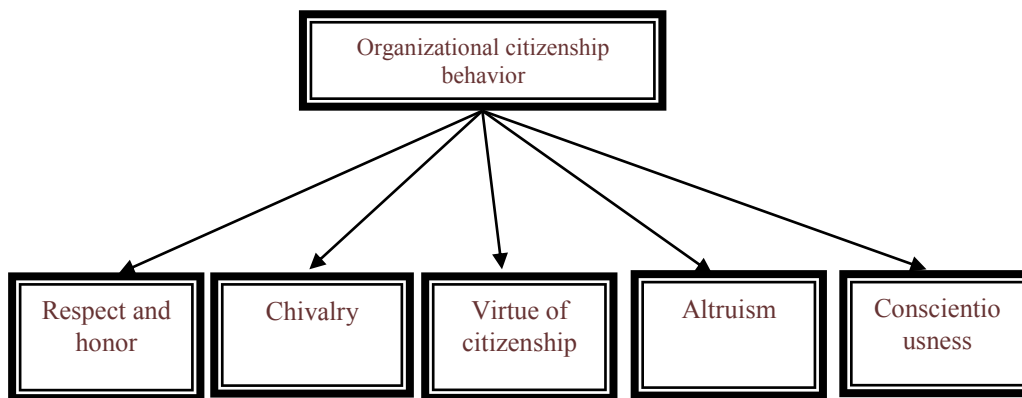


Fig1. Organ organizational citizenship behavior model

According to this model, conscientiousness or loyalty indicates behavior in which a person acts more than the minimum duty and requirements in doing a job [4]. Altruism is meant to help partners in completing the works in unusual circumstances [5]. Citizenship or civic virtue involves behaviors such as participation in extracurricular and additional activities, supporting the development and changes proposed by the organization's administrators, the desire to read books, magazines, and increase public information and concerning about installing posters and announcements in the organization to raise others awareness [6]. Chivalry emphasized on the organization's positive aspects rather than its negative aspects, which includes the tendency of patience in the face of inevitable disturbances and work injustices without complaining. Respect and honor cover all the forethoughts by a person to prevent work problems in relation to other employees [7].

In 2004, Jahangir, Mojahed Akbar and Elhaj studied and combined the opinions of the following researchers to provide a general pattern in relation to the factors affecting organizational citizenship behavior: Organ, 1990; Organ and Lingl, 1995; Agino, 1995; Skarlicki and Latham, 1995; Deluga, 1995; Podsakoff, Mackenzie and Bomer, 1996; Farh, Orly and Lane, 1997; Penner et al., 1997; Schappe, 1998; Tang & Ibrahim, 1998; Wagner and Rosh, 2000;Barbuto et al., 2001;Hanam and Jameson, 2002. Based on the findings of this group, the following final model was provided [12].

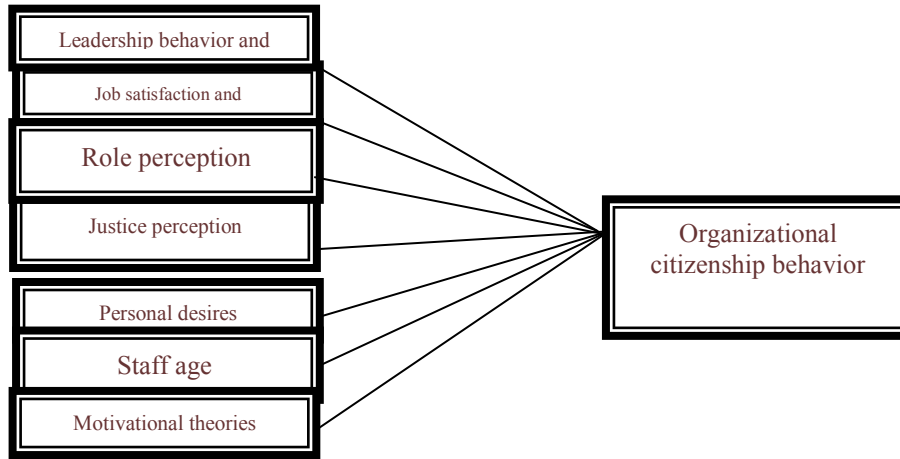


Fig: 2. Factors affecting organizational citizenship behavior [Nadim Jahangir et al., Brock University, p. 81]

According to what reviewed on the organizational citizenship behavior, all definitions and models presented by researchers on organizational citizenship behavior have some similarities. All these definitions emphasize on the extra-role of organizational citizenship behavior and do not consider it as a part of job requirements according to **Table-4**, among the dimensions of emotional intelligence, self-awareness dimension had the highest average [3.59], while management dimension had the lowest average [3.31]. For dimensions of organizational citizenship behavior, social mores [3.60] and chivalry [3.25] dimensions had the highest and lowest average, respectively.

Table: 4. Mean and standard deviation of citizenship behavior and dimensions of emotional intelligence

Variable	Mean	Number	standard deviation	Min	Max	Range	Middle
Self-awareness	3.59	108	0.734	1.75	5.00	3.25	3.50
Self-management	3.40	108	0.700	1.50	5.00	3.50	3.33
Social Awareness	3.33	108	0.753	1.50	5.00	3.50	3.37
Relationship management	3.31	108	0.781	1.40	5.00	3.60	3.40
Conscientiousness	3.30	108	1.019	1.00	5.00	4.00	3.33
Altruism	3.38	108	0.673	2.00	5.00	3.00	3.33
Virtue of citizenship	3.41	108	0.769	1.33	5.00	3.67	3.33
Chivalry	3.25	108	0.701	1.67	4.67	3.00	3.33
Social mores	3.60	108	0.704	1.67	5.00	3.33	3.66

DISCUSSION

According to **Table-2** of the first hypothesis and given the result, the correlation coefficient between two variables of self-awareness and organizational citizenship behavior is equal to 0.691, which along with $t=6.269$ [greater

than 1.96] indicates the confirmation of the hypothesis. Comparing the results with the results of studies by Andi 2012, Fox and Spector 2000 and Heydari Pour et al. 2014 shows consistency.

According to **Table-3** of the second hypothesis and given the result, the correlation coefficient between two variables of self-management and organizational citizenship behavior is equal to 0.776, which along with $t=6.108$ [greater than 1.96] indicates the confirmation of the hypothesis. Comparing the results with the results of studies by Andi 2012, Fox and Spector 2000, Heydari Pour et al. 2014 and Naseri 2015 shows consistency.

According to **Table-4** of the third hypothesis and given the result, the correlation coefficient between two variables of social awareness and organizational citizenship behavior is equal to 0.723, which along with $t=7.745$ [greater than 1.96] indicates the confirmation of the hypothesis. Comparing the results with the results of studies by Andi et al. 2012, Heydari Pour et al. 2014 and Kazemi et al. 2012 shows consistency.

According to **Table-4** of the fourth hypothesis and given the result, the correlation coefficient between two variables of relationship management and organizational citizenship behavior is equal to 0.802, which along with $t=8.654$ [greater than 1.96] indicates the confirmation of the hypothesis. Comparing the results with the results of studies by Andi 2012, Heydari Pour et al. 2014 and Soleymani and Ali Beygi 2010 shows consistency.

CONCLUSION

The As the results indicate, and given that in testing the main hypothesis, the correlation coefficient between two variables of emotional intelligence and organizational citizenship behavior is equal to 0.851 and $t=4.797$ [greater than 1.96], the evidence points to the positive relationship and confirmation of the hypothesis. Therefore, the results are consistent compared with previous results by Pour Heydari et al. Ahmadinejad et al] and Hosseinian et al.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None.

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None declared.

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INVESTIGATING THE RELATIONSHIP BETWEEN CORPORATE OWNERSHIP AND TAX DECISIONS IN TEHRAN STOCK EXCHANGE

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ABSTRACT

This research investigates the relationship between corporate ownership and tax decisions in the companies accepted in Tehran Stock Exchange. The statistical population of research is all the companies accepted in Tehran Stock Exchange, that 85 companies were selected in the time period of 2009 to 2014 for testing research hypotheses. In order to investigate the relationship between variables, four hypotheses were compiled and tested. To analyze the data the multivariate regression model and Eviews software based on mixed data have been used. The research results showed that there is not a significant relationship between the Board of Directors size and tax avoidance and conservatism. In other hypotheses the relationship between family ownership percentage and tax avoidance and conservatism was confirmed. Moreover, in other hypotheses the relationship between the percentage of non-executive members of the Board of Directors and tax conservatism was confirmed, but the relationship between the percentage of non-executive members of the Board of Directors and tax avoidance was not confirmed. Finally, in the last two hypotheses the relationship between the duality of Manager Director's duties and tax avoidance and conservatism has not been confirmed.

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KEY WORDS

Tax Decisions, Corporate Ownership, Tehran Stock Exchange

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INTRODUCTION

Tax payments are among the major costs that people and enterprises bear due to their income-generating activities. As tax payment transmits the wealth from the company and the owners to the government, most of the companies design and perform managerial measures in a way to minimize the company's tax commitments [1]. The theoretical bases and empirical evidences show that the companies are trying to reduce or postpone their income tax. Tax avoidance, tax being bold, tax evasion, interest management, and etc. are the tools that the companies might use to reduce the tax if necessary, depending on the situation [2]. In this research, the phenomena of tax avoidance and tax conservatism as two tools of the companies accepted in Tehran Stock Exchange are investigated. Tax avoidance is actually a kind of using legal gaps in the tax laws to reduce the tax, and there are not generally restrictive laws about tax avoidance control [3]. Tax avoidance can be a tool for storing the tax and reducing the company's costs and consequently increasing stakeholders' wealth [2]. Tax avoidance is performed in the tax laws framework, and the taxpayer does not have any reason for concern to probable discovering of his/her measures. In the tax avoidance, the person is not concerned of revealing his/her action, because he/she has not performed an illegal action, and this factor causes encouraging tax avoidance phenomenon [2]. Conservatism can be regarded as a mechanism to control managers' motivations to report more than real interest and preventing overly opportunistic and optimistic behaviors in offering managers' information as owners' representative [4]. Conservatism in the accounting has a long history. [5] believe that conservatism has impacted on the theory and practice of accounting during the centuries. These researchers know the conservatism when the bad news is reflected more rapidly than good news in accounting reports [5]. Some researchers argued that corporate governance is a factor impacting on the reaction type of company towards companies' tax rate changes. When the government is weak, the tax rate increase results in the companies thinking measures to reduce the tax of enterprise. The companies perform these actions through various methods such as violating the laws, using the legal gaps, and etc. When the corporate governance is strong, the tax rate increase of enterprise can provide the background of acquiring more output for the company [2]. The empirical evidences show that the companies have motivation to reduce the tax, so that by performing conservative accounting save their tax cost. Moreover, investigating the relationship between the difference of diagnostic and definitive tax

and assertive tax shows that the strategy of reducing the tax by doing conservative accounting used by the companies is also regarded legal by the government, because provided that such a strategy is regarded illegal by the government, the government can determine more tax than the assertive tax for the companies that have taken a conservative approach Seyedi,[6].

MATERIALS AND METHODS

Tax avoidance and conservatism are among the policies that can be used for tax incentives by the companies, and in this regard the corporate governance is one of the factors that can have impact on it [6]. Corporate governance plays important and significant role in performing and implementing tax conservatism. Corporate governance is actually a set of mechanisms that: 1) ensures that the company's assets are used effectively and efficiently; 2) and prevents inappropriate distribution of assets to the managers or other partners at the expense of the rest of stakeholders. Thus, stronger governance results in controlling management better, the accounting data is offered on time, and the possibility of exposing litigation case costs reduces; therefore, it can be proposed that the companies with stronger corporate governance will show higher and more ratio of conservatism [7]. In this respect, a complementary approach believes that the adequate and appropriate governance results in better control and organizing management, and in this regard it is expected that the effective and efficient corporate governance results in performing and implementing conservatism. Two observations existing in the literature support this approach. Firstly, Watts and Watts in 2003 explained that the demand for conservatism is originated from the contractual role of accounting. Ahmad and Duellman in 2007 offered evidences that conservatism helps the managers in reducing company's representative costs [8] Thus, it can be inferred that the demand for conservatism will be higher, provided that the financial reports are prepared and made ready under weaker corporate governance. In investigating the relationship between accounting conservatism and corporate governance, the factors such as company history or age, time period of company's investment cycle, and the standard deviation of daily stock input have important role. With regard to the measurement indicators based on the market and conservative commitment and corporate governance indicators, it can be inferred that the companies with proper governance will participate significantly in higher conservative levels in their financial report activities [9] The potential interests of conservatism accounting in corporate governance indicate positive relationship between corporate governance ability and conservatism[10].

Moreover, the studies on the relationship between corporate governance and tax avoidance have shown that the managers having proper corporate governance will have more motivations for tax avoidance, because the presence of other governance mechanisms prevent managers to extract the rent that is created from their tax avoidance activities. In comparison, the managers with weak and low level corporate governance will not have motivations for aggressive tax avoidance, because the lack of control and monitoring makes possible for these managers to exploit the profits that their aggressive tax planning creates. The executive costs of tax avoidance such as the costs related to structuring complex tax interactions, inability to return and invest foreign incomes and potential and probable political costs are determining and important for the future operations, and if the stakeholders and managers have various priorities for tax avoidance, the corporate governance mechanisms for impacting on managers' tax avoidance decisions will be used [11]. Better corporate governance through increasing organizational ownership should result in unity and better coordination of managers and stakeholders' motivations, and hence it should result in a tax avoidance level that closer to the optimum selection from stakeholders' viewpoint. In fact this relationship with regard to the increase or decrease of effective and efficient tax rates depends on the point that, whether the primary level of investment in tax avoidance is very high or very low [12]. The performed studies in this field have shown that the improvements and progresses in corporate governance result in more tax avoidance that particularly is performed through applying international tax planning strategies. Tax avoidance improves significantly the company's value that this point is only true for the companies with proper corporate governance[11]. It can be said that the corporate governance mechanisms play important and significant role in tax avoidance. Corporate governance of company level, more accurately, the organizational ownership is regarded as important determinants in creating strong motivations in changing decisions and tax avoidance activities. The quality of corporate governance results in impacting of tax avoidance on the company's value; for instance it results in proper results for the companies that have proper corporate governance [13]

Two regression models have been offered for this research. For testing the first, third, fifth, and seventh hypotheses, regression model number 1, and for testing second, fourth, sixth and eighth hypotheses the regression model number 2 are used.

$$TaxAvoidance_{it} = \beta_0 + \beta_1 DUAL_{it} + \beta_2 BSIZE_{it} + \beta_3 BCOM_{it} + \beta_4 ACCOM_{it} + \beta_5 SIZE_{it} + \beta_6 LEVERAGE_{it} + \beta_7 ROA_{it} + \varepsilon_{it}$$

Number 1

$$TaxConservat_{it} = \beta_0 + \beta_1 DUAL_{it} + \beta_2 BSIZE_{it} + \beta_3 BCOM_{it} + \beta_4 ACCOM_{it} + \beta_5 SIZE_{it} + \beta_6 LEVERAGE_i + \beta_7 ROA_{it} + \varepsilon_{it}$$

Number 2

DUAL_{it} = virtual variable with value one if there is duality, otherwise zero

BSIZE_{it} = Board of Directors size

BCOM_{it} = Percentage of family ownership

ACCOM_{it} = Percentage of non-executive members

LEVERAGE_i = Financial leverage

SIZE_{it} = Company's size

ROA_{it} = Asset output

TaxAvoidance_{it} = Tax avoidance

TaxConservat_{it} = Tax conservatism

RESULTS

The sample under examination was investigated during the time periods of 2009 to 2014. In this part, the mean, median, standard deviation, maxima and minima (dispersion criteria) of used variables have been calculated and have been presented in [Table- 1](#).

Table: 1. Descriptive Indicators of Case Study Variables

Research Variables	Mean	Median	Maxima	Minima	Standard Deviation
Tax avoidance	0.104	0.092	0.231	-0.087	0.088
Tax conservatism	-0.041	-0.024	0.72	-0.70	0.31
Duality of CEO duties	0.17	0.21	1	0	0.38
Board of Directors size	5.05	5.5	7	5	0.22
Percentage of family ownership	0.72	0.61	1	0	0.49
Percentage of non-executive members	0.61	0.54	0.8	0.25	0.21
Financial leverage	0.66	0.68	0.98	0.03	0.17
Company's size	5.86	5.78	8.11	4.73	0.61
Asset output	0.15	0.13	0.7	-0.3	0.14

Mean is regarded as the major and most important central indicator that indicates the balance point and is the gravity center of distribution. The median is a point that divides one sample into two equal parts. In other word, 50 percent of observations are located before and 50 percent of observations are located after it, as it has been shown in [Table-1](#). In general, dispersion criteria are the criteria that investigate and compare the dispersion of observations around the mean.

DISCUSSION

Test of Sub-Hypothesis H1a

Hypothesis: There is a significant relationship between the Board of Directors size and tax avoidance.

With regard to the results of **Table- 2**, since the t-statistics of the Board of Directors size variable is smaller than 1.965, and its significance level is greater than 0.05, hence there is not a significant relationship between the Board of Directors size and tax avoidance. Considering that the significance level of F-statistics is obtained greater than 5 percent, so the assumption of the linearity of model and its significance is accepted. The Durbin-Watson value that is the statistics of autocorrelation existence in the disruption component of model with the score 1.745 also shows the lack of correlation between the errors.

Table: 2. Results of Sub-Hypothesis H1a Test

Variable	Coefficients	Standard Deviation	T-Statistics	Significance Level
Constant value	0.342	0.089	3.789	0.000
Board of Directors size	0.051	0.084	1.663	0.457
Financial leverage	-0.084	0.071	-2.742	0.034
Company's size	-0.019	0.086	-3.029	0.000
Asset output	-0.164	0.074	-5.664	0.000
F-statistics		24.218	Determinant coefficient	0.412
Significance level of F-statistics		0.000	Adjusted determinant coefficient	0.406
EGLS method			Durbin-Watson value	1.745

Test of Sub-Hypothesis H1b

Hypothesis: There is a significant relationship between the Board of Directors size and tax conservatism.

With regard to the results of **Table- 3**, since the t-statistics of the Board of Directors size variable is smaller than 1.965, and its significance level is greater than 0.05, hence there is not a significant relationship between the Board of Directors size and tax conservatism. Considering that the significance level of F-statistics has been obtained greater than 5 percent, so the assumption of the linearity of model and its significance is accepted. The Durbin-Watson value that is the statistics of autocorrelation existence in the disruption component of model with the score 1.745 also shows the lack of correlation between the

Table: 3.Results of Sub-Hypothesis H1b Test

Variable	Coefficients	Standard Deviation	T-Statistics	Significance Level
Constant value	0.278	0.082	2.663	0.000
Board of Directors size	0.033	0.072	1.009	0.684
Financial leverage	-0.112	0.096	-3.656	0.000
Company's size	-0.027	0.066	-3.374	0.000
Asset output	-0.188	0.084	-6.012	0.000
F-statistics		27.231	Determinant coefficient	0.488
Significance level of F-statistics		0.000	Adjusted determinant coefficient	0.481
EGLS method			Durbin-Watson value	1.995

Test of Sub-Hypothesis H2a

Hypothesis: There is a significant relationship between the percentage of family ownership and tax avoidance. With regard to the results of **Table- 4**, since the t-statistics of the percentage of family ownership variable is greater than 1.965, and its significance level is smaller than 0.05, hence there is a significant relationship between the percentage of family ownership and tax avoidance. Considering that the significance level of F-statistics has been obtained greater than 5 percent, so the assumption of the linearity of model and its significance is accepted. The Durbin-Watson value that is the statistics of autocorrelation existence in the disruption component of model with the score 2.067 also shows the lack of correlation between the errors.

Table 4. Results of Sub-Hypothesis H2a Test

Variable	Coefficients	Standard Deviation	T-Statistics	Significance Level
Constant value	0.279	0.094	3.344	0.000
Percentage of family ownership	0.099	0.071	2.497	0.009
Financial leverage	-0.079	0.088	-2.463	0.000
Company's size	-0.031	0.076	-1.998	0.027
Asset output	-0.214	0.094	-7.784	0.000
F-statistics		46.232	Determinant coefficient	0.589
Significance level of F-statistics		0.000	Adjusted determinant coefficient	0.583
EGLS method			Durbin-Watson value	2.067

Test of Sub-Hypothesis H2b

Hypothesis: There is a significant relationship between the percentage of family ownership and tax conservatism. With regard to the results of **Table- 5**, since the t-statistics of the percentage of family ownership variable is greater than 1.965, and its significance level is smaller than 0.05, hence there is a significant relationship between the percentage of family ownership and tax avoidance. Considering that the significance level of F-statistics has been obtained greater than 5 percent, so the assumption of the linearity of model and its significance is accepted. The Durbin-Watson value that is the statistics of autocorrelation existence in the disruption component of model with the score 1.995 also shows the lack of correlation between the errors.

Table 5. Results of Sub-Hypothesis H2b Test

Variable	Coefficients	Standard Deviation	T-Statistics	Significance Level
Constant value	0.263	0.089	2.978	0.000
Percentage of family ownership	0.081	0.077	2.374	0.018
Financial leverage	-0.048	0.96	-1.991	0.044
Company's size	-0.22	0.81	-2.069	0.011
Asset output	-0.308	0.077	-5.291	0.000
F-statistics		29.074	Determinant coefficient	0.499
Significance level of F-statistics		0.000	Adjusted determinant coefficient	0.491
EGLS method			Durbin-Watson value	1.995

Test of Sub-Hypothesis H3a

Hypothesis: There is a significant relationship between the percentage of non-executive members of the Board of Directors and tax avoidance.

With regard to the results of **Table- 6**, since the t-statistics of the percentage of non-executive members of the Board of Directors variable is smaller than 1.965, and its significance level is greater than 0.05, hence there is not a significant relationship between the percentage of non-executive members of the Board of Directors and tax avoidance. Considering that the significance level of F-statistics has been obtained greater than 5 percent, so the assumption of the linearity of model and its significance is accepted. The Durbin-Watson value that is the statistics of autocorrelation existence in the disruption component of model with the score 2.018 also shows the lack of correlation between the errors.

Test of Sub-Hypothesis H3b

Hypothesis: There is a significant relationship between the percentage of non-executive members of the Board of Directors and tax conservatism.

With regard to the results of **Table- 7**, since the t-statistics of the percentage of non-executive members of the Board of Directors variable is greater than -1.965, and its significance level is smaller than 0.05, hence there is a significant relationship between the percentage of non-executive members of the Board of Directors and tax avoidance. Considering that the significance level of F-statistics has been obtained greater than 5 percent, so the assumption of the linearity of model and its significance is accepted. The Durbin-Watson value that is the statistics of autocorrelation existence in the disruption component of model with the score 2.221 also shows the lack of correlation between the errors.

Table: 6. Results of Sub-Hypothesis H3a Test

Variable	Coefficients	Standard Deviation	T-Statistics	Significance Level
Constant value	0.199	0.092	1.996	0.000
Percentage of non-executive members of the Board of Directors	-0.028	0.083	-1.374	0.121
Financial leverage	-0.041	0.091	-2.431	0.009
Company's size	-0.304	0.086	-4.001	0.000
Asset output	-0.474	0.067	-7.096	0.000
F-statistics		26.212	Determinant coefficient	0.512
Significance level of F-statistics		0.000	Adjusted determinant coefficient	0.501
EGLS method			Durbin-Watson value	2.018

Table: 7. Results of Sub-Hypothesis H3b Test

Variable	Coefficients	Standard Deviation	T-Statistics	Significance Level
Constant value	0.548	0.088	4.599	0.000
Percentage of non-executive members of the Board of Directors	-0.217	0.091	-3.225	0.000
Financial leverage	-0.088	0.074	-4.279	0.000
Company's size	-0.221	0.089	-3.886	0.000
Asset output	-0.339	0.078	-5.096	0.000
F-statistics		22.213	Determinant coefficient	0.485
Significance level of F-statistics		0.000	Adjusted determinant coefficient	0.479
EGLS method			Durbin-Watson value	2.221

Test of Sub-Hypothesis H4a

Hypothesis: There is a significant relationship between the separation of Managing Director post and the president of Board of Directors and tax avoidance.

With regard to the results of **Table- 8**, since the t-statistics of the separation of Managing Director post and the president of Board of Directors is smaller than 1.965, and its significance level is greater than 0.05, hence there is not a significant relationship between the separation of the Managing Director post and the president of Board of Directors and tax avoidance. Considering that the significance level of F-statistics has been obtained greater than 5 percent, so the assumption of the linearity of model and its significance is accepted. The Durbin-Watson value that is the statistics of autocorrelation existence in the disruption component of model with the score 1.889 also shows the lack of correlation between the errors.

Table: 8. Results of Sub-Hypothesis H4a Test

Variable	Coefficients	Standard Deviation	T-Statistics	Significance Level
Constant value	0.299	0.070	2.019	0.000
The separation of Managing Director post and the president of Board of Directors	0.003	0.099	0.523	0.865
Financial leverage	-0.037	0.074	-2.141	0.008
Company's size	-0.127	0.091	-2.278	0.000
Asset output	-0.401	0.089	-8.213	0.000
F-statistics		21.27	Determinant coefficient	0.587
Significance level of F-statistics		0.000	Adjusted determinant coefficient	0.579
EGLS method			Durbin-Watson value	1.889

Test of Sub-Hypothesis H4b

Hypothesis: There is a significant relationship between the separation of Managing Director post and the president of Board of Directors and tax conservatism.

With regard to the results of Table- 9, since the t-statistics of the separation of Managing Director post and the president of Board of Directors is smaller than 1.965, and its significance level is greater than 0.05, hence there is not a significant relationship between the separation of Managing Director post and the president of Board of Directors and tax avoidance. Considering that the significance level of F-statistics has been obtained greater than 5 percent, so the assumption of the linearity of model and its significance is accepted. The Durbin-Watson value that is the statistics of autocorrelation existence in the disruption component of model with the score 2.002 also shows the lack of correlation between the errors.

Table: 9. Results of Sub-Hypothesis H4b Test

Variable	Coefficients	Standard Deviation	T-Statistics	Significance Level
Constant value	0.329	0.084	2.897	0.000
The separation of Managing Director post and the president of Board of Directors	0.037	0.094	1.741	0.099
Financial leverage	-0.029	0.088	-1.978	0.045
Company's size	-0.222	0.081	-4.309	0.000
Asset output	-0.388	0.091	-7.023	0.000
F-statistics		34.213	Determinant coefficient	0.551
Significance level of F-statistics		0.000	Adjusted determinant coefficient	0.546
EGLS method			Durbin-Watson value	2.002

CONCLUSION

The tax is a cost imposed by the government on all profit units that somehow generate income. Provided that the companies and legal entities are regarded as units that perform activity in respect of acquiring benefit and interest, it can be expected that they seek solutions to reduce their payable tax. In financial literature in the foreign countries, the legal endeavors and solutions of companies for reducing the cost of tax are recognized by different names such as tax management, tax payment avoidance and bold tax procedure. The activities of avoiding tax payment are commonly referred to the tools of saving tax that transfer the resources from the government to the stakeholders and hence increase the value of company after the tax. The result of investigating 85 companies accepted in Tehran Stock Exchange indicates that there is not a significant relationship between all corporate governance dimensions and tax avoidance and tax conservatism, although according to the theoretical framework it was expected that a significant relationship existed between all corporate governance dimensions and tax avoidance and tax conservatism. Regarding the research literature investigation, it can be claimed that the

government is more willing to receive the tax more than the assertive tax from the companies that use tax avoidance, and recognizes more tax for this group of companies. Thus, in such conditions the tax avoidance and tax conservatism might not be an efficient measure to reduce the real tax, and perhaps this is the reason that the companies that intend to reduce the tax turn to other solutions such as interest management, tax evasion, and etc. Additionally, the market and other groups might also show negative reaction to the companies that perform tax avoidance measures, and these measures create negative reputation for the company. Moreover, some researches show that the tax increases conservatism motivation in the companies, and on the other hand the government also regards the conservatism of companies as permitted procedures and by disposing tax more than assertive tax does not penalize conservative companies; thus the companies have the motivation to postpone their tax by conservative accounting actions. With regard to the results obtained from research, some suggestions are offered as follows:

- The managers and decision makers while regarding the long term horizon view, are recommended to consider the probable impact and consequences of each one of tax policies. The investors while regarding the tax strategies and planning of companies, are also recommended to consider the related probable consequences on cash flows and the future performance of companies, and consider the related data in their decision making model.
- The decision makers and users are recommended to consider tax avoidance and conservatism aspects in their decisions about tax reduction, and regard other consequences raised from each one of these strategies.
- Considering the role of non-executive managers in strengthening the effectiveness of Board of Directors' performance, it is suggested to consider this important point more and by offering solutions the role of non-executive managers in the Board of Directors composition is strengthened, because this factor can minimize taking improper tax decisions and policies. Or considering the point that the accounting literature shows that the existence of non-executive managers has constructive role in improving all financial reporting. Cases such as long term membership of non-executive managers in the Board of Directors composition might damage their dependency and reduce their effectiveness, that in this respect the companies accepted in the Stock Exchange should care more. The non-executive managers, due to the lack of executive posts have more independence than the executive managers. So, when the independency of the Board of Directors increases, it is likely that the manipulation ratio in real activities such as sale, arbitrary costs, and operational activities, and particularly improper tax policies reduce. According to the representative theory there is a contradiction of interests between the managers and owners in the organization, and hence the existence of non-executive managers in the Board of Directors composition is in this respect important that their interests do not contradict with the company's interests, therefore they can perform more effective monitoring role and judge impartially and with a professional vision about the managers' decision makings.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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THE RELATION BETWEEN THE OWNERSHIP COMPANY, CORPORATE GOVERNANCE COMPANY AND IN TIME OF THE PROFIT IN THE COMPANY THAT ACCEPTED IN STOCK EXCHANGE OF TEHRAN

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ABSTRACT

The aim of the present research is checking the relation between the ownership company, corporate governance Company and in time of the profit in the company that accepted in stock exchange of Tehran. Statistical society of this research is collection of companies accepted in stock exchange in Tehran during the period of 6 years from 1387 to 1392. The research is practical from the aspect of the aim and the method of deduction data is descriptive name - solidarity. A scholar used the regression model of fixed effects panel for estimating the relation between the Independent determinants and dependent Data Processing using the eviews8. The results of research shows that the relation between the concentration of property and in time profit is a reverse U, also there is no meaningful relation between property management and institutional ownership and in time of profit, therefore there is a reverse relation and undeniably connecting between the company property and the in time of profit.

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In time of profit, corporate ownership, corporate governance ownership concentration.

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INTRODUCTION

One of the most fundamental extensions of each country is the economy and financial system of the country. The economy in the two levels of micro and macro has the ability to check and deliberation. Checking the financial system of a country without regard to the below the collection, is not possible. Read and check cases like the exchange, stock, shares companies and topics in the field of financial and economic, always ensure approach are positive. Especially profits and timelessness when it is always being attention of everyone including managers companies, shareholders, members of the board of directors and public and interested. Process of measuring the profits and the result of it, has significant role in the management of the company. Since the calculation of the benefit of the economic institution is influenced of the accounting methods and judge producers and providing the form of finance is the duty for management of the commercial unit, management may, according to the different reasons, precede profit management [1].

Wang (2010) showed that in the supply of the public stock, there is the lack of information symmetry between managers and investors. This subject with questioning the efficiency the capital markets led to lack of optimizes allocation sources. The profit information for being related must published immediately in the market and be available for everyone. In other words, information should be in time. In time of profit implies to the ability of the current interest in the transfer of information related to the current. In time of the benefit implies to this that the profit is able to transfer the information efficiently [2]. Therefore within items contains qualitative and helpful information for investors overseas and reduce the lack of information symmetry between managers and investors.

When the lack of symmetry information in relation to the shares of a company increases the value of the essential with the price in the capital market will be different. Therefore, lack of symmetry information in the capital market, will endanger the fund of ordinary people in this market, too. Also if the information related to the benefit is on time, led to reduce the lack of symmetry of information and as a result led to real expected efficiency for

investors. Wang (2010) showed that companies that profits more on time are due to the decrease of information symmetry between managers and investor's stock price they fall will be less.

Mechanisms of company sovereignty effects on quality of information revealed by companies, including information related to the predicted profit. Revealing transparent financial information problems and issues represented by decreasing the lack of information symmetry between the management and shareholders to at least. In return revealing financial information weakly, often mystifying shareholders and affects their wealth. Undesirable the result of previous research, those mechanisms of company sovereignty, like the features of the Directory, property structures logistic thorough knowledge, impressing the revealing financial information. Therefore it can be said that company sovereignty is a factor that can improve the quality of the information provided by management. If revealing predicted profit is considered by management as a tool for reducing the lack of information symmetry between management and potential investors, the credibility of this predicted are significantly important, because the accuracy of the predicted profit by management in the form of investors' confidence for this kind of revealing is a vital factor [3].

Whatever company sovereignty is more effective and reduce the problem of representation from the view as shareholder company function would be better and quality of benefit would be less. Anyway the identification of setup things that can increase the quality of profits and reduce conflicts of interest existing between beneficiaries is especially important. These objectives can fulfill by desirable company sovereignty.

According to the on time profit is affected other features, checking these features required for this research. Including this feature can name to the structure of ownership and Company sovereignty. Therefore the present investigation is effort in the direction on this issue that each of the ownership with the impact of company sovereignty what does effect on the time of profit?

Theoretical foundation and background research

Today because of the expansion of economics activities development of financial markets and investment in the capital markets particular exchange stock by actual and legal, the most important tool for adopting financial decisions, access to right information and accurate analyzing. The lack of symmetry information has undesired ramifications of anything like that increasing transaction costs, reducing liquidity. On the other hand, when public offered shares, for decisions about buying stock requires information to the time for decisions. In the case of the asymmetrical information presented at the stock group of men efficiency abnormal gaining and as a result the investors of ordinary people and those have less information are risk [4].

Profit as one of the most important features of accounting is always for various purposes such as sharing the value of the stock, function assessment manage companies and cases like that. A few recent years most research in the area affect the profits of the accounting price or efficiency stock has been the quality of the profit little attention. The crisis of financial aid in recent years is a reason of going to the finger toward accounting and financial reports and credit system financial reports to win the trust of all are tarnished [5].

One of the most important factors must follow their constituent's wishes to control and manage the company's combination of ownership and ownership concentration stock companies are in the hands of the major shareholders. Such shareholders who have the significant shares of the company that provides managing the company. In return micro shareholders do not tend to control and monitor the managers, because in this case they had to pay for the control themselves,

While have little share in the profits. When there is a high ownership concentration, there will be the possibility of better surveillance and control on the company management function [6].

Efficient corporate governance mechanisms for the proper functioning of capital markets and the economy, is a vital and necessary to attract and retain public trust. Suitable Corporate governance creates the confidence that your business assets are used effectively. In addition, it will ensure that the Company brings the benefits of a wide range of interest groups as well as the society in which the company operates, are considered and the board is accountable to the shareholders and the company. When the principles of corporate governance structure are weak, large and small investors also increased conflict. First studies on corporate governance in order to use it in certain companies, but this spread subject in many countries was drafted into law. Check the events related to the bankruptcy of large companies such as Enron, WorldCom, Adfy, Seiko, Lions Entertainments, Global crossing,

Sunbeam, Tyco, X VAX and 1997 Asian financial crisis that caused the loss of many investors and stakeholders show that the main source of these events was, poor corporate governance systems, manipulate earnings and profits report baseless and poor quality. Often, managers of these companies resorted to fraudulent methods such as planning and carrying out fictitious transactions with related parties for the purpose of earnings management, quality of financial reporting and the quality of earnings were reduced as much as possible to the lowest level. Due to the importance of the effect of the necessary mechanisms and achieve a high quality of earnings, most communities have done attempted to provide these mechanisms. One of these mechanisms, a system of proper corporate governance in companies and firms which are hired by most countries to strengthen and improve it [7].

Ownership structure is one of the internal mechanisms of governance (steering) company. Corporate governance is one of the major components of growth. The main issue in the discussions of ownership structure is represented as a conflict of interest between the directors and shareholders leads to costs represented. Dispersed ownership (decentralized) causes a problem because the company's representation in the ability and incentives of shareholders to control the management will be weak because their contribution is small. In addition, investors often invest in various companies to reduce risk through diversification. They are indeed the hope of future profits of their stock portfolio investment, not in the hope of a better future for a particular company. In addition, scattered shareholders don't have the ability to effectively control the management because they don't have enough information and necessary expertise to make the right decision. In contrast, centralized ownership (ownership concentration) considerably motivate the major shareholders and by increasing their share in the company, incentives for them to improve the company's operations and management control, will be more [8].

Composition of shareholders companies is different. Partial ownership of companies is available to minority shareholders and individuals. This group to monitor the performance of managers mainly relies on publicly available information such as financial statements are published.

Another part of the property held by major shareholders and professional, which, unlike the first group of valuable information about future prospects and business strategy and long-term investments through direct connection with the directors of the company they placed. The major shareholders would put more pressure on management and called for optimal performance reports. When financial reports showing weakness in the performance management, major shareholders are the major threat to management. They can never tolerate this situation and are more dissatisfied than minority shareholders. As a result, they may carry out activities that endanger interests of other beneficiaries [9]. The corporate governance system with a set of rules, regulations, institutions and procedures to suggest how it managed to strike the right balance between freedom of management, accountability and the interests of various stakeholders now be provided.

Namazi and Kermani (1387) studied entitled "The impact of ownership structure on the performance of companies listed in Tehran Stock Exchange". The aim of this study was to evaluate the effect of ownership structure on the performance of companies listed on the Tehran Stock Exchange. The main theory of this study is a significant relationship between ownership structure and function there. Particular theories based on the relationship between ownership structure and performance of companies. To test each hypothesis, four models based on dependent variables were defined. The sample consisted of 66 companies during the years 1382 and 1386. The statistical method used to test theories raised in this study is "combined data". The results show that significant negative relationship between the "institutional ownership" and company performance and a significant and positive "corporate ownership" and company performance are "property management" significantly and negatively affect performance and in the case of "foreign ownership" of information that the ownership of foreign investors samples companies is not observed. In this regard, the profitability index is calculated using performance evaluation. In "private property" also is better majority ownership being in the hand of the investors company. In general, there is significant relationship between ownership structure and performance [10].

Hasas Yeganeh et.al studied entitled "The relationship between corporate governance and performance of listed companies in Tehran Stock Exchange". The aim of this study was to rank companies in terms of corporate governance and its effect on the performance of the company. In this research sample companies using a comprehensive questionnaire with 25 criteria of corporate governance standards, is measured. These criteria derived from the provisions of the Corporate Governance Code of listed companies in Tehran Stock Exchange in the three categories of information transparency, board structure and its ownership structure. The information 1 year 90 companies were evaluated using regression analysis, research hypotheses were tested. The results showed that there is no significant relationship between corporate governance and firm performance [11].

A study entitled "The impact of organizational culture, ownership concentration and ownership structure affects the quality of financial information of listed companies in Tehran Stock Exchange" has done by Etemadi et.al in year (1388). The study was conducted on 105 Stock company suggests three factors: organizational culture, ownership concentration and ownership structure affect the quality of financial information. Among these factors, ownership structure, with direct effect on the quality of information, but the most important role, it is self-moderating effect on the relationship between organizational culture and quality of financial information and the relationship between ownership concentration and the quality of financial information. In a way that is more and more private ownership structure, ownership concentration to enhance the quality of financial information, while in companies with less private ownership, this relationship is reversed. Therefore, it is suggested to ensure that non-private companies / private little domain, only allowed having a maximum of 16% of stocks Exchange (directly or through subsidiaries with their interfaces)[12].

Esmailzadeh (1389) explores the impact of corporate governance on earnings quality in the Tehran Stock Exchange during the years 1383 to 1387 were examined. Corporate governance mechanisms examined in this study, the percentage of institutional ownership, number of blocks major shareholders, the percentage of outside directors on the board, the absence of Director as Chairman or Vice Chairman and independent auditor size. Using panel data and test hypotheses using data from 94 firms listed in the Tehran Stock Exchange during the years 1383 to 1387 through a combination of time series data and cross-sectional. The results show that a positive relationship between the percentage of institutional ownership, number of blocks major shareholders, the percentage of outside directors on the Board, the absence of the CEO as chairman or vice chairman and corporate auditor size and earnings quality there[13].

Nikoomaram and Mohammadzadeh salteh (1389) studied entitled "The relationship between corporate governance and earnings management". Test results showed that the difference between companies that have been adequate corporate governance with corporate governance whether they are strong or weak. This means that these companies have less discretionary accruals, earnings management occurs less often and companies with corporate governance are adequate, in the same levels of corporate governance also has the ability to lower discretionary accruals and firms with poor corporate governance to companies with strong corporate governance, not necessarily more discretionary accruals. Overall, the results indicate that the adequacy of corporate governance, corporate governance and earnings management in the ability of a significant relationship. The results indicate that the adequacy of corporate governance is one of the decisive factors affecting earnings management[14].

Aghayi and Chalaki (1389) were investigating "the relationship between the characteristics of corporate governance and earnings management in listed companies in Tehran Stock Exchange" in the period from 1380 to 1386. The results show that significant negative relationship between institutional ownership and management interest between board independence and earnings management there as well. In addition, there is no relationship between corporate governance (ownership concentration, penetration Director, duality Director, board size, reliance on debt and term of office of Director on the board) and profit management[15].

Mashayekh and Abdolahi (1390) have studied entitled "The relationship between concentration of ownership, performance and dividend policy in listed companies in Tehran Stock Exchange". This study sought to identify the relationship between ownership concentration, performance and dividend policy in listed companies on the Stock Exchange of Tehran. Hence, the numbers of 64 companies during the period 1380 to 1388 were studied. The selected approach for the integration of hypotheses using cross-sectional data and time. In this study, the method of least squares regression integration (data panel) is used. Concentration of ownership with Tobin's Q and ROE, ROA using the percentage of ownership of major shareholders above 5%, the performance was evaluated using three criteria. The results showed that the level (DPS / EPS) and dividend policy on using the ratio of dividends Tobin There is a significant relationship, the higher the Q and ROE 95% between ownership concentration and performance two criteria that ownership concentration is higher, more control applied to directors, company performance will improve. Also significant relationship between Tobin and the dividends were, in the sense that Q and ROA improved performance metrics can include dividend increases to be followed. At the same time, statistically wasn't observed significant relationship between ownership concentration and the ratio of dividends[16].

Khaleghi Moqadam and Ahmad khanbeygi (1390) did a study entitled "conservatism and timeliness net profit relationship with company size and the size audit institute". In this study, changes to the timeliness and conservatism as both net profit and evaluated the effects of company size and the size audit institute on these two properties is investigated. The sample studied consisted of 90 companies listed on the Tehran Stock Exchange

during the period 1386 to 1378. Results indicate that while the net profit companies generally conservative, but over the time dose not be more conservative and timeliness. Both firm size and audit Institute size were not effect on both net income determined in this study[17].

Khodadadi et.al (1391) have done a study titled "Investigation of Characteristics of corporate governance on financial performance and value of companies listed on the Tehran Stock Exchange" did. In an analysis were used the data from 80 firms listed in the Tehran Stock Exchange in the period from 1384 to 1387. The results showed that the concentration of ownership and state ownership has a positive and significant relationship with performance and corporate value. Major institutional investor has a positive relationship with the value of the company and with the company's performance negatively. Duality has a significant negative relationship with the value of the company and with firm performance relationship is not significant. Also corporate governance structure that contains all structural features surveyed in this study has a positive correlation with the value of the company and its performance[18].

Biyabani and Reza Kazemi (2013) found in a study entitled "ownership structure (shareholders and focus) and dividend policy of listed companies in Tehran Stock Exchange" that companies that have institutional ownership compared to corporate ownership, management and shareholders actual profit more between its shareholders are divided. Also centralized or dispersed ownership is not too different from the father dividend[19].

Alinejad Sarookalayi et al (2013) have done studied entitled "The impact of other corporate governance mechanisms on the relationship between institutional investors and inventory management". The aim of this study was to investigate the influence of other corporate governance mechanisms, including property management, board structure and board size on the relationship between institutional investors and listed companies on the Stock Exchange inventory management in Tehran. To analyze the data by using multivariate regression GMM is used. The sample consisted of 47 companies during the years 1385 to 1390 was a member of the Tehran Stock Exchange. The results showed that managerial ownership and board size on the relationship between institutional investors and inventory management has a significant impact. But in relation to the impact of board structure on the relationship between institutional investors and there was no significant effect of inventory management [20].

Khodadadi and Faramarz and Tabatabayi (2013) have done a study entitled "The impact of the information content of earnings timeliness and conservatism". The results showed that companies that are earning a high level of timeliness, have the information content of higher profits, while companies that benefit conservatism in terms of their high information content have lower profits[21].

Bayat and Ahmadi (2014) have done a study entitled "Delay audit and timeliness of financial reports". The results show that in the period between firm size, auditor's opinion, change management, and the percentage of institutional ownership is negative relationship with audit delay. Also between existences the internal audit, the number of shareholders and extraordinary items have a positive relationship with audit delay.

Vaeiz et.al reviewed relationship between concentrated ownership and board structure with working capital management performance. Research hypotheses based on data from 113 companies listed on Tehran Stock Exchange in the period from 1385 to 1391 and by using panel data model to evaluate the test. The results indicate that the level of ownership concentration has significant negative relationship with inventory conversion period and the cash conversion cycle, But no significant correlation with the period of collection of receivables and debt payment period. In other words, increasing the percentage of shares held by the five major shareholders because of The level of supervision of shareholders by reducing the inventory conversion period and the cash conversion cycle, can lead to increased efficiency of working capital management. However, the structure of the board, except for receivables collection period, has no significant correlation with other elements of working capital management. So, in general it can be said that due to lack of a significant relationship between board structure with cash conversion cycle as a result of a common and the illusion of three other indicators, the board does not have a significant impact on the efficiency of working capital management This could indicate that the weakness and inefficiency of the Board in monitoring and control of working capital policy of Iranian companies[22].

Mitton¹ (2004) on the review of corporate governance and dividend policy in emerging markets showed companies that have strong corporate governance, they pay higher dividends. In addition, in companies with stronger governance there is a negative relationship between dividend payments and growth opportunities[23].

Research of Deng and Wang² (2006) show that between the structure of ownership and risk of the financial health of Chinese companies is an inverse relationship. Companies that have the majority of shares in state-owned institutions, most likely to be the lack of financial health. In addition, nothing found between the property management (board of directors) and the financial health of companies. The reason may be the lack of (minority) managers compared to the company's shareholders[24].

Mueller and Spitz³ (2006) analyze the relationship between ownership management (which includes shares held by family members of the board), and the performance of medium private companies and small German with motivational thought experiment. They were divided in their study of a sample of 356 companies that trade-related services, the results of this study show that the performance of top management with ownership percentage of 40%, is improving[25].

Chin et.al⁴ (2006) found that firms with concentrated ownership in Taiwan, offer forecasting lower profits and further deviation. This evidence is consistent with the hypothesis that controlling shareholders in the management of the company's profit margins to conceal their opportunistic behavior and avoid the unintended consequences, such as disciplinary action in South Korea, India and China[26].

Ely et.al⁵ (2005) Suggest that the major shareholder pressure on management to perform their particular tasks or when company performance is reduced to a certain extent, are demanding the dismissal of managers. So, managers who are major shareholders in companies have high incentives to manage earnings, especially in companies that are faced with a reduction in performance[27].

Mashayekhi (2007) investigate relationship between the three characteristics of corporate governance (board size, CEO duality, representatives of institutional investors in the board of directors) and earnings management and the results indicate that the size of the Board of Directors dichotomy the task of managing director on the board of representatives of institutional investors have a significant correlation with earnings management[28].

Ding, Hua and Juanxi (2007) studied 273 Chinese companies with public and private property concluded that there is Non-linear (u-shaped) relationship between earnings management and ownership structure. So with property management companies, eager to maximize their earnings. On the other hand, the pursuit of self-interest by the owners (the majority), or the effect of ownership concentration on earnings management in companies with managerial ownership, is less than state-owned companies[29].

Tsaia and Gu (2007) were studied relationship between institutional ownership and firm performance in the casino industry for the years 1999 to 2003. Institutional ownership equal percentage of stock held by SOEs shares of the total capital and these companies include insurance companies, financial institutions, banks, SOEs and other parts of the State. They showed that institutional investors to invest in the casino can help the industry to reduce agency problems resulting from the separation of management and ownership.

Lang & Hurwitz (2009) investigate a study that shows the effect of some mechanisms of corporate governance on firm value, during 1997 and 1998 in Hong Kong's financial crisis. Their results showed that companies that focus more ownership there, the company have shown better performance in the capital market. The results also showed that equity ownership in companies with more outside directors, there is some decline in stock prices.

Lim et.al (2014) studied entitled "corporate ownership, corporate governance and timely correction of interest: A Case Study of Malaysia". This article presents evidence shows concentration of ownership and identity of the shareholders to the company's profits timeliness is important to stock prices and delayed reporting time scale is measured. Using panel data 1276 Malaysian company from 1996 to 2009, a non-linear relationship was observed between concentrated ownership is measured by the risk of the company's largest shareholder and delayed reporting timeliness not by price discovery. Although public companies as largest shareholder and political ties with reporting delays are shorter, previous companies on price discovery, act more timely. The family and overseas company as the largest shareholder in less price discovery act in time. While the delay in the reporting period following the integration of the Malaysian Corporate Governance (MCCG) to exchange rules, but its impact on the timeliness of price discovery has been negligible [30].

MATERIALS AND METHODS

This research is based on studies aim of applied research is classified. And also from the perspective of classification based on the method of research is correlation. Research will be conducted within the framework of deductive reasoning - inductive. Thus, theoretical research through Data mining, observation and library studies is comparative as well as financial information required to measure variables by using the audited financial statements. Tehran Stock Exchange companies and software-related data, including TADBIRPARDAZ info, RAHAVARD NOVIN and KADAL internet website and documents available within the company for confirmation and for inductive hypothesis are collected.

The population of this research includes all companies listed on the Stock Exchange that were used the systematic removal method using the following filter data from 89 companies as samples for analysis assumptions:

- 1) Companies that are the symbol for more than three consecutive months during a fiscal year have not been closed.
- 2) Companies must constantly be active during the years 1387 to 1392 in stock exchange.
- 3) The information required to calculate the variables in the case of companies, during the period of the study must be available.
- 4) Companies that have not been done trade on stock more than three months have been removed from the research.
- 5) Should not be part of the financial group companies include banks, investment companies, holding and leasing, because disclosure of financial information and decisions are different.

RESULTS

Descriptive statistics, analysis of data carried out by using measures of central tendency such as dispersion indices standard deviation and mean and median and to test the hypothesis of panel data regression model will be used.

Table 1. Descriptive statistics of variables after normalization

BRD SIZ E	BRD LND	DUAL	VOL	BM	BADNEW S	LEV	SIZE	MANOW N	CORO WN	INSOW N	OWNC ON	TIMELIN E
4.99 025 3	0.645 507	0.59844 1	0.28517 7	0.57426 1	0.064327	13.3722 2	5.861701	0.281375	68.1363 0	0.71862 5	0.01768 7	0.060126
5.00 000 0	0.600 000	1.00000 0	0.02346 0	0.55003 3	0.000000	1.56278 2	5.752406	0.207300	75.5300 0	0.79270 0	0.00106 0	0.085330
8.00 000 0	1.000 000	1.00000 0	6.39220 2	9.16042 2	1.000000	979.298 1	8.031089	0.991800	95.3500 0	0.99090 0	0.45792 7	2.492760
3.00 000 0	0.000 000	0.00000 0	- 0.88421 7	- 19.5308 3	0.000000	- 704.176 3	4.175599	0.009100	- 2.92000 0	0.00820 0	2.71E- 07	-4.074170
0.23 779 3	0.194 792	0.49069 2	0.84000 2	1.24888 0	0.245575	90.4181 1	0.638037	0.237665	23.7268 0	0.23766 5	0.05314 4	0.938188
2.01 332 1	- 0.635 872	- 0.40162 3	2.77523 9	- 8.48645 7	3.551648	3.28020 2	0.950002	1.449782	- 1.44438 6	- 1.44978 2	4.36728 5	-0.206113
69.4 812 1	3.616 129	1.16130 1	13.8693 1	140.997 0	13.61420	53.7784 7	4.470186	4.374268	4.35167 4	4.37426 8	24.0524 4	3.322702
948 18.7 5	42.68 480	86.0561 4	3183.79 8	413205. 6	3486.651	56034.4 0	123.3649	220.0789	217.427 2	220.078 9	11104.2 7	5.858183
0.00 000	0.000 000	0.00000 0	0.00000 0	0.00000 0	0.000000	0.00000 0	0.000000	0.000000	0.00000 0	0.00000 0	0.00000 0	0.353446

Investigation showed that variable variables COROWN (corporate ownership) with an average 68/13630 are highest average among the variables and the lowest mean belonged to the variable OWNCON (ownership concentration) at a rate of 0/017687 respectively.

Also the Middle Most of variable COROWN (Property Company) in 75/53000 and the lowest variable unpleasant news and to the ownership of the company is zero.

Most background variables related to COROWN (Property Company) is 95/35000 and the lowest variable rate OWNCON (ownership concentration) is the amount 0/457927.

Most minimum variable related to size of the company 4/175599 and the lowest variable financial leverage is 704/1763.

Most standard deviation of the variable leverage is 90/41811 and minimum is related to OWNCON (ownership concentration) variable and the amount is 0/053144

Most skewness of the variable OWNCON (ownership concentration) 4/367285 and the lowest ratio of book value to market value of the variable is 8/486457.

Most elongation of the variable ratio of book value to market value is the amount 140/9970 and the variable tasks related to the dual post of managing director are 1/161301.

The highest quartile value for the variable is the ratio of book value to market value of 6/413205 and the lowest related to timeliness variable interest rates is 5/858183.

Methods and models to choose from panel data regression models using the Chow test. This means that if the Chow test can be selected using panel data, instantly analyzes the pay model, But if panel data is selected, be sure to Hausman test to be performed. Hausman test was used to determine the use of the fixed effects model against random effects model. After estimating the model and variable placement of the research being analyzed to determine the model assumptions, Eviews software were analyzed through the results achieved and relationships to be discovered.

Table 2: The results of the Chow test hypotheses

Meaningful	F Statistics	Meaningful
0.0000	35.125213	research model

Given the significant results of the Chow test (**P=0.0000**), at this stage, the fixed effects model (**Panel**) as the preferred model to model and research hypotheses is selected.

Table-3: Hausman test results related to the research model

Meaningful	Statistics	The effect of test	theories
0.0000	40.981940	Fixed	research model

As you can see, due to the significant level achieved at this stage ($P=0.0000$) fixed effects model as the preferred model hypotheses is selected.

Table 4: shows the results of estimating hypotheses

Meaningful	T Statistics	Standard deviation	Factor	Variables
0.0000	-18.54199	0.306426	-5.681754	constant number
0.0264	0.297242	2.262114	0.672395	Largest
0.0109	-0.776439	4.288270	-3.329579	Largest^2
0.1048	-1.564415	0.025458	-0.015456	INSOWN
0.0216	-3.446916	0.011426	-0.023490	COROWN
0.2504	-0.156874	0.179873	-0.015646	MANOWN
0.0000	19.21838	0.051465	0.989072	SIZE
0.0729	0.071686	0.015646	0.477237	LEVERAGE
0.4307	8.044582	0.007496	0.004564	BADNEWS
0.0000	-5.292135	0.009985	-0.052841	BM
0.0000	29.48275	0.011982	0.353275	VOLATILITY
0.1167	-0.659874	0.187526	-0.098784	DUAL
0.0002	3.736029	0.046265	0.172848	BRDLND
0.6355	0.474396	0.031955	0.015159	BRDSIZE
F Statistics	120.5614	Adjusted coefficient of determination	0.555057	
F probability statistic	0.000000	Durbin-Watson statistic	1.865898	

As is observed in Table 4, according to the statistic F can be said that the above regression model is significant. The Durbin-Watson statistic is equal to 1.86, the value of this fixed a correlation between the initial model is showing disturbing elements. The adjusted coefficient of determination of the model indicates that the model variables, the explanatory power (55 percent) have to explain the dependent variable. According to the results there is a direct and significant relationship between ownership concentration and timeliness profit. Due to the variable coefficient Largest ² is negative, this relationship is inversely u-shaped. There is no significant relationship between managerial ownership and timeliness of benefit. But there is significant inverse relationship between corporate ownership and timeliness of interest. Also a significant relationship between institutional ownership cannot be seen with the timeliness of profit.

DISCUSSION

In this study, in order to achieve the research goals, 4 assumptions were used:

Hypothesis 1: an inverse u-shaped relationship is between ownership concentration and timeliness profit.

Hypothesis 2: There is a significant relationship between managerial ownership and timeliness benefit.

Hypothesis 3: there is a significant relationship between corporate ownership and the timeliness of profit.

Hypothesis 4: There is a significant relationship between institutional ownership and timeliness benefit.

Study model and calculation of variables

Board Structure and ownership structure are among the most important mechanisms of corporate governance that corporate governance ranking by the various rating agencies (such as Standard & Poor's Institute) were used as well as in various research areas of corporate governance.

Healy & Palepu (2001), Eng & Mak (2003), Vanayz (2005), Etemadi et al. (1380), Feodor (2013) and Lim et al. (2014) have learned of the Company's Board of Directors as an effective mechanism to reduce agency problems between shareholders and managers. They believe strengthening the role of size-dependent characteristics of the Board, the Board and the CEO's role ambiguity. Effect of the board size on its ability to steer the company was the subject of many studies over time. Previous research suggests that board size has a significant effect on the effectiveness of the board of directors .

According to different, board size is usually between corporate interests of low and reflects the cost of monitoring.

The Board reflects the Board's independence, saying that the board has more independence from the executive director, acts more effective . In other words, external members of the Board of Directors, monitoring and control of dysfunctional management behaviors, causing performance to be more effective and increase shareholder wealth.

Another issue of the structure of the board that is concern is CEO duality. Independence CEO of the Board of Directors as a nice feature for effectiveness and efficiency in maximizing the shareholders expressed in previous studies [31].

On the other hand the existence of shareholders with different characteristics in terms of the desire to improve monitoring and notification can be effective on information asymmetry and quality and timeliness of the information provided .

Warfeild and others (1995) found that the information content of earnings increases by the level of managerial ownership.

Fan and Wong (2002) argued that managers of companies with high ownership concentration, many motivational factors for disclosure of the final information for limited companies.

Laban and Iskan (2005) showed that the quality of financial reporting increases by reducing the concentration of ownership.

Bushman and others (2004) found a significant correlation between the timeliness of profit and ownership concentration.

According to the model used Lyme et al. (2014) and studies on the variables affecting the timeliness of profit, the regression model used in this study are as follows:

$$TimeLiness_{it} (ReportingLag)_{it} = \alpha + \beta_1 LargestShareHolding_{it} + \beta_2 LargestShareHolding_{it}^2 + \beta_3 OwnerType_{it} + \beta_4 CG_{it} + \beta_5 Size_{it} + \beta_6 Leverage_{it} + \beta_7 B/M_{it} + \beta_8 BadNews_{it} + \beta_9 Volatility_{it} + e_{it}$$

The variables used in this model are as follows:

Ownership concentration *Largest Shareholding and Largest Shareholding²*

Public company ownership structure can dissipate (a large number of small shareholders) or concentrated (very few major shareholders). When ownership is in the hands of major shareholders, system control is centralized and when ownership is distributed, system control will be decentralized. Since the concentration of ownership, corporate governance mechanism was seen as an important determinant, seems to be controlling owner identity have an essential role in respect of the ownership-performance.

Generally expressed that an inverse U-shaped relationship is between concentration and profitability of companies. In other words, when the concentration of ownership of a very low level, start to rise, Due to the increasing supervision from the major shareholders reduced agency costs and thus increase profitability. But when the concentration of ownership increased to a certain extent, costs and profitability of the profits surpassed reduced.

As research Dalyval et al. (2008), Grvln and Mychayyly (2008), Folsom (2009), Hay (2009), Marseille Avktyt and Park (2009) in this study, the Herfindahl-Hirschman has been used for calculating the variable [36]:

$$HHI = \sum_{i=1}^{N_j} (SALES_{i,j} / \sum_{i=1}^{N_j} SALES_{i,j})^2$$

In this regard, $SALES_{i,j}$ is the total sales of company (i) in industry (j).

Owner type

Owner type is measured by the following indicators:

Corporate ownership:

In corporate ownership, mainly the major shareholders (companies and businesses) make up a high percentage of stock ownership company [7]. The way of calculation is calculating the percentage of shares held by corporate components of total capital stock and includes all types of joint stock companies, except those mentioned in the previous item [32].

Institutional ownership:

Institutional investors are included banks, insurance companies, pension funds, investment companies and other institutions that buy and sell large amounts of securities . The way of calculation is calculating the total percentage of shares held by institutional investors such as banks, insurance companies, etc [33].

Property management:

In this type of property, most stocks are in the hand of managers and family Board of Directors or members of a family . The way of calculation is calculating the percentage of shares held by directors, board members and their families.

Timeliness reporting

The timeliness of profit, is concerned the ability of current interest in transfer the current data. Earnings Timeliness pointed out that the profit is able to efficiently transmit information.

This is calculated by the following formula:

$$Timeliness = \frac{\sum_{t=-364}^0 \{ |Ln(P0) - Ln(Pt) - \{Ln(I0) - Ln(It)\}|\}}{365}$$

Where (Pt) is closing Stock Price on day (t) and (It) is a market index on day (t). (P0) is closing stock price in the 14 days after the publication of dividends (Earnings Release Date). The lower profit is the amount of timeliness, price discovery would be faster, and means financial information in the stock price in a timelier manner is shown.

The structure of the Board of Directors corporate governance (CG)

Corporate governance measured with the following indicators and variables:

- The percentage of independent members of the Board of Directors
- Duality obligation of Director
- Board size

The percentage of independent members of the Board of Directors:

The primary responsibility of the Board of Directors, the creation of efficient governance on corporate governance in the interests of shareholders and balance the interests of various stakeholders, including customers, employees, investors and local communities. In all actions of the board of directors provides to make its commercial decision is expected in such a way that the best interests of the company is in that. In fulfillment of this commitment, honesty and integrity of senior executives and managers can rely on consultants and independent auditors. The way of calculation is calculating the ratio of the total number of board members to independent board members [34].

Duality obligation of Director:

If the CEO is also the Chairman of the Board, this refers to the duality Director and in this case CEO has potentially greater authority. Dual structure also allows the Director to control information available to other board members effectively and thus may prevent effective monitoring. If the duality of effective monitoring prevented, may be connected with the more unusual accruals. The method of calculation through variables of ones and zeros. If the CEO is chairman of the board equal to one and otherwise used in zero.

Board size

In terms of representation can be argued that a larger board is likely to alert the agency problems, because more people will work under the management. When the boards are bigger, likely consist of more independent members with valuable expertise. Board member expert is expected the better action to prevent or limit the opportunistic behavior management. The way of calculation is calculating the number of members of the board of each company.

Size of the company

Managers often have a tendency to grow the company beyond its optimal size, because the company's growth increases the power management by increasing the resources under its control. Large companies by the amount of funds that need to be purchased are less likely to be exposed to unwanted acquisitions. Therefore, it is expected that corporate managers on investment and fiscal policy, have more power and authority that is leading to much higher cash balances.

Leverage represents assets that are financed through debt.

Market value to book value B/M or share price divided by book value per share gives a new benchmark which can be found many times the book value of its shares will be traded. Whenever the state of the economy in exchange for political crises, etc., is undesirable and the value of the stock is ejaculate, shares of many companies are almost traded equal to the their book value. In the case smart people collect their stock. Therefore, attributed in many cases could be considered the benchmark for investing. In most cases for example, when companies have loss, we cannot measure performance and price-to-earnings ratio (P/E) per share. In this case, the ratio of market value to book value shows benchmark for measuring the performance and value created for the shareholder.

According to research by Fama and French have done this criterion, compared to other financial variables measure is more stable and more reliable.

Bad news which represents the annual loss in these studies, unexpected positive earnings is considered as good news and negative earnings surprise is considered as bad news. Using dichotomous variables for measuring the type of news (good or bad news) "good news" was published earlier than "bad news"

. The method of calculation through variables of ones and zeros. If the company is experiencing an annual loss equal to one, otherwise zero is used.

Stock price volatility is one of the characteristics of time series of earnings quality. More volatility is associated with a higher risk due to several factors. The predictability of profit as a feature of quality and profit time series, including "The ability to predict the current interest in future profits in the short term and long term". Although many factors may affect the volatility of earnings, profit volatility is the two main reasons: economic factors and the accounting treatment. Companies in the economic activity, if we assume the economic environment as the sea and the company as a ship; Ships are challenged at sea turbulence effects. Therefore, we can conclude that economic shocks and something like that, which are outside the company's control; will affect firm performance. Accounting factors mainly about style and how to identify revenues and costs and thus profit economic unit; could affect this mechanism.

Volatility is stock prices or stock returns and measured as follows :

$$Var = \sum (r - \mu)^2 / (N - 1)$$

In which (r) is stock returns, (μ) is average stock returns, (N) is number of days in the period under consideration, 60-day for ordinary due and 30-day for unusual period.

CONCLUSION

Hypothesis 1: According to the results, an inverse relationship between ownership concentration and timeliness profit is u-shaped. So the hypothesis is confirmed. Results obtained from test this hypothesis, the research results confirmed; Aydin, Sayim, and Yalama (2007) expressed that the participation of foreign-owned companies' performance, improves the timeliness profit. Lim et al. (2014), Etemadi et al. (1388), Khodadadi et al. (1391), Mahdavy & Heydari (1384), Provides evidence shows that ownership concentration is important for the timeliness of the company's profits. Results obtained from test this hypothesis, the research results are not confirmed; Chin et al. (2006) found that firms with concentrated ownership in Taiwan, predicted profit with less accuracy and with further deviation to offer. This evidence is consistent with the hypothesis that controlling shareholders in the management of the company's profit margins to conceal their opportunistic behavior. Aghayi & Chalaki (1389) expressed there is a positive relationship between ownership concentration and earnings management.

Hypothesis 2: According to the results there is no significant relationship between managerial ownership and timeliness of benefit. So the hypothesis is rejected. Results obtained from test this hypothesis, the research results are not confirmed; Alinejad Saroukalayi & Bahreyni & Taheri (1392) found that managerial ownership on the relationship between institutional investors and inventory management has a significant impact. Also Namazi & Kermani (1387) found that there was a significant relationship between managerial ownership and profitability. Mueller and Spitz found that the performance indicators of the profitability of companies with high management ownership percentage of 40%, is improving. Mohammadi et al. (1388) found that there is a relationship between property management and profits.

Hypothesis 3: According to the results of corporate ownership and a significant inverse relationship with the timeliness profit. So the hypothesis is confirmed. Results obtained from test this hypothesis, the research results confirmed; Namazi and Kermani (1387) found that there was a significant relationship between corporate ownership and profitability. Mohammadi et al. (1388) found that there is a relationship between corporate ownership and profit.

Hypothesis 4: According to the results of a significant relationship between institutional ownership cannot be seen with the timeliness of profit. So the hypothesis is rejected. Results obtained from test this hypothesis, the research results are not confirmed; Namazi and Kermani (1387) found that there is a significant relationship between institutional ownership and profitability. The results of Aghayi & Chalaki (1389) show that there is significant negative relationship between institutional ownership and profits. Mohammadi et al. (1388) found that there is a relationship between institutional ownership and profits. Ding, Hua, Junxi (2007) state that privately owned companies, eager to maximize their earnings and timely disclosure of information about the profit. As well as research Deng and Wang (2006) states that companies whose shares are mostly held by government institutions, more likely to be the subject of financial health.

Based on assumptions practical suggestions are provided below:

- Because there is a significant benefit and direct relationship between ownership concentration and timeliness, it is recommended for increasing the timeliness benefit from ownership concentration should be used instead distribution of property, however, investors should note that the relationship between ownership concentration and timeliness is reversed U-shaped profit.
- Because there is no significant relationship between managerial ownership and timeliness benefit, therefore, we recommend investors and financial analysts in financial analysis to consider this issue.
- Because of the timeliness of corporate ownership interest and a significant inverse relationship, so investors and financial analysts that use the company property in their ownership structure should consider this issue.
- Because a significant relationship between institutional ownership cannot be seen with the timeliness profit, therefore, we recommend investors and financial analysts in financial analysis to consider this issue.

Due to the complex process of analysis reports and financial statements, it is suggested to facilitate access to analysts, researchers, investors and other users of the variables mentioned above, Software companies that offer financial information and stock exchange, calculate described variables and make available to consumers to make financial decisions and academic research done more quickly.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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EFFECT OF RESOURCES RELATED TO MARKETING AND INNOVATION ON EXPORT PERFORMANCE WITH MEDIATING ROLE OF PRODUCT INNOVATION (CASE STUDY: BONYAD MOSTAZAFAN FOOD AND DRINK HOLDING)

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ABSTRACT

The present study aims to investigate the effect of resources related to marketing and innovation on export performance with mediating role of product innovation (case study: Bonyad Mostazafan Food and Drink Holding). In order to achieve the research objective, all 87 managers and experts of export, selling, marketing, and R&D sectors of Orumiyeh Pakdis, Kermanshah Zamzam, Iran Behnoosh, and Glokozan Companies 61 subjects filled the translated questionnaire adapted from Stephen and Lau researches. Main variables of the research include market orientation, innovation performance, innovation orientation, technology resources and export performance. This is an applied research in terms of the objective and a descriptive-survey study in terms of implementation. Path analysis model and PLS were used to investigate the relationship among research variables and hypotheses. The data analysis and hypotheses tests show that the relationship between market orientation and innovation orientation was confirmed in the export sector of Orumiyeh Pakdis, Iran Behnoosh, and Glokozan Companies. Increasing innovation grade is resulted by increasing marketing-orientation level that leads to better export performance in the company; in this regard, the increase of innovation resources plays a significant role in innovative performance of the company; however, total factors ultimately will increase export performance directly. Generally, it can be concluded that market orientation significantly influences export performance and product innovation performance. Therefore, as a general suggestion it can be stated that by using results obtained through this practical and applied research managers of these companies can enable the organization to maintain the loyal customers by relying on higher levels of market-orientation and innovation and consequently improve export performance of the company by implementing this strategy.

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KEY WORDS

Market orientation, innovation performance, trends, innovation, technology resources and export performance

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INTRODUCTION

Until the fifties, the traditional view on marketing knowledge was dominant and marketing laws were determined and indicated by looking from inside to outside of organization. The dominant thought was to produce and sell at that time. The responsibility of marketing unit was to sell whatever company could produce and business units were thinking of monopolizing information and mass production strategy as well as the increase of selling and profitability of the company through appealing to governance over the markets. By then, Webster described marketing knowledge as: organizations decision makers consider short-time horizons and advertisement and the sales force ability of a company attract the most attention of the marketing sector [1].

The marketing conception states that activities of any business unit start with identification of customers and their needs rather than with having initial materials or utilizing sale skills; therefore, an organization is responsible for effectiveness to customers rather than simply to produce and sell goods or services and the organization will survive

just if it satisfies the customers and their needs successfully. Various researchers have formulated methods and models to apply marketing conception. Since organizations success is linked to making a sustainable competitive advantage and to create a superior value for customers is the key of making this advantage; hence, focus on customers, competitors, and other effective factors in the market have been practically used as the dominant culture in the organization or as an integrated set of purposeful activities toward market have been applied as comprehensive conceptions such as market orientation and customer orientation. [2]

Kohli and Jaworski (1990) defined marketing as the implementation of marketing conceptions. Marketing conception is defined as following [3]:

- 1- - The efforts of all members of the organization to obtain customers' satisfaction;
- 2- The management focus on marketing strategic planning;
- 3- To achieve profit by responding to different and changing needs of customers, particularly profitable customers. In fact, market-orientation have modified the traditional conception of marketing [4];

Kohli and Jaworski [4] identified three structural components of market-orientation as the following:

- 1- Collecting and analyzing all data related to the market;
- 2- Publishing data in various organizational sectors for coordination and strategic planning;
- 3- Executing the designed strategic plans to satisfy customers in the market;

Marketing-orientation is one of the organizational culture dimensions through which employees give the highest value to the firm profitability and customers' retention by creating superior value. Market-orientation is a type of behavioral norm expanded all over the organization and is responsive to the present and future needs of the market and customers by innovation. Narver and Slater defined market-orientation as a competitive strategy which is the most effective behavior to increase value for consumer and consequently to ensure positive results in long-term. As quoted by these authors, market-orientation is defined based on customer-orientation, competitor-orientation, and coordination inside the organization [5].

To measure this structure, Lado offered a more extensive model to define market-orientation including all application areas, organizational levels, and all different participants in the market as a competitive strategy. [6]

Market participants or market forces include:

- 1- Final customer
- 2- Mediator (distributor) customer
- 3- Competitor
- 4- Environmental factors

In order to provide and protect a competitive advantage, organizations should analyze each market force properly.

INNOVATION CONCEPT

According to a view, innovation is a managerial system which emphasizes on organization mission, seeks for exceptional opportunities, determines whether the strategy is proper or not, determines success criteria and searches for new opportunities. Dracker believes that successful innovation requires a concentrated hard work and a targeted effort. Innovation is an essential factor in making competitiveness at the global level leading to organizational growth and future success. It is like to an engine that allows companies to have permanent efficiency in global economy. [7]

Porter and Stern state that companies should make a flow of new products and processes to use technology more and yet move toward their stability. [8]

Wyckoff described innovation framework as the following:

- Challenge is the driving force of innovation. Interaction with customers and understanding their needs is one of the best ways of discovering new opportunities, capabilities, and motivation to implement them.
- Creativity is the brain of innovation. All things start from a thought and innovative organizations have found out that thought can be originated from anywhere.
- Communications is the vital vessel of innovation. The free information, beliefs, and emotions streams are the main vessel of innovation.
- Cooperation is the heart of innovation. Innovation is a team process fed by information interaction and team power.
- Completion is the muscle of innovation. New innovations are projects which are proposed as prior beliefs and executed successfully.
- Accuracy and contemplation is the ladder of innovation. Learning from successful and unsuccessful projects makes a vision for us to actualize the next successes in this regard.

Culture is the range of role playing and innovation. Culture is the reflection of leader, norms, values, the exact and visible representation of working manner and the organization's individuals' behavior with each other. Providing a flexible environment enables employees to respect to their ideas, tolerate risk, celebrate for successes, take pattern from employees respect to each other, and appraise the hobbies. The mentioned framework can facilitate making innovative organizations. [9]

EXPORT CONCEPTION

Today, export growth is a key for governments' economic recreation [10]. Export development is in peak of government priorities and policies nearly in all developing countries as awareness and attention to the importance of export issue exists in developed countries.

In one hand, knowledge and experience are vital factors for competitiveness in foreign markets; on the other hand, there are various problems in exporting path that block export sales of the firm. Therefore, governments have historically offered motives for export both as export supporting plans [11] and as institutes like export development banks (Exim banks) [12]. Awareness, information, data, experience, and resources are necessary for firms to cope with these problems. Export developing plans are also defined to satisfy such needs and help the learning process in the international competitive environment, motivate business space toward exporting goals, and provide necessary infrastructures to facilitate export.

Market-orientation export is a strategic application of market-orientation in the export environment. The effect of market-orientation on the main performance is accepted in marketing literatures and companies with higher levels of market-orientation export achieve more information about customers and their needs [13].

In this state, companies will better understand strategies and suggestions about their competitors, and company will be able to achieve a better status in responding to its customers and the market in competitive environments than its competitors. Since few empirical studies have been conducted about marketing and innovation aspects and the effects on exporting performance, this research tries to mostly investigate various aspects of these variables. [14]

RESEARCH HYPOTHESES

Main Hypothesis

- Marketing and innovation resources are effective to export performance with mediating role of product innovation.

Secondary Hypotheses

- There is a positive relationship between market-orientation and innovation tendency in the studied companies.
- There is a positive relationship between innovation and innovative resources in studied companies.
- There is a positive relationship between market-orientation and product innovation performance in the studied companies.
- There is a positive relationship between market-orientation and export performance in the studied companies.
- There is a positive relationship between innovation and product innovation performance in the studied companies.
- There is a positive relationship between innovation resources and product innovation performance in the studied companies.
- There is a positive relationship between product innovation performance and export performance in the studied companies.
- Technological turbulence moderates the effect of market-orientation on export performances of the studied companies.
- Market turbulence moderates the effect of market-orientation on export performances of the studied companies.

Market competition intensity moderates the effect of market-orientation on export performances of the studied companies.

RESULTS

Descriptive Analysis

In this section of statistical analysis, distribution of the statistical sample is examined according to gender, marital status, educational level, organizational level, the work experience of the company

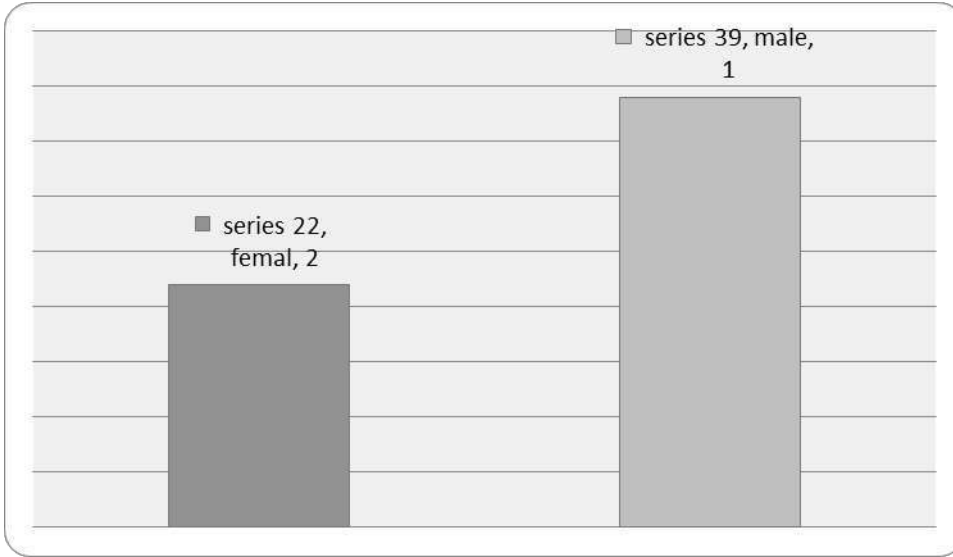


Fig: 1. Examination of the statistical sample by participants' gender

According to [figure-1](#), 56.5% of participants are female and 43.5% are male.

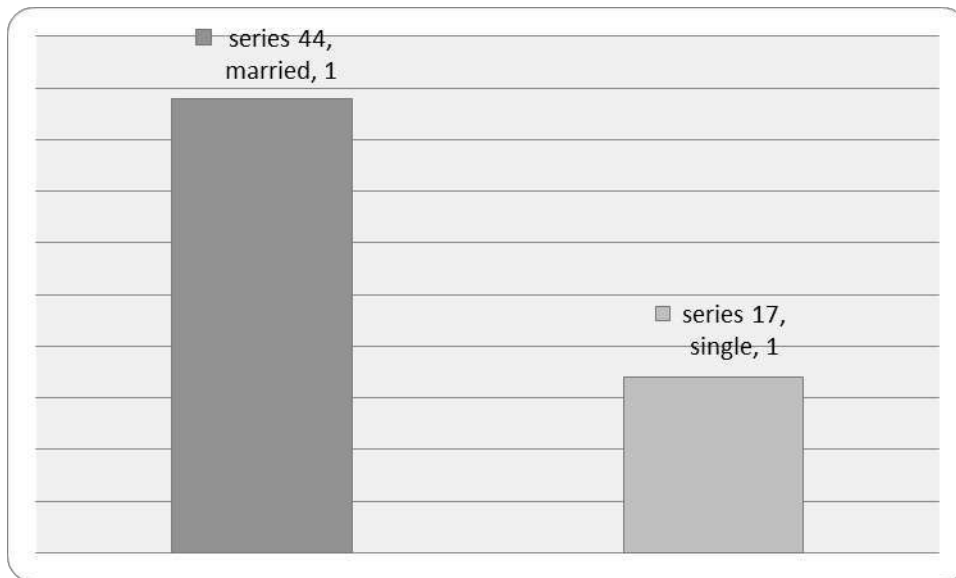


Fig:2. Examination of the statistical sample by marital status

According to **Figure-2**, 72.13% of participants are married and 27.87% are single.

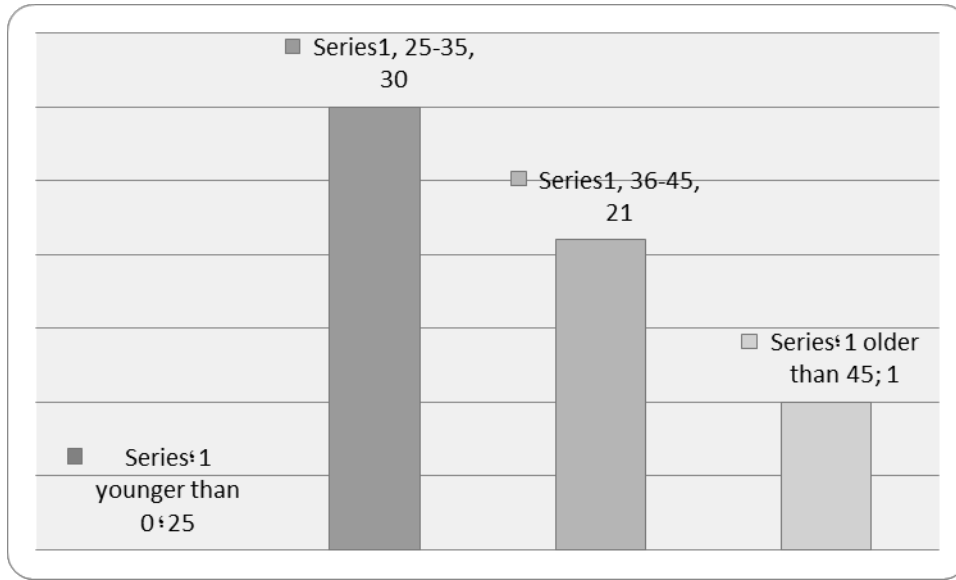


Fig:3. Examination of the statistical sample by participants' age

As it is observed in **Figure-3**, none of participants are younger than 35, 49.18% of them are between 25 to 35 years, 34.43% aged between 36-45 years and 16.39% are older than 45 years.

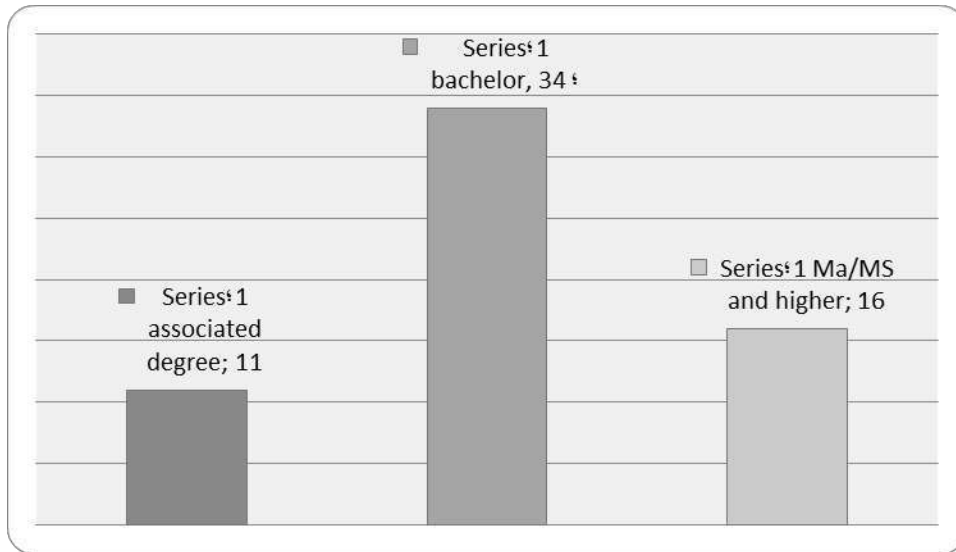


Fig:4. Examination of the statistical sample by participants' educational level

According to **Figure -4**, 18.03% of participants have associated degree, 55.74% have bachelor, and 226.23% have MA/MS or higher educational degree

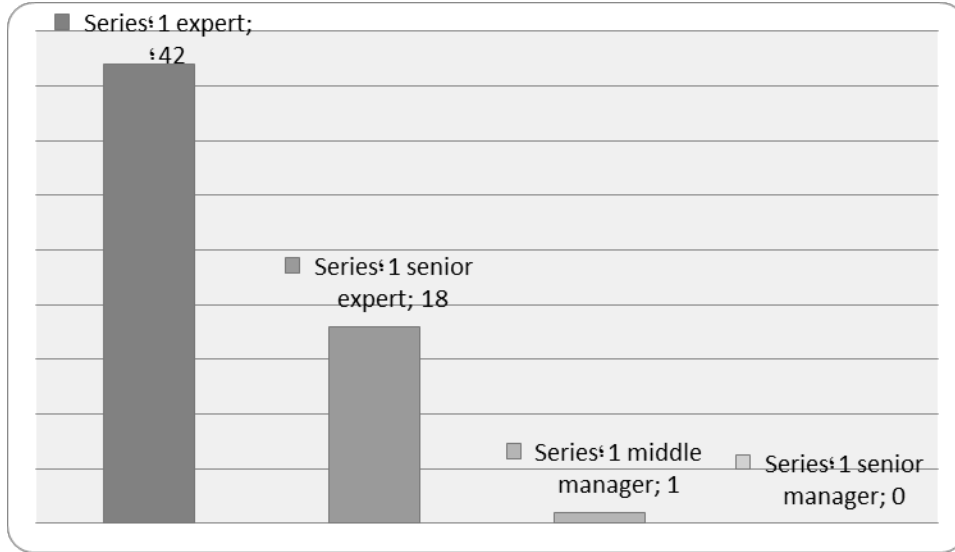


Fig:5. Examination of the statistical sample by organizational level

As it is observed in **Figure-5**, 68.85% of participants are expert, 29.51% are senior expert, 1.64% is middle manager and none of them are senior manager .

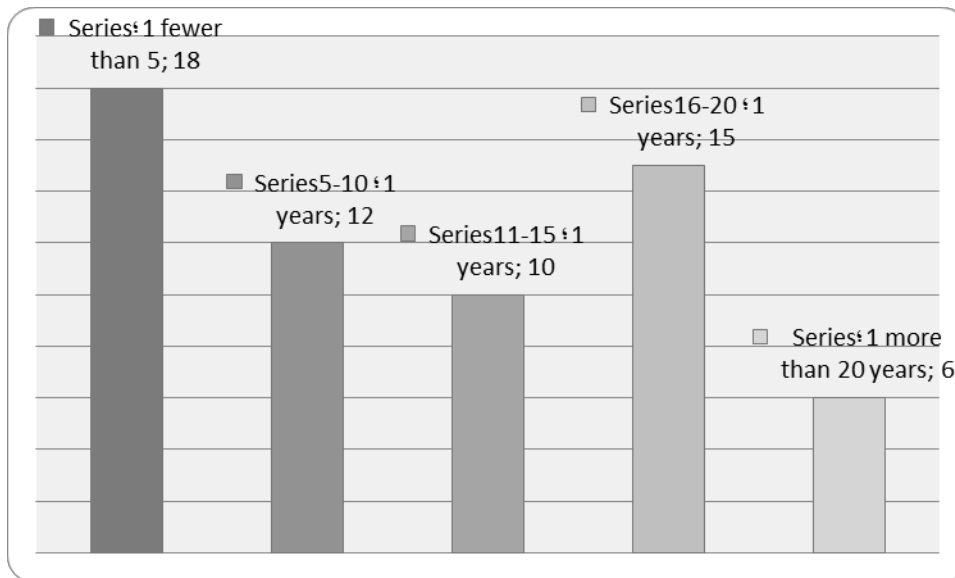


Fig:6. Examination of the statistical sample by work experience

According to **Figure- 6**, 29.51% of participants have fewer than 5-year work experience, 19.67% have worked for 5-10 years, 16.39% have 11-15-years work experience, 24.59% have worked for 16-20 years, and finally 9.84% of participants have more than 20-years work experience.

TESTING THE STRUCTURAL QUALITY

In analysis of structural models by the partial least squares method, there are three main criteria to test structural models: 1- determination of coefficient index (R2), 2- path coefficient significance (β), and 3- redundancy index or predictor relationship. To determine the coefficient is the main criterion of evaluating endogenous latent variables of path model. This index shows what percent of the endogenous latent variables is done by exogenous variable. However, if endogenous latent variable is influenced by several exogenous latent variables, the average determination coefficient values will be acceptable. The obtained R2 for variables of the model is adapted by the following **Table -1** that all are significant:

Table:1. Determination coefficient for structural quality test

Variable	Determination coefficient
Export performance	0.758
Innovation orientation	0.664
Innovation resources	0.843
Product innovation performance	0.498

Another index to confirm relationships in the structural model is significance of the path coefficients. The significance of path coefficients is complementary of the magnitude and the sign direction of beta coefficient of the model. If the above obtained value is considered more than the minimum statistics in confidence level, that relationship or hypothesis will be confirmed. The following **Table-2** shows significance of 95% of the model path coefficients:

Table: 2. path determination coefficient

Hypotheses	Path coefficient	Significance	Reject-confirm
H1	0.815	13.159	Confirmed
H2	0.918	31.772	Confirmed
H3	0.683	4.289	Confirmed
H4	-0.127	0.525	Rejected
H5	0.071	0.194	Rejected
H6	-0.041	0.091	Rejected
H7	0.834	5.696	Confirmed
H8	0.485	1.731	Rejected
H9	-0.104	0.345	Rejected
H10	-0.358	1.388	Rejected

In addition, the endogenous model and relationships among variables are as following **Figure :8**

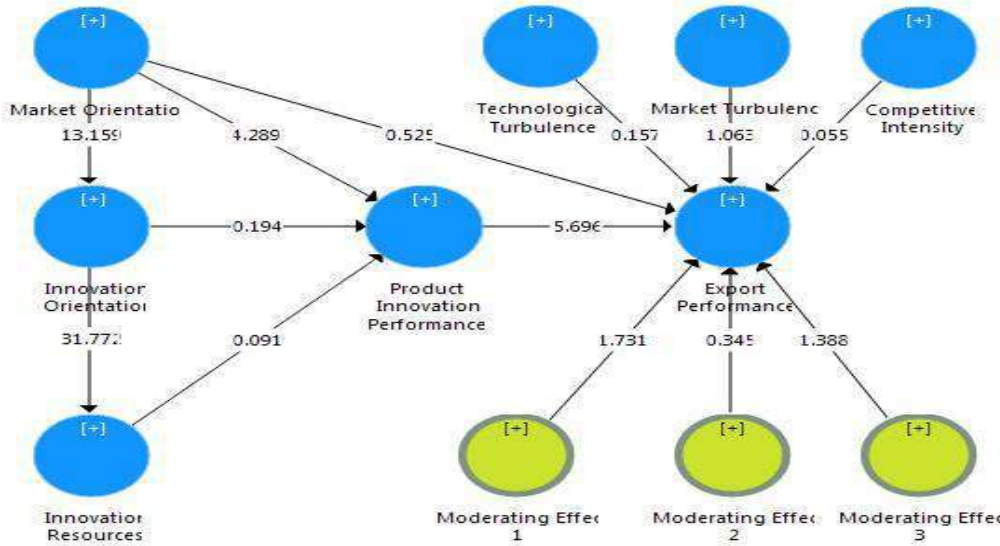


Fig:8. The model of path analysis coefficients

RESULTS OF HYPOTHESES TESTING

Findings of the first hypothesis: there is a positive relationship between market-orientation and innovation tendency in the studied companies.

Since significance of path coefficients is the index to confirm relations of the structural model, the path coefficient between market-orientation and innovation tendency is 0.815 implying that per unit increase in market-orientation 82% is added to innovation tendency. The significance of path coefficients is complementary of the magnitude and the sign direction of beta coefficient of the model. Since sig. value of this hypothesis is 13.159, H_0 is rejected and the research hypothesis based on significant effect of market- orientation on innovation tendency is confirmed.

Findings of the second hypothesis: There is a positive relationship between innovation tendency and innovation resources in the studied companies.

Since significance of path coefficients is the index to confirm relations of the structural model, the path coefficient between innovation tendency and innovation resources is 0.918 implying that per unit increase in innovation tendency 91% is added to innovation resources. The significance of path coefficients is complementary of the magnitude and the sign direction of beta coefficient of the model. Since sig. value of this hypothesis is 31.772, H_0 is rejected and the hypothesis based on significant effect of innovation tendency on innovation resources is confirmed.

Findings of the third hypothesis: There is a positive relationship between market-orientation and product innovation performance in the studied companies.

Since significance of path coefficients is the index to confirm relations of the structural model, the path coefficient between market-orientation and product innovation performance is 0.683 implying that per unit increase in market-orientation 68% is added to product innovation performance. The significance of path coefficients is complementary of the magnitude and the sign direction of beta coefficient of the model. Since sig. value of this hypothesis is 4.289, H_0 is rejected and the hypothesis based on significant effect of market-orientation on product innovation performance is confirmed.

Findings of the hypothesis 4: There is a positive relationship between market-orientation and export performance in the studied companies.

Since significance of path coefficients is the index to confirm relations of the structural model, the path coefficient between market-orientation and export performance is -0.127 implying that this hypothesis can't be analyzed via path coefficients and because sig. value of this hypothesis is 0.525, according to the path analysis, H_0 is confirmed and the hypothesis is rejected.

Findings of the hypothesis 5: There is a positive relationship between innovation tendency and product innovation performance in the studied companies.

Since significance of path coefficients is the index to confirm relations of the structural model, the path coefficient between innovation tendency and product innovation performance is 0.071 implying that this hypothesis can't be analyzed via path coefficients and because sig. value of this hypothesis is 0.194, according to the path analysis, H_0 is confirmed and the hypothesis is rejected since innovation tendency doesn't have any significant effect on product innovation performance.

Findings of the hypothesis 6: there is positive relationship between innovation resources and product innovation performance in the studied companies.

Since significance of path coefficients is the index to confirm relations of the structural model, the path coefficient between innovation resources and product innovation performance is -0.041 implying that this hypothesis can't be analyzed via path coefficients and considering that the sig. value of this hypothesis is 0.091, according to the path analysis, H_0 is confirmed and the hypothesis is rejected since innovation resources doesn't have any significant effect on product innovation performance.

Findings of the hypothesis 7: There is a positive relationship between product innovation performance and export performance in the studied companies.

Since significance of path coefficients is the index to confirm relations of the structural model, the path coefficient between product innovation performance and export performance is 0.834 implying that per unit increase in market-orientation 83% is added to product innovation performance. The significance of path coefficients is complementary of the magnitude and the sign direction of beta coefficient of the model. Since sig. value of this hypothesis is 5.696, H_0 is rejected and the hypothesis based on significant effect of product innovation performance on export performance is confirmed.

Findings of the hypothesis 8: Technological turbulence moderates the effect of market-orientation on export performance of the studied companies.

Since significance of path coefficients is the index to confirm relations of the structural model, the path coefficient between technological turbulence of the market-orientation effect and export performance is -0.485 implying that this hypothesis can't be analyzed via path coefficients and considering that the sig. value of this hypothesis is 1.731, according to the path analysis, H_0 is confirmed and the hypothesis is rejected since technological turbulence of the market-orientation effect doesn't have any significant impact on export performance.

Findings of the hypothesis 9: Market turbulence moderates the effect of market-orientation in export performance of the studied companies.

Since significance of path coefficients is the index to confirm relations of the structural model, the path coefficient between market turbulence of the market-orientation effect and export performance is -0.104 implying that this hypothesis can't be analyzed via path coefficients and considering that the sig. value of this hypothesis is 0.345, according to the path analysis, H_0 is confirmed and the hypothesis is rejected since market turbulence of the market-orientation effect doesn't have any significant impact on export performance.

Findings of the hypothesis 10: Market competition intensity moderates the effect of market-orientation on export performance of the studied companies.

Since significance of path coefficients is the index to confirm relations of the structural model, the path coefficient between market competition intensity of the market-orientation effect and export performance is -0.385 implying that this hypothesis can't be analyzed via path coefficients and considering that the sig. value of this hypothesis is

0.194, according to the path analysis, H_0 is confirmed and the hypothesis is rejected since market competition intensity of the market-orientation effect doesn't have any significant impact on export performance.

DISCUSSION AND CONCLUSION

Discussion about findings of the first hypothesis

Market orientation as the application of marketing concept is considered by the present era organizations because now customer is selected for overtaking production on demand and increasing competition among producers [1], and the lack of attention to the customer is a way to destruct any business. Findings of the current research show the significant effect of market-orientation on innovation tendency.

Discussion about findings of the second hypothesis

The philosophy of market-orientation is based on the principle that to reach the organizational objectives market needs and demands should be considered and customers' satisfaction should be met more, better, and more efficient than other competitors. Therefore, according to the basis of this philosophy, organizations moderate type of productions and consequently supply the consumers' needs and gain profits. Research findings showed that innovation tendency has a significant effect on innovation resources.

Discussion about findings of the third hypothesis

Results of our research showed that an organization needs innovation to get a long-term competitive advantage and needs cognition and an accurate perception for this innovation. To achieve this purpose, the organization should constantly monitor the customers and competitors and analyze the obtained data. Market-orientation emphasizes on coordination of all activities and organization sectors along with cognition and supplying customers' needs to create a superior value for them. Findings of the research showed a significant effect of market-orientation on product innovation performance.

Discussion about findings of the hypothesis 4

It is argued that since market-oriented organizations have the knowledge advantage compared to their competitors, this knowledge help them to be more efficient to develop new products. To succeed to develop new products leads to positive results for employees, customers, and generally organizations. Findings of the present research showed that market-orientation doesn't have any significant effect on export performance.

Discussion about findings of the hypothesis 5

Company's attention to marketing, innovation in products and providing services to customers are two important effective issues to customer satisfaction and finally customer loyalty. This issue shows that a successful formula is having high innovation with extensive marketing. Findings of the research showed that innovation tendency doesn't have any significant effect on product innovation performance.

Discussion about findings of the hypothesis 6

Findings of the current study showed that innovation resources don't have any significant effect on product innovation. Maybe, it can be concluded from the evidence that innovation resource is not an organization's problem, rather not to have an accurate perception about international market despite having strong R&D and marketing teams is the main problem.

Discussion about findings of the hypothesis 7

Organizations which are able to promote unknown views to unique solutions and employ methods to change creative ideas to useful results are considered as creative and innovative organizations. The organization appraise active innovation, education, and its members' up-to-date knowledge development be updated and provide job security at an excellent level for employees to reduce the fear of being fired because of their mistakes as well as courage people to be changeable. Findings of the research showed that product innovation performance has a significant effect on export performance.

Discussion about findings of the hypothesis 8

The role of industry environment in development of a firm's competitive ability is one of important fields in strategic management literature. As though, similar to strategic marketing literature, it shows daily incremental

interest to study the role of environment in forming a marketing strategy. Findings of the research showed that technological turbulence of market-orientation doesn't have any significant effect on export performance.

Discussion about findings of the hypothesis10

Competition intensity refers to the situation that the competition is intensive due to the many numbers of competitors in the market and the lack of growth opportunities. If there is no competition or if it is low, the organization may have proper performance because the customers may be inevitable of consuming company's products while customers will have various choices in the case of an intensive competition. Findings of the research showed that market turbulence of market-orientation doesn't have any significant effect on export performance. Therefore, it can be concluded that in Iranian market, despite the organizations' equipment to all technologies, the necessary results have not been achieved yet. This may be due to the lack of having strong business intelligence and updated products.

Discussion about findings of the hypothesis10

Strategic management literature shows that managers formulate organizational strategies after reviewing environmental procedures. Therefore, the key point includes: Perception and interpretation of competitive forces by managers form the market conditions, intensity and nature of the competition and influence industry dynamisms. Findings of this research showed that market competition intensity of market-orientation doesn't have any significant effect on export performance. Maybe, as innovation in the market can be a winning score for any organization, other reasons lose their importance or become less important for the managers. [13]

CONCLUSION

Since the relationship between market orientation and innovation is confirmed in the present research, it is suggested to managers of the present research that to reach superior indexes about market-orientation requires innovation tendency such as customers' satisfaction and to have commitment to customers' needs. We should have clear perception of all consumers' needs. Today, creating value for customers is the main reason of survival in the market. Organization development and promotion can be achieved by creating superior value and ensuring for stay permanently in the market. For example, this promotion can be helped by marketing tools such as marketing research. The regular data collection from customers and competitors, cognition their advantages and disadvantages, and using organization competitive advantage to proceed others can be important tools of market-orientation for survival, while they should be aware of the organization's present and future performance and coordination in all organizational levels. Information about the customer successful and unsuccessful experience is accessible for all employees and all business performances are integrated to provide services to the market needs, and managers perceive how each organization member can contribute to play a role in creating value for customer.

Since innovation tendency to innovation resources is confirmed in the present research, it is suggested to managers of these companies to promote the rate of new product introduction more than competitors, and the number of new lines of the products and changes in the product line or the product itself as the major executive and strategic plans can be known as innovation degree indexes in an organization.

In addition, the increase of organization resources such as certain policies for products innovation, R&D activities, and financial and human resources for investment to grow innovation should be considered. Managers should create an efficient research space in the organization and actively search new ideas. Resistance against risk reduces innovation and creative people and their reactive ideas should be supported by organization. In order to be proceeding in innovation, organizations should have close relationship with academic and scientific research centers, a coordinated and stabilized mechanism among customers, a good innovation process, and the production procedure in the organization.

Since the relationship between market-orientation and product innovation performance is confirmed in this research, it is suggested to the studied companies' managers to improve market-orientation level in the organization to have loyal customers and so to take step in retaining the present customers that is less costly than attracting new customers according to marketing management literature. Therefore, product innovation performance is measured in various years to improve it. Its growth or non-growth should be monitored by managers. Organizations should regularly distinguish their products, if necessary, to have good market orientation on various products.

Since the relationship between product innovation performance and export performance wasn't confirmed in this research, it is suggested to these companies' managers to emphasize on ways of increasing proper innovation according to the customers' needs of target markets among the present customers as well as to emphasize on the ways of retaining and increasing customers of the organization, and to prevent from any defects that leads to the lose of customers, because satisfying the loyal customers can act as a powerful instrument against organization competitors. To survive in export markets, having the necessary intelligence for perceiving changes in tastes and methods of satisfying customers' needs in various countries is the required condition.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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THE STUDY OF ORGANIZATION DEVELOPMENT AND THE ROLE OF KM INITIATIVES TO IMPROVE ITS

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ABSTRACT

The purpose of this research is to study the impact of the dimensions of knowledge management on organization development of Regional Electricity Company of Zabol City, its population includes all the employees of the company, they are 175 people and using Morgan table, we have selected 118 of them as our sample. For data collection, we used library studies and questionnaire. Professors and experts of the related field have confirmed the validity of questionnaire of knowledge management and standard questionnaire of Paul Jared and by Cronbach's alpha test, we confirmed their reliability. Their alpha was more than standard rate and the questionnaires have reliability. Through descriptive and inferential tests (Pearson, regression and one-sample t-test) we analyzed data, in order to do that, we used SPSS software. Findings indicate all the dimensions of knowledge management (culture, services and documentation) have significant impact on organization development. In order to improve the concept of development at Regional Electricity Department, it is better to pay serious attention to the component of openness and transparency of the system as well as other components such as trust in each other, feedback from inside and outside, employee engagement with each other, encouraging and empowering staff and thin layer of organizational structure.

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KEY WORDS

Knowledge management, culture of knowledge management, services of knowledge management, documentation, organization development

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INTRODUCTION

In the past, many organizations only had used knowledge of each employee to improve his or her performance; meanwhile, nowadays, organizations are trying to apply staff's knowledge throughout organization in order to achieve its objectives more than ever. This contributes to the spread of a new approach named knowledge management about administrative issues and related subjects. Nowadays, to coordinate with environmental changes, organizations need to improve and develop their operations. Organization development is a method for improving organization's performance, but mainly, it is based on a process for teaching and changing organization staff's values and attitudes. [Daft] It can be said, organization development is a response to transformation and it is a complicated educational strategy for changing beliefs, attitudes, values and structure of organizations, so it could accept new techniques, markets, and challenges and adapts to the confusing pace of change better [1].

Organizations in the current economy recognize knowledge as a key economic resource and, therefore, it is considered important for sustaining competitive advantage. Needless to say, organizations must possess the right knowledge in the desired form and content under all circumstances to be successful. The risks and uncertainties inherent in such dynamic environments have increased the importance of managing organizational knowledge [2]. On the other hand, age of knowledge has brought significant changes into programs and systems of organizations. Meanwhile, those organizations that are trying to strengthen and develop the institutional capacity to solve problems and increase intellectual capital, have greater durability during external and internal competition arena. Knowledge management is an important and valuable approach, by establishing it, leading organizations could maintain their technical expertise and prevent loss of vital knowledge due to retirement, downsizing or firing employees, and changes in human memory. [3] Today, researchers believed that knowledge is the most important organizational source and its correct management and operation can create sustainable competitive advantage for the organization [4]. Indeed, KM is a response to the serious need of the organizations to using knowledge source in the era in which knowledge is the most important capital or organizations. Today, in the advanced countries in

the world, this issue is accepted that knowledge and using it is the most important factor that can distinguish the competitor organizations from each other leads to the growth or loss of the companies than their competitors [5].

According to Snoden's theory [2000) knowledge management is identifying, optimizing and managing intellectual capitals. This knowledge can be available for individuals as an explicit knowledge in human's manufacture or as a tacit knowledge. Miller and Longdon [2004) say knowledge management has an emphasis on doing the right things instead of doing things right, they consider it as a framework for all the organization's processes that are based on knowledge management. [6]

Movement of organization development was based in the second half of the twentieth century and it is being developing and growing in the current decade significantly, it is based on some assumptions and it is compatible with human values. Richard Backhard says organization development is an effort that is 1. Planned, 2. Throughout the organization, 3. Directed by the organization's senior, 4. Increases effectiveness and healthiness of organization, 5. Involved in planning of organizational processes through taking advantage of knowledge of behavioral science. [Mohammad Ali 2001) Organization development is a process that an organization could develop its internal capacity through it in order to reach its maximum effectiveness and maintain it in the long run. [6]

Organization development is a long-range, planned and sustainable effort and it is based on a general strategy. It tries to identify difficulties rationally and regularly and mobilize all available forces and resources to perform a transformation program. Although in organization development, processes, procedures, regulations and so on will be changed, the main purpose of transformation focuses on individuals' attitude, behavior and performance within organization. Now, the question is how can we increase organization development? From the perspective of modern management, knowledge management in organizations is one of the methods for increasing organization development. Nowadays, researchers believe knowledge is the most important source in an organization, proper management and utilization of it could create sustainable competitive advantage for organization. [7]

In fact, knowledge management is a response to serious need of organizations to exploit source of knowledge in an era that knowledge is the most important capital of organizations. Today, it is accepted that in the world's developed countries, knowledge and application of it are the most important factors that can distinguish rival organizations from each other and they are the cause of growth or decline of companies compared to their competitors. [6] Organization development has significant importance at Regional Electricity Company, employees should be able to carry out their business activities better. According to this, using exploratory interviews and observations within the company, researcher realized its organization development is not at a high level. Thus, we are looking for the answer of the following question, does knowledge management affect organization development of staff of Regional Electricity Company or not?

LITERATURE REVIEW

KNOWLEDGE MANAGEMENT

Frappaolo [2000) believes knowledge management deals with applying and growing knowledge assets of an organization and considers its goals. Armstrong [1999) says knowledge management means usage of information in order to achieve business facts and create value through intangible assets to get this aim. In other words, knowledge management is a strategy for creating knowledge on time via individuals in real time and it helps people to share information and improve organization's performance. This requires a transformation from individual knowledge to organizational knowledge. Therefore, there will be an effective relation between those who know and those who need to know.

Chmieleka [2004) believes knowledge management has some features, they are in [Figure- 1](#):

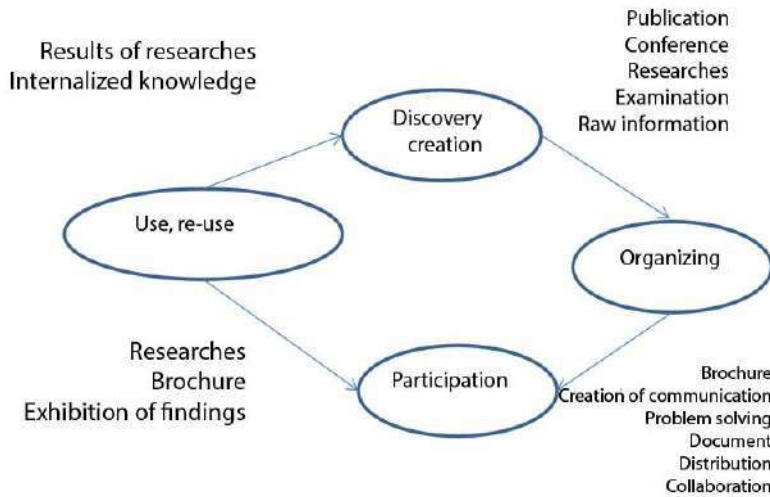


Fig. 1. Chmieleka's knowledge cycle in 2004

KNOWLEDGE MANAGEMENT OF PRIVATE AND PUBLIC ORGANIZATIONS

There are different perspectives on knowledge management and its functions among private and public sectors and it is due to the structural difference of these economic sectors. Unlike private organizations, many public organizations do not sell their products, their products are usually exclusive. There is less freedom for managers of public organizations, workers of these organizations have different values, and public organizations compared to private ones are less effective. [8]

McAdam and Reid [2000) compared public perceptions of public and private section, applied knowledge management, and identified the differences between public and private sectors regarding people's perceptions and acceptance of knowledge management. They concluded knowledge management as a philosophy of management exists in public sector and the reason for this view comes from a pressure to improve quality and efficiency in public sector.

To be able to make good use of the capabilities of knowledge management in public sector, it is necessary to exploit the best available experiences perfectly. In order to achieve that, we should identify the differences of knowledge management between public and private sectors and simulate the strengths of the private sector for public sector. [9] The difference between public and private organizations regarding some cases are in Table-1:

Table: 1. Distinction between public and private organizations

Private organization	Public organization	Case	Row
Emphasis on development of networks for individuals' communication for sharing tacit knowledge	Emphasis on development of electronic documents system that have been compiled, stored and distributed	Knowledge management strategy	1
Focus on investments with the objective of facilitating peaceful dialogue and the exchange of tacit knowledge	Focus on heavy investment in order to connect individuals to reusable codified knowledge	Information technology [Henson 1999)	2
Recruiting business executives who are interested in solving problems and can tolerate ambiguity	Recruiting fresh graduated people to reuse knowledge and apply solutions	Human resources [Henson 1999)	3
Training individuals through individual coaching - rewarding people for sharing knowledge with others directly	Training people in groups, distance computer-based learning – rewarding people for usage of databases and focus on documentation	Training [Henson 1999)	4

DIFFERENT TYPE OF KNOWLEDGE

The most important help we can do to knowledge management is recognizing the different types of knowledge and expressing their differences.

- Tacit knowledge: It is not observed and is hidden in experiences, culture and values of a person or an organization.
- Explicit knowledge: It is revealed and coded.
- Theoretical knowledge: It is the knowledge based on the deep specializations of people. The feature of this type of knowledge is mostly similar to tacit knowledge [10]

Table: 2.The structure type and dominance of different types of knowledge

	Coded	Theoretical	Type of knowledge
+	-	-	Simple structure
-	+	-	Machine bureaucracy
+	+	-	Structure of each section
-	+	+	Professional bureaucracy
+	-	-	Adhocracy

ORGANIZATION DEVELOPMENT

Although theorists have been considering, writing and discussing the basic principles of organizational development and improvement over decades, there is no general agreement on its range and parameters. [11] In other words, there are a lot of disagreements about the crux of organization improvement. [12]

Organization development is chosen over ‘organizational development’ phrase. Sometimes, phrase such as ‘organizational culture’ or ‘organizational optimization’ or even ‘organizational development’ will be used. It is believed that organization development phrase is more compatible with its fundamental meaning and purpose than others. [6]

Although organization development is a relatively new scientific endeavor that was emerged in the years after World War II and there is still no consensus on many of its features, its main and specific purposes are as follows: [1]

- Raising the level of trust and support from members of organization
- Increasing the frequency of coping with organizational difficulties, both within groups and between groups
- Creating an environment where the authority of the official role improves by personal knowledge and skills
- Raising the level of openness and openness of horizontal, vertical and corner to corner or side to side communications
- Raising the level of joy and personal satisfaction in the organization
- Finding creative methods for groups to eliminate problems that occur very frequently
- Raising the level of personal and collective responsibility in the planning and execution of tasks

KM AND ITS STRATEGIC ROLE IN ORGANIZATION DEVELOPMENT OF EMPLOYEES

In recent years, the growth of knowledge and information are rapid and now the present era is the information explosion era as 80% of the technology and knowledge results and 90% of technical information and knowledge in the world are produced in century 20. While, in each five and half years, it is doubled and most of them get old in less than 4 years.

Despite new products, knowledge can lead into sustainable advantage. Finally, all the competitors bring the cost and quality of their goods to the good level of the market and quality level and prices of the pioneer companies but the companies using the KM and the enrichment of wealth progress and achieve a high degree of quality,

innovation and efficiency as the company can benefit more profit and it continues as specific trend. Despite the materialistic capitals, that in case of using, their value is reduced, the value of knowledge capital is increased as it is used [Davenport, T., & Grover, 2001). The knowledge-based companies don't lose their new thoughts and they create new thoughts and improve the performance level of their forces. The KM activities focus on using gained knowledge as one of the most effective components of this management. In other words, total consideration of the KM is on the point that existing knowledge in organizations is applied to lead into the organization profitability. Unfortunately, the great importance of knowledge doesn't guarantee its implementation in organization activities. In this issue, the stages of measuring tacit knowledge and available skills should be considered. The combination of the daily duties with the knowledge-management related duties, support of top managers and using knowledge are effective for competition and increasing efficiency and lead into the creativity and innovation in employees, their empowerment and creation of a learning organization. Empowerment and sustainable development of the employees is the principle by which the quality of productions and services to customers are improved continually [13]

It can be said that effective factors on Organization Development of employees is information, knowledge and job skill by which KM is achieved. To provide this factor, the facilities to develop the job skills in organization, the grounds of effective and efficient training in organization and having technical and specialized information with the positions are useful.

THEORETICAL FRAMEWORK

Theoretical framework of a research is a structure that research is based on it. Theoretical framework identifies and indicates the relationships between those important factors and variables that have a role in the creation of issues. [Skaran 2007:8) For this research, we used the dimensions of knowledge management [culture of knowledge management, services of knowledge management and documentation) Nanouka [2000), we estimate the impact of these dimensions on organization development [14]. Its model is in Figure-2.

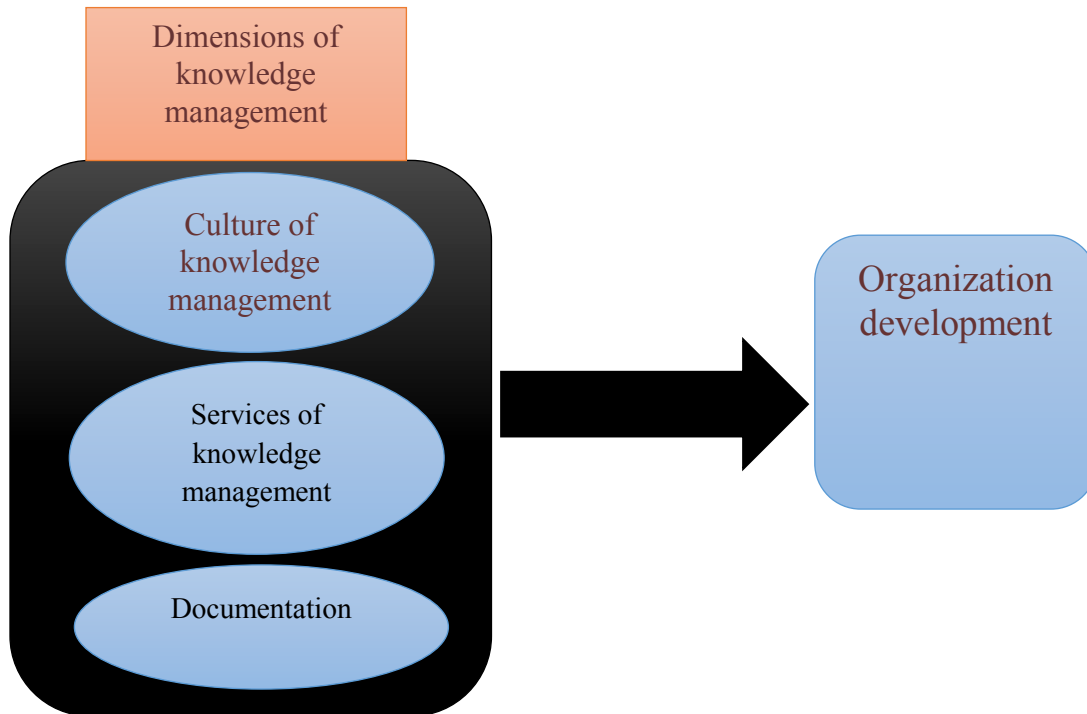


Fig: 2. Conceptual model of the research

Hypothesis

Main hypothesis: the dimensions of knowledge management have impact on organization development.

Sub-hypotheses:

- Culture of knowledge management has significant impact on organization development.
- Services of knowledge management have significant impact on organization development.
- Documentation has significant impact on organization development.

METHODS

This paper has descriptive correlation method. Its population includes 175 employees of Regional Electricity Company of Zabol City and 118 people among them based on Morgan table are considered as sample. Data collection and distribution of questionnaire are simple random, because any employee can contribute to this research. For data collection we used two standard questionnaires, according to professors, researchers and different studies, the validity of questionnaire of knowledge management is confirmed, moreover, according to Cronbach's alpha, its reliability is 87.4%. The second questionnaire is for estimating organization development of employees, Paul Jared [2006) designed it. The validity of this questionnaire through different studies and professors is confirmed and it equals 81.3%. Their alphas indicate a strong reliability. In order to analyze the data, we used inferential statistics such as Pearson test and multivariate regression, using SPSS software version 16.

RESULTS

HYPOTHESES TESTING

Main hypothesis: the dimensions of knowledge management have significant impact on organization development of employees of Regional Electricity Company in Zabol City.

To study the effect, we analyzed the regression of the model and it is as follows. Hence, to study and offer a model for knowledge management [Y) and organization development [X), we evaluate its adequacy indices, they are in **Table-3**, and then we will offer a processed model.

Table: 3. Estimation of regression model of knowledge management and organization development

Correlation coefficient	Coefficient of determination	Adjusted coefficient of determination	SD of error
.216	.047	.038	9

Correlation between independent variables and dependent variable is 0.216. Coefficient of determination is 0.047, it indicates 4.7% of changes of knowledge management relate to organization development. Since this amount does not take the degree of freedom into account, we will use adjusted coefficient of determination and it equals 3.8%. According to the mentioned indices, the model has adequate efficiency, but its influence is very low.

Table: 4. Significance of regression using F-test

Model	Sum of squares	Degrees of freedom	Mean sum of squares	F-statistic	Sig.
Regression	435.16	1	435.16	5.26	0.024
Remaining	8852.10	107	82.73		
Total	9287.26	108			

According to the **table-4**, significance level of this statistic is 0.024 and it shows the regression is significant at 95-percent level.

Sub-hypothesis 1: culture of knowledge management has significant impact on organization development of Regional Electricity Company of Zabol City.

To study the effect, we analyzed the regression of the model and it is as follows. Hence, to study and offer a model for culture of knowledge management [Y) and organization development [X), we evaluate its adequacy indices, they are in **table-5** below, and then we will offer a processed model.

Table: 5. Estimation of regression model between culture of knowledge management and organization development

Correlation coefficient	Coefficient of determination	Adjusted coefficient of determination	SD of error
.265	.070	.068	9.29

Correlation between independent variables and dependent variables is 0.265. The coefficient of determination is 0.070 and it shows 7 percent of changes of culture of knowledge management relate to organization development. Since this amount does not take degree of freedom into account, we will use adjusted coefficient of determination and for this study, it is 6.8%. According to the indices, the model has adequate efficiency.

Table: 6. Significance of regression by F-test

Model	Sum of squares	Degrees of freedom	Mean sum of squares	F-statistic	Sig.
Regression	390.78	1	390.78	4.45	0.049
Remaining	9247.47	107	86.42		
Total	9287.26	108			

According to the **Table-6** above, significance level of this statistic is 0.049 and it shows the regression is significant at 95-percent level.

Sub-hypothesis 2: services of knowledge management have significant effect on organization development of Regional Electricity Company of Zabol City.

To study the effect, we analyzed the regression of the model and it is as follows. Hence, to study and offer a model for services of knowledge management [Y) and organization development [X), we evaluate its adequacy indices, they are in **Table-7**, and then we will offer a processed model.

Table: 7. Estimation of regression model between services of knowledge management and organization development

Correlation coefficient	Coefficient of determination	Adjusted coefficient of determination	SD of error
.351	.123	.115	8.72

Correlation between independent variables and dependent variable is 0.351. Coefficient of determination is 0.123 and this shows that 12.3 percent of changes of services of knowledge management relate to organization

development. Since this amount does not take degree of freedom into account, we will use adjusted coefficient of determination and here it is 11 percent. According to the mentioned indices, the model has adequate efficiency.

Table: 8. significant of regression by F-test

Model	Sum of squares	Degrees of freedom	Mean sum of squares	F-statistic	Sig.
Regression	1142.53	1	1142.53	15.01	0.000
Remaining	8144.72	107	76.11		
Total	9287.26	108			

According to the **Table-8**, the significance level of this statistic is 0.000 and it shows the regression is significant at 99-percent level.

Sub-hypothesis 3: documentation has significant effect on organization development of employees of Regional Electricity Company of Zabol City.

To study the effect, we analyzed the regression of the model and it is as follows. Hence, to study and offer a model for documentation [Y) and organization development [X), we evaluate its adequacy indices, they are in **Table -9**, and then we will offer a processed model.

Table: 9. Estimation of regression model for documentation of knowledge management and organization development

Correlation coefficient	Coefficient of determination	Adjusted coefficient of determination	SD of error
0.393	0.155	0.152	9.27

Correlation between independent variables and dependent variable is 0.393. Coefficient of determination is 0.155 and this amount indicates 15.5 percent of changes of documentation relate to the organization development. Since this amount does not take degree of freedom into account, we will use adjusted coefficient of determination, it is 15.2 percent for this test. According to the mentioned indices, the model has adequate efficiency.

Table: 10. Significance of regression through F-test

Model	Sum of squares	Degrees of freedom	Mean sum of squares	F-statistic	Sig.
Regression	79.03	1	79.03	0.918	0.008
Remaining	9208.23	107	86.05		
Total	9287.26	108			

According to the **Table-10**, significant level of this statistic is 0.008 and it indicates the regression is significant at 95-percent level.

DISCUSSION

The impact of knowledge management on model of organization development is evident in all the organizations, therefore, we should consider changes in three factors called human resources, processes and technology interactively. When knowledge management is a part of business model of an organization, culture change in organization is applicable with fewer issues, because no changes is possible without awareness, preparedness, and enough energy. Hence, gaining competitive knowledge for steps of quality execution in order to make organization ready for changing, seems necessary. Accordingly, leader has a pivotal role in development of strategies, human resources will have correct information for proper budgeting, accurate decisions and creation of an environment that fosters innovation. Participation in value chain and strategic processes between organizations, with an increase in partners' power will be possible and we could evaluate products and offer customers high quality services. Those organizations that want to have a better status than their rivals, should meet their customers' needs and expectations using competitive knowledge of the organizations. Therefore, establishment of knowledge as valuable and strategic asset of organization, and model of organization development as a tool for identifying the potential of organizational improvement, will increase competitiveness and competencies in the value chain.

CONCLUSION

Main hypothesis: the dimensions of knowledge management have significant effect on organization development of employees of Regional Electricity Company of Zabol City.

Correlation between independent variables and dependent variable is 0.216. Coefficient of determination is 0.047, it indicates 4.7% of changes of knowledge management relate to organization development. Since this amount does not take the degree of freedom into account, we will use adjusted coefficient of determination and it equals 3.8%. According to the mentioned indices, the model has adequate efficiency, but its influence is very low.

We can calculate regression equation using column of unstandardized coefficients as follows:

Organization development = 49.38 + [0.374] knowledge management

It can be said that with an increase in one unit of each independent variable, dependent variable will increase as much as the mentioned coefficient. In other words, with an increase in one unit of knowledge management, 0.374 of standard deviation of organization development will improve, consequently, they have a positive relationship. Therefore, the field of knowledge development in this organizations requires more improvement and support.

Sub-hypothesis 1: culture of knowledge management has significant effect on organization development of employees of Regional Electricity Company of Zabol City.

Correlation between independent variables and dependent variables is 0.265. The coefficient of determination is 0.070 and it shows 7 percent of changes of culture of knowledge management relate to organization development. Since this amount does not take degree of freedom into account, we will use adjusted coefficient of determination and for this study, it is 6.8%. According to the indices, the model has adequate efficiency.

We can calculate regression equation using column of unstandardized coefficients as follows:

Organization development = 66.50 + [0.248] culture of knowledge management

It can be said that with an improvement in one unit of any independent variable, dependent variable will improve as much as the mentioned coefficient. In other words, with an increase in one unit of culture of knowledge management, 0.248 unit of standard deviation of organization development will develop, consequently, they have a positive relationship. Hence, the culture of processes, infrastructures, and technologies in an organization should propagate in order to attract, develop and optimize knowledge capital of organization to make the achievement of strategic objectives possible.

Sub-hypothesis 2: services of knowledge management have significant effect on organization development of employees of Regional Electricity Company of Zabol City.

Correlation between independent variables and dependent variable is 0.351. Coefficient of determination is 0.123 and this shows that 12.3 percent of changes of services of knowledge management relate to organization development. Since this amount does not take degree of freedom into account, we will use adjusted coefficient of determination and here it is 11 percent. According to the mentioned indices, the model has adequate efficiency.

We can calculate regression equation using column of unstandardized coefficients as follows:

Organization development = 43.75 + [1.40] services of knowledge management

It can be said that with an improvement in one unit of any independent variable, dependent variable will improve as much as the mentioned coefficient. In other words, with an increase in one unit of services of knowledge management, 1.40 unit of standard deviation of organization development will develop, consequently, they have a positive relationship. Therefore, in order to apply knowledge management, organizations need some facilities. By services of knowledge management, we mean the existence of facilities and circumstances in an organization for implementing knowledge management.

Sub-hypothesis 3: documentation has significant effect on organization development of employees of Regional Electricity Company of Zabol City.

Correlation between independent variables and dependent variable is 0.393. Coefficient of determination is 0.155 and this amount indicates 15.5 percent of changes of documentation relate to the organization development. Since this amount does not take degree of freedom into account, we will use adjusted coefficient of determination, it is 15.2 percent for this test. According to the mentioned indices, the model has adequate efficiency.

We can calculate regression equation using column of unstandardized coefficients as follows:

Organization development = 65.78 + [0.422] documentation

It can be said that with an improvement in one unit of any independent variable, dependent variable will improve as much as the mentioned coefficient. In other words, with an increase in one unit of documentation, 0.422 unit of standard deviation of organization development will develop, consequently, they have a positive relationship. Hence, one way to improve circumstances of survival of organization is the establishment of knowledge management and documentation and transforming it to organizational knowledge and wisdom, hence, guiding knowledge of an organization relates to human resources. Therefore, organizations must pay attention to all the components of knowledge management such as perspective, teamwork, open communications, empowering employees and information technology in order to implement knowledge management and they should analyze them through identifying their current situations.

RECOMMENDATIONS

- In order to improve the concept of development of Regional Electricity Department, it is better to pay serious attention to the component of openness and transparency of the system as well as other components such as trust in each other, feedback from inside and outside, employee engagement with each other, encouraging and empowering staff and thin layer of organizational structure.
- Effort of senior management of organization in creating organizational culture and providing necessary services for employees and organizational units to share knowledge as well as creating proper circumstances for receiving benefit from knowledge in order to increase the share of creation and growth of organization development is important.
- Some measures from senior management for identifying required knowledge and developing knowledge of organization seem necessary.
- Due to score of development regarding knowledge management that is lower than average, senior managers should consider some management arrangements for knowledge management in order to increase organization management.
- Organization should have a strong culture of teamwork and there should be some activities for groups to improve processes.
- Self-scrutiny is necessary for organization development. Senior and middle managers must know what is going on within organization.
- Information must be available throughout organization. By establishing a good internal relationship between personnel and managers, ideas will be shared and transferred from one side to another side.
- To apply knowledge management at Regional Electricity Company scientifically, managers should determine a strategy based on knowledge, identify perspective, long-term and short-term goals, determine path, required resources and frameworks, and consider a basis for performance evaluation.
- Using experienced consultants of knowledge management and creating change group for implementing knowledge management process
- We recommend managers to use databases, special journals, books, magazines, different conferences [video, audio, visual and verbal], the Internet and emails.

- Providing specialized courses and necessary facilities for employees to be familiar with and use information technology and communication, is recommended.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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STUDY OF THE RELATIONSHIP BETWEEN ORGANIZATIONAL SILENCE AND ORGANIZATIONAL COMMITMENT (CASE STUDY: MASHHAD RAILWAY GENERAL DEPARTMENT EMPLOYEES)

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ABSTRACT

The present research aims to study the relationship between the organizational silence and organizational commitment among Mashhad Railway employees. In terms of objective, the research is applied; in terms of methodology, it is descriptive and correlational; and in terms of method of data collection, it is a field research. The statistical population in this research is all Mashhad Railway employees in 2015, including 600 employees at the time of conducting the research. For sample selection, simple random sampling method is used which considering Cochran's statistical formula in the following relation, the minimum number of sample under study is 180 people. For data collection, Fayload's Organizational Silence and Meyer and Allen's Organizational Commitment Standard Questionnaires (1991) were used. For data analysis, for research hypotheses testing and for determining the effect of each of the components of organizational silence on organizational commitment, SPSS statistical software, Pearson correlation coefficient and multivariate regression coefficient were used, respectively. Research findings show that there is a significant inverse relationship between the organizational silence and organizational commitment among Mashhad Railway employees. In addition, results show that there is a significant inverse relationship between submissive silence, defensive silence and altruistic silence with organizational commitment of Mashhad Railway employees.

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KEY WORDS

Organizational silence, organizational commitment, railway, Mashhad

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INTRODUCTION

Organizational commitment is a view about employees' loyalty to the organization and a continuous process which shows the attention of individuals to the organization and its prosperity through their participation in organizational decisions. One of the most common methods of addressing the organizational commitment is that it is considered as an emotional and psychological attachment to the organization. Based on this method, a person who is strongly committed to his organization receives his identity from the organization, actively participates in the organization, is engaged with it and enjoys being a member of the organization. Therefore, in short, loyalty to values and objectives of the organization, a sense of belonging and attachment, and finally staying in the organization are called organizational commitment [1].

In the literature, two approaches are found for defining the organizational commitment. In the first definition, commitment is the objective of employees for the continuous work in the organization. The second definition defines it as an attachment between individuals and organizations and a reflection of the psychological involvement of employees in the organization [2].

In many cases, it is believed that employees do not have the required experience for understanding important issues, they lack the power and authority, they are not good team players and their behavior only can create problems and a negative sense of participation. Managers ironically believe that employees encourage themselves to speak clearly, but on the other hand, they use official methods to silence opposing opinions of employees. Employees who cannot express their opinions about their jobs in the organization will become indifferent to their job which results in the lack of commitment to the job and organization. Organizational silence is associated with the limitation of the effectiveness of organizational decisions and processes of change. Currently, organizations face this problem and

most of them suffer low percent of employees' comments. When it happens, the decision making quality and amount of change are reduced [3]. In addition, the organizational silence prevents an effective organizational change and development through inhibition of negative feedback; therefore, the organization will lack the ability to investigate and correct errors. According to Fortado, teaching supervisors how to refuse demands and comments of subordinates has become an art in organizations and such negative behaviors will lead to silence, so that employees do not express their opinions to the organization and supervisors who encourage such behaviors and reactions [4].

However, it is worth mentioning that in addition to the organization's condition, personality traits and abilities of organization's employees can be a factor affecting the organizational silence [5]. Personality traits and abilities of individuals are relatively fixed characteristics and capabilities which rather than to be learned over time and through experience, conditions and organizational situation, they are priori affairs which are less likely to change; however, they may face a limited change over time through repetition and practice [6]. The research aims to use managers and persons in charge of Mashhad Railway for improving the organization's situation and employee's commitment as well as achieving organizational objectives. Therefore, in the statistical population under study, what is the situation of organizational silence? Generally, the final objective of the present research is to answer this question: what is the relationship between organizational silence and organizational commitment among Mashhad Railway employees.

THEORETICAL FOUNDATIONS

ORGANIZATIONAL SILENCE

Conceptual Definition

According to Pinder&Harlos's definition, employees' silence is the prevention and inhibition of honest and sincere opinions about behavioral and cognitive evaluations and effectiveness of organizational situations to people who are able to change the situation. They identify and introduce two kinds of silence: submissive silence, i.e. prevention and inhibition of providing ideas by surrendering and accepting any condition, and quiescent silence, i.e. prevention and inhibition of providing ideas due to fear and for being survived in the organization, because speaking in such a situation is basically undesirable [7]. By adopting a different approach, Morrison & Milliken consider organizational silence as a collective phenomenon in which employees prevent providing their comments about organization's potential problems [8]. Employees' silence is a phenomenon in which an organization's employees avoid providing their opinions about organizational issues for different reasons and prefer to be silent. Silence is a very important sign of disease, stress, aging, depression or fear in the organization and managers must trace and remove its reason in the first place. Neglecting this issue may lead to more serious events and even death of the organization [9].

OPERATIONAL DEFINITION: SUBMISSIVE SILENCE

When most people call a person as a silent one, they mean that he does not communicate actively [10]. The silence resulted from such behavior is called the submissive silence and refers to the inhibition of ideas, information or comments by surrendering and accepting any condition. Therefore, submissive silence indicates a kind of isolated behavior which is more passive, rather than active [7]. Behavioral characteristics of people who suffer such a silence include low participation, negligence, carelessness and stagnation. They consider such a silence as a factor against voice which is usually a form of passive agreement or acceptance of the current situation. People having such a silence are surrendered by the current situation and reluctant to speak, participate or attempt to change the current situation. For example, an employee avoids providing his opinions because he believes that speaking is useless and change of the current situation is out of mind through speaking and providing opinions and or he may not trust his personal abilities for penetrating the conditions. In both cases, silence is the result of surrendering and accepting any condition. When people in an organization believe that they cannot make any change, they are surrendered by any condition and stop actively providing ideas or comments. Finally, submissive silence includes an intentional and passive behavior and inhibition of providing information based on submission or a sense that effective changes are beyond the group capabilities [7].

DEFENSIVE SILENCE

The incentive of this silence is to create a sense of fear in providing information. Defensive silence is an intentional and non-passive behavior which is used for being survived against external threats, but unlike submissive silence, such a silence is non-passive and includes much awareness of existing problems and options in decision making and is the inhibition of providing ideas, information and comment as the best strategy at the right time. Defensive silence is similar to a situation where people avoid releasing bad news due to the distress of people or creation of negative consequences for the informer [11].

ALTRUISTIC SILENCE

Benefit of other individuals in an organization based on altruistic, collaborative and cooperative incentives is called intentional and non-passive altruistic silence which generally pays attention to others. Altruistic silence is an insightful and rational behavior which cannot be done through organizational orders [12]. This kind of silence is considered as a defensive silence based on consideration and awareness of alternatives in decision making and at the same time, it is inhibition of ideas, information and comments. But, unlike defensive silence, such a silence happens considering others' interests, instead of the mere fear of personal negative results of providing ideas. A comprehensive review of literature on silence shows that one of the dimensions of silence is the spirit of generosity which is directly related to the altruistic silence. Spirit of generosity is the lack of complaints and tolerance of job hardships, problems and uncertainties without whining and complaining. Since it has some interests for others, it is altruistic. Therefore, prevention of whining and complaining (silence) indicates inhibition of a mere attention to personal issues and shows altruistic purposes, patience, politeness and humility toward others [13]. In addition, altruistic silence can include prevention from releasing information for maintaining features such as being confidant.

ORGANIZATIONAL COMMITMENT

Conceptual Definition

According to Derry's definition, organizational commitment is a degree of an individual's loyalty to an organization [14].

In Robbins' opinion, organizational commitment is a state in which an individual considers organization as his representative and wishes to survive in the organization. According to Meyer, Stanley & Herscovitch, commitment is individuals' interest in spending energy and loyalty to the social system [15]. According to Gautam, Dick & Wagner, organizational commitment is an attitude or orientation toward organization which links a person's identity to the organization [16].

In addition, there are two views regarding the organizational commitment: the first one considers organizational commitment as an attitudinal and emotional issue. Based on this view, organizational commitment includes strong attachment and interest in the organization and determination of the identity for which three factors are conceptually considered:

1. Acceptance and strong belief in organization's objectives and values; 2. interest in high efforts toward realization of organization's objectives; and 3. intense desire to stay and take part in the organization [17].

Based on the organizational commitment, the second view is a behavioral issue and this kind of commitment is a rationalistic one. In this view, people are attached to the organization due to their advantages and interests and their investments in the organization [18]. Organizational commitment is an attitude toward employees' loyalty to the organization and a continuous process which achieves the success and prosperity of the organization through participation of individuals in organizational decisions and their attention to the organization [1].

Operational Definition

The organizational commitment is divided into the following three dimensions by Meyer and Allen (1991):

- Emotional commitment (the person receives his identity from the organization and is attached to it, enjoys taking part there and does not leave the organization).
- Enduring commitment (desire to take continuous actions based on the person's identification of expenses of leaving the organization).

- Normative commitment (people stay in the organization because they have a sense of duty not to leave the organization [19]).

RESEARCH HYPOTHESES

Main hypothesis

Organizational silence has a relationship with organizational commitment of Mashhad Railway employees.

Secondary hypotheses:

1. Submissive silence has a relationship with organizational commitment of Mashhad Railway employees.
2. Defensive silence has a relationship with organizational commitment of Mashhad Railway employees.
3. Altruistic silence has a relationship with organizational commitment of Mashhad Railway employees.

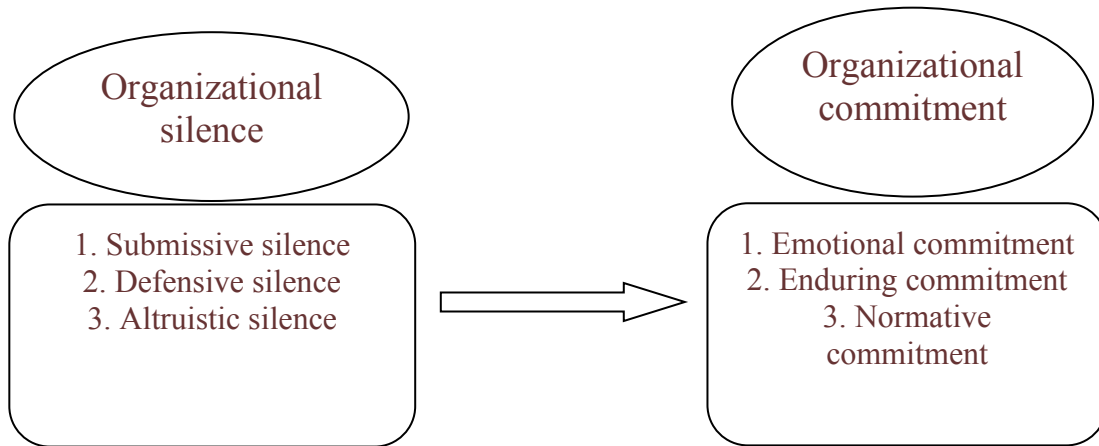


Fig: 1. Research conceptual model

METHODS

In descriptive researches, the researcher looks for the manner of subject including data collection for hypothesis testing or answering questions about the current situation of the subject under study. Descriptive researches are also applied and basic. In terms of applied aspect, results of these researches are used in decision making, policy making and planning. Generally, descriptive researches can be divided into three or four groups, including: survey research, case study, content analysis and ethnography, and if ethnography is a kind of case study, this classification into three groups is correct.

Survey researches as a branch of descriptive researches are a method of data collection in which a special group of individuals are asked to answer some specific questions. In a survey research, the first step is problem statement. In other words, for conducting a survey research, researchers must carefully define their objectives and each question must be related to one or several survey objectives. In the second step, the population must be correctly defined and determined. In the next step, the method of data collection must be determined which is generally divided into two categories of library and field methods. Then, from among the population, some individuals are randomly selected as the sample. Since the most common tools used in the survey research are questionnaire and interview, after the determination and design of tools, they can be considered for data collection from the selected sample and finally, after the adjustment and analysis of data, research findings and results are reported. In terms of objective, the present research is applied and in terms of methodology, it is descriptive and correlational, and it aims to study the relationship between the organizational silence and organizational commitment among Mashhad Railway employees.

STATISTICAL POPULATION

Population includes all real or imagined members to whom we are interested in generalizing the research findings or in other words, the population includes a group of individuals, objects or events which at least has a common

trait or property. The statistical population is the original population from which the sample is obtained. The statistical population in this research is all Mashhad Railway employees in 2015 which include 600 people at the time of conducting the research.

SAMPLE SIZE AND SAMPLING METHOD

Sampling is defined as the selection of some individuals, events and objects from a population as its representatives. In other words, sampling includes the selection of a percent of population as its representatives. Random sampling includes sample selection and data collection so that the obtained results can be generalized to a larger population considering error sizes (determined using statistics methods). Random sampling is prioritized over other methods because it uses inferential statistics methods. For sample selection, simple random sampling method is used which based on Cochran’s statistical formula in the following relation, the sample under study at least includes 180 people.

DATA COLLECTION METHOD & TOOLS

1. Collection of data required by the research using a field method through the research conducted by the interviewer in Mashhad Railway.
2. Library studies including study of domestic and foreign books and journals and searching databases (internet) for obtaining theoretical foundations and using experiences of other researchers.
3. Using questionnaires as the main tools of data collection for obtaining the required data from Fayload’s Organizational Silence and Meyer and Allen’s Organizational Commitment Standard Questionnaires (1991).

VALIDITY & RELIABILITY OF QUESTIONNAIRE

Validity and reliability are features which must be included in every measurement tool, including questionnaires. Validity means whether the content of tool and or questions stipulated in the questionnaire accurately measure variables and subject of the study or not. In other words, do we really measure what we think we are measuring? Validity is associated with the amount of appropriate information provided by the test in relation to the decision making process. Therefore, judgment about the validity is always studied in relation to a certain decision or particular application.

In addition, validity or reliability of a measurement tool means that if the measurement is replicated under similar conditions, to what extent the obtained results are similar and reliable. A tool is a valid measurement if it has compatibility and regeneration features, i.e. it can be used several times and in all cases, generates the same result. Inappropriate and insufficient measurements can invalidate any scientific research. In the subject of validity, the nature of reality is generally questioned. Validity can be studied without investigating the variables’ scale. But, study of validity is impossible without studying the nature and meaning of variables. According to Kriner, obtaining validity is mostly a technical issue. But, validity is beyond a technique and is located in the original nature of science. For calculating reliability, there are different methods, including: retest, parallel peer method, split-half method and Cronbach's alpha coefficient. Theoretical and experimental studies have shown that from among the above methods, Cronbach's alpha method has higher power and precision. Therefore, in this research, for determining the reliability of questionnaire, Cronbach's alpha coefficient is used. Cronbach's alpha method is used to calculate the internal consistency of measurement tools, including questionnaires or tests which measure different traits. In such tools, answer to each question may have different numerical values. For calculating Cronbach's alpha, first, the score variance of each set of questions in the questionnaire and total variance must be calculated. Then, using the following formula and SPSS software, alpha coefficient is calculated:

$$r_a = \frac{j}{j-1} \left(1 - \frac{\sum S_j^2}{S^2} \right)$$

(1)

Where,

j= The number of question subsets in questionnaires or test (2)

S²_j= Variance of jth subtest (3)

S²= Total variance of test (4)

For measuring validity of the questionnaire, the content validity was used. Questionnaires were provided to professors and they were asked whether the questionnaires were good tools for measuring variables and they were

confirmed by professors. For measuring the reliability coefficient of questionnaires, Cronbach's alpha coefficient was used.

Results obtained from Cronbach's alpha coefficient are as follows:

Table :1. Table of reliability coefficients related to each variable

Variable	Cronbach's alpha coefficients
Organizational commitment	0.84
Organizational Silence	0.79

RESULTS

For analysis of data obtained from samples, both descriptive statistics and inferential statistics methods were used. For data analysis, correlation, regression and other related tests as well as SPSS software and other software's were used.

Research results show that 20% of respondents are female and 80% are male. 9.4%, 38.3% and 52.2% of respondents are under 30, 30-40 and over 40 years old, respectively. 13.9% and 57.2% of respondents hold high school diploma and bachelor's degree certificate with the lowest and highest frequencies, respectively. Finally, 5.6% and 32.8% of respondents are under 5 years of service and 16-20 years of service with the lowest and highest frequencies, respectively.

Table:2. Results of Pearson correlation coefficient for determining the correlation relation

Independent variable	Statistics	Dependent variable
		Organizational commitment
Organizational silence	Pearson correlation coefficient	- 0.703**
	Significance level	0.001
	Sample size	180

** Significance level of tests is 0.01

Based on results of **Table -2** and since the significance level of test error for confidence level of 0.99 is less than 0.01, it can be said that the organizational silence has a significant inverse relationship with organizational commitment of Mashhad Railway employees and the correlation coefficient between these two variables is – 0.70.

Table:3. Results of Pearson correlation coefficient for determining the correlation relation

Independent variable	Statistics	Dependent variable
		Organizational commitment
Submissive silence	Pearson correlation coefficient	- 0.383**
	Significance level	0.001
	Sample size	180

** Significance level of tests is 0.01

Based on results of **Table -3** and since the significance level of test error for confidence level of 0.99 is less than 0.01, it can be said that the submissive silence has a significant inverse relationship with organizational commitment of Mashhad Railway employees and the correlation coefficient between these two variables is – 0.38.

Table :4. Results of Pearson correlation coefficient for determining the correlation relation

Independent variable	Statistics	Dependent variable
		Organizational commitment
Defensive silence	Pearson correlation coefficient	- 0.697**
	Significance level	0.001
	Sample size	180

** Significance level of tests is 0.01

Based on results of **Table -4** and since the significance level of test error for confidence level of 0.99 is less than 0.01, it can be said that the defensive silence has a significant inverse relationship with organizational commitment of Mashhad Railway employees and the correlation coefficient between these two variables is - 0.69.

Table :5. Results of Pearson correlation coefficient for determining the correlation relation

Independent variable	Statistics	Dependent variable
		Organizational commitment
Altruistic silence	Pearson correlation coefficient	- 0.647**
	Significance level	0.001
	Sample size	180

** Significance level of tests is 0.01

Based on results of **Table -5** and since the significance level of test error for confidence level of 0.99 is less than 0.01, it can be said that the organizational silence has a significant inverse relationship with organizational commitment of Mashhad Railway employees and the correlation coefficient between these two variables is - 0.64.

Table :6. Summary of multivariate regression model for components of organizational silence and organizational commitment

Correlation coefficient	Coefficient of determination	Adjusted coefficient of determination	Durbin-Watson
0.72	0.53	0.52	1.87

Based on results of **Table -6** the correlation coefficient between components of organizational silence and organizational commitment is 0.72 and coefficient of determination is 0.53. In other words, it can be said that dimensions of organizational silence commonly determine 0.53 of changes in the organizational commitment. If Durbin-Watson statistic is placed in the acceptable interval of 1.5-2.5, a lack of correlation between errors is observed. Based on the fact that Durbin-Watson statistic is 1.87, it can be said that a lack of correlation between errors is observed.

Table:7. Results of multivariate regression coefficient for organizational silence and organizational commitment

Predictor variable	Non-standard coefficients		Standard coefficient	T	P
	SE	B	BETA		
Fixed value	-1.48	0.15		-9.50	0.001
Submissive silence	-0.02	0.05	-0.02	-0.46	0.64
Defensive silence	-0.31	0.05	-0.47	-6.24	0.001
Altruistic silence	-0.20	0.05	-0.29	-3.94	0.001

on the results of **Table -7** and beta coefficients, it can be said that if dimensions of organizational silence commonly enter the regression equation, defensive silence and altruistic silence will anticipate -0.47 and -0.29 of changes in the organizational commitment, respectively.

CONCLUSIONS

Research findings show that there is a significant inverse relationship between the organizational silence and organizational commitment among Mashhad Railway employees. Furthermore, results show that there is a significant inverse relationship between the submissive silence, defensive silence and altruistic silence with organizational commitment of Mashhad Railway employees. In the explanation of these findings, it can be said that an increase in the organizational silence of Mashhad Railway employees leads to the reduction of their organizational commitment.

Research findings are consistent with research results of DanaeiFard and Panahi (2010). In their research, they show that there is a significant relationship between dimensions of silence (attitude of senior managers toward silence, attitude of supervisors toward silence and communicative opportunities) and professional attitudes with employees' silence, so that there is a relatively intense positive correlation between the attitude of senior manager

and supervisor and employees' silence and a relatively intense negative correlation between communicational opportunities and professional attitudes of employees and employees' silence.

Research results are consistent with research results of DanaeiFard et al. (2011). Research result shows the influence of organizational culture on the organizational silence (atmosphere and behavior of silence). Furthermore, Maleki Avarisan et al. (2013) show that there is a significant relationship between the psychological empowerment of teachers and its components (sense of competence, sense of being effective, sense of being significant and sense of trust) with organizational commitment.

Tulubas & Celep's researches show that although organizational silence is generally referred to non-expression of ideas, information and opinions by employees, based on the incentives of employees for silence, its nature is different. Sometimes, silence is the result of being surrendered by conditions, sometimes fear and conservative behaviors and sometimes for creating an opportunity for others and listening to their beliefs.

SUGGESTIONS

- Mashhad Railway employees must not avoid providing information for preserving their position (fear of losing position).
- Mashhad Railway employees must express their opposite opinions about the organizational issues.
- Mashhad Railway managers must not stigmatize employees who express opposite opinions as traitors.
- Mashhad Railway managers must provide an opportunity for employees to express their opinions and comments.
- Mashhad Railway senior managers must encourage employees to express their opposite opinions about organizational issues.
- Mashhad Railway managers must provide opportunities for employees to freely talk to their supervisors about organizational issues.
- Mashhad railway employees must share their knowledge and experience with others.
- Organizational changes must be informed adequately.
- Mashhad railway managers must inform employees of their missions, objectives, plans and progresses.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None declared.

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THE QUALITY OF GREEN SPACES BASED ON BEHAVIORAL PATTERNS USING FACTOR ANALYSIS-A CASE OF KHOLDEBARIN PARK IN SHIRAZ, IRAN.

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ABSTRACT

All people interact with their surroundings; they affect it or they are influenced by it. Providing some solutions, this research aimed at improving the quality of green spaces by using behavioral patterns to enhance the quality of space in line with the characteristics and needs of users. It, therefore, examined men's behavior settings and the way to apply techniques in order to increase the quality of green spaces in harmony with people. This study conducted in Kholdebarin Park located in district 1, Shiraz. Direct observation, interview and a questionnaire on the quality of different spaces for different age groups are the research's methods. Obtained data showed that coefficient of variance was 0.786 for both variables, namely the environment and behavior. Two variables, therefore, had the same effect on the behavior settings. There was also a correlation between environmental and behavioral factors; the significance level of this relationship is less than 0.5.

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KEY WORDS

Green Space, Behavioral Patterns, People-Environment Interaction, Kholdebarin Park, Shiraz.

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INTRODUCTION

Green spaces play an extraordinary role in human's life with different and multilateral values such as providing security, comfort, and creating leisure and recreation environment for people to gather, etc. In fact, it creates diversity in mind. One of the criteria to assess the quality of urban environment is public green spaces in which citizens are able to interact comfortably. The importance of this issue is to the extent that today there is an attention to urban green spaces and applying policies to release people of some problems such as despair and frustration, and to create a good relation between environment and green spaces [1]

To recognize behavioral psychological and human interaction with the environment, the issue is of one the architects and urban planners' interest. To design according to the psychological patterns allows designers to create flexible environment which responds to people's different trends, a place which Altman believes makes it possible to monitor social interaction [2].

The relationship between man and environment follows a system in which sensory receptors are influenced by environmental stimuli and finally human's response appear as behavior. All human behavior is done in certain spaces considered as behavior setting. Space is desirable when it is designed in accordance with individuals' characteristics, behavior and his needs. In design of spaces, it is necessary to consider human, his perception and behavior to make it consistent with the environment's target. Therefore, in order to benefit from human spaces in which the value of the environment is concerned, it is necessary to examine human-environment interactions and the consequences of it on behavioral patterns [3]

Barker studies behavioral patterns of individuals under ecological psychology, i.e. behaviors presents in behavior settings collectively. He believes, there is a certain connection between physical and behavioral aspects of these settings. The relationship is expressed by the concept of homologous. He states, there is a relationship between man

and these settings; it takes certain social roles in different behavior settings. He defines the behavior settings as a fixed set of activities and places in which certain repetitive activity or fixed patterns of behavior happens, have a specific plan of environment, and make an appropriate relation between repetitive activities and environment that is done in a certain period of time [4]. It is necessary to examine the factors influencing behavioral patterns in behavioral place (green space), and then by them try to increase the quality of green space, and to make the space consistent with users' behavior.

MATERIALS AND METHODS

To achieve the desired goal of this research and to recognize the positive points by examining and finding the potentials available in the park, the analytical and descriptive methods are used to develop the behavior patterns. Data are collected through field study, observation, interviews and questionnaires. The case study is Kholdbarin Park—an urban park. Factors are extracted through library researches and the questionnaire designs on the basis of them. Pattern's factors in a behavior setting are divided into those stimulate the behavior and those related to environmental design. The options are considered as 6 photos of park. Data analysis has been done through SPSS software and has been presented by descriptive and inferential approaches such as correlation coefficient, mean and ANOVA [Figure- 4]. Fig. 5 also indicates the executive process of the research.

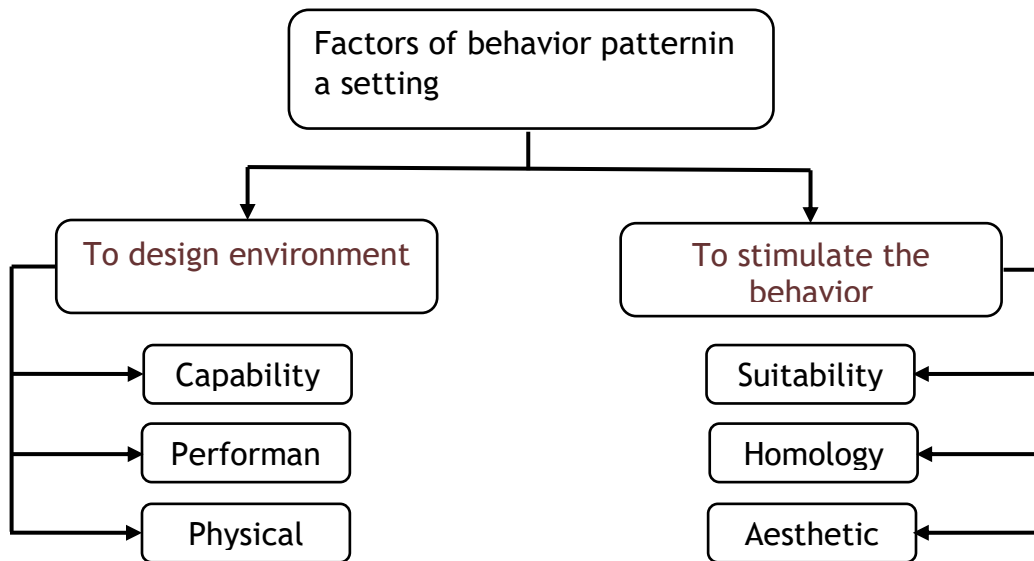


Fig. 4. Factors of behavior patterns in a setting

RESULTS

In this study, the quality of spaces is examined according to the mentioned factors.

Descriptive Statistics

According to Table- 2, 34 men and 32 women participated in the research, among them 53.8% were married and 47% were single. Age category includes respondents between 7-75 years old. The majority of them were between 16 and 25 years old which indicate a young sample group. Nearly 38.5% of the respondents had M. A. or higher education, 40% diploma and A. M, and 21.5% were students.

To do this research 6 spaces were chosen in the park. They were the choices for the questionnaire. The researchers asked the people in the park to respond to the questionnaire by choosing one of the pictures.

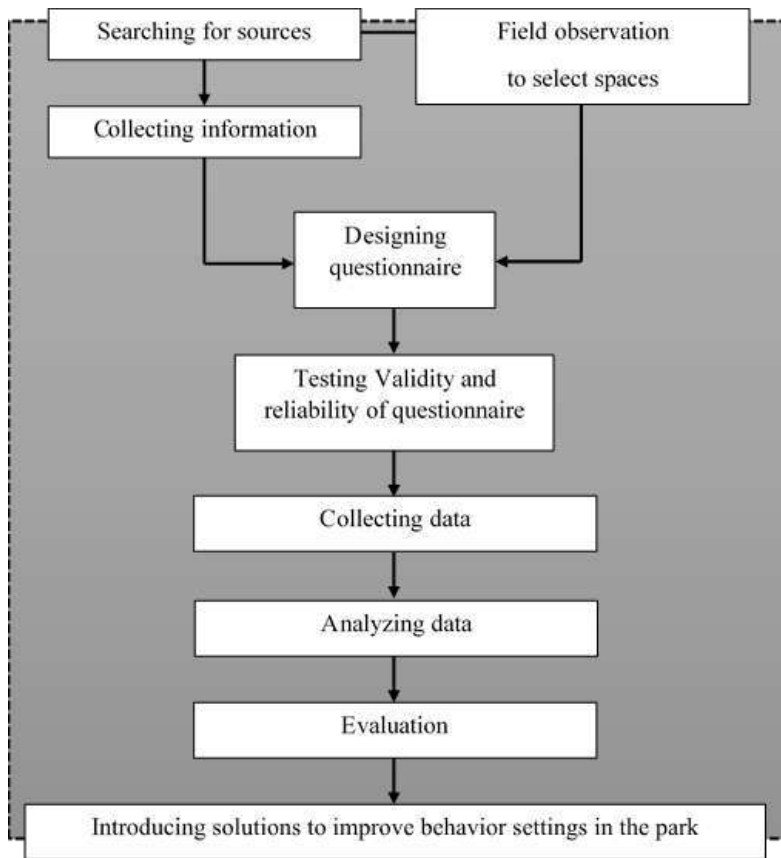


Fig: 5. Research executive process diagram

Table: 2. Demographic characteristics of samples

	number	Count (%)
<i>Gender</i>		
Female	32	48.5
male	34	51.1
<i>Marriage status</i>		
Married	31	53
Single	30	45.5
No response	1	1.5
<i>Age</i>		
7-15	10	15.2
16-25	16	24.2
26-35	10	15.2
36-45	10	15.2
46-55	10	15.2
56-75	10	15.2
<i>Educational background</i>		
Elementary school	7	10.6
Guidance school	3	4.5
High school	4	6.1
Diploma	25	37.9
B.A/BSc	1	1.5
M.A/MSc	23	34.8
PhD	2	3.0
No response	1	1.5

Inferential Statistics

a) The effect of age on aesthetic factors

As Table- 3 shows, the age affects the aesthetic factor. As the results of mean indicates respondents between 46-75 years old paid more attention to this factor (=3.5775) and after this group the respondents between 46-55 years old poses the second place (=3.0100). Therefore, it can be concluded that when the person is older the aesthetic factor become more important.

Table: 3. The effect of age on aesthetic factors.

Age category	Age	Mean	Standard deviation
1	7-15	2.6200	0.48259
2	16-25	2.8562	0.81320
3	26-35	2.8400	0.99465
4	36-45	2.2400	0.65862
5	46-55	3.0100	0.54665
6	56-75	3.5775	0.90711
-	Sum	2.8572	0.98882

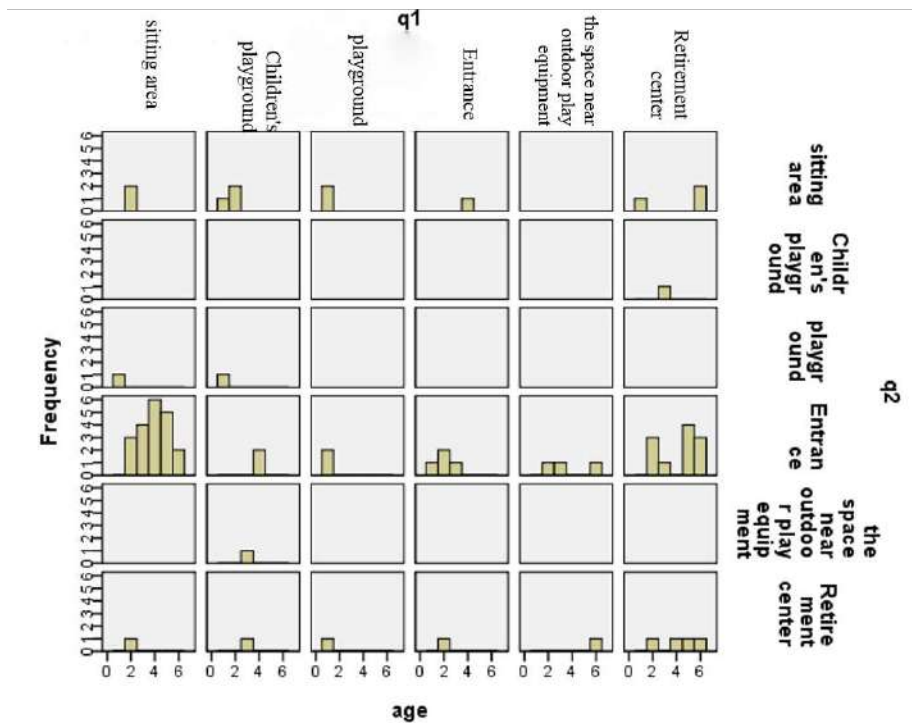


Fig:8. Assessing the spaces based on aesthetic factor; question 1 is about the memory of place, and question 2 is related to the culture which is subcategory of aesthetic factor. Age categories are shown in the horizontal axe.

According to Figure-8, among different spaces, the entrance space contains cultural characteristics, and sitting area and retirement center evoke the memory of place more for the respondents.

Group 4 (36 to 45 years old respondents) selected the choice “sitting area” more than other groups; and group 5 (46 to 55 years old respondents) selected the choice “retirement center” more than others.

Table: 4.the most striking aesthetic factors and quality of space

Behavior setting	Aesthetic factors	The quality of space
entrance	Landmark, culture	Landmark, Iranian culture, visual beauty
sitting area	The memory of place, the value governing thinking, attitude, meaning, need, culture	Using an element appropriate to culture, good vision
retirement center	culture, simulation, meaning, need, the value governing thinking	Iranian culture, the memory of place, visual beauty, pleasure and comfort, sense of belonging to the place, sense of invitation
		climatic comfort, good view, the existence of fountains, silence, the existence of shade and appropriate furniture, centrality of the form, justify to performance
		cozy space, justify with the needs, belonging Iranian culture characteristics

b) The Effect of Factors in Behavior Settings

Table-5 shows the share value of variance coefficient for each variable. The primary share values are estimated variance in each variable considered with all components or factors. The values of this column indicate the amount of the total variance; all factors can explain it. In this section, the value of this variance is equal to 1 for all variables. Its variance extracted share value varies. This amount can vary between zero and one (Afshani, 2012). As shown in Table-5, this amount is equal to 0.786 for both the variable. Both variables (environment and behavior), therefore, have the same effect in behavior setting.

Table: 5. The share values

variable	primary share values	estimated share values
environment	1.000	0.786
behavior	1.000	0.786

According to Table-6, the rotational component matrices of both variables - environment and behavior - equally influence the behavior patterns and are in interaction with each other. Among environmental factors and in comparison with other factors, aesthetic factor is more effective [See Table-7], and among behavior factors, the physical factor is more effective in behavior settings[See Table-8].

Table: 6. Rotational component matrix of environment and behavior.

Variable	rotational component matrix
	1
Environment	0.887
Behavior	0.887

Table: 7. rotational component matrix of aesthetic and homology.

Variable	rotational component matrix
	1
Aesthetic	0.722
Homology	-0.722

Table: 8. rotational component matrix of aesthetic and homology.

Variable	rotational component matrix
	1
physical	0.818
capability	0.641
Performance	0.204

As shown in Table-9, there is a correlation between the environment and behavior, and the significance level is less than 0.05. Therefore, the assumption of no correlation is rejected.

Table: 9. the correlation between the environment and behavior.

variables	correlation	significance level
Behavior- environment	0.599	0.00

DISCUSSION AND CONCLUSION

With the development of human societies and vacuum of meaning and concept in space, and lack of attention to the people’s psychological needs with different ages in built spaces, the users considered the quality of spaces and the role of aesthetic and physical factors in building different spaces to create an appropriate pattern in a behavior setting. Its consequence includes paying attention to effects of environmental and provocative behavior in built space and in human’s mind and behavior. These factors can determine the type of relationship between the audience, his activities and environment. Therefore, the way physical and aesthetic elements are used in spaces is important [Figure- 9].

Examining the effect of age on the aesthetic factors it can be said:

- Middle-aged and older people have considerable attention to aesthetic factors.
- The entrance space shows the most cultural characteristics; data indicates sitting area and retirement center have the most memory of place, respectively.
- In spatial perception, spatial quality as users’ psychological perception is of paramount importance.

Examining the effect of factors on behavior settings it is concluded that:

- The amount of extracted share value of variance coefficient for both variable is equal to 0.786; therefore, both variables (environment and behavior) were equally effective in behavior settings.
- The effect of physical factor as compared with other factors in behavior patterns was also more significant.
- There was also a correlation between environmental and behavior factors and the significance level of this relationship was less than 0.05.

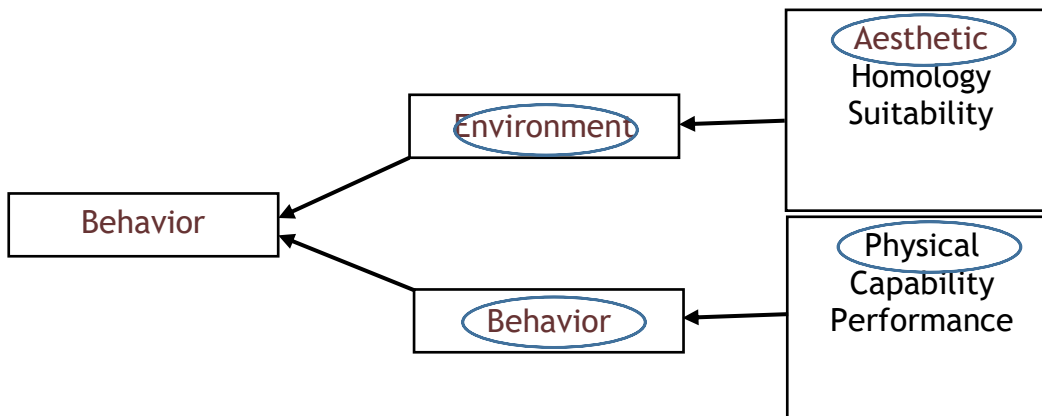


Fig: 9. effective factors in behavior settings (source: authors)

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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ASSESSMENT THE MANNER OF OBTAINING HIERARCHIES AND PRIVACY OF TRADITIONAL HOUSES ENTRANCE IN PROVIDING A SAFE PLACE: A CASE STUDY OF TRADITIONAL HOUSES IN SHIRAZ)

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ABSTRACT

In this paper the manner of obtaining hierarchies and privacy entry of traditional houses in providing a safe place in the city of Shiraz will be evaluated by Qualitative – Descriptive methods and 6 old houses case study. The houses of Shiraz, as the houses in other cities in Iran are a response to climate and physical features. The old part of Shiraz has a compressed and dense texture in which the houses are in narrow and tight alleys. In this regard the principles of traditional house entrance design have been introduced. The results show that every house has a private entrance. Direction of the entry of most houses is toward the south and with a turn to the south-east side. Entrance to yard path in all the cases is not straight, and this had been done by using 90 degrees rotates of the corridor leading to the yard. Vestibule provides a private place for the house and entrance stairway to the rooftop is located inside it.

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KEY WORDS

Entrance, Components of entrance, Hierarchy, Frontage, Shiraz houses

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INTRODUCTION

From ancient time people of Iran have shown the tendency to introverted architecture due to their attitudes of house and family. Basically Iranian doctrinal and specific issues had influence on formation of different spaces and especially in residential areas. One of those Specifications is respect for private life and reverence for it [1] and for example we can point the entrance and the way in which one enters home from the public alley that is one of the traditional Iranian architecture arts and connects architecture art to Iranian beliefs. It can be said that Iranian doctrinal and specific issues had influence on formation of different spaces and especially in residential areas [1] [2]. The entrance of a house has its own specific entrance to cover the aims and maintaining the traditions of that house. Household needs, lifestyle, culture, and technical skills are all effecting on the formation and architecture of a house entrance. In fact the nature of society and features of what is important in a society usually are reflected in designing the constructions. Entrance area is a part of Contiguous sequence and related spaces off the entire house. While entering a house, the door and the front of the house are both a barrier to enter the house and an area to welcome to the semi-familiar guests. This area is like a waiting place for the strangers. Entrance of a house is also a bridge from the house to alley, street and district.

From what that has been said above, it can be seen that even this small space has its own characteristics, which plays a role beyond its function in the home series. Dr. Kateb in “Architecture of Iranian House” expresses the basics of designing entrance of a traditional house: conserving the house frontage, entering is a gradual process, entering process show humility, entrance controlling is indirect and the view of the house is different in the neighborhood [3]. Also Dr. Soltan zade in “Entrance Space in Traditional Iranian Architecture” expresses these factors: Maintaining privacy and security, ease of access, entering with humility and calm, to gradually entering and solving physical problems, linking urban space with architectural space [4].

By studying historic and old towns and their original homes, the authors have considered the city of Shiraz as an evaluation area, privacy and immediate problem of how to create a safe environment from the street has been evaluated by using 6 old and traditional houses as the sample. In these houses the relationship between the inside

and outside is gradually due to central yard and some areas like vestibule, Corridor and hallway are at the arrival and this process cuts the connection of public and private life in a good method and introversion of homes, has a role in preserving the confidentiality of them [2].

There is not much studies in the assessment of manner of Shiraz houses entrance in providing a safe place and there is few literatures about residential architectural of Shiraz houses. In this field we can name books like “Entrance Space In Traditional Iranian Architecture” by Hossein Soltanzade, “Architecture Of Iranian House” by Fateme Kateb, and “House, Nature And Culture” by M. Reza Haeri Mazandarani that evaluates traditional hoses in the cities of Hamedan, Rasht, Kashan, Shiraz and Bushehr, and published papers including The Assessment Of Stylistic Characteristics Of Residential Architecture In Qajar In Shiraz by Hony Zaree [5] and some other works. This study evaluates the manner of Shiraz house entrance in providing a safe place about 6 old houses in Qualitative – Descriptive methods. Different parameters like frontage, hierarchy and its components have been studied and some ideas about designing new entrance have been recommended.

MATERIALS AND METHODS

According to the few studies about the features of Shiraz house entrance, the main part of data collecting has been due to field harvest and studies. In this research data from 6 old houses as sample and present dates has been used to follow the objectives of the research. Choosing the houses among the old houses in traditional texture being in the map and available has been in the selection criteria method. The steps of the research area as follows:

- Selecting some traditional houses in shiraz
- Field harvest of the maps and the sizes by using Leica Laser meter D5 model
- Evaluating and comparison of different parameters like frontage, hierarchy and its components.
- After providing the above steps, the produced data has been presented in tables and the results have been collected. Some software like AutoCAD to draw the maps and Excel to calculate the data has been used in this process.

Case Study

The city of Shiraz is located in the heart of one of the most ancient centers of Iran Civilization at the south-west of Iran and has the longitude 52 ° and 33 minutes east, Latitude 29 degrees and 36 minutes north. City is expanded along the main axis and the minor axis over the time [6]. From the beginning Shiraz monuments has been influenced by religion. In traditional society, the family is the basic units of society, and home is the main axis of the integrity of the family [7]. The houses in Shiraz not just are one of the most shining traditions in Iran from the view of map, decorating and arrays, but also are the treasures of art which are unique aspects of inner beauty and cultural value. Traditional homes with elegant and complex designs in Shiraz are derived from cultural and religious traditions, and have achieved their maximum boom and surprises [7].

The houses in Shiraz are related to some different periods of time and remaining houses mostly are belonged to Qajar period. Because almost of the old houses has been ruined and just a few of them was remained. The houses in old and new texture are completely different in Architecture and the features are presented in Table 1.

The location of the houses in the old and central texture is Sporadic and the selection has been in different areas. The selected houses are different in the style of entrance but all of them solve the problem of privacy and being safe and separate the inside and outside area. In this paper the manner and process will be discussed and will be compared in case studies (Fig. 1).

Table: 1. Specifications of case study's Home

Building	Construction Era	Registration No of Nation's Heritage	NO of Floor	Basement	Direction	Area	
B1	Forrogh ol molk Home	Qajar	2040	2	YES	North Eastern-South Western	1020
B2	Owji Home	Qajar	2384	1	YES	North Western-South Eastern	378
B3	Towhidi Home	Qajar	4522	1	YES	North Western-South Eastern	418
B4	Saadat Home	Qajar	10481	1	YES	North-South	406
B5	Hasani Ardekani Home	Qajar	1601	1	YES	North-South	943
B6	Afsharian Home	Pahlavi	8994	1	YES	North Eastern-South Western	584
B6	Afsharian Home	Pahlavi	8994	1	YES	North Eastern-South Western	84

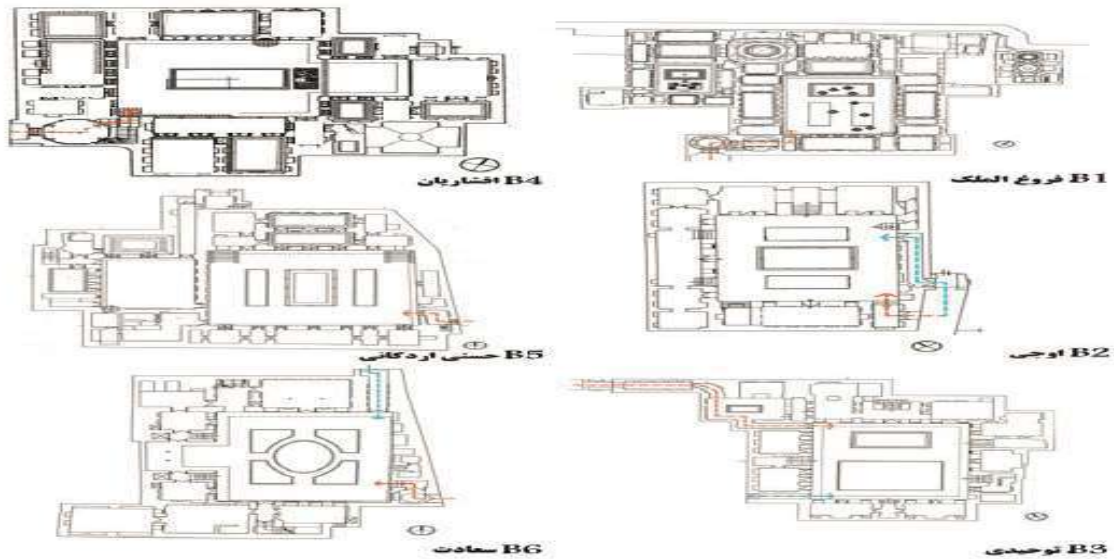


Fig: 1. The map of Shiraz in Qajar period (right), the plan of case studies in Shiraz (left) [8].

RESULTS

According to what we discussed before, it is obvious that the entrance has specific features and roles in past residential architecture of Iran and every feature can be discussed independently. So in this part we will evaluate and discuss some of these features.

Hierarchy

The principle of hierarchy is one of the most important principles in formation of Iranian traditional architecture and urbanism. The role of hierarchy in defining a set of components and identifying them is undeniable. Hierarchy is the organization and composition of spaces and elements based on some physical properties or performance that Create hierarchical in arrangement, using or viewing elements [4]. Classification in terms of territory and Privacy shape spaces is done by observing the principle of hierarchy. This structure can be seen in smaller scale in building's Architectural space. Hierarchy is in more traditional buildings, including forecourt and entrance, entrance vestibule, corridors, hallways, courtyards and other performance spaces around the courtyard [2].

Respecting the principle of hierarchy, causes the separation of public and private areas and shows the role of privacy more important in spatial structure. It can be noted that privacy is one of the physical manifestations of respect for hierarchy that is seen in Islamic cities and creates lasting values such as safety, comfort, privacy and confidentiality in traditional buildings [2].

The entrance space is to connect the input space into the outdoors. Other functions can be changing direction, stopping, waiting to enter, as divider and set the direction or directions. Hierarchy that exists in this run creates the best performance in the entrance space [4]. The creation of social hierarchies rooted in religious beliefs and has helped design an indirect path being formed to not let the people enter the house suddenly and not being any direct view to the interior [4]. In fact conscious design has changed the simple path to a long and spiral path [4]. According to evaluation of hierarchy element in the case studies it was found that all the entrances are indirect and there is turns in the path.

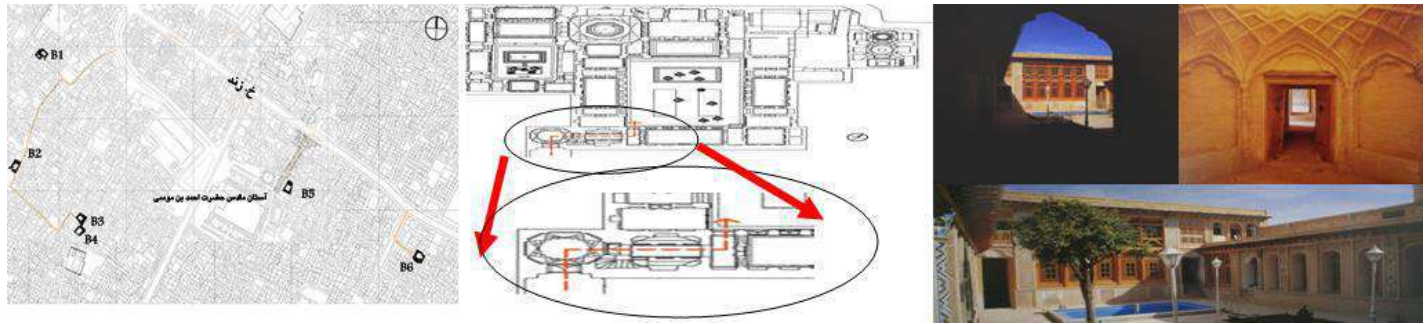


Fig. 2. Using Hierarchy in the entrance components of Forughol molk house in the city of Shiraz, source: Negarandegan

Table. 2. Case Study's Entrance

Building	Entrance	Entrance Direction	Entrance Way	How TO Enter	Porch(Hashti)	First Entrance
B1 Forrogh ol molk Home	1	South Western	Indirect		Yes	
B2 Owji Home	1	South Eastern	Indirect		No	
B3 Towhidi Home	2	North Western	Indirect		No	
B4 Saadat Home	1	South Eastern	Indirect		Yes	
B5 Hasani Ardekani Home	2	South Eastern	Indirect		Yes	
B6 Afsharian Home	1	South Western	Indirect		Yes	

Privacy

Artist architect has used the privacy in Shiraz traditional houses in the best way. Keeping the veil in Iranian homes because of family privacy is obvious and is shining in Iranian architecture [9]. It can be said that the meaning of privacy in architecture and urban space is Privacy body to have a space to be two aspects of the physical and semantic. Privacy of having more space within the body is focusing on the principles that will shape the security environment and the semantic domain for architectural features that brought dignity and worth of the individual in such a way to relax. Intimate space is a space that provides to achieve physical and spiritual conditions of confidentiality in all its various dimensions. Privacy can be seen as one of the distant past that has been seen in the architecture of Iran [2].

Privacy and introspection in Iranian architecture, the entrance gets important because it connects the outdoor and indoor and usually is the outside view of the building. Evaluation indicates that how the designer keeps the

privacy and also moving through it. In most of the houses the privacy is controlled by the path. The vestibule turns from entering the house, separates the inside and outside space and provides privacy for the house because it eliminates the view of the house just to vestibule.

By evaluating the privacy in the case studies it has been known that entering to a house has been assisted by the yard. It means that however the entrance path is in indoor, but it does not lead the person in the heart of the house suddenly. The entrance path goes to the yard at first and then it goes to other parts of the house. It is noticeable that in some houses it does not occur, for example the auxiliary entrance of the house of Forughol Molk that one can go from vestibule to guest room. In all the houses that were studied there is a yard. Also in all the cases the path is not direct. This is seen even in the houses that are likely to enter directly like Hasani Ardekani and Saadat. The turn, separates the inside and outside space and provides privacy for the house because it eliminates the view of the house just to vestibule.

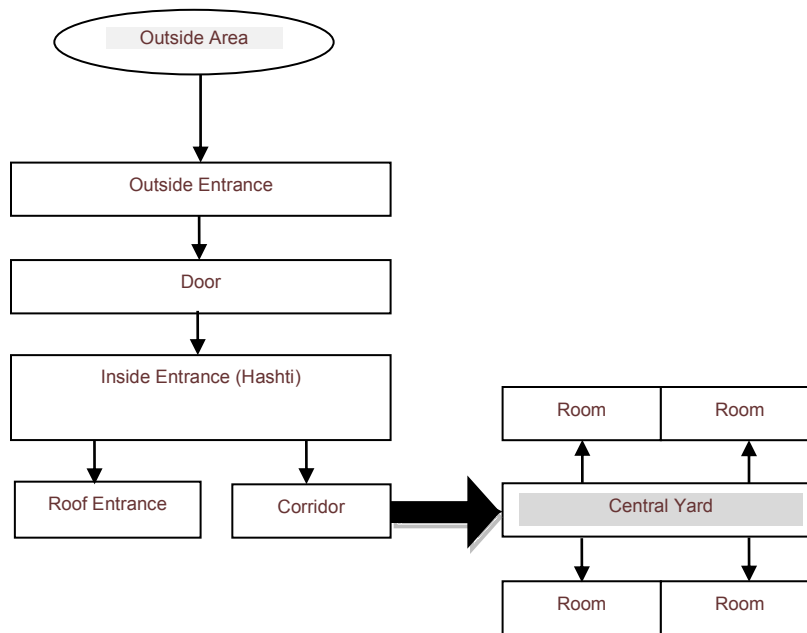


Fig. 3. The steps of entering a house in functional view





Entrance components

The entrance area of a traditional house has different components including doorway, vestibule and corridor. The entrance door is the boundary between inside and outside. The small place in which the door stands is called doorway [4]. The doorway has a little shadow and protects the guest from snow and rain while he or she is at the door. In addition to the oven and departed, there are two platforms, which is aid "old settlement," [10]. Facade shows the house entrance and also is evidence to start or final part of a house. The entrance begins from a corner and the doorway is the only place to move in and the wooden door has completely closed it. It seems that safety has been very important for the people of Shiraz which base such architecture: Tall and closed walls. But it is not the only reason of being closed; the reason also can be finding in vestibules.

Vestibule is a space that locates after doorway and is a place to branch the ways [4]. Vestibule often is Octagonal-shaped or semi-octagonal or sometimes four corners. Vestibule usually has a short roof and there is a light hole in its domed roof and has some places to sit [3].

Corridor is an indirect path from vestibule to yard [3]. The most important role of it is providing a connection between two places in this way the privacy was produced [4].

Table 3: The vestibule of case study's

	Building	Porch	The Form	Ways from Porch	Porch to Yard	Entrance Plan
B1	Forrogh ol molk Home	Yes	Eight Sides	Corridor, way to roof	Corridor	
B2	Owji Home	No	No	No	No	No
B3	Towhidi Home	No	No	No	No	No
B4	Saadat Home	Yes	Circle	No	Corridor	
B5	Hasani Ardekani Home	Yes	Four Sides	Way to roof, yard	No	
B6	Afsharian Home	Yes	Eight Sides	Corridor, way to roof	Corridor	

DISCUSSION AND CONCLUSION

The entrance in the houses of Shiraz originates from the residential culture just like other ancient structures. At first there is the door and after that the vestibule and is Octagonal-shaped or semi-octagonal and play the role of pre entrance space. This space is lower than the alley about one step. The entrance is from a path which is normal to vestibule. By this turn, there will be no view to the house and it is obvious that the privacy is provided in this series.

By evaluating 6 houses we will understand that:

- Almost all the houses have private entrance. Two houses of Hasani Ardekani and Tohidi have two entrances and one of them has not vestibule and directly goes to the yard. It means there is no stop place for the strangers to get more familiar.
- The entrance direction is toward the south or south-east and in all the cases the entrance is in a corner
- The entrance path is indirect and has one or two 90 degrees turn in corridors toward the yard.
- Just two houses of Owji and Tohidi did not have vestibule and in other cases it was in different shapes. Vestibule is a private place for the house and the stairs to roof is also in it.
- Entrance corridor is another place of vestibule that provides stop and turn for the guest.
- The direction is in a way that entering person does not see the main house and after 90 degrees turn he or she will see the house.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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FINANCIAL DISCLOSURE

None declared.

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DESIGNING AN ENTREPRENEURIAL UNIVERSITY MODEL WITH THE ORGANIZATIONAL ENTREPRENEURSHIP APPROACH IN PAYAM-E- NOOR UNIVERSITY

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ABSTRACT

The purpose of the present study is to design a model of an entrepreneurial university with the organizational entrepreneurship approach in Payam-e Noor University. The present study follows applied objectives through the descriptive and correlational nature and a mixed methodology (qualitative and quantitative). Regarding the qualitative part, the researchers collected the opinions of 15 scholars in Payam-e Noor University (based on snowball sampling) by means of in-depth interviews with open-ended questions. Regarding the quantitative part, 96 scholars among the instructors and professors of PNU were selected according to the sampling formula for infinite population, based on the purposive sampling and the required data was collected through questionnaires. The following aspects were considered as features of an entrepreneurial university: 1. the quality of graduates; 2. Scientific publications; 3. Observing resources for research activities; 4. Providing consultation services; 5. providing industrial training courses; 6. research contracts; 7. Protecting intellectual properties by obtaining patents and licenses; 8. Creating spin-off companies; 9. Creating technology parks; while features of an organizational entrepreneurship were examined through these aspects: 1. Innovation; 2. Renovation and 3. Introducing new business. The reliability and validity of the instruments were confirmed by seven university scholars in the related field of studies. Furthermore, convergent and divergent validity of research structures were examined and confirmed by means of PLS approach and their reliability were also highly reported with the Cronbach's alpha coefficients higher than 0.6. The qualitative data were analyzed by open and axial coding. Research model was also analyzed through structural equation modeling approach by means of PLS software. The results showed that research contracts, financial resources, structure and patent certificate with path coefficients of 0.06, 0.03, 0.09 and 0.07 respectively have direct, yet weak relation with entrepreneurial university. However, this relation was not confirmed regarding the t-value less than 1.96 and at the significance level of 95%. On the other side, the variables such as courses' content, organizational culture, graduates, macro management, spin-off companies, characteristics of students, science and technology parks, instructors' characteristics and publications were in direct relation with entrepreneurial university as the t-value was higher than 1.96 and the relation was confirmed at the significant level of 95%.

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KEY WORDS

entrepreneurial university;
organizational entrepreneurship;
science and technology park;
Course content; organizational
culture: Pavam-e Nur University

INTRODUCTION

Universities are among the most ancient and fundamental institutes in the history and they need a more recent and comprehensive evaluation [1]. Today's knowledge based societies are requiring universities with a much closer and interwoven relation with innovation than the industrial societies [2]. Universities' role and activities and research systems have been changed under the shadow of global competition' new quality and international competition and national prosperity would not be possible if these evolutions are not in line with innovational approaches and establishing entrepreneurial universities [1]. Therefore, universities ought to have entrepreneurship approach in order to commercialize their findings and apply them in knowledge-based businesses [3]. Clark believes that four factors are influential in transforming traditional universities into entrepreneurial universities, namely, increasing the number of students, experts' demands for proposing trainings skills in universities, demands for less payment and better achievements and finally incredible expansion of knowledge [4]. Another proposed reason for the emergence of entrepreneurial universities is the increasing rate of research and technical progress in industries [5]. According to the Triple Helix of university-industry-government relationships, the concept of commercialization as one of the main activities of universities has revolutionized the universities and shaped entrepreneurial universities [6].

Globalization and internationalization have a great role in social and economic processes and evolutions and new responsibilities toward the changing society, national economy, social progress, reduction of public financial resources and educational market have changed the role of the universities [7]. The primitive role of universities to educate the students (the first generation of universities) and later to research (the second generation) have evolved to the third generation known as entrepreneurial universities. Guerrero and Urbano are describing entrepreneurial university as a university which can meet the current requirements of the society through developing its organizational potentials, innovation, creating and identifying opportunities, team work, risk taking [8].

Iranian universities are usually the second generation and do not have many commercial activities regarding their research's findings and entrepreneur training. Commercial activities of domestic universities is normally restricted to the science and technology parks without any significant output to the business market. Thus, creating innovative activities through entrepreneurial universities is a necessity.

Major deficiency of the proposed entrepreneurial universities' models is that they are merely a list these universities' characteristics or suggesting the connections between entrepreneurial elements in the university. Another problem is studying entrepreneurial universities without considering their organizational structure and proposing a solution in order to strengthen the entrepreneurial characteristics inside their organizational structure. Therefore, the present study aims in providing an entrepreneurial university's model, considering entrepreneurship activities within the organizational structure and propose this question: what is the entrepreneurial university's model with focus on organizational entrepreneurship characteristics?

MATERIALS AND METHODS

The present study follows applied objectives through the descriptive and correlational nature and a mixed methodology (qualitative and quantitative). Regarding the qualitative part, the researchers collected the opinions of 15 scholars in Payam-e Noor University (based on snowball sampling) by means of in-depth interviews with open-ended questions. Regarding the quantitative part, 96 scholars among the instructors and professors of PNU were selected from an infinite population and according to the sampling formula for infinite population, based on the purposive sampling:

$$n = \frac{(Z^2 p(q) / d^2) + ((1.96))^2 \cdot 0.5(0.5)}{(0.1)^2}$$

Finally, 96 PNU scholars were selected as the statistical population. As it has been mentioned, the sampling method was purposive, that is the selected participants for filling the questionnaires has higher knowledge of management and entrepreneurship concepts while being knowledgeable about the academic activities.

In the qualitative part, the snowball technique continued to achieve theoretical saturation. In fact, the interview would be stopped if conducting more interviews would not add any new concepts to the previous knowledge. In the present study, the researcher continued interviewing until the fifteenth interview. The qualitative data was collected through in-depth interviews with open ended questions while the questionnaires were utilized to collect the quantitative data. The mentioned questionnaire has been developed based on the discussed concepts in the literature review and results of the qualitative part. The total number 110 questionnaires were distributed and 103 questionnaires were returned and 100 of them were usable.

The following aspects were considered as features of an entrepreneurial university: 1. the quality of graduates; 2. Scientific publications; 3. Observing resources for research activities; 4. Providing consultation services; 5. providing industrial training courses; 6. research contracts; 7. Protecting intellectual properties by obtaining patents and licenses; 8. Creating spin-off companies; 9. Creating technology parks [9]; while features of an organizational entrepreneurship were examined through these aspects: 1. Innovation; 2. Renovation and 3. Introducing new business. The content validity of the questionnaire is confirmed by the scholars of this field; content and face validity of

the instruments were also confirmed by seven university scholars in the related field of studies. Furthermore, convergent and divergent validity of research structures were examined and confirmed by means of PLS approach and their reliability were also highly reported with the Cronbach's alpha coefficients higher than 0.6 using SPSS. The qualitative data were analyzed by open and axial coding. Research model was also analyzed through structural equation modeling approach by means of PLS software.

RESULTS

Coding the qualitative data

The qualitative data were analyzed by open coding method and later by axial coding. The axial coding is represented in [table.1](#) according to open coding and the identified variables:

Table.1. Summary of the open coding and axial coding results

No.	Open coding	Code Symbol	Axial coding	frequency
1	The general level of graduates' business skills	I1	Graduates	8
2	The ability of recruiting graduates	I2		5
3	The level of graduates and students entrepreneurial activities	I3		6
4	Graduates' Theoretical skills	I4		5
5	Matching graduates' skills with the requirements of the business market	I5		6
6	Academic publication expansion	P1	Publications	6
7	Academic publication variety	P2		2
8	Academic publication functionality	P3		5
9	Academic publication probability for the university	P4		6
10	absorbing governmental aids	Grnt1	Financial resources	4
11	Financial aids for research dissertations and thesis	Grnt2		5
12	Financial support from independent institutes	Grnt3		1
13	Financial support from large companies	Grnt4		4
14	the capacity of absorbing funds from foreign resources	Grnt5		5
15	The number of university sponsors	Grnt6	Research Contracts	5
16	Signing general research contracts	Cres1		6
17	Research contracts with businesses	Cres2		4
18	Variety and expansion of research contracts	Cres3		3
19	Research contracts with government	Cres4	4	
20	Pursuing academic innovations and turning them into certificates	Patnt1	Patent certificate	2
21	Number of patents	Patnt2		3
22	Supporting students' innovations	Patnt3		10
23	Incomes from selling certificates	Patnt4		6
24	The number of spinoff business	Spnf1	Spinoff Business	8
25	Faculty members tendency to establish spinoff businesses	Spnf2		5
26	spinoff businesses as the results of academic innovations	Spnf3		7
27	Students tendency to establish spinoff businesses	Spnf4		4
28	Park businesses satisfaction	Tchprk 1	Science and Technology Park	6
29	Technologic development of parks	Tchprk 2		5
30	The level of interaction among the companies in the park	Tchprk 3		4

31	Science and Technology Park activities	Tchprk 4		6
32	Science and Technology Park expansion	Tchprk 5		7
33	The culture of supporting innovations	Cul1	Organizational culture	3
34	The culture of accepting new ideas	Cul2		6
35	The culture of involvement	Cul3		6
36	The stimulating reward system of entrepreneurship	Cul4		7
37	Organic structure	Str1	Organizational Structure	3
38	Flexible structure	Str2		2
39	Instructors' approach toward entrepreneurship	Teac1	Instructors	4
40	Entrepreneurship knowledge of Instructors	Teac2		4
41	Entrepreneurship experience of Instructors	Teac3		10
42	University chairman support	Man1	Macro Management	5
43	University chairman approach toward entrepreneurship	Man2		3
44	Management entrepreneurship strategies	Man3		10
45	Course content regarding entrepreneurship	Cour1	Course content	5
46	Holding workshops	Cour2		6
47	Associative and teamwork nature of course content	Cour3		5
48	Entrepreneurship intentions of students	Stu1	Students	3
49	Students' entrepreneurial consciousness	Stu2		7
50	Having a startup business	Stu3		8
51	Innovation	INNV	Innovation	11
52	Renovation	RNW	Renovation	6
53	Introducing new businesses	NEWBI Z	Introducing new businesses	5

The dimensions of the model have been extracted according to the results of [table.1](#).

Table.2. Model dimensions

variable	Variable's type	Indices
Graduates	Independent	5
Publications	Independent	4
Financial resources	Independent	6
Research contracts	Independent	4
Patents' certificates	Independent	4
Spinoff Businesses	Independent	4
Science and Technology parks	Independent	5
Organizational culture	Independent	4
Structure	Independent	2
Macro management	Independent	3
Instructors	Independent	3
Students' traits	Independent	3
Course content	Independent	3
Innovation	Dependent	4
Renovation	Dependent	4
Introducing new businesses	Dependent	4

According to the qualitative data analysis, the entrepreneurial university variables are divided into thirteen aspects: 1. the quality of graduates; 2. Academic findings publications; 3. Absorbing resources for research activities; 4. Research contracts; 5. Protecting intellectual properties by obtaining patents and license; 6. Establishing spinoff companies; 7. Establishing science and technology parks; 8. Organizational culture; 9. Structure; 10 Macro management; 11. Instructors; 12. Students' traits; 13. Course content. The identified variables were quantitatively analyzed in order to achieve the final model.

Quantitative part

The technical features of the model are primarily measured in order to examine the Structural Equation Modeling (SEM).

Composite reliability and convergent validity

Table 3. Reliability and convergent validity of instruments

	AVE	Composite reliability	Cronbachs Alpha
Course content	0.5007	0.7513	0.7054
Research contract	0.538	0.8229	0.8078
Organizational culture	0.5651	0.7608	0.7024
Financial resource	0.4997	0.7466	0.8358
graduates	0.485	0.6604	0.8834
Macro management	0.5798	0.6434	0.7999
Spinoff companies	0.3089	0.6369	0.746
Structure	0.7392	0.85	0.8807
Students' traits	0.5831	0.6332	0.7377
Science and technology parks	0.7053	0.9051	0.9546
Instructors	0.7159	0.8824	0.8685
Innovation	0.4882	0.7161	0.7976
Introducing new businesses	0.6112	0.8618	0.9053
publication	0.5397	0.8134	0.8619
Patents	0.2575	0.7703	0.7352
Renovation	0.4976	0.664	0.8516

According to the results of **table 3**, the variables have high validity in the model, the Composite reliability of the variables is higher than 0.7 and Cronbachs Alpha coefficient is also higher than 0.7 with the exception of some of the variables which are less than 0.6 but they are also relatively acceptable. In terms of convergent validity all of the variables have high validity, expect the patent variable and spinoff variable, which means the observed variables are representing the latent variable.

Divergent validity

Table 4 shows the numbers along the diagonal of the square root of the average variance extracted or AVE and the rest of the figures are absolute values of correlation coefficients.

Table 4. divergent validity

	Course content	Research contract	Organizational culture	Financial resource	graduates	Macro management	Spinoff companies	Structure	Students' traits	Science and technology parks	Instructors	Innovation	Introducing new businesses	publication	Patents	Renovation
Course content	0.707602	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Research contract	0.4846	0.733485	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Organizational culture	0.426	0.2677	0.751731	0	0	0	0	0	0	0	0	0	0	0	0	0
Financial resource	0.3201	0.1237	0.3063	0.706895	0	0	0	0	0	0	0	0	0	0	0	0
graduates	0.1016	0.0269	0.4368	0.0311-	0.696419	0	0	0	0	0	0	0	0	0	0	0
Macro management	0.6171	0.4932	0.295	0.2274	0.1052	0.761446	0	0	0	0	0	0	0	0	0	0
Spinoff companies	0.0192	0.0518	0.2095	0.3097	0.3209	0.0879	0.555788	0	0	0	0	0	0	0	0	0
Structure	0.1016	0.2448-	0.3026	0.081	0.0683	0.0421-	0.3805	0.859767	0	0	0	0	0	0	0	0
Students' traits	0.3378	0.4964	0.0844	0.0074	0.2036	0.3318	0.2174	0.0211-	0.76361	0	0	0	0	0	0	0
Science and technology parks	0.1518	0.123	0.1226-	0.0793-	0.1236-	0.5289	0.2805	0.0855	0.0677-	0.839821	0	0	0	0	0	0
Instructors	0.1449	0.0428-	0.1209	0.2653	0.1374	0.2337	0.3631	0.3226	0.0696	0.2386	0.846109	0	0	0	0	0
Innovation	0.5185	0.2131	0.2957	0.2287	0.5473	0.678	0.4018	0.1136	0.2359	0.4466	0.5097	0.698713	0	0	0	0
Introducing new businesses	0.2573	0.006	0.2022-	0.0145-	0.0732-	0.4127	0.3076	0.0495-	0.2683	0.4571	0.0669	0.3296	0.781793	0	0	0
publication	0.0404	0.1358	0.5108	0.0256	0.6539	0.1282	0.5038	0.0843	0.0639	0.1546	0.1668	0.3789	0.0161	0.734643	0	0
Patents	0.0974	0.0782	0.2617	0.1802	0.4962	0.2825	0.4665	0.3096	0.2826	0.3599	0.1542	0.5083	0.1437	0.404	0.507445	0
Renovation	0.3787	0.1956	0.4266	0.0409	0.6337	0.4864	0.3742	0.1534	0.2975	0.365	0.2608	0.7199	0.2706	0.4716	0.5465	0.705408

The results of table 4 reveals that the square root of the variables' average variance extracted is larger than their correlation with other variables showing the divergent validity of the variables.

Factor Analysis

The next step after checking the validity and reliability of the research instruments is check the validity of the variables' classification through factor analysis. The results of **table 5** reveals that all of the indices for the related variables is confirmed by factor analysis and can explain their design.

Variables' significance and factor loading (measurement)

Table 5 shows the results of the variables' significance by means of significant number (sig.).

Table.5. measuring the model

Observed variable	Load factor	SD	t-value
Cour1 -> Cour	0.6963	0.0874	4.5341
Cour2 -> Cour	0.5873	0.1065	3.6365
Cour3 -> Cour	0.613	0.0588	10.4325
Cres1 -> Cres	0.7844	0.1506	5.2071
Cres2 -> Cres	0.7461	0.1445	5.1631
Cres3 -> Cres	0.5997	0.2633	2.1384
Cres4 -> Cres	0.716	0.1437	4.9842
Cul1 -> Cul	0.5348	0.0911	2.5766
Cul2 -> Cul	0.6535	0.102	3.4643
Cul3 -> Cul	0.6867	0.1708	2.6783
Cul4 -> Cul	0.6253	0.2492	2.7067
Grnt1 -> Grnt	0.6165	0.1868	3.3012
Grnt2 -> Grnt	0.5465	0.1788	3.0564
Grnt3 -> Grnt	0.4423	0.0953	2.4933
Grnt4 -> Grnt	0.6311	0.2062	3.0606
Grnt5 -> Grnt	0.4715	0.1039	2.6494
Grnt6 -> Grnt	0.4061	0.406	3.7539
I1 -> I	0.5194	0.1356	3.8302
I2 -> I	0.5623	0.109	5.1596
I3 -> I	0.4742	0.1255	2.1858
I4 -> I	0.4809	0.1036	3.676
I5 -> I	0.5678	0.0917	2.9212
Inv1 -> inv	0.6752	0.057	11.8486
Inv2 -> inv	0.64	0.0647	9.889
Inv3 -> inv	0.6271	0.0635	9.8792
Inv4 -> inv	0.5422	0.0783	6.929
Man1 -> Man	0.7205	0.0607	11.867
Man2 -> Man	0.5194	0.0668	7.7722
Man3 -> Man	0.4666	0.0872	4.2068
Nwbiz1 -> nwb	0.8792	0.2407	3.6527
Nwbiz2 -> nwb	0.6893	0.2484	2.7752
Nwbiz3 -> nwb	0.7345	0.2057	3.5704
Nwbiz4 -> nwb	0.8105	0.2273	3.566
P1 -> p	0.4723	0.145	2.5667

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P2 -> p	0.7958	0.0656	12.1393
P3 -> p	0.8152	0.0708	11.513
P4 -> p	0.85	0.0699	12.1677
Patnt1 -> patent	0.6639	0.239	2.7778
Patnt2 -> patent	0.5056	0.1067	4.7371
Patnt3 -> patent	0.4278	0.1589	2.6918
Patnt4 -> patent	0.4454	0.1188	2.3825
Rnw1 -> rnw	0.6689	0.0463	14.451
Rnw2 -> rnw	0.7402	0.0407	18.173
Spnf1 -> Spn	0.4675	0.1985	2.3546
Spnf2 -> Spn	0.4855	0.2549	1.9649
Spnf3 -> Spn	0.6045	0.1097	5.5097
Spnf4 -> Spn	0.6449	0.1696	3.8016
Str1 -> Str	0.8762	0.4374	2.0034
Str2 -> Str	0.843	0.4246	1.9856
Stu1 -> Stu	0.7145	0.1583	4.5131
Stu2 -> Stu	0.7145	0.1583	4.5131
Stu3 -> Stu	0.4584	0.2741	2.3076
Tchprk1 -> Tchpar	0.877	0.1489	5.8882
Tchprk2 -> Tchpar	0.8145	0.1373	5.9303
Tchprk3 -> Tchpar	0.8937	0.1493	5.9858
Tchprk5 -> Tchpar	0.7681	0.1385	4.5341
Teac1 -> Teac	0.8664	0.2469	3.6365
Teac2 -> Teac	0.9164	0.2236	10.4325
Teac3 -> Teac	0.7464	0.1846	5.2071

The indices with load factors less than 0.4 and t-value less than 1.96 were excluded from the model and the final model was conducted again. Regarding the indices' results, load factors of indices is higher than 0.4 which means the considered indices for variables are representing the related factors. Diagram 1 shows the path coefficient of the research model in standard mode. Numerical comparison of the model coefficient is possible in standard mode.

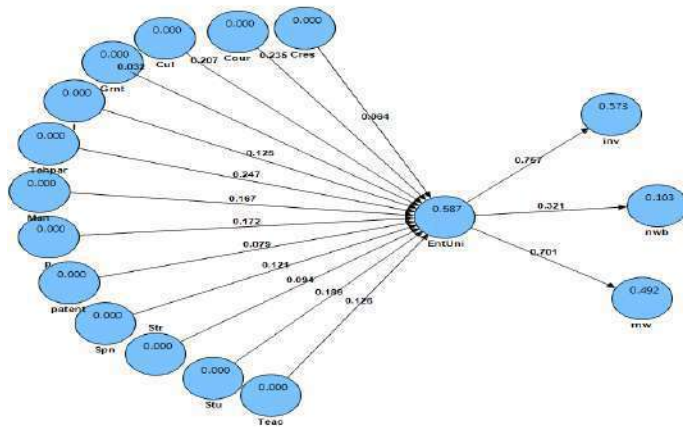


Fig: 1. Standardized coefficients of the model

Significant variables and path coefficient (structural)

The analysis represented in diagram 1 show that the explained variance by research variables in terms of entrepreneurial university is 0.58. The following show the results of the relation between latent variables.

Table 6.structural model

path	Path coefficient	SD	t-value
Cour <- EntUni	0.2349	0.0621	3.7825
Cres <- EntUni	0.0643	0.0578	1.1123
Cul <- EntUni	0.207	0.0903	2.2931
Grnt <- EntUni	0.0315	0.0423	0.7455
I <- EntUni	0.1246	0.0471	2.644
Man <- EntUni	0.1673	0.0502	3.3356
Spn <- EntUni	0.1206	0.0546	2.2077
Str <- EntUni	0.0938	0.0643	1.4586
Stu <- EntUni	0.1885	0.0598	3.1539
Tchpar <- EntUni	0.2472	0.0922	2.6821
Teac <- EntUni	0.1256	0.0469	2.6815
p <- EntUni	0.1724	0.0651	2.647
patent <- EntUni	0.0786	0.0519	1.5138
EntUni <- inv	0.7567	0.0652	11.6004
EntUni <- nwb	0.3206	0.1708	1.9771
EntUni <- rrw	0.7013	0.0803	8.7367

According to **table 6** , the relation between the influential aspects on the entrepreneurial university show that course content (Cour) with the path coefficient of 0.23 has direct relation with entrepreneurial university, this result is confirmed with the t-value of 3.78at the significant level of 95%. The variable of research contract (Cres) with the path coefficient of 0.06 has a direct, yet not significant relation with the entrepreneurial university, thus this relation is not confirmed with the t-value of 1.11 at the significant level of 95%. The variable of organizational culture (Cul) with the path coefficient of 0.2 h23 has direct relation with entrepreneurial university, this relation is confirmed with the t-value of 2.29 at the significant level of 95%. The variable of financial resources (Grnt) with the path coefficient of 0.03 has a direct, yet nit significant relation with the entrepreneurial university, thus this relation is not confirmed with the t-value of 1.11 at the significant level of 95%. The variable of graduates (I) with the path coefficient of 0.12 has direct relation with entrepreneurial university, this relation is confirmed with the t-value of 2.64 at the significant level of 95%. The variable of macro management (Man) with the path coefficient of 0.16 has direct relation with entrepreneurial university, this relation is confirmed with the t-value of 3.33 at the significant level of 95%. The variable of spinoff companies (Spn) with the path coefficient of 0.12 has direct relation with entrepreneurial university, this relation is confirmed with the t-value of 2.2 at the significant level of 95%. The variable of structure (Str) with the path coefficient of 0.09 has a weak relation with entrepreneurial university, this relation is not confirmed with the t-value of 1.45 at the significant level of 95%. The variable of students' traits (Stu) with the path coefficient of 0.18 has direct relation with entrepreneurial university, this relation is confirmed with the t-value of 3.15 at the significant level of 95%. The variable of science and technology park (Tchpar) with the path coefficient of 0.24 has direct relation with entrepreneurial university, this relation is confirmed with the t-value of 2.68 at the significant level of 95%. The variable of science and instructors' traits (Teac) with the path coefficient of 0.12 has direct relation with entrepreneurial university, this relation is confirmed with the t-value of 2.68 at the significant level of 95%. The variable of publications (P) with the path coefficient of 0.17 has direct relation with entrepreneurial university, this relation is confirmed with the t-value of 2.64 at the significant level of 95%. The variable of patent (Patnt) with the path coefficient of 0.07 has an insignificant relation with entrepreneurial university, this relation is not confirmed with

the t-value of 1.51 at the significant level of 95%. Moreover, the relation among different aspects of the entrepreneurial university is as the following: innovation (Inv) with 0.75 and renovation (Rnw) with 0.7 and introducing new businesses (Nwb) with 0.32 are explaining the entrepreneurial university.

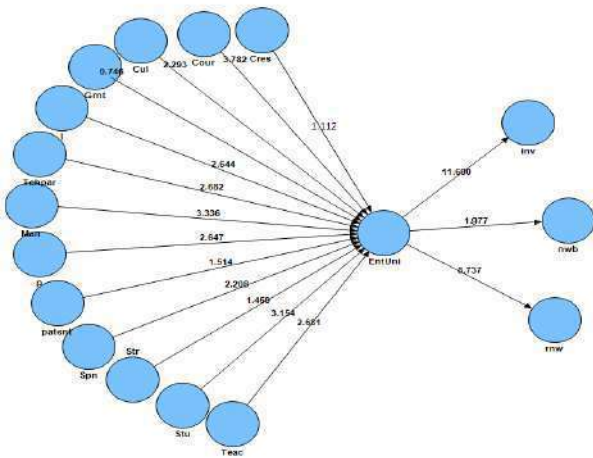


Fig. 2. T-value

Ranking the identified factors

Research variables have been ranked based on standardized coefficients in the structural part of the model. The results are represented in table 7.

Table 7. Ranking Factors

variable	Path coefficient	Priority
Science and technology parks	0.2472	1
Course content	0.2349	2
Organizational culture	0.207	3
Students' traits	0.1885	4
Publication	0.1724	5
Macro management	0.1673	6
Instructors	0.1256	7
Graduates	0.1246	8
Spinoff companies	0.1206	9

General fitting of Path analysis model

According to tanhouse *et al.*, (2005), the following formula can be utilized to calculate the model fitness in PLS:

$$GOF = \sqrt{\text{communality} \times R^2}$$

$$GOF = \sqrt{0.86 \times 0.43} = 0.61$$

As the minimal acceptable level to measure this index is equal to 0.36 and the result in this study is equal to 0.61 then we can conclude that the model is appropriately fit.

CONCLUSION

The following would be a summary of the findings:

According to the results, the variables such as research contract, financial resources, structure and patents respectively with the path coefficients of 0.06, 0.03, 0.09 and 0.07 have direct, yet not significant relation with the

entrepreneurial university and thus regarding the t-value of less than 1.96 the relation is not confirmed at the significant level of 95%.

The variable of course content has direct relation with entrepreneurial university with the path coefficient of 0.23 and t-value of 3.78, thus the relation is confirmed on the significant level of 95%. This result reveals that practical course content and holding courses in the form of workshops are necessary elements of an entrepreneurial university with highly positive impacts. Team work and association are another factors need to be considered in course content.

The variable of organizational culture has direct relation with entrepreneurial university with the path coefficient of 0.2 and t-value of 2.29, thus the relation is confirmed on the significant level of 95%. The culture of supporting new ideas and innovation and tolerating and accepting other opinions are influential factors in an entrepreneurial university. Although the culture of total involvement in the work is a new concept entering to the organizational discussing during the resent two decades, but it has great importance. Involved students and staff are energetic and productive with high tendency toward doing their best to accomplish their goals.

The variable of graduates has direct relation with entrepreneurial university with the path coefficient of 0.12 and t-value of 2.64, thus the relation is confirmed on the significant level of 95%. Many factors about the graduates should be considered such as their general business skill, the possibility of recruit, the entrepreneurship activities, matching their abilities with business market requirements and their theoretical skills.

The variable of macro management has direct relation with entrepreneurial university with the path coefficient of 0.16 and t-value of 3.33, thus the relation is confirmed on the significant level of 95%. Top management is one of the main aspect of an entrepreneurial university, in fact manager's support of entrepreneurship and allocating the necessary resources, motivating and encouraging students and staff and finally having entrepreneurial approach and strategies all would direct the university toward entrepreneurship.

The variable of spinoff companies has direct relation with entrepreneurial university with the path coefficient of 0.12 and t-value of 2.2, thus the relation is confirmed on the significant level of 95%. The number of spinoff business, faculty members' tendency toward establishing spinoff businesses, rising these spinoff companies from the innovative ideas within the universities and students interest in establishing such companies re all the result of considering this variable into account.

The variable of students' traits has direct relation with entrepreneurial university with the path coefficient of 0.18 and t-value of 3.15, thus the relation is confirmed on the significant level of 95%. Considering students entrepreneurial objectives, their entrepreneurial alertness, having plenty of experience in this field are among the main traits of an ideal entrepreneurship student.

The variable of science and technology parks has direct relation with entrepreneurial university with the path coefficient of 0.24 and t-value of 2.68, thus the relation is confirmed on the significant level of 95%. The satisfaction level of parks' businesses, their activation, the extent and utilized technology in science and technology parks are all among the main indices influencing the process of establishing an entrepreneurial university.

The variable of instructors' traits has direct relation with entrepreneurial university with the path coefficient of 0.12 and t-value of 2.68, thus the relation is confirmed on the significant level of 95%. Instructors and professors approach toward entrepreneurship is one of the key factors in the establishment an entrepreneurial university. Mere theoretical discussions I the classes is not a suitable method but rather applying practical and scientific methods are necessary. Instructors in such a university are required to possess a high level of entrepreneurial multi-aspect knowledge. It is important for them to have practical entrepreneurial experiences in order to own a realistic point of view about the existent issues.

Finally, the variable of academic publications has direct relation with entrepreneurial university with the path coefficient of 0.17 and t-value of 2.64, thus the relation is confirmed on the significant level of 95%. The expansion of academic publication about entrepreneurial theoretical and practical issues, the variety of such

publication, their practicality and their profitability are among the major factors in establishing the entrepreneurial university.

The proposed research model is represented in figure 3.

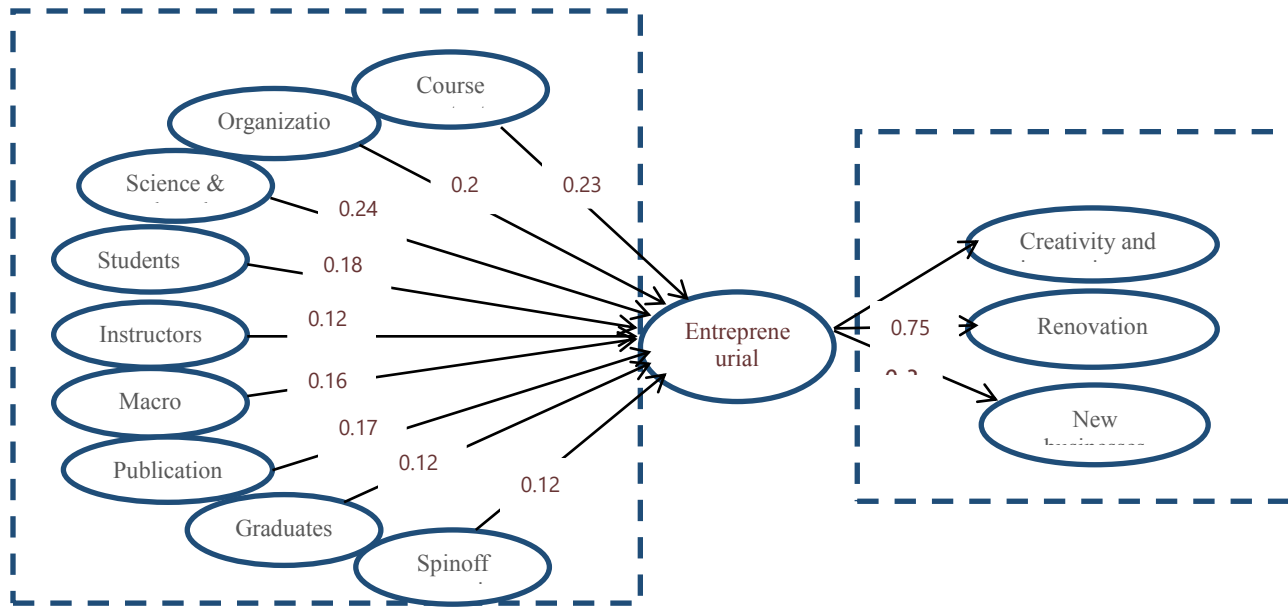


Fig: 3. Entrepreneurial university model with an organizational entrepreneurship approach

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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REVIEW OF THE DAMAGES AND PROBLEMS OF PUBLIC TRANSPORTATION FOR THE DISABLED IN GORGAN CITY

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ABSTRACT

Iran has the highest population statistics for the disabled a large group of whom are the veteran of the years of Defa'eMoghadass . That part of the society has practically been deprived of using urban space due to physical disability which is because of their disabilities. According to the statistics of World Health Organization, ten percent of the population of the world somehow suffers from physical disability. Because of such process, several issues are tangible in solving general problems of the disabled as a considerable class of the society since the disabilities have grown in many dimensions in proportion with population growth and it leads to their isolation which has great economic and social damages in the long run as its consequences. Providing transportation vehicles for the disabled is among vehicles that shall be considered by not only the rehabilitation authorities and educators but also by the authorities and designers, factory owners and manufacturers and even legislators. One of the most important items of the transportation vehicles for the disabled is public transportation. The cause of it can be searched for in their disability. That is why the problems of transportation of the disabled and veterans have been considered as one of the vulnerable groups of the society in this research. In this research, pathology of the condition of the transportation of the disabled and veterans in the city Gorgan has been reviewed. The results show that the strategies of development of public transportation special for the disabled in the city Gorgan is not proper and requires accurate programming in order to improve and reform the current condition and transportation network and to increase safety and easiness with the presence of the disabled and veterans.

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KEY WORDS

Public Transportation, Disabled, Gorgan, Damages, Problems

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INTRODUCTION

Making the urban space proper and improving accessibility and activity of people with disabilities are very important in reducing poverty [1]. All of the disabled people in developing countries of the world, especially our country, suffer from a high rate of prevalence of poverty and inaccessibility of equal social and economic opportunities and subsequently inappropriateness of urban spaces and facilities. One of the most important urban facilities is public transportation who has always observed the maximum volume of the users and meets the main needs of citizens in various dimensions. Today, urban public spaces have become significant in urban development programs. This is due to the effect on promotion of sociocultural aspect of the city and therefore production of social capital [2]. In urban development issues, spaces are divided into three classes: 1- public spaces which is the area of the social interaction of all citizens of the city; 2-semi-public spaces which are considered as the average of the area of public and private behaviors; 3- private spaces which are considered as the privacy of special groups and individuals [3]. According to the statistics of the World Organization, ten percent of the population of the world somehow suffers from a kind of physical disability, all of whom require having access to public systems of the society including health centers, public and private transportation, administrative, entertainment, business, service, educational, religious and athletic centers [4]. Making arrangement for having and providing the services of these centers will be a reason for recognizing the social rights of these people and considering the principle of equalization of opportunities for all classes of the society. The disabled people's access to urban equipment and transportation network not only leads to useful usage of their talents and potentials, but it is considered as a kind of prevention of occurrence of new disability [5]. Among these and given the significance of transportation of the disabled people throughout the city, it is public transportation that plays the most important role in this matter and it should be greatly considered [6]. Having public transportation is effective not only in social and economic life but also in the mental status of the disabled as well. Presence of proper transportation vehicles is one of the basic conditions for

each disabled individual to meet his or her social objectives so much so that without these vehicles, a great obstacle will be created in the way of the disabled. Generally, what has been studied in this research is evaluation of the public transportation system for the disabled and veterans [7].

Among the necessities of growth and development of the societies, creation of proper physical and spatial substrates for all of the groups of the society to use public services and facilities is significant for a better mobility and transportation and an easier accessibility throughout the city [8]. Physically disabled people and veterans are a group of the people in a society who need to have access and to use public services and facilities like others [9]. However, existence of some obstacles especially in the method of designing, architecture and urban development, many urban spaces, especially public passages, parks and green spaces, has lacked the necessary conditions for meeting the needs of accessibility of the disabled people. Given the significance of the issue, urban transportation shall be in such way that it is used by the disabled people and veterans [10]. Transportation is one of the inseparable components of today's life. In urban transportation, what is important is the transportation systems which increases the speed and prevent loss of time as well as guaranteeing health and safety of the trip. In order to meet the transportation needs of the disabled and the veterans is a proper design of the infrastructures of public transportation has always been one of the challenges of the urban transportation programming [11]. With a brief look at the structure dominating the space of the cities of Iran, we understand that all spaces, including terminals, have all been planned, designed and executed for healthy people and it is one of the most important tasks of urban management in any society to prepare the substrate of the city for a proper usage of all citizens [12].

MATERIALS AND METHODS

Among the challenges and problems, we can refer to the following items:

- High energy consumption: transportation is one of the main and basic sections of energy consumption and is considered as one of the problems given its excessive consumption.
- Noise and air pollution: the problem of noise and air pollution, in a majority of the cities of the world, is mainly caused by the traffic of vehicles.
- Lack of an accurate programming in urban transportation: passages, highway networks, parking and etc. haven't gone through any changes in proportion with population growth and increase of number and today, we see that passages and allies and streets are the parking spaces for vehicles. Absence of urban unit management leads to the creation of chaos and disorder in the urban performance and none of the relevant organizations have accepted the problems.
- Waste of time: one of the important and efficient indexes in the desirability of the transportation methods is the index of time. By creating proper substrates in the development of public transportation and sufficient educations in this field, millions of minutes can be saved by reducing the usage of personal transportation vehicles and turning to public transportation systems.
- Reduction of safety: one of the other problems of transportation is reduction of safety. As the usage of personal transportation vehicles and creation of traffic density and mental pressures of the drivers increase, the risk factor also increases in the majority of drivers and this often leads to violation of laws and ultimately, it will reduce the safety index in transportation.

RESULTS

Special place: according to the law, each train shall at least have one special place for the disabled on wheelchairs. Larger trains shall have a larger number of these places. For example, trains with 12 or more wagons must have 4 or more places for the disabled people on wheelchairs.

Information: destinations shall be written inside and outside of the train or the tramway as well as being announced.

Doors: BRTs and tramways are at the same level as the stations. Other trains have instruments for the disabled people to get on which are ramps. Most of these ramps can be carried and most of the time, the ramps are in put in the stations by the workers for the disabled people. In inter-city trains, if a disabled person has reserved the train, these facilities will be provided for him/her in advance. Some special doors have been considered for the disabled people to use which are larger than normal. A lamp with pink signs shows when the door is open and when it is closed. Inside the train and tramway: the distance between the door and the special space for the disabled is 850mm wide and there is enough space for the wheelchair to turn. The inside doors are automatic ones or they open with a simple touch. The fences and the doorknobs are colored and easily seen. The length of the special place for the wheelchair is at least 1300mm and its width is 750mm. There are some emergency exists as well. If

the wagon has a telephone, this telephone is put in a place which can be easily accessed by the disabled person and if it doesn't, the disabled person can ask to use the mobile phone of the staff of the train which will be accepted.

Bathroom: there is a definitely bathroom close to the special space for the disabled on wheelchair.

Restaurant and diner: if the disabled persons are not able to go to the restaurant or buffet of the train, their food will be brought to them.

Facilities of the intra-city buses

According to the law of the buses with the capacity of transporting more than 22 travelers shall have special facilities for the disabled people on wheelchair and they are included in the law mentioned above.

Doors: buses which move on a lower level than the ground use ramps for the disabled people to get in. It is the driver who is responsible for the ramp and the angle of the ramp to the ground shall not exceed 8 degrees. In most buses, the space for the disabled faces the other seats. In this mode, it is safer for them and the wheelchair won't be deviated, fall down or turn. In this mode, it is not necessary for the disabled to fasten their seatbelts. In a small number of buses, the special space for the disabled does not face the other seats and it faces the front of the bus. In these buses, the bus drivers are responsible to attach the straps of the wheelchair to the place and there is also a seatbelt which is fastened by the disabled person [13].

Bell: there is a bell close to the special space for the disabled which rings while pressed by the hand.

Bars: there are vertical and horizontal bars in various sections of the bus and in the special space for the disabled. The inputs and outputs have bars in the both sides.

Problems of development of public transportation in Iran

- 1- Expenses of the establishment of public transportation systems such as metro are very high and it requires intense and efficient supervision and management that most of the third world countries lack.
- 2- Constructing some public transportation systems such as monorail which will be problematic given the urban traditions of the third world countries especially in Islamic countries due to creation of closeness and maintenance of privacy.
- 3- Due to low rate of income of the majority of the public, public transportation system, especially buses which are the main element of the public transportation system, is limited. It shall be known that in general, public transportation have undesirable features in third world countries which has led to the fall of traffic safety. Briefly, management of public transportation is at a low level in these countries. It is the improper economic conditions that play a main role in the formation of this.

Problems in the matter of traffic of the disabled people in Gorgan city

- 1- Excavations associated with the development of municipal utilities
- 2- Uneven, narrow sidewalks and absence of rough and rugged mosaics on the ground of the passages for the blind people to navigate
- 3- Absence of phonic warning signs in the crossroads
- 4- Presence of improper bridges and stairs in the passages
- 5- Wide and long boulevards in the middle of the street in the pedestrian crosswalks
- 6- Short height of the shadings of the stores and presence of tree branches with short height in the sidewalks
- 7- Absence of an internal plan of the governmental and nongovernmental offices and organizations roughly in their entrances
- 8- Presence of unpredictable obstacles on the way such as mailboxes and so on
- 9- Presence of stairs in the entrance of most of the educational, health, administrative, service and entertainment complexes and centers and lack of predicting ramp for these centers
- 10- Absence of a especial bathroom for the disabled people in public places

Obstacles on the way of making the traffic of the disabled people proper in Gorgan city

Despite the considerable efforts the organizations responsible for the matter of optimizing urban spaces have made, there is still no kind of cohesion in the process of these activities. These are the causes of this problem:

- 1- The current approvals and laws in this regard lack the necessary executive guarantee and therefore, violation of their execution is unavoidable.

- 2- Lack of prediction of the required validities in making it proper
- 3- Unawareness of the responsible organizations of the current laws and necessity of their execution and thus lack of need in the authorities for following up the process of executing programs of making these proper throughout the country
- 4- Inexistence of provincial supervision committees and inaccessibility of specialized experts in this field in beneficiary organizations which has sometimes caused the made efforts to lead to making it improper instead of creating changes in proportion with the needs of the disabled people
- 5- Ignorance of economic benefits of the executors and people involved with the establishment of public places and passages and lack of government's financial support of these individuals with the purpose of encouraging them to consider the principles of this method
- 6- Lack of cohesion in the efforts and lack coordination and parallelization between the beneficiary organizations in this process with leads to waste of energy, credit resources and time being

DISCUSSION AND CONCLUSION

Given the mentioned challenges, some recommendations are provided as follows for accelerating the process of making the urban spaces proper for the disabled people of the city Gorgan:

- 1- making people and authorities aware about the necessity of the presence of disabled people in the society through the social medias
- 2- accurate supervision of the executive authorities on the construction process of places and passages in terms of formation of supervision committees and application of the encouragement and punishment policy for accelerating this matter
- 3- predicting specific credit rows for various organizations for an active participation in the matter by the programming and management organization
- 4- Creating coordination and cohesion between the beneficiary organizations as well as assigning a special organizational position called the expert for making this matter proper for each organization

Making the public transportation proper and facilitating it for the disabled people of Gorgan city has the following outcomes:

- 1- Development of active participation of the disabled people in various sections of the society
- 2- Reinforcement of self-esteem, motivation, effort and love for life in this group of individuals for making the future better
- 3- Increasing the level of social stations for the disabled people through attaining the more effective roles in the society
- 4- Using hidden creativities and capabilities of the disabled people in facilitating the process of social development
- 5- Combining various dimensions of the person with disability with other members of the society and avoiding their separation from other groups of the society.

The last thing to say is this: let us thing in another way from now on. Making the process proper and improving the living environment are a divine and humanistic responsibility for the disabled people. If we accept this absolute reality in a framework bigger than regulations and rules, we will have a society as beautiful as the paradise in which all persons take advantage of their share of life [14]. In such a society, we definitely no longer hide the heroes of sacrifice and resistance. We don't make the mothers, under whose feet lies paradise, fail against environmental obstacles only because they can't stand on their feet. With an indifferent look, we don't gaze at those whose eyes lack the sight of apparent eyes and we don't forget elders in disappointment and isolation who are the prophets of their tribes.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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THE EFFECT OF STRING ELASTOPLASTOMER ADDITIVE ON DURABILITY OF MIX ASPHALT

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ABSTRACT

Today, given to the fact that roads are considered as an infrastructure investments for countries, repairing and maintenance of them is very important but this issue bring an extensive cost, therefore; it has been tried to find a way for long life and durability of mix asphalt by doing research about components of mix asphalt and analyzing the effect of various factors on it. This study is aimed to analyze string elastoplastomer polymer to produce polymer asphalt and to see obtained results in future costs of repair and maintenance of path during long time. The method of the research is laboratorial and a research study was done by using Tehran's refinery bitumen and the stone material of mines around this city in place of soil mechanics and technical laboratory company of ministry of roads & urban development in order to analyze the effect of using string elastoplastomer polymer in performance and durability of hot mix asphalt. The results of tests show that bitumen modification by using string elastoplastomer polymer and producing mix asphalt by using this kind of polymer causes the durability of hot mix asphalt to be increased and also causes damages of roads pavement such as alligator cracking due to fatigue, and rutting and damages of naked singularities to be delayed.

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KEY WORDS

String elastoplastomer, cracking, alligator cracking, polymer, bitumen hardening and ageing phenomena

INTRODUCTION

Given to the issue that bitumen is used in asphalt less than stone material it seems that the role of bitumen in behavior, durability and performance of asphalt pavement layers is not very important and considerable, but the fact is that bitumen and its physical and chemical properties has a major effect on good performance, durability and stability of asphalt mixtures. For proper functioning and durability of asphalt pavement, the bitumen not only must have durability but it also must have proper behavior and function in the range of high, low and middle temperatures[1]. Today in addition to bitumen and stone material, the additive material or bitumen modifiers are also used. These components which consist the wide range of material are applied as follow in order to repairing and improving some of the bitumen properties and subsequences asphalt mixtures:

- Preventing from naked singularities of asphalt mixtures gravel
- Preventing from thermal and contraction cracking
- Reducing deformations and asphalt paving bituminous phenomena
- Preventing from asphalt cracks and reflective cracks manifestation
- Reducing the phenomenon of hardening and ageing of bitumen
- Increasing the resistance of mix asphalt fatigue

The following conditions must be provided by an additive in order to be effective, applicable and economical

- it must be easy to reach and economical
 - Do not be damaged at mixture temperatures of mix asphalt
 - Easily mixed with bitumen and with lowest costs
 - It must increases resistance against fluency in high temperatures of pavement, without making bitumen very soft or very hard in mixture temperature or making it fragile in low temperatures of pavement.
 - Preserving the first characteristics of bitumen during storage, execution and servicing.
- To be sustainable during storage, execution and servicing time both physically and chemically.
- To be reached to desire rotational at ordinary temperatures of asphalt mixtures execution, and it should be injectable and pumpable.

MATERIALS AND METHODS

Laboratorial research methods was used to study the use of elastomers in asphalt, and a research study was done by using Tehran's refinery bitumen and the stone material of mines around this city in place of soil mechanics and technical laboratory company of Ministry of Roads & Urban Development in order to analyze the effect of using string elastoplastomer polymer in performance and durability of hot mix asphalt and functional properties of ordinary hot asphalt mixes and modified hot asphalt with string polymer was evaluated by doing functional tests including four-point bending beams fatigue test, resilient modulus and wheel rutting of Hamburg wheel track loading cycle. Rheological¹ behavior and properties of modified and pure bitumen with string polymer was also evaluated by doing performance tests and determination performance rating of the bitumen. [2]

RESULTS

The project of mix asphalt mixture Topeka layer 0-19 mm was done with limitation of grading specifications number 4 inserted in publication No. 234, Iranian roads asphalt pavement bylaw, by determining the optimum bitumen at a rate of 6/1. It is worth noting that for providing and preparing of modified bitumen, at first bitumen is heated to 150 ° C. temperature and the process of mixing began at low speed through the gradual addition of additives to 20 weight percent of bitumen. Then with use of high shear mixer and rotation speed of 3000 revolutions per minute mixing process was performed for 15 minutes.

Functional tests of bitumen including RTFO² and PAV³ and DSR⁴ and BBR⁵ and RV⁶ tests was performed on the pure and modified bitumen with string polymer and these bitumen were classified respectively with functional grading PG 64-22 and PG 76-28. The results showed that the modification of bitumen by using string polymer causes its properties to increase and enhance in a range of high and low temperatures of paving services, so that the functional degree of high temperature of bitumen would be improved two unit of measures and functional degree of low temperature would be improved one unit of measures. The tests show that modified bitumen against rutting damages, thermal cracking and fatigue cracking can provide strength and long life than pure bitumen. [3]

Dynamic creep test of ordinary and modified asphalt samples with string polymer was done at a temperature of 45 ° C. based on BSDD226 standard. In accordance with standard the testing time has been 3600 seconds and during this time 1800 loading cycle have been applied, in each cycle the time of loading with amount of 100 kilopascal is equal to a second. The results of test are presented in [table 1](#). The results of test show that modified asphalt with string polymer has more resistance against permanent deformation, so that at the end of loading, the strain of modified asphalt sample is 1/5 time less than its amount for ordinary hot asphalt made by pure bitumen. Based on the obtained results the durability and life of modified asphalt mixtures with string polymer in danger of rutting in high temperature of servicing is more than ordinary asphalt mixture. [4]

Table 1. The results of dynamic creep test after 1800 loading cycles

final cumulative strain (percent)	type of asphalt mixture
1.156	Ordinary asphalt mixture
0.749	modified asphalt mixture with string polymer

The test of four-point bending beams fatigue of ordinary and modified asphalt samples with string polymer was performed in accordance with standard procedure of AASHTO T321. The test results of mentioned samples at temperature of 20 ° C and 250 and 400 micro-strains are presented in **table 2**. The results show that the number of loading cycles of fatigue life of modified samples with string polymer in loading 250 and 400 micro strains are respectively 1/9 and 2/9 time more than ordinary hot asphalt mixture containing pure bitumen. These results show that the behavior and function of modified mix fatigue with string polymerase significant improvement in comparison with control mixture which is made by pure bitumen. Therefore, modification of hot mix asphalt with string polymer causes the tensile strength of mixture and its resistance against cracks due to fatigue (alligator cracking) to be increased. [5], [6]

Table 2: the results of bending beams fatigue test of asphalt mixture

	The number of final cycles	Micro strain	Type of asphalt mix
	2347670	250	Ordinary asphalt mixture
	61320	400	
	6798500	250	modified asphalt mixture with string polymer
	114160	400	

Rutting test of modified and ordinary hot asphalt mixtures with string polymer was done by Homburg wheel track rutting machine that is shown in **figure 1** in accordance with AASHTO T324 standard. In this machine, the loading wheel with constant load on sample level moves in form of reciprocating and sample is tested in dry or flooding conditions.

The dimensions of used sample in this machine are of 5 × 30 × 30 cm. Wheeled loading of machine is 20 cm in diameter and 5 cm in width. The samples were compacted by roller compactor machine in which friction method is used for compaction and is shown in **figure 2**. Asphalt slab samples immersed in water at 50 ° C, 705 newton wheeled load and reciprocating motion speed 50 passes per minute, were passed under 20000 wheel load motion (10000 reciprocate). The size of furrow depth in various cycles for modified and ordinary hot asphalt mixture with string polymer is presented in **figure 3&4**. The size of furrow depth of modified and ordinary asphalt mixture samples after 20000 loading wheel passes, has been respectively 6/62 and 0/13 mm. Control hot asphalt mixture made by pure bitumen in the path of loading wheel motion was destructed because of naked singularity under the influence of water and rutting continued with more intensity. The results of the test show that modification of bitumen by using string elastoplastomer polymer cause to increase the hot asphalt strength against permanent deformations and wheel J rutting in pavement. Moreover, considering that ordinary hot asphalt mixture was damaged because of naked singularity, not happen to modified mixture, modification of bitumen with string polymer also cause to increase moisture durable of asphalt mixture and its resistance against naked singularities as well as the damages due to sand and fatigue cracking.



Fig: 1. Humbug wheel track rutting machine



Fig: 2. Roller compactor machine

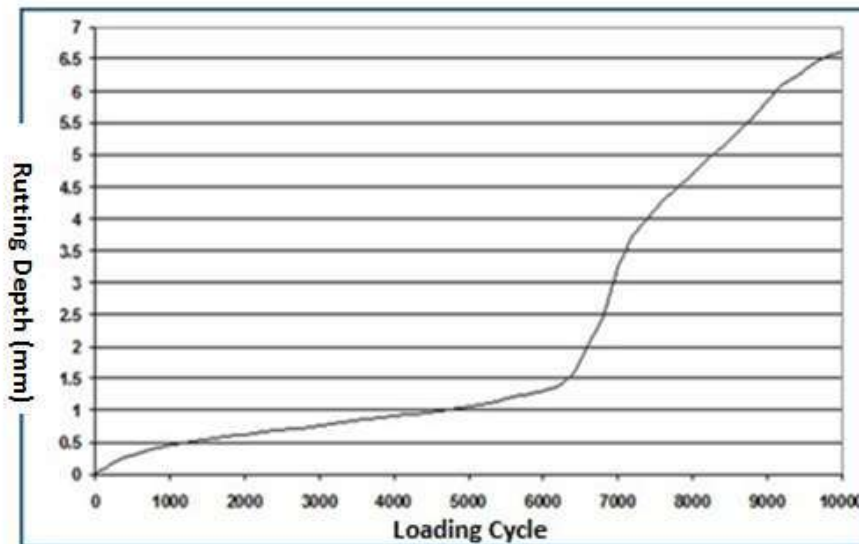


Fig: 3. Ordinary asphalt mixture rutting against the number of loading cycle

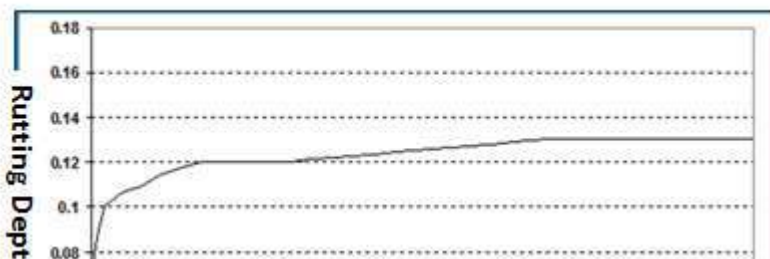


Fig: 4. Polymer asphalt mixture rutting against number of loading cycle

The results of the tests show that modification of bitumen by using string elastoplastomer polymer and producing asphalt mixture by using this type of polymer, causes to increase the durability of hot asphalt mixture and also causes to postpone the common damages of roads pavement including alligator cracking due to fatigue, rutting and damages of naked singularities.[7]

Mosaic and alligator cracks in projects causes to pavement with asphaltmilling machine and high costs during long time and blocking the roads, by using %8 of string elastoplastomer polymer to consuming bitumen, the polymer asphalt pavement was applied by 20 percent decreasing of paving thickness and after more than three years of testing and frequent reviews, the issuance of confirmation shows successfulness of this plan. [7]

DISCUSSION AND CONCLUSION

Given to the issue that bitumen is used in asphalt less than stone material it seems that the role of bitumen in behavior, durability and performance of asphalt pavement layers is not very important and considerable, but the fact is that bitumen and its physical and chemical properties has a major effect on good performance, durability and stability of asphalt mixtures. For proper functioning and durability of asphalt pavement, the bitumen not only must have durability but it also must have proper behavior and function in the range of high, low and middle temperatures. Today in addition to bitumen and stone material, the additive material or bitumen modifiers are also used. These components which consist the wide range of material, are applied as follow in order to repairing and improving some of the bitumen properties and subsequences asphalt mixture:

- Preventing from naked singularities of asphalt mixtures gravels
- Preventing from thermal and contraction cracking
- Reducing deformations and asphalt paving bituminous phenomena
- Preventing from asphalt cracks and reflective cracks manifestation
- Reducing the phenomenon of hardening and ageing of bitumen
- Increasing the resistance of mix asphalt fatigue

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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IDENTIFICATION AND PRIORITIZATION OF FACTORS AFFECTING ADMINISTRATIVE HEALTH PROMOTION OF AGRICULTURAL MOVEMENT ORGANIZATION IN SISTAN AND BALUCHESTAN PROVINCE

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ABSTRACT

This study was conducted to identify and prioritize factors affecting on administrative health promotion of Agricultural Movement Organization of Sistan and Baluchestan Province. The research method is descriptive-survey. The study population consisted of all employees of Agricultural Movement Organization of Sistan and Baluchestan. In this study, we selected the total number of 290 samples using simple random sampling and Morgan's formula. Data collection was conducted through a questionnaire. We used Nikpour (2012) 'assessment questionnaire with 59 questions and 5-choice of Likert spectrum with little tabloid- to collect information on research variables of the factors affecting on administrative health promotion. The questionnaire evaluates 6 dimensions affecting on administrative health promotion. The results indicated that factors such as human resources management, supervision and inspection, organizational structure, organizational culture, effective management and leadership factors affect largely on administrative health promotion. The organizational culture ranked first and organizational structure ranked last in prioritization of these factors.

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KEY WORDS

Health administration, human resource management, supervision and inspection, organizational structure, organizational culture, effective management, leadership factors

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INTRODUCTION

Nowadays, the administrative health has been considered as the only approach to deal with administrative corruption. Administrative health refers to a condition that all elements of an organization have capability to meet the goals of the organization favorably, and they can identify deviate from administrative and legal norms, as well as organizational goals barriers as soon as possible, and take required and in time measures to remove them. Administrative health is a qualitative trait in organization which indicates alignment in definition and realization of individual, organizational, and national interests (Tehran Urban Research and Planning Center 2008:18).

Corruption is a phenomenon that more or less exists in all organizations, but its type, shape, and level are various in various organizations. In any case, corrupt leads to degeneration. Many countries have found that corruption and administrative offenses is one of the most important threats to economic stability, development and progress. Also our administrative system has been long suffered from disease of corruption and administrative offenses. To eliminate or reduce this sinister phenomenon in the country's administrative system, we need programs so as to analyze the issues, select and implement the optimal strategy through evaluating various ways [1].

In today's world, the phenomenon of administrative corruption, especially in developing countries, has been proposed as one of the major obstacles to the development of society. This phenomenon has caused irreparable damages to community development wheels speed, and makes the development and progress route limited and blocked [2]. To achieve administrative health, first it is necessary to examine the factors affecting on it. Administrative health realization in an organization or administrative system requires different elements and resources to predispose its formation. In various studies, various factors have been explained as factors preventing and the fighting against corruption, and influencing administrative health [3]. These factors include organizational structure, organizational culture, human resources empowerment, transparency and accountability, performance evaluation, use of technology, finance system and resource mobilization, etc., supervisory bodies, as well as environmental and cultural factors. Since the study aims to examine the role of decentralization in administrative health realization, the main question

proposed in the study is that: what are the factors affecting on administrative health promotion between the employees of Agricultural Movement Organization of Sistan and Baluchestan Province? Which one of the identified factors is more affective on administrative health promotion than other ones?

RESEARCH QUESTION

- What are the factors affecting on administrative health promotion between the employees of Agricultural Movement Organization of Sistan and Baluchestan Province?
- How does the prioritization of factors effect on administrative health promotion between the employees of Agricultural Movement Organization of Sistan and Baluchestan Province?
- What are the solutions offered to promote administrative health promotion between the employees of Agricultural Movement Organization of Sistan and Baluchestan Province?

THE THEORETICAL FRAMEWORK OF RESEARCH

This study aims to identify factors affecting on administrative health promotion of Agricultural Movement Organization of Sistan and Baluchestan Province. SO the affective factors in this study are independent or predicator variables, and administrative health is dependent or purpose variable. Various factors effect on administrative health promotion and the lack of administrative corrupt. In this study we divide the factors to 7 categories.

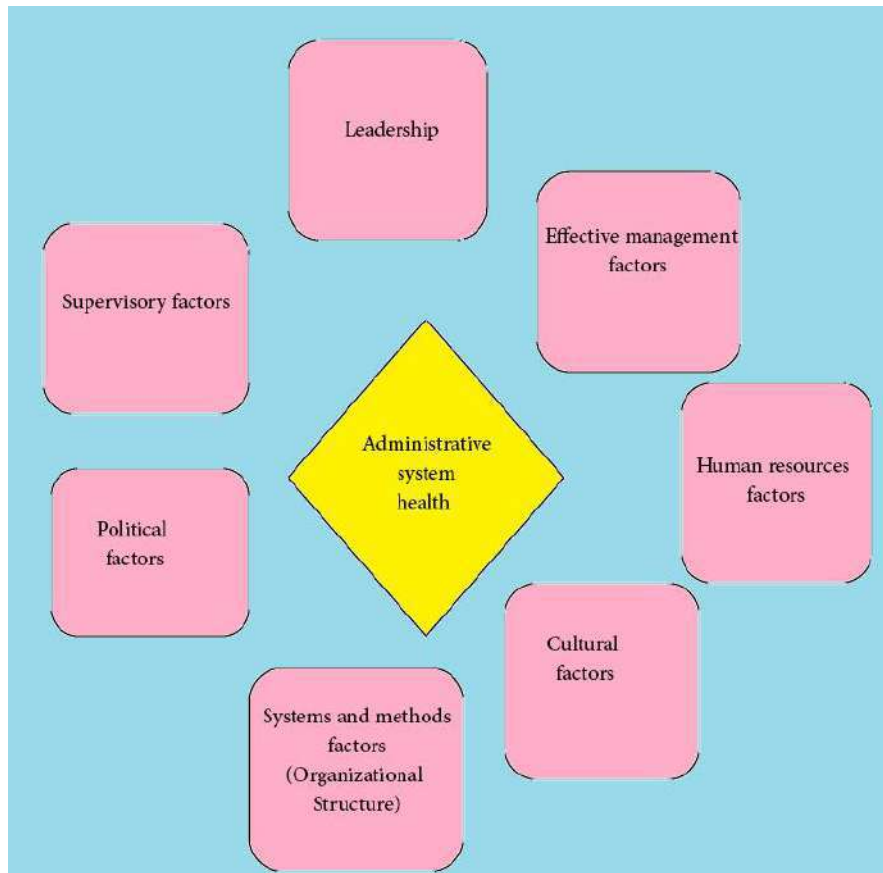


Fig: 1. Conceptual model of the study

METHODS

Selecting the research method depends on our purpose, and the nature of studied subject and its facilities [4]. The method of this research is descriptive survey with regard to the subject of study. In fact, descriptive survey describes what is exist [5]. The study

statistical population includes all employees of Agricultural Movement Organization of Sistan and Baluchestan Province (total population Number =1182).In this study we have used simple random sampling in which 290 persons were selected as sample. Data collection was conducted through questionnaire. We used Nikpour (2012) 'assessment questionnaire with 59 questions and 5-choice of Likert spectrum with little tabloid- to collect information.

5 levels of this questionnaire have been arranged as:1-verylow ,2=low,3=to some extent,4=high,5=very high. The questionnaire evaluates 7 dimension of Human resources management, supervision and inspection, organizational structure, organizational culture, effective management , political factors and effective leadership factors in administrative health promotion .The research validity is of content type. We provided 5 professors and experts of management field with questionnaire to identify validity. After investigating, the questionnaire was confirmed by advisor. In order to calculate the reliability of questionnaire, first we distributed them between 30 participants, and then we collected them. Cronbach's alpha was used to calculate the reliability, which its value was obtained 0.91, so its reliability is confirmed. In this study, we used chi-square, and Friedman tests to analyze hypotheses. It should be noted that all statistical analysis were conducted by SPSS software, version 19.[6].

RESEARCH FINDING

Prioritization of the factors affecting on administrative health of Agricultural Movement Organization of Sistan and Baluchestan Province

To analyze the information and achieve the above subject response, we have used Friedman test to prioritize the factors affecting on administrative health promotion of Agricultural Movement Organization of Sistan and Baluchestan Province. The results are shown in **Table- 1**:

Table: 1.The results of Friedman test to prioritize the factors affecting on administrative health of Agricultural Movement Organization of Sistan and Baluchestan Province

Factors	Average Ranking	Ranking
Human Resource Development	3.71	3
Supervision and Inspection	3.68	4
Systems and methods(organizational structure)	2.90	6
Organizational Culture	3.81	1
Effective management	3.19	5
leadership	3.71	2
Sig=0.003		df=5
		X ² =17.68

In Friedman test, given that the significance level is less than 0.05 (sig = 0.003), the null hypothesis is rejected and this indicates that at least a pair of independent variables are significantly different. Thus, according to the difference between variables, they can be ranked in the following order:

1. Organizational Culture
2. leadership
3. Human Resource Development
4. Supervision and Inspection
5. Effective management
6. Systems and methods(organizational structure)

So, according to results of **Table-1**, from 6 main factors, “organizational culture” is the most effective factor, and “systems and methods (organizational structure)” is the less effective one in administrative health. The bar graph of factors prioritization is drawn in the following:



Fig:2. Prioritization graph of the factors affecting on administrative health of Agricultural Movement Organization of Sistan and Baluchestan Province.

Prioritization of the indices of human resource development factor

To analyze the information and achieve the above subject response, we have used Friedman test to prioritize the human resource development factor .The results are shown in **Table- 2**:

Table: 2. The results of Friedman test to prioritize indices of human resource development factor

Factors	Average Ranking	Ranking
Designing and establishment of an effective system of appointment, promotion and change of directors on the basis of merit.	6.49	1
Designing and establishment of an effective system of recruitment, appointment and promotion of staff based on merit.	5.40	5
Designing and establishment of an effective system of managers and employees 'performance evaluation.	4.94	8
Establishment of an effective system of compensation of employees and managers' services with an emphasis on performance, capabilities, status and characteristics of job and employee.	6.34	2
Improving payment systems and promoting livelihoods and well-being of employees.	5.15	7
Providing specific training to deal with corruption in workplace.	5.85	4
Paying particular attention to training of employees and managers to enhance their various skills.	5.44	6
Specifying the carrier path and employees 'job development direction	6.06	3
Job enrichment and the struggle for independency in daily activities	4.52	9
Sig=0.000	df=8	X ² =51.08

In Friedman test, given that the significance level is less than 0.05 (sig = 0.000), the null hypothesis is rejected and this indicates that at least a pair of independent variables are significantly different. Thus, according to the difference between variables, they can be ranked in the following order:

1. Designing and establishment of an effective system of appointment, promotion and change of directors on the basis of merit.
2. Designing and establishment of an effective system of managers and employees 'performance evaluation.
3. Specifying the carrier path and employees 'job development direction
4. Providing specific training to deal with corruption in workplace.

5. Establishment of an effective system of compensation of employees and managers’ services with an emphasis on performance, capabilities, status and characteristics of job and employee.
6. Paying particular attention to training of employees and managers to enhance their various skills.
7. Improving payment systems and promoting livelihoods and well-being of employees.
8. Designing and establishment of an effective system of recruitment, appointment and promotion of staff based on merit.
9. Job enrichment and the struggle for independency in daily activities

So, according to results of **Table-2**, from 9 main factors of human resources development, “Designing and establishment of an effective system of appointment, promotion and change of directors on the basis of merit” is the most effective index, and “Job enrichment and the struggle for independency in daily activities” is the less affective one in administrative health of Agricultural Movement. The bar graph of prioritization of factors is drawn in the following:



Fig: 3. Prioritization graph of human resources development factor

Prioritization of the supervision and inspection indices affecting on administrative health of Agricultural Movement Organization of Sistan and Baluchestan Province

Figure 3: Prioritization graph of supervision and inspection factors affecting on administrative health. To analyze the information and achieve the above subject response, we have used Friedman test to prioritize supervision and inspection factors. The results are shown in **Table- 3**:

Table: 3. The results of Friedman test to prioritize indices of supervision and inspection factors affecting on administrative health of Agricultural Movement Organization of Sistan and Baluchestan Province.

Factors	Average Ranking	Ranking
The revision of the duties and responsibilities of supervisory bodies in order to strengthen their supervisory role and eliminate the overlapping of functions.	4.35	3
Explaining the practical mechanisms of relation and interaction between regulatory bodies for rapid exchange of information and experiences.	4.26	4
Training of complaint-investigator staff to enhance their abilities and skills	4.89	1
Strengthening internal supervision Besides extra-organizational supervision in the office.	4.78	2
Creating imperceptible supervisory systems	3.98	6
Necessity of paying attention to obligation of promotion of virtue	4.12	5

and prevention of vice as an aspect of public surveillance.		
Creating public surveillance system in order to use common opinions (clients and the staff of the company).	3.79	7
Sig=0.000	df=6	$\chi^2=77.21$

In Friedman test, given that the significance level is less than 0.05 (sig = 0.000), the null hypothesis is rejected and this indicates that at least a pair of independent variables are significantly different. Thus, according to the difference between variables, they can be ranked in the following order:

1. Training of complaint-investigator staff to enhance their abilities and skills
2. Strengthening internal supervision besides extra-organizational supervision in the office.
3. The revision of the duties and responsibilities of supervisory bodies in order to strengthen their supervisory role and eliminate the overlapping of functions .
4. Explaining the practical mechanisms of relation and interaction between regulatory bodies for rapid exchange of information and experiences.
5. Necessity of paying attention to obligation of promotion of virtue and prevention of vice as an aspect of public surveillance.
6. Creating imperceptible supervisory systems
7. Creating public surveillance system in order to use common opinions (clients and the staff of the company).

So, according to results of **Table- 3**, from 7 factors of supervision and inspection, “Training of complaint-investigator staff to enhance their abilities and skills” is the most effective index, and “Creating public surveillance system in order to use common opinions (clients and the staff of the company)” “is the less affective one in administrative health of Agricultural Movement. The bar graph of prioritization of factors is drawn in the following:

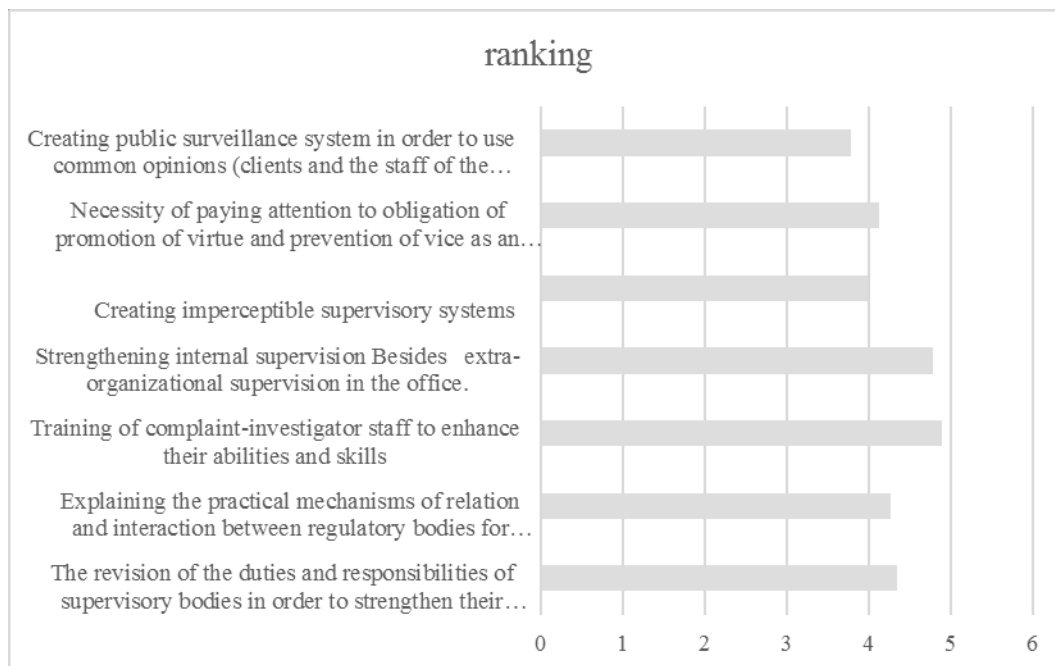


Fig: 4. Prioritization graph of Prioritization of the supervision and inspection indices affecting on administrative health factor

Prioritization of indices of systems and methods factors in administrative health

To analyze the information and achieve the above subject response, we have used Friedman test to prioritize systems and methods factors .The results are shown in **Table- 4**:

Table: 4. The results of Friedman test to prioritize systems and methods factors affecting on administrative health of Agricultural Movement Organization of Sistan and Baluchestan Province.

Factors	Average Ranking	Ranking
Simplification of administrative procedures and practices and reduction of its steps.	6.14	10
Automating administrative operations and development of new technologies in the administrative system.	6.50	5
Reducing the direct connection of clients and employees through electronic portals.	6.79	3
Eliminating the complex regulations and many steps to do work, that leads to waste of time for clients to perform a simple task.	6.71	4
Updating rules and regulations and their transparency.	6.16	9
Identification of corruptive pathways for the ways of doing task, eliminating and remedying them.	6.31	8
Realization of organizational goals with high standards of quality and quantity.	6.39	7
Continuous reviewing of the organizational structure to make it agile, fit and rational , according to environmental changes	6.46	6
The proper changing of the administrative structure of the organization	7.58	1
Availability of office automation system	6.98	2
Sig=0.021	df=9	X²=20.45

In Friedman test, given that the significance level is less than 0.05 (sig = 0.021), the null hypothesis is rejected and this indicates that at least a pair of independent variables are significantly different. Thus, according to the difference between variables, they can be ranked in the following order:

1. The proper changing of the administrative structure of the organization
2. Availability of office automation system
3. Reducing the direct connection of clients and employees through electronic portals.
4. Eliminating the complex regulations and many steps to do work, that leads to waste of time for clients to perform a simple task.
5. Automating administrative operations and development of new technologies in the administrative system.
6. Continuous reviewing of the organizational structure to make it agile, fit and rational , according to environmental changes
7. Realization of organizational goals with high standards of quality and quantity.
8. Identification of corruptive pathways for the ways of doing task, eliminating and remedying them.
9. Updating rules and regulations and their transparency.
10. Simplification of administrative procedures and practices and reduction of its steps.

So, according to results of **Table- 4**, from 10 factors of systems and methods, “The proper changing of the administrative structure of the organization” is the most effective index, and “Simplification of administrative procedures and practices and reduction of its steps” is the less affective one in administrative health of Agricultural Movement. The bar graph of prioritization of factors is drawn in the following:

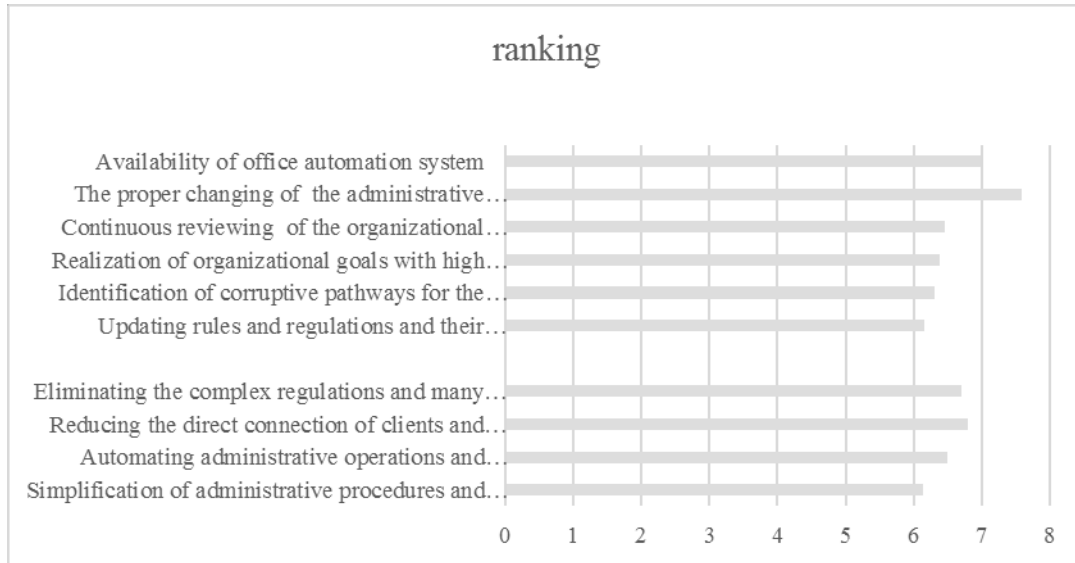


Fig. 5. Prioritization graph of systems and methods factors

Prioritization of the indices of organizational culture factors

To analyze the information and achieve the above subject response, we have used Friedman test to prioritize organizational culture factors .The results are shown in **Table- 5**:

Table: 5. The results of Friedman test to prioritize organizational culture factors

Factors	Average Ranking	Ranking
Internalization of organizational culture based on Islamic values and human dignity.	7.95	4
Promotion of religious and moral values of the organization	7.52	6
Trying to reduce the prevalence of materialism	7.84	5
Reforming social structure based on the reducing gap between employees and officials of the organization	8.02	3
Having work ethic	8.71	1
Strengthening internal commitment and loyalty to the organization's staff	6.85	7
Creating a belief in the moral and fair life.	8.25	2
Creating satisfaction of teamwork and friendly behavior in collective environment.	6.75	8
Establishing stability in motivational methods.	6.58	9
Developing a code of conduct for employees.	6.21	10
Sig=0.009	df=9	$\chi^2=35.82$

In Friedman test, given that the significance level is less than 0.05 (sig = 0.009), the null hypothesis is rejected and this indicates that at least a pair of independent variables are significantly different. Thus, according to the difference between variables, they can be ranked in the following order:

1. Having work ethic
2. Creating a belief in the moral and fair life .
3. Reforming social structure based on the reducing gap between employees and officials of the organization
4. Internalization of organizational culture based on Islamic values and human dignity .
5. Trying to reduce the prevalence of materialism
6. Promotion of religious and moral values of the organization
7. Strengthening internal commitment and loyalty to the organization's staff

8. Creating satisfaction of teamwork and friendly behavior in collective environment.
9. Establishing stability in motivational methods.
10. Developing a code of conduct for employees.

So, according to results of **Table-5** from 10 factors of organizational culture, “Having work ethic” is the most effective index, and “Developing a code of conduct for employees “is the less affective one in administrative health of Agricultural Movement. The bar graph of prioritization of factors is drawn in the following:

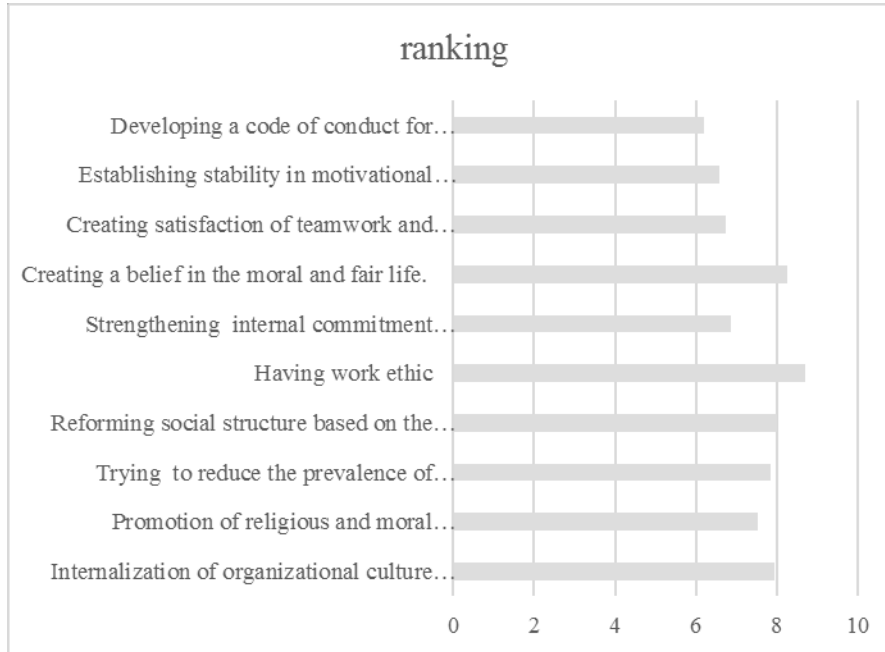


Fig: 6: Prioritization graph of organizational culture factors

Prioritization of indices of effective management factors

To analyze the information and achieve the above subject response, we have used Friedman test to prioritize effective management factors .The results are shown in **Table- 6:**

Table: 6. The results of Friedman test to prioritize effective management factors

Factors		
Management stability.	10.63	4
Paying attention to employees' job security.	11.45	1
Lack of weakness of managers' knowledge and expertise.	10.89	3
Active implementation of participative management system.	10.21	6
Taking responsibility for all aspects of the organization and having accurate perceptions.	11.32	2
Lack of much authority and excessive power and abuse of it.	9.21	8
Creating satisfaction and work commitment in employees.	10.59	5
Paying attention to suggestions and feedbacks of employees.	9.85	7
Making the administrative system Knowledge -based through applying the principles of knowledge management.	9.10	9
Paying honest attention to staff as professional colleagues.	8.63	11
Strengthening sense of solidarity and trust among employees.	8.85	10
Efficient use of time and opportunities, and making and accurate quick decisions.	7.95	14
Developing Intimacy in the workplace.	8.02	12
Adherence of senior officials and managers to ethical principles.	7.98	13
Paying attention to clients' satisfaction as a basic principle.	7.56	15
Sig=0.022		df=14
		X²=32.64

In Friedman test, given that the significance level is less than 0.05 (sig = 0.022), the null hypothesis is rejected and this indicates that at least a pair of independent variables are significantly different. Thus, according to the difference between variables, they can be ranked in the following order:

1. Paying attention to employees' job security.
2. Taking responsibility for all aspects of the organization and having accurate perceptions.
3. Active implementation of participative management system.
4. Management stability.
5. Lack of weakness of managers' knowledge and expertise.
6. Lack of much authority and excessive power and abuse of it.
7. Creating satisfaction and work commitment in employees.
8. Paying attention to suggestions and feedbacks of employees.
9. Making the administrative system Knowledge -based through applying the principles of knowledge management.
10. Paying honest attention to staff as professional colleagues.
11. Strengthening sense of solidarity and trust among employees.
12. Efficient use of time and opportunities, and making and accurate quick decisions.
13. Developing Intimacy in the workplace.
14. Adherence of senior officials and managers to ethical principles.
15. Paying attention to clients' satisfaction as a basic principle.

So according to results of **Table- 6**, from 15 factors of effective management “Paying attention to employees’ job security” is the most effective index, and “Paying attention to clients' satisfaction as a basic principle “is the less affective one in administrative health of Agricultural Movement. The bar graph of prioritization of factors is drawn in the following:

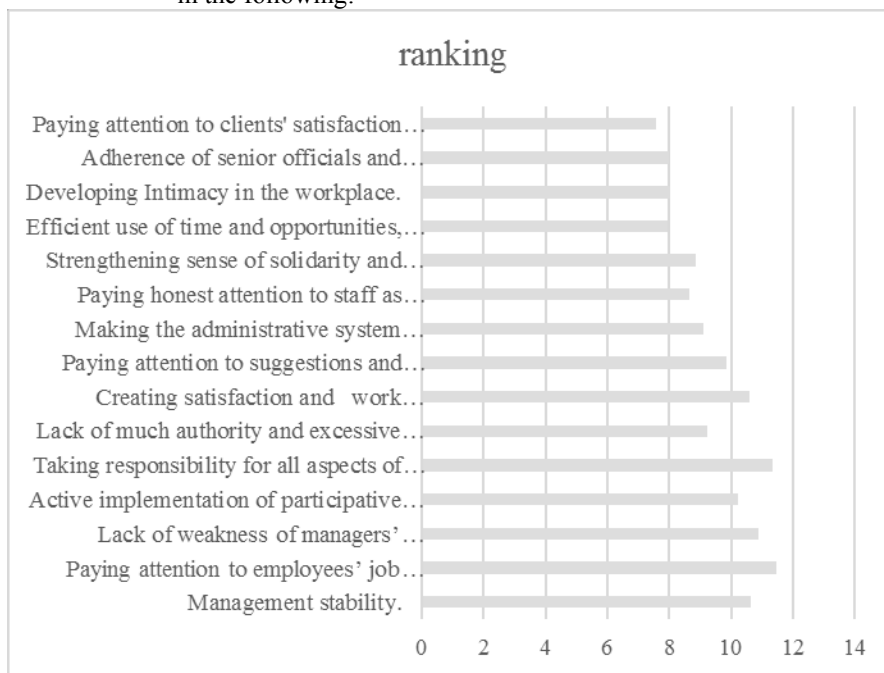


Fig: 6. prioritization graph of effective management factors

Prioritization of indices of leadership factors effecting on administrative health of Agricultural Movement Organization

To analyze the information and achieve the above subject response, we have used Friedman test to prioritize effective leadership factors .The results are shown in **Table- 7**:

Table: 7. The results of Friedman test to prioritize leadership factors effecting on administrative health of Agricultural Movement Organization

Factors		
Encouraging employees to effort Eagerly to the specific objectives of the organization.	4.44	3
Inviting staff participation in organizational decision	3.85	6
Trust and confidence to employees in organizational decision making	4.89	1
Reducing disappointing barriers in staff	3.54	7
Helping employees to clarify their role expectations	4.75	2
Meeting the needs of employees due to their effective performance	3.95	5
Increasing opportunities for personal satisfaction resulted from good performance of employees	4.21	4
Sig=0.009		X ² =24.16

In Friedman test, given that the significance level is less than 0.05 (sig = 0.009), the null hypothesis is rejected and this indicates that at least a pair of independent variables are significantly different. Thus, according to the difference between variables, they can be ranked in the following order:

1. Trust and confidence to employees in organizational decision making
2. Helping employees to clarify their role expectations
3. Encouraging employees to effort eagerly to the specific objectives of the organization.
4. Increasing opportunities for personal satisfaction resulted from good performance of employees
5. Meeting the needs of employees due to their effective performance
6. Inviting staff participation in organizational decision
7. Reducing disappointing barriers in staff

So, according to results of **Table -7**, from 7 leadership factors, “Trust and confidence to employees in organizational decision making” is the most effective index, and “Trust and confidence to employees in organizational decision making “is the less affective one in administrative health of Agricultural Movement. The bar graph of prioritization of factors is drawn in the following:

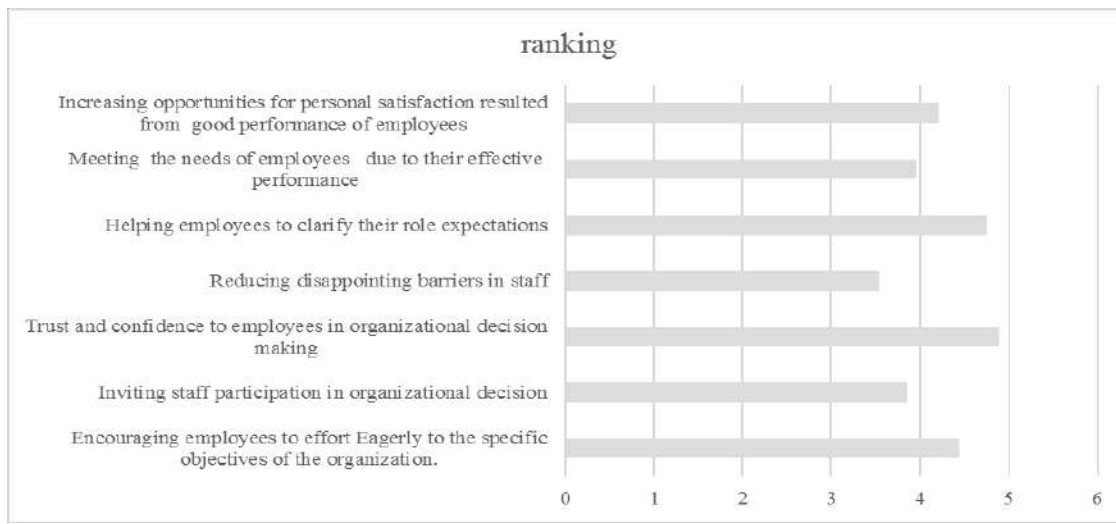


Fig: 7. prioritization graph of leadership factors in administrative health

DISCUSSION AND CONCLUSION

Corruption in the administrative system affects more or less on all countries, and damages caused by corruption are countless due to the different forms of it [7]. It is necessary for a country which takes steps toward development and progress, to take action to this necessary issue free from corruption category. The importance of controlling and

restraining the corruption, and promotion of health in organizations would be cleared when we have investigated the consequences of corruption, and have a specific statistics of its effects.

To realize the importance and necessity of serious fight against corruption and all its instances in administrative system, we explain some consequences of corruption which have dealt serious damage to organizations.

- Corruption leads to waste the resources through harming government policies in the face of interests and goals of the majority.
- Corruption inhibits the growth competition and thereby neutralizes the efforts to reduce poverty and social discrimination.
- Corruption leads to social damages through weakening of incentives, to political damages through weakening of existing institutes, and to economic damages through unfair distribution of resources.

Therefore, today it is necessary to fight continuously and seriously with all powers in all fields against causes of corruption, to prevent from intensifying the damages in future, and realizing a sustainable and comprehensive development in the society in a healthy and free of corruption country.

RECOMMENDATIONS

1-Recruiting and employing competent persons in organization, appointing capable persons in key posts, preventing from partial elections , allocated appointments and deposes as well as establishing organizational excellence systems.

2- Considering penalties in proportion to crimes, reviewing the laws, and completing implementation of them.

3- Establishing the independent inspection bodies in each province, establishing sensible monitoring systems, evaluating the periodical functions of subsidiary branches, and Investing of violations and crimes and dealing decisively with the perpetrators.

4- Identifying sensitive jobs as well as financial and administrative vulnerable points, trying to discover and identify the corruptive bottlenecks through conducting required studies to identify these areas, and then taking controlling and informational measures.

5- Developing the computerized technologies, doing transactions and operations through these systems, and as a result, reducing the role of human resources in carrying out activities and thus preventing from corruption and bribery.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None declared.

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THE ROLE OF SELF-ACTUALIZATION AND SPIRITUAL EXPERIENCES IN ORGANIZATIONAL COMMITMENT OF FEMALE NURSES IN ZABOL

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ABSTRACT

The aim of this study was to investigate the role of self-actualization and spiritual experiences in organizational commitment among female nurses in Zabol. This study was descriptive, correlational and predictive, statistical population. The population of the study is consisted of 210 nurses working in hospitals in Zabol. In this study, 132 questionnaires were distributed randomly among nurses and in order to collect information, three questionnaires on self-actualization in Ahwaz (1999), spiritual experience by Ghobarie et al., (2005) and organizational commitment by Allen and Meyer were used. The results of simultaneous regression for prediction of nurse's organizational commitment showed that self-actualization predicts 37/0 organizational commitment variance in nurses and the results of stepwise regression showed that the communication with God, the transcendent mystical experience, find meaning in life and social - religious activities predict 33/0 organizational commitment variance of nurses in Zabol.

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KEY WORDS

self-actualization, spiritual experiences, organizational commitment, nurse

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INTRODUCTION

Due to the complex and dynamic global requirements in today's world and the era of communication and information that has changed the world into a small village and also the tremendous progress of science and technology, human variety and consequently raise living standards and consequently increased cultural expectations of human as well as rapid changes in traditional societies, organizations no longer can be managed regardless of their internal and external dynamic environments. One of the most important motivational issues that are now widely used in industrial psychology and developed organizational studies is organizational commitment [1]. Organizational commitment is defined as an important occupational and organizational attitude that has been largely considered important and interesting for many researchers in organizational behavior and psychological disciplines during the last years [2]. Like other organizational behavior, organizational commitment has been defined in different styles. Although several definitions can be found for organizational commitment, in the study by Meyer and Allen in 1987 about definitions of organizational commitment, it was found that each of these definitions was associated with one of the three themes of emotional dependence, costs incurred and a sense of duty. In other words, organizational commitment is the continuity of an employee's sense of responsibility towards his duties in the organization and emotional attachment to the organization identified with it and getting involved in the organization and its goals have been described [3]. Variables that appear to be involved in the organizational commitment include self-actualization and spiritual experiences. The concept of self-actualization was firstly proposed by Maslow. He suggested that the ultimate motivation of the individual is to achieve self-actualization and has mentioned characteristics such as sufficient understanding of reality, a sense of value and uniqueness, acceptance and respect for self, creativity, high degree of personal autonomy and accountability for self-actualized men [3]. Self-actualization is the tendency of every person to achieve his much potential abilities (inherent) [4]. Spirituality is defined as a dimension of human being that manifests qualities like nature, the capacity for the knowledge of internal awareness and source of strength, sacred mental experience, ability of men for love capacity and greater knowledge, integration with the whole life shadow and finding a meaning for each individuality. In addition, spirituality is defined as a set of values, attitudes and wishes that are related with superior existence and guides human life with experiences and bringing them uncertainty, Then it seems that that job is considered to be related closely with human lives and in occupations such as nursing human relationship plays more stressful roles [5]. Given the importance of health and nurses in providing care to patients and the health is a human right human, it therefore seems that there is an essential need for such research. Hence, this study answers the question of whether

there is a relationship between self-actualization and spiritual experiences with organizational commitment in female nurses in Zabol?

METHODS

This study was descriptive, predicted correlation. The population of study is consisted of all 210 nurses working in hospitals in Zabol. In this study, 132 questionnaires were distributed randomly among nurses. As well as to determine the sample size, Morgan table (1970) was used.

The data collection tool

In order to collect information from three questionnaires including Ahvaz self-actualization (1999), spiritual experience [6] and organizational commitment of Allen and Meyer were used.

Ahvaz self-actualization questionnaire: the base for the ultimate form of self-actualization questionnaire for Ismail Khani, Najjarie and Mehrabi Zadeh in 1999 was a 50-point Leicester questionnaire. The questionnaire contained 25 items that 40 degrees have been set for each of them and is called Ahvaz self-actualization scale. Face validity of the questionnaire was confirmed by Shahid Chamran University professors in Ahvaz it and its reliability coefficient was calculated 0/90% by split-half method [7].

Spiritual Experience Questionnaire: This questionnaire was provided by Ghobari, Banab, Lavasanie and Muhammad in 2005 in Iran. This scale consists of 74 items and 6 components of finding meaning in life (questions 19, 25, 26, 28, 30, 31, 32, 33, 35, 36, 37, 47, 54, 55, 56, 57, 58, 66, 67), the impact of communication with Allah (questions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 27, 29, 34, 41), prosperity and spiritual activity (questions 12, 13, 14, 15, 16, 17, 21, 22, 23, 24), transcendental mystical experiences (questions 18, 38, 39, 40, 48, 49, 50, 51, 52, 53, 62, 63, 64, 65, 72), negative experiences (questions 42, 43, 44, 45, 46, 59, 60, 61, 70, 71, 74) and social - religious activities (questions 20, 68, 69, 73, 75) respectively. Scoring the questionnaire was as follows; strongly disagree = 1, disagree = 2, somewhat disagree = 3; indifferent = 4, somewhat agree = 5, agree = 6 and strongly agree = 7. The reliability of the test was reported %94. The correlation between the total score of the scale and communication with God component was reported 86/0," "find meaning in life %79", "prosperity and spiritual activity %77," transcendental experiences" %67, "negative experiences %55 and prosperity and spiritual activity %43 [8].

Organizational Commitment Questionnaire will be used to assess the scale of organizational commitment and organizational commitment by Allen and Meyer (1984). The scale was firstly translated into Persian in Iran by Shokrkon (1996). The scale was included 24 items and consisted of three scales for emotional commitment (8 items) questions 1-4-7- 10-1316-19-22, continuous commitment (8 items) questions 2-5-8-11-14-17-21 -23 and normative commitment (8 items) questions 3-6-9-12-15-18-21-24. Questions 2-3-6-10-11-17 and 20 have reverse score. Scoring method was follows: strongly agree (5), agree (4), no opinion (3), disagree (2) and strongly disagree (1). The questionnaire validity coefficients by Samii (1996) were fluctuated in all sub-scales between percent %17 to %71. Reliability was calculated %83 and %87 by Ferdowsi, Marashyan, Talebpour (2011) using Cronbach's alpha and split-half respectively.

RESULTS

After data collection, data analysis was carried out at two descriptive and inferential statistical level using SPSS software. At descriptive level (mean, standard deviation, frequency and percentage) and for inferential statistics, correlation and regression analysis were used.

Table 1. Frequency and percentage of subjects by gender

Percentage	Frequency	Gender
100	210	female

As can be seen in **Table- 1**, Frequency and percentage of subjects by gender

Table 2: Frequency and percentage of subjects by education

Education level	Percentage	Frequency
Bachelor	95%	126
Master of science	4.5%	6
Total	100	132

As can be seen in **Table- 2**, Frequency and percentage of subjects by education.

First question 1: is there any meaningful relationship between self-actualization and organizational commitment among female nurses?

In order to analyze the data related to the first question, the Pearson correlation coefficient was used. The results are presented in the following tables.

Table 3: Results of correlational matrix for self-actualization and organizational commitment among nurses

Normative commitment	Continuous commitment	Affective commitment	Variable
-%33	-%32	%61	self-actualization

Correlation is significant at $p \leq 0/05$ level.

Correlation is significant at $p \leq 0/01$ level.

As can be seen in **Table- 3**, there is a significant positive relationship between self-actualization and emotional commitment and also there is a significant negative relationship self-actualization and continuous commitment.

Table: 4. The results of regression for prediction of organizational commitment in nurses

Sig	t	β	B	Sig	F	Adjusted R Square	R^2	R	variable
0.00	8.77	0.61	0.15	0.00	76.82	%37	%37	0.61	self-actualization

As can be seen in **Table- 4**, results of regression to predict the organizational commitment of nurses suggests that self-actualization forecasts 37/0 of the variance in organizational commitment of nurses.

Second question: is there any relationship between spiritual experience and organizational commitment of female nurses?

Table: 5. Correlational matrix of spiritual experience and organizational commitment of nurses

socio-religious activities	negative experiences	transcendental mystical experiences	actualization and
spiritual activities	communication with God	Finding meaning in life	variable
0.21	0.15	0.43	0.50
0.44	self-actualization		

Correlation is significant at $p \leq 0/05$ level.

Correlation is significant at $p \leq 0/01$ level.

As can be seen in **Table- 5** there is a significant positive relationship between the subscales of spiritual experiences (finding meaning in life, communication with God, prosperity and spiritual activities, transcendental mystical experiences and socio-religious activities) and organizational commitment.

As can be seen in **Table- 6**, the results of stepwise regression for prediction of the organizational commitment of nurses by spiritual experiences aspects show that in the first step communication with God component alone predicts %25, in the second step, communication with God and transcendent mystical experiences together % 27, the third step communication with God and transcendental mystical experiences and finding meaning in life % 31, and finally in the fourth step communication with God, the transcendent mystical experience, finding meaning in life and socio-religious activities predict %33 of variance in organizational commitment of nurses.

Table: 6. Results of stepwise regression for prediction of organizational commitment of nurses by spiritual experiences aspects

Sig	F	Adjusted R Square	R^2	R^2	variable	Step
0.00	42.31	0.24	0.25	0.50	Communication with God	First step
0.00	25.71	%27	%27	0.53	Communication with God Transcendental mystical experiences	Second step
0.00	20.75	0.31	0.31	%57	Communication with God Transcendental mystical experiences Find meaning in life	Third step
0.00	16.99	0.33	0.33	0.59	Communication with God Transcendental mystical experiences Find meaning in life Religious and social activities	Fourth step

CONCLUSION

The job commitment has affective factors on the social discipline and involves the highest regulatory effect [9]. When an organization paves the way for realizing the maximum potential of the individual, they seek to take advantage of them through self-actualization and actualize all of their hidden talents. When they reach the stage of self-actualization and use their talents and abilities, they feel commitment to the organization that has provided the foundation for their self-actualization and abilities. Smith (2002) also showed a relationship between self-actualization and spirituality, which is consistent with current research. It seems that people who follow a specific purpose in life, having a real relationship with God, doing spiritual and religious activities and get pleasant experiences by resorting to God have better self-actualization stage, because they have provided context for understanding one's own spiritual experiences and God and they achieved their goals, talents and abilities by trust, faith and belief in their God. This study showed that there is no relationship between self-actualization and socio-religious activities sub-scales. Working conditions and work shifts, doing other family and official activities, office may be represented as the contributing factors to the lack of correlation in the subjects. The results of studies by Rezai [10] also showed a significant relationship between organizational commitment and spiritual experiences, which is consistent with current research. It seems that people who have a purpose in life can establish a good relationship with God, have religious and social activities and their working conditions are also different from others, because in addition to the emotional attachment to their respective organizations, these people tend to remain in the organization. In other words, we can say that the spiritual experience of these individuals provides a context for organizational commitment.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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CODIFICATION OF RECREATIONAL SPORTS ACTIVITIES OF GUILAN UNIVERSITIES' STUDENTS

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ABSTRACT

Aims: The aim of this study was formulation of a strategy for recreational sports activities of Mazandaran universities' students. **Materials and methods:** Statistical society of this research is 71 persons, containing physical education professors of the province's institutions and directors of university programs. For data collecting, the researchers' questionnaire has been used and its validity was confirmed by several experts and its reliability was confirmed. **Results:** Research findings indicate recreational and sports activities of university students in Mazandaran, in terms of strategic location and in internal and external matrix is located in conservative area. **Conclusion:** For solving problems, outdoor benefits like new technologies, facilities, improvement and restoration of existing technology or specialized workers with high skills should be used.

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KEY WORDS

Recreational sports activities, Strategy, SWOT

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INTRODUCTION

Mechanical life is consider as one of the main problems of humans, because its effects are reducing mobility and activities of people. Leisure time and the way of spending it is one of the new concepts that gets its true meaning with the advent of technology and industrialization of societies in people's life. Recreational Sports and sports that are related to leisure time are the best and perhaps the most essential forms of spending leisure time in this era. From the ten reasons of death in the world, six of them are related to diet and physical activity. Roughly, 80 percent of non-communicable diseases occur in developing countries and Iran is one of these countries [1]. In fact spending leisure time by doing physical activates is one of the most common ways in the world. Several studies, found the correlation between general fitness level of physical and mental health, stress, burnout and their exacerbating factors [2]. School and university courses are filled with study as an intellectual work that fills considerable amount of student life. In such a situation, using recreational and sports activities to enrich leisure time can create nice, joyful and happy feeling [3]. For university students who spend their teenage hood without any trouble and the chance of going outside the lines for them is next to nothing, the constructing, innovating, creative, imaginative, and inner satisfying aspects of leisure time activities will be more focused on. Paying attention to sport activates throughout collage is a great opportunity to make them more familiar with the benefits of physical activity [4]. Due to the positive and useful effects of exercise on all aspects of people's lives, findings of experts in Iran show that only 10 percent of students have sports activities, while watching TV and listening to music fill much of their leisure time and exercise is in lower ranks [5]. Improving public health through increasing opportunities for participation in sport activities has huge economic benefits, especially in developing countries that health resources are scarce, so prevention is very necessary [6]. Preceding studies conducted in connection with leisure time show that sport does not have an appropriate place in the leisure time activities and often young people, especially university students show less interest in them than TV or other leisure activities. However, in countries such as France, sport is known for the first and most important activity of students. Sport has positive functions such as reducing social harm and deviations, increasing social cohesion, reducing lack of exercise, and improving the quality of life that can have an important role in spending university student's leisure time.

Strategic planning allows the organization to adapt its activities and services to meet the changing needs of the environment. This plan not only provides a framework for application development, but also suggests a framework for restructuring plans, management and cooperation and also to assess the organization's progress in this regard.

Strategy development in sport has numerous benefits that the following can be mentioned:

- Promote public health, social cohesion, modernization, rehabilitation and lifelong learning.
- Demonstrate long-term goals and a glimpse of province's current sport situation.
- Efficiently and effectively meeting the community's sport needs.
- Help to increase participation in sport and creating ways to develop people skills.
- Help to create the best values.

In a study to investigate gender differences in relationship between the characteristics of the school environment and physical activity among 9 to 12 year-old student in Ontario, Canada, concluded that schools should choose a special room for flexibility activities for female students [7]. In a study to prioritize sport and leisure activities in elementary school realized that basketball with 26.48% is the most favorite sports. Swimming with 20.59% and tennis with 14.71% are in second and third place [8]. In studying on women in concluded that the average participation of women in active leisure time is more than women's participation in none-active leisure time [9]. Being aware of situations and properties of ways of doing recreational sports and creating conditions and suitable facilities according to different tendencies and tastes, are among the responsibilities of managers and authorities of leisure activity subject. It is also essential that the planning and cultural work on different segments of society, especially the academics should be done to make them aware of the positive effects of healthy leisure and recreational activities and pushed them further into these kinds of activities [6,4,3].

It is recommended that university officials and student dormitories pay more attention to increase low-cost and special space and facilities of leisure activities in college dormitories and university faculties and plan their strategies in this direction. Creating more facilities and sports halls in university faculties and dormitories will be an effective step toward pushing students to do fun, active leisure activities that can be weekly planned and will not cost students anything [10]. Now the question is that which strategy is suitable for recreational and sports activities of Guilan university students?

MATERIALS AND METHODS

The research method according to themes and objectives, is strategic studies and surveys that were conducted in the field and descriptive field way. In other words, recognition of the status quo SWOT was described and the results were analyzed. From the purpose point, this study was practical and its required information was collected through library studies and researcher-made questionnaire; in which qualitative and quantitative methods were used to analyze the data.

Research model

The theoretical framework or conceptual model is F. R. David and J. David Hunger strategic management model. According to F. R. David method, important planning steps can be incorporated in a three-step decision-making framework. Figure 3-1 shows the comprehensive framework of strategy formulation. Tools and methods presented in this framework are suitable for all types of organizations (of different sizes) and helps strategists to identify, evaluate and select them.

Table 1: Comprehensive framework of strategy formulation

The input stage	
Internal Factors Evaluation Matrix (IFE)	External factors evaluation matrix (EFE)
Strategic goals	
Comparing step	
Strengths, Weaknesses, Opportunities, and Threats matrix (SWOT)	
The decision step	
Strategic Planning	

Statistical society and sample

The Statistical society in this study is consisted of province's professors of physical education and extracurricular and physical education administrators of all universities of Guilan, which were 71 altogether. In professors' category, 30 of experience professors in the field of sport were randomly selected and in extracurricular administrator category, all of the universities that had extracurricular and physical administrators were surveyed. Of 71 questionnaires sent to statistical society members, 65 questionnaires were filed. Table 1 shows the distribution of statistical society and received questionnaire.

Data collection methods

Data collection methods were chosen according to research records and documents, essays and dissertations and sports specialist advice and opinions of the provided in the two following sections:

Library Studies

In this research, through exploring documents via the Internet and library resources, recreational sports activity sources were reviewed and the cases related items were used.

Self-designed questionnaire was used for identifying the strengths, weaknesses, opportunities and threats of recreational sports activities of Gilan university students.

Personal information

This section measures up the demographic characteristics, including age, sex, education and fields of study.

Opinions of professionals about identifying the strengths, weaknesses, opportunities and threats of Gilan university students' recreational sports activities: For this purpose, in order to determine the strengths, weaknesses, opportunities and threats of recreational sports activities of university students in Gilan, by taking advantage of records and documents, theories, related researches, essays and articles and also advices and opinions of experts in sports management and strategic committee including faculty professors member of the province with executive work history, After reviewing the situation, the researcher designed a questionnaire.

At first, internal environment and the external environment factors, and then each of the four strengths, weaknesses, opportunities and threats were defined and explained with an example in this questionnaire. The following questionnaire were designed for members of the Steering Council, elites and experts and were sent to them and they were asked to insert strengths, weaknesses, opportunities and threats of recreational sporting activities of Gilan universities' students in questionnaire. According to information obtained from the questionnaires completed by the elite and members of the Steering Council and the study of theoretical bases and history of related researches, a package questionnaire consisted of 12 strengths, 16 weaknesses, 14 opportunities and 15 threats was extracted. Then to determine the final list of SWOT, in a strategic council meeting that were held for this reason and according to the members of the steering council and the elite, the initial extracted questionnaires were reviewed and some questions were eliminated, modified or added to the SWOT list.

The final package includes a four-part questionnaire: 1. Strengths (10 questions), 2. Weakness (12 questions), 3. Opportunities (10 questions) and 4. Threats (11 questions) and 9 options for each question was of importance, so that option from 1 to 9, respectively, the figure was from the lowest to the highest importance.

RESULTS

Among all the items outlined in the strengths of strategies recreational sports activities of universities' students of Gilan, the presence of students in recreational sports activities item in this section has the highest importance. Obviously, in order to promote and develop recreational sports activities for students paying special attention to this sector is needed. Also among all the statements expressed in this section, items of continuous and purposeful gathering of physical education administrators of Gilan universities has the minimum importance in strong points of recreational sports activities of province's university students. Among all the items outlined in the weaknesses of recreational and sports activities for university students of Gilan, lack of strategic planning in physical education structure at the universities of Gilan has the highest point of weakness, from the perspective of respondents in this sector. Obviously, in order to resolve this weakness, special attention should be paid to the strategic planning of physical education in the universities of Gilan, and by developing appropriate programs and strategies, a logical connection between the planners and administrators of student sport of the province should be created. Also among all the statements expressed in this section, the item of incorrect behavior of some university staff with students who were interested in sports, has the lowest importance.

Among all the items outlined in recreational sport activities opportunities faced by university students in Gilan, the item of presents of some outstanding professors of physical education in the physical education departments and colleges academic centers of Gilan, has the highest level of important in this sector. So according to this result, this opportunity should be exploited. Also among all items outlined in opportunities, the least important items was private sector participation in recreational and sports activities in the province's universities.

Among all the statements made in threats section, high costs of city's physical education department gyms are the highest threat that the recreational sports activities of the students of Gilan are facing with, which should be overcome with a special focus on the threat above. Also the item of making money out of sport centers approach and giving extracurricular sports facilities to physical education student's sports teams, is the least threat to recreational and sports activities of university students of Gilan. For simultaneous analysis of internal and external factors, internal and external matrix was used. This matrix was used to determine the location and type of talent finding strategy in recreational and sports activities of province's university students. To form this matrix, obtained scores from internal and external evaluating factors matrices were put in the horizontal and vertical dimensions so the place of recreational sports activities for students of Gilan in the matrix will be determined and appropriate strategies will be adopted. In this matrix, scores on a two-part range of strong (5.2 to 4) and poor (1 to 5.2) are determined.

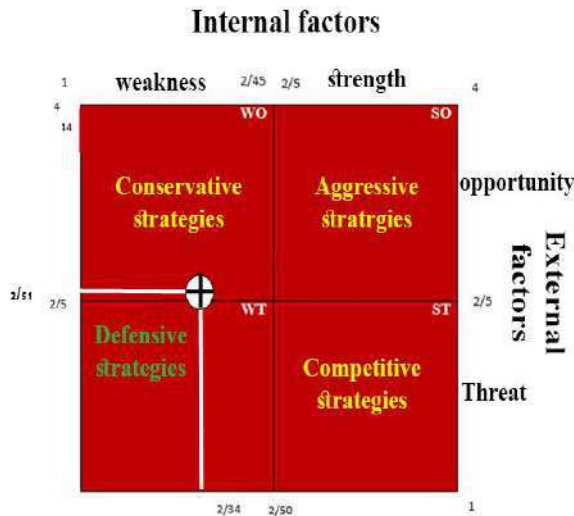


Fig: 2. Simultaneous matrix of internal and external factors of recreational sports activities for students of Guilan

Usually, strategies are selected according to the regional of the organization in one of four elements of internal and external matrix (SO, ST, WO and WT). In addition, the results suggest that recreational and sports activities for university students of Guilan, according to figure 1-4, in terms of strategic position and in the internal and external matrix, is located in conservative area. Therefore, the organization should be able to solve its vulnerabilities and weaknesses within the organization and the environmental benefits, such as new technology, upgrade and repair existing technology or hiring specialized workers with high skills to solve its problems.

DISCUSSION

The study’s results showed that the strategic position of recreational and sports activities of university students in Guilan are in such a way that has a lot of weaknesses and threats in this regard and to solve them the available strengths and opportunities can be used and also the dominant strategy is selecting can be from the WO kind. However, recreational sports activities of university students in Guilan, based on existing conditions, can benefit from ST, WT and WS strategies. After this phase of the research and getting to the final list of items of SWOT, by using SWOT matrix analysis, strategies associated with these items were extracted. At this stage 4 strategies SO, 5 strategies of ST, 4 strategies WO, and 3 strategies WT strategy, a total of 16 strategies, were developed. In order to discuss the results and data of the present study, the developed strategies of SWOT matrix respectively will be analysis and discussed.

Strategy 1: Benefit from outstanding teachers for participating of more students in recreational sports activities (the use of experts) (S1O1)

Strategy 2: Strengthening extra-curricular and physical education and creating an ongoing relationship between the director of extra-curricular and physical education, physical education outstanding professors and students (S1S2S3O1)

Strategy 3: Creating culture in the field of recreational sports activities among university students by use of qualitative forces and experts and also religious teachings for developing of recreational sports activities. (S3 S4 S3 O4)

Strategy: Design of research and development system for talent finding in recreational sports activities (O1 O2 S3)

Strategy 5: Reducing the cost of renting sports halls for student participation in recreational sports activities (S1 T1)

Strategy 6: Informing students of the dangers of inactivity by the director of extra-curricular and physical education professors (S2 S4 T2 T6)

Strategy 7: Increasing attention of authorities to student recreational sports compare to championship in society and the media (S1 S3 T2 T5 T6 T7)

Strategy8: Selecting of expert and competent and also preventing the entry of Unskillful in various parts of college sports (S4 T4)

Strategy 9: Creating incentive mechanisms and a favorable atmosphere for the development of recreational sports activities (S3 T2 T5 T6)

Strategy 10: Developing a strategic plan for recreational sports activities of students in universities of Mazandaran (W1 W4 O1 O3 O6)

Strategy 11: Provides financial resources, facilities and spaces for teachers and administrators in extra-curricular sport and physical education students to participate more in recreational sports activities (W2 W3 W5 W6 W7 O5 O6)

Strategy 12: Use of natural areas to address the shortage of financial resources (W2 W3 O6)

Strategy 13: Increasing in per capita sport facilities according to the rules and regulations to protect and enhance the state (W2 W3 W7 O6)

Strategy 14: Implementation of the recreational sports activities strategic plan of Guilan Universities (W1 W6 W10 T2 T3 T5 T6)

Strategy 15: Create a reward system to attract students and educators to promote recreational sports activities (W7 W11 T2 T5 T6)

Strategy 16: Activation of the private sector in support of students' sports in Mazandaran (W2 W3 W7 O6)

The Swedish government gives special privileges to NGOs and the private sector, so they work harder to achieve expanding the public sport [11,12,13].

Part of the income of these organizations, by obtaining membership fees, training and education is provided, and in order to support the development of sport and encourage participation, the government considers some tax breaks for these organizations [14,15].

CONCLUSION

Generally, in almost all countries the private sector assistance government, the interesting point is that their activities are all under state control and in cases where the public interest are related, state control will get increased to guide these sectors to the development of sports among all classes of people. The private sector in the province has a strong potential to university students' support sports and the hope is that by encouraging this sector, the province can see the growth and development of recreational sports activities in its universities.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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A COMPARATIVE STUDY OF ACOUSTIC CHARACTERISTICS OF THE VOICE BEFORE AND AFTER TONSILLECTOMY

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ABSTRACT

Introduction: tonsillectomy as one the most common surgeries in children is recommended. Since tonsillectomy causes a change in the shape and size of the inferior areas of glottis, researchers are looking for the presence or absence of significant difference in the acoustic and perceptual characteristic of the voice before and after tonsillectomy. **Methods:** It's a descriptive-analytical study. 15 patients aged 3 to 10 years old with tonsillitis were participated by available sampling. Having a normal IQ and without the history of certain diseases, neurologic problems or structural problems of head and face and voice disorder before the surgery. Before surgery as well as 3 to 4 weeks after that, voice samples of patients including 6 Persian vowels of /æ/, /e/, /o/, /a/, /i/ and /u/ were recorded in an acoustic room. Recording and analysis of the collected data were done by the software of MDVP/Computerized Speech Lab (CSL) model KAY 4500. The examined acoustic parameters in this study include fundamental frequency average, construction formant of F1, F2, F3, jitter, shimmer and harmonic-to-noise ratio (NHR). The acoustic data were analyzed in SPSS.22 software. **Results:** variation of F1 after the surgery was reducing and these variation were increasing regarding the vowel /u/ and /i/ only and variation of the F3 for all vowels (except /æ/ and /e/) were increasing. Mean variation of the fundamental frequency before and after the surgery for the vowel /æ/ (p-value=0.03), the vowel /e/ (p-value<0.01) and the vowel /i/ (p-value<0.01) has a significant difference, while for the vowels /o/, /â/ and /u/, there was not a significant difference before and after the surgery (p-value>0.05). The mean variation of jitter was reduced after surgery in all sounds. Shimmer average was decreased for all sounds except /e/ and /u/. NHR was in normal distributed only for two sounds; so that these changes for the vowel /o/ is reducing and for the vowel /e/ was increasing. However, changes in any type of these variables were not significant (p-value>0.05). **Conclusion:** It can be concluded from this study that an objective evaluation of the voice which was used in this study, showed the little effect of tonsillectomy on the acoustic parameters and so the voice quality. So acoustic analysis of voice can be served as a tool to help the ear, throat and nose specialists and predict the effect of surgery on the probable recovery of the patient situation.

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KEY WORDS

Voice, acoustic analysis, tonsillectomy, sound

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INTRODUCTION

Language is a coding system that refers to the environmental objects and their relationships and helps the human beings to arrange objects as the special systems [1]. Language is established in two main levels of speaking and writing. On the first levels of system, speaking codes replaced the objects and phenomena and can be used to communicate. In speaking, there are some kind of controlled movements of mouth, tongue and lips. The human brain controls all these more complex movement to product he meaningful speech and high quality of voice [2]. The speech includes some fluency components of production, resonance and voice. Vocal track is considered as a resonator for sound production which is started from glottis and continued to the lips [3]. Normal speaking growth of a child depends on his/hergenetic abilities and environmental features. One of them is structural changes in the vocal track that maybe effect the voice of human. Physiological hypertrophy of the tonsils during childhood can cause changes that effects on speaking [4]. Arrangement of the lymphoid tissue in the oral cavity and nose-pharynx is known as tonsillar ring [5] that has an immunologic role [3] and includes anterior lingual tonsil, around palatine tonsils and pharyngeal tonsil behind this ring [5]. The growth of pharyngeal tonsil located on

nasopharynx caused by infection is called Adenoids [6] that interferes breathing through nasal path and phonation [5] and lead to oral breathing in children [6]. Removing it through a surgery is called adenoidectomy [6]. In some texts, when they talk about voice disorders related to tonsils, palatine tonsils are the aim [6] that are located between palatoglossal and palatopharyngeal membrane [3,4, 5]. Tonsil infection which is released into the nasal cavity, ear and respiratory tract is called tonsillitis [6]. Removing tonsils through surgery is called tonsillectomy [6].

Prevalence of voice disorders in children with hypertrophic tonsils is not clear yet, but Salami et al in a study have reported that sound deviation in production /s/ before tonsillectomy is 42.5% [7]. Hypertrophic tissue has a destructive effect of the quality of voice [7]. During producing oral sound, the soft palate moves and tenses to the back of pharynx and separates nasal cavity in above from the oral cavity in bottom. Large tonsils may inhibit this process and cause an air escape from the oral cavity and a hyper nasal speech. Other effects of large tonsils may include mouth breathing, respiratory apnea and muffled voices [3]. To resolve these problems, tonsillectomy as one the most common surgeries in children is recommended [3]. Tonsillectomy may be associated with pain after surgery as well as bleeding [8].

Since tonsillectomy causes a change in the shape and size of the inferior areas of glottis [9], researchers are looking for the presence or absence of significant difference in the acoustic and perceptual characteristic of the voice before and after tonsillectomy. In this regard, a confliction is seen between the conducted studies. Some researchers like D. Antonio et al (1996) acquired significant differences in the acoustic parameters of the voice before and after surgery in adults [10], but another did not find significant differences. For example, Chuma et al (1999) reported that tonsillectomy has a little effects on different voice parameters [11]. On the other hand, some parents say about acoustic producing changes of their children in a short period after the surgery. They mention that tonsillectomy has changes acoustic features from hyper nasal to normal mode or normal to denasality speech. [11]. Most of these studies have been conducted on adults and they investigate the effect of tonsillectomy on the voice rather than intensification [11]. Present study was conducted to evaluate the effect of tonsillectomy on voice recovery after the surgery by acoustic parameters in children to introduce risk factors of tonsillectomy on voice features to determine successfulness of surgery.

METHODS

This is a descriptive-analytical and non-interventional study. All patients aged 3 to 10 years old with tonsillitis were selected by available sampling from the educational, research and treatment centers of 3 main hospital of Mashhad from December 21th, 2014 to December 21th, 2015 were evaluated for vocal analysis. The number of participants were 15. Inclusion criteria of the study included children with tonsillitis in the mentioned age range, having a normal IQ and without the history of certain diseases, neurologic problems or structural problems of head and face and voice disorder before the surgery. Exclusion criteria included non-cooperation of subjects and deficit in one or more acoustic data related to each subject which causes the acoustic data of each subject was not complete. None of them were not treated by language and speaking pathology services before and after the surgery. These patients were in the waiting list of tonsillectomy. The surgery was performed with general anesthesia and lasted about half an hour. The surgeon accessed to the tonsils through the oral cavity and then proceed to the surgery. Data collection and analysis in this study were evaluated acoustically and analysis was conducted by SPSS.22 software.

Collecting acoustic data of the voice

Before surgery as well as 3 to 4 weeks after that, voice samples of patients including 6 Persian vowels of /æ/, /e/, /o/, /a/, /i/ and /u/ were recorded in an acoustic room. After making the initial communication with the child, the test implementation method was performed. The child was asked to pronounce each vowel for 5 seconds with the habitual loudness and pitch. Microphone was placed with an angle of 90 degrees in front of the child's mouth and at a distance of 15 cm. During recording samples, a short opportunity was given to the participant to rest. To ensure about the adequacy of the data recording, three samples were recorded from each vowel to use the second and third samples if the first and second recorded samples were not appropriate, respectively. In case of inappropriateness of any of the samples, the child was excluded from the study at each stage of sampling. Recording and analysis of the collected data were done by the software of MDVP/Computerized Speech Lab (CSL) model KAY 4500.

The examined acoustic parameters in this study include fundamental frequency average, construction formant of F1, F2, F3, jitter, shimmer and harmonic-to-noise ratio (NHR). The fundamental frequency defined as the lowest frequency of a periodic signal which can be measured in hertz scale [3]. Formants are referred to the resonant frequencies of the audio track in time of vowels production which are detectable by sound spectrograph. Jitter is measured as cycle to cycle changes of the fundamental frequency that determines small random perturbations during a voice cycle. Shimmer notes to cycle to cycle changes of the

amplitude in aharmonic voice cycle and the NHR is the ratio of pressure level of harmonic sound to noise in a voice signal that makes the confusions and noises quantitatively [3].

Analysis of the voice acoustic data

The acoustic data were analyzed in SPSS.22 software. Paired t-test was used to analyze these data. Distribution of the data related to shimmer mean variation of vowel /æ/ and mean variation of NHR for the vowels /u/, /i/, /â/ and /æ/ using Kolmogorov-Smirnov test showed that their distribution is not normal, so we must use non-parametric Wilcoxon Signed Rank test.

RESULTS

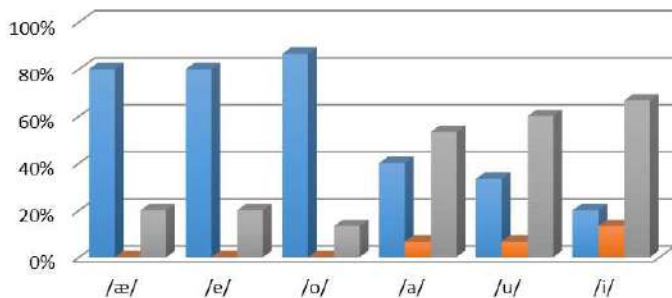
In this section, comparing fundamental frequency changes after the surgery was reported analytically and evaluation of other variables due to low power of the samples was reported as descriptive.

Formants variability

According to the obtained results, the variation of the first, second and third formants which were shown in the [Figures- 1, 2, 3] for all vowels was as follows: the variation of F1, F2 & F3 for the vowels of /æ/ and /e/ was reducing in most cases. For the vowel /o/, variation of F1 and F2 were reducing and changes of the F3 was more increasing. For the vowel /a/, variation of the F1 and F2 were more increasing and reducing, respectively but variation of the F3 was remained flat mode in most cases. Also for the vowels of /i/ and /u/, variation of F1, F2 & F3 were increasing, reducing and increasing in most cases, respectively.

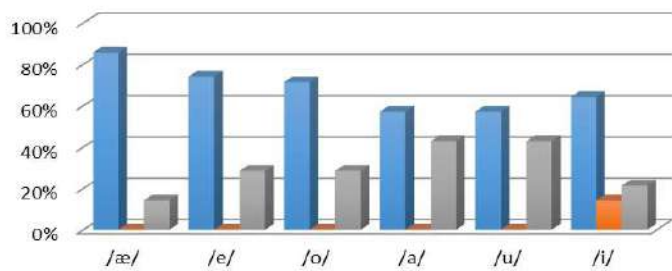
In general, according to the [Figures- 1, 2, 3], variation of F1 after the surgery was reducing and these variation were increasing regarding the vowel /u/ and /i/ only and variation of the F3 for all vowels (except /æ/ and /e/) were increasing.

Chart 1- the frequency percentage of the F1 variation before and after tonsillectomy in all samples

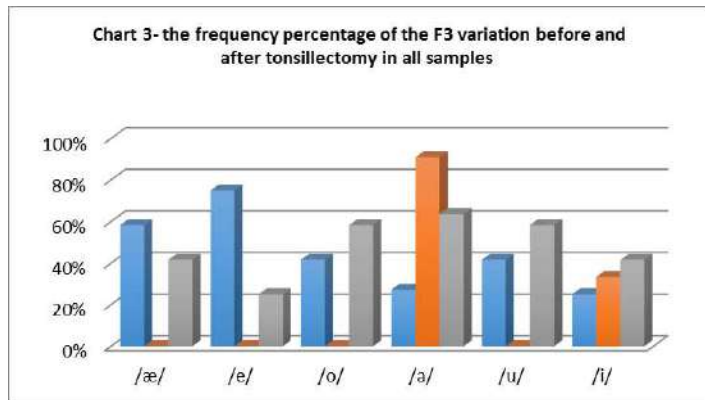


Increasing ■ without change ■ decreasing ■

Chart 2- the frequency percentage of the F2 variation before and after tonsillectomy in all samples



Increasing ■ without change ■ decreasing ■



Increasing ■ without change ■ decreasing ■

Fig: 1, 2, 3

Mean variation of the formants is given in [Table-1]. The variation were not significant for any formants (P-value>0.05)

Table:1. Mean variation of the fundamental frequency and formants before and after tonsillectomy in all samples

Variables/ group		Mean ±			
		Fundamental frequency	F1	F2	F3
Before the surgery	/æ/	333.08±57.27	2459.90±1601.25	6767.93±2347.77	9922.80±2360.94
	/e/	343.34±52.66	3801.83±3449.77	6915.15±2851.17	8856.70±2810.50
	/o/	356.48±76.10	1078.49±211.82	5471.80±1232.53	9391.88±1103.99
	/a/	319.85±59.91	1279.29±197.44	5565.10±1972.61	9470.07±2441.98
	/i/	365.49±80.68	943.62±380.88	5704.53±2100.37	9076.81±1937.63
	/u/	361.02±70.65	2357.00±2194.89	4944.49±1842.37	7867.15±2129.26
After the surgery	/æ/	385.43±69.27	3808.62±3185.46	8761.76±3429.80	10843.63±5055.78
	/e/	387.19±64.34	3172.35±2782.86	6722.45±2786.38	9584.23±2290.53
	/o/	383.13±68.55	1175.91±243.96	5640.03±1384.18	9677.90±2563.72
	/a/	352.09±51.27	1424.80±411.52	6259.56±1678.73	10261.99±1709.45
	/i/	439.52±84.46	1123.72±1232.21	6356.47±2054.54	7980.16±3220.12
	/u/	417.37±64.48	1929.05±1919.65	4590.82±1859.99	7013.65±1883.58

Mean variation of the fundamental frequency

Mean variation of the fundamental frequency before and after the surgery for the vowel /æ/ (p-value=0.03), the vowel /e/ (p-value<0.01) and the vowel /i/ (p-value<0.01) has a significant difference, while for the vowels /o/, /a/ and /u/, there was not a significant difference before and after the surgery (p-value>0.05). [Table-3].

The mean variation of jitter, shimmer and NHR

The mean variation of jitter was reduced after surgery in all sounds. Shimmer average was decreased for all sounds except /e/ and /u/. NHR was in normal distributed only for two sounds; so that these changes for the vowel /o/ is reducing and for the vowel /e/ was increasing [Table-2]. However, changes in any of these variables were not significant (p-value>0.05). [Table-3].

Table: 2. Mean variation (standard deviation) of the other acoustic parameters of the sound before and after tonsillectomy

Variables/ group		jitter	shimmer	Harmonic-to-noise
Before the surgery	/æ/	.92253 (0.600849)	*	*
	/e/	.89236 (0.602653)	2.22050 (0.723368)	.11293 (.038490)
	/o/	.98075 (0.942665)	2.53325 (1.301210)	.10475 (.019932)
	/a/	1.28292 (.931131)	3.29438 (1.429942)	*
	/i/	1.48160 (1.929236)	2.35210 (1.225994)	*

After the surgery	/u/	.91089 (0.921690)	2.10522 (0.551100)	*
	/æ/	.83380 (0.722780)	*	*
	/e/	.81557 (0.534828)	2.88300 (1.513683)	.11479 (.043892)
	/o/	.62908 (0.309234)	2.11958 (0.873160)	.09658 (.016790)
	/a/	.84985 (0.473424)	2.80985 (0.868349)	*
	/i/	1.04240 (0.918656)	1.77200 (1.496624)	*
	/u/	.85400 (0.375552)	2.20522 (804148)	*

Explanation: the variables with * were not normal distributed.

Table:3. Comparing acoustic parameters of sound before and after tonsillectomy

	Vowel type	P _{value}
F ₀	/æ/	0.035
	/e/	0.012
	/o/	0.153
	/a/	0.142
	/i/	0.011
	/u/	0.216
F ₁	/æ/	0.583
	/e/	0.098
	/o/	0.290
	/a/	0.651
	/i/	0.373
	/u/	0.056
F ₂	/æ/	0.124
	/e/	0.360
	/o/	0.104
	/a/	0.054
	/i/	0.672
	/u/	0.094
F ₃	/æ/	0.188
	/e/	0.165
	/o/	0.592
	/a/	0.189
	/i/	0.389
	/u/	0.673
jitter	/æ/	0.744
	/e/	0.716
	/o/	0.225
	/a/	0.153
	/i/	0.575
	/u/	0.844
shimmer	/æ/	0.218
	/e/	0.354
	/o/	0.281
	/a/	0.448
	/i/	0.758
	/u/	0.570
NHR	/æ/	0.221
	/e/	0.342
	/o/	0.914
	/a/	0.071
	/i/	0.415
	/u/	0.314

DISCUSSION

The objective of this study was to evaluate the effect of tonsillectomy on voice recovery after the surgery by the acoustic parameters in 3 to 10 years old children. Our findings in this study showed that after tonsillectomy, the average of fundamental frequency in frontal vowels sound has found a significant variation, but in case of the posterior vowels sound, variation have not been significant. We also found that although the mean variation of the first formant after the surgery for the vowels of /u/ and /i/ was increasing and for the other vowels was decreasing and mean variation of the third formant for all vowels except /æ/ and /e/ was increasing, but these changes were

not significant. Given that the fundamental frequency has varied in the mentioned items but has not had a significant effect on formants, it seems that this phenomenon is occurred due to the constant resonant source [12]. The jitter mean variation after surgery in all sounds and mean variation for frequency range in all sounds except /e/ and /u/ were decreasing. NHR was only for two sounds normally distributed; so that these changes for the vowel /o/ is reducing and for the vowel /e/ is increasing. In general, it would be seen that decreasing in frequency and perturbation range after surgery is proven [13, 14].

The fundamental frequency and formants are under influence of aerodynamic characteristics and the muscles in the voice tract [3]. Tonsillectomy can effect on the sound by increasing the cavity of resonator or change in formant or a part of soft palatine muscle [11, 15]. Theoretically, it can lead to scaring and limitation in fine motor control or even closure of the velopharyngeal sphincter [12]. Formants are the same harmonic spectrograph peaks of a complex waves. It would be different in various people but it has a stable pattern which facilitates the reading of a sound sample [16].

Sunborg has determined some parts of anatomy in the voice track and has related it to the formant frequencies [12]. The F1 is associated with the open jaw which has limited the sound track and will be increased by open jaw. The F2 is more sensitive to the shape of tongue body and the F3 is sensitive to the tip of the tongue [12].

Although some authors do not distinguish a relationship between tonsillectomy and voice variation, but the others insist on such relationship. Jarboe et al (2001) indicate that tonsillectomy does not involve laryngeal tissue; so the audio features remains relatively stable [17]. Chuma et al showed that tonsillectomy has a little qualitative and quantitative effects on the acoustic parameters [11]. Saida et al also obtained same findings [15, 18]. Lin et al showed in their studies that the third formant is reduced by tonsillectomy, but F0, F1 and F2 has no variation [19]. The researchers who disagree with this idea, like Finkelstein [20] et al (1994) and Antonio [10] et al (1996), indicate that the removal of the oral pharyngeal soft tissue changes the anatomy acoustic transmission path of the upper pharynx and acoustic scales that is related to the intensified voice track. Antonio reported that tonsillectomy significantly improve the abnormal pitch and breathe noise. Tonsillectomy changes the pharyngeal resonator, so phonation characteristics may be effected [10].

Ilk et al reported that after tonsillectomy, specific parameters of speaking was changed. These changes are basically were the third central frequency of formant and the third broadband of formant for the vowel /o/ and a little decrease in the first and second broadband of formant (B1, B2) of this vowel. Whatever a tonsil is larger, more changes can be seen in the speech spectrograph. Changes in the speech characteristics which lead to improve, express the involvement of aural feedback and or replacement of the new soft tissue instead of tonsil [3]. So in general, it seems that tonsillectomy has a little effect on the voice [15, 18, 19, 20, 21, 22] that these studies are corresponded to the results of our study.

CONCLUSION

It can be concluded from this study that an objective evaluation of the voice which was used in this study, showed the little effect of tonsillectomy on the acoustic parameters and so the voice quality. So it can be served as a tool to help the ear, throat and nose specialists and predict the effect of surgery on the probable recovery of the patient situation.

Study limitations and recommendations

The small sample size due to the time limitation as well as excluding some samples makes it difficult to interpreted variables. It is recommended that more research will be conducted in this field especially in larger sample size or as a longitudinal study. Also, doing the comprehensive evaluations including physiological evaluation, patient-based cognitive and expert-based cognitive evaluations and determining relationship between these evaluations to understand better about the voice problems of clients seems useful. It is also recommended for future study that the effect of tonsil size, type of surgical tools (scalpel, laser and ...) and the comparison of tonsillectomy effect with adenoidectomy on the voice as well as resonance in children and adults are examined.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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DESIGNING THE TOURISTIC-ENTERTAINMENT COMPLEX WITH THE APPROACH OF THE CONTEXTUALIZED ARCHITECTURE IN RASHT

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ABSTRACT

Cities are the products of the mutual interaction of the various living factors, meaning human and nonliving factors, meaning buildings. The product of this communication is a place named city which is created over time and due to several factors. Moreover that today, tourism is considered as a need, it is also an income resource for the touristic cities. Tourism is an affair which helps the urban planners in order to achieve the sustainable development. Tourism has two fundamental and significant functions for the host city. The first is the economic function and the second is the cultural exchange as the consequence of the people's traffic. The second one is significant and important and should be more investigated. It is investigable from the viewpoint that tourism can have destructive consequences culturally. For this reason, special physical and functional characteristics should be considered for the places which have to be the host of internal or external tourists in order for them to prevent from the cultural destruction. One of the strategies existing in the architecture and has been accepted by the public is the architecture design by using the concepts of contextualized approach. The aim of the contextualized architecture is coping with the lack of identity and lack of place existing in today's cities which are the results of mechanization of the people's lives. With interpreting the existing concepts in the architecture field, this approach is aimed to use them in the best way in today's buildings for meeting the needs of today's users. The two significant subjects of the contextualized architecture and the touristic-entertainment centers in the city of Rasht made the author to study in this field. At the beginning of this paper, we investigate the contextualization concept and the needs and conditions of the tourist complexes; and ultimately, we will recommend a plan for the touristic-entertainment complexes in Rasht.

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KEY WORDS

tourism, leisure time, contextualization, public space

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INTRODUCTION

The changes which were the result of the industrial evolution influenced the type of people's living. By using and by the help of machines, human tried to meet his daily needs. In such conditions, the machine which was a human-made tool, along with the nature turned into the two significant factors in behaviors and daily approaches of everybody. With the passage of time, the role of machines became bolder every day and even in some works, the machine became a competitor for human. The results of the new conditions in the human life were change in needs and the way of meeting them; in the era after the industrial evolution, architectures and city-makers tried to meet the human needs with the help of the tools and machine criteria. In this period, architectures and city-makers made some calculative mistakes and forgot the human who had played the first role of the urban happenings and put the machine in the place of human. The bustling cities, fast traffic of cars, fast speed of life, dignified cities and the elimination of the social role and function of the citizens are from the catastrophic results of excessive reliance on the car. "From the viewpoint of a narcissist modernist, a building should be significant compared to its surrounding buildings and it should be considered as a symbol of future" [1]. However even in the same era of the peak of the modern period, there were somebodies who disagreed and warn the society from its negative consequences, but due to the financial, political and advertising power of the other party, they were not successful. The contextualized people were a part of that group who presented some strategies for elimination of this lack of identity and lack of place which was the product of the modern era; and each of the thinkers tried to investigate this subject and present some strategies in order for giving the today's human identity. "the contextualized architecture does not want to save the current conditions and it also does not encourage the saving and mummification of the old cities [1]. Hence, the city of Rasht has turned into a place for the passage of tourists not far years ago, and this has had adverse socio-economic effects. In the conditions which in today's world, tourism has become a fundamental and important subject for the realization of the sustainable development, in the city of Rasht no attention paid to it. Attracting tourists requires the creation of a specific context which is carried out by the creation of hardware and software

facilities. Regarding to the fact that the investigation of the software conditions does not fit in this space, the author tries to recognize the hardware facilities which help the tourist attraction. The importance of tourism encouraged the author in selecting this topic in which he poses a plan to help the creation of a context for tourist attraction. In this paper, it will be tried to present a plan with the urban scales in order to create a context for introducing the social and cultural features of the people of Gilan in addition to the introduction of the current field's architecture. In the studies carried out in this field, Brolin Brent C. in the book of the *Contextualized Architecture* says that: "the contextualized architecture neither emphasize to imitate nor prevents from innovation which its message is the necessity of paying attention to the physical surrounding environment of the architectural work and indicates that this attention may be both useful for the architectural work and an amplifier and positive factor. In fact, the contextualized architecture tries to indicate the ability of creation of the desired visual environment in a larger scale than the architecture. [2] in the paper of *Contextualization in Urbanization* says that: "contextualization – one of the common views in urbanization – considers the city as a historical happening in which the city elements are recognized, processed and produced. the mentioned view firstly paid attention to the only physical aspects, but gradually, it tended to the human aspects and expanded its field study to the socio-cultural aspects of the society. in this viewpoint, ideas and elements of the past cities present in the formation of the body of the contemporary cities. Therefore, the contextualized city maker must be able to recognize the features of a place and consider it as a part of his designing process. At the time of creating the new components of the city shape, he remains committed to the following: 1) physical contextualization, in the form of the pre-existing total; 2) historical contextualization, in the extent and the order of the relationship of city's components over time; 3) socio-cultural contextualization, that is to say the common values and purposes. In this study, it has been tried to investigate various aspects of this tendency and its place in the urban development.

CONTEXTUALIZATION IN ARCHITECTURE

Tradition-orientation, region-orientation and contextualization in architecture

The new structures which are the indicator of the history of art and architecture of each specific era luster in the cities as the dynamicity and vitality of an alive city and the lack of construction of new structures in the urban texture will lead its vitality and dynamicity toward stability. Modern life does not make it possible to artificially imaging from the cities like the new technical science, but it is necessary to recognize them with testing what which has been fundamentally in their creation and adopt them with the new condition. The form of architecture which should be substituted with the current conditions is the type which is coordinated with the cultural, social, environmental and economic criteria; otherwise, the same wrong response should pay a heavy cost for reconstruction and returning the lost values. Such an architecture and urbanization will respond the current and future needs of its users regarding to its sustainability and with relying on its own field over time.

All environments are classified based on four interrelated components:

1. The land area – ground, structure and its processes
2. Alive environment – vivo organs and ways occupy it
3. Social environment – relationships among the people
4. Cultural environment – behavioral norms of the society and its hand made products" [Asadi Tabar, quoting from Lang]

The first aspect of contextualization is its physical aspect. The most important criterion of this aspect includes respecting to the texture and place and paying attention to the surrounding environment, ecology and climate. As it was mentioned above, also the first concern of the discussion of the sustainable development is the environment and the interaction of the living thing and the ecology. Here, we can recognize the deep relationship of the contextualization and the sustainable development. It can be said that paying attention to the field is the first step of creating sustainable places. Also it can be said that there is a large coverage between these two discussion. Contextualization and the sustainable development have common aspects including economic, social and environmental features. Paying attention to the climate and weather factors, topography, surrounding nature, using the local materials, using the traditional construction patterns and many other cases are from the principles of contextualization which must be considered in order to achieve a sustainable development in the environmental aspect.

The history of contextualization and contextualization in architecture

Contextualization in architecture originates from the thoughts of the ancient times about order and coordination, and placing the buildings in one direction with the adjacent forms. But the term “contextualization” has been used in an unpublished paper named “*Locorbusier: the Urban Development Architecture*” by Stewart Cohen and Steven Heart. These discussions have been started from the late 1950s and have been continued by Calin Row and Bob Slotzky with the presentation of the paper “*Real and Phenomenal Clearness*” in 1955. In the literature, the subjects of contextualization has been recalled with the ecology-orientation, the architecture without architect, and the city without the urban designer. Many cities and villages have benefitted from the idea of the architecture without architect and the city without designer. Villages such as Kandovan village in Iran, the underground villages in China, etc. are some examples of these works. also in the contemporary era, architectures like Hasan Fathi, the Egyptian architecture is from the contextualization fans. Contextualization has been emerged with the emergence and advertisement of the garden cities in Europe, especially Belgium, Germany and England, the publication of the book “*Death and Living of the American Great Cities*” by Jane Jacobs, and it has been continued with raising the idea of Colage by Colin Row and Cooter, etc.

Principles and components of the contextualized architecture

As a holistic approach in designing the artificial environment, with respecting the mental and objective structure of the subjective and objective as a complete event in the physical, natural, historical, and socio-cultural aspects and with linking understanding and interpretation of the audience with the field, contextualization aims to integrate the artificial environment in the objective and mental aspects and realize any ideal and aspiration regarding to the pre-existing conditions. In designing a place, it is necessary to refer to its background and field; because otherwise, the result presents just an instable and time limited quality instead of having understandable and rooted quality. In order to understand the soul of place, Schultz poses the concepts of meaning and structure. “*the meaning of any object are rooted in the relationships of that with the other objects*” [4].; that is to say that, something has essence and existence in what the object gathers together due to this gathering. Instead, the structure refers to the formative and shape features of a series of relationships.

Contextualization and its aspects

Architecture is not apart from the cultural, social, economic, and sociological aspects; and in fact it is the result and the reflection of them. The field and texture in which the architectural work gets its identity has exclusive physical, geographical, climatic, social, cultural, economic, historical and the other features and characteristics. The scholars classify the field in the architecture in three general subjects: form, activity and climatic patterns. But in this paper the contextualization aspects are investigated in four categories of 1. Historical field, 2. Climatic field, 3. Physical field and 4. Socio-cultural field.

Historical contextualization

If the society separates itself from the past, this means that it ignores the attempts of the past human; and cutting the historical continuity is humiliation of its past living. “In this approach, designers are committed to maintain the balance and order of the components which have been created in the field over time.” [2].

The field should be looked at as a kind of history. The field should not be considered as a stable and in-time factor, but it should be considered as a dynamic and changing and fluid factor. The field of the contextualized architecture is some kind of changing and moving field and based on this, the architecture building named [text] cannot be designed in a changing and moving and fluid field in a dynamic form, this is the field which is continually changing and reconstructing the natural and original form of the Earth in most of human-inhabited area [like cities) from the past till now. Each building which is constructed is posed as a part of the field and as a part of field makes the context for the building after it. The history of field in the architectural buildings is the history of the life of architecture and urban development. The historians believe that the past has some objective lessons for the current urban development. “in this approach, architects do not want to save the current conditions and also they do not encourage the saving and mummification of the old cities” [1].

CLIMATIC CONTEXTUALIZATION

Saving the God blessed [divine) resources and respecting them, setting the environmental conditions using the natural energies and consuming the minimum fossil energy and coexistence with the natural and climatic conditions are as one of the sustainability patterns in the architecture and a step to reach the sustainable architecture and finally sustainable development. Paying attention to the context climate and the climatic factors in which the architecture is done can be a springboard to fly to the sustainable architecture. Attention to this important subject opens the way for using the natural forces such as sun, wind, water, and so on and minimizes the use of fossil resources.

As mentioned, in the past, the facility elements such as wind towers, mills, pergolas, sunken gardens, cellars, etc. have been made with the help of the recognition of architectural field and the environmental capacities. So, it is necessary to pay attention to the climatic factors of the area such as the climatic features of each context, wind, rain, day and night temperature changes, air temperature, air flow, sky status, the sun radiation, and so on.

PHYSICAL CONTEXTUALIZATION

Also it includes elements like form and shape, scale, proportions, material details, texture, colors, geometry, accessibilities, directions, views and perspectives, location topography, vegetation status, urban texture including the density rate of buildings, streets and sidewalks and their proportion with each other, the material genus, material composition, combination of volumes and forms next to each other, organizing the spaces, adjacency of buildings with each other, linking the old and new buildings, skyline, landline and the kind of linking to the ground and many other issues.

In contextualization, the city's components are not evaluated and studied by themselves, but they are put in an environmental wider context. An architectural work is related to the larger urban system and locates in a hierarchy of sets. Thus, contextualization is the linkage of architecture and urban development in a determined context. In other words, context is where the architecture and urban development are related to each other. The tendency of city makers to construction in the current complex means combining the new and the old so that it can create a desirable and alive total; then, a special commitment should be sensed about the issue of the entrance of modern architecture to the current existing context. "the historical samples indicate that variety, innovation and change can also be achieved without damage to the visual homogeneity of the context" [2].

Socio-cultural contextualization

Always, the developments created in the human cultures and the society's transformations have cleared their most obvious and important in the cities' face and urban buildings; hence, architecture cannot be investigated as a distinct phenomenon. It can be looked as a subject separated from culture, sociology, policy, economy and psychology; because this transcendental art which has been transferred to us over the history and from generation to generation and with the help of the prominent architects is the most beautiful expression and reflection of the culture and tradition in each historical period. The originality and identity which is observable in each architectural work is in fact the spirit which the architect blows in the nonliving body of a sculpture called building; therefore, this is the designer who should differently look at the greater issues in addition to paying attention to the functional, professional, psychological and aesthetical issues; issues such as culture, tradition, mysticism and philosophy, originality and identity of each city and the excellent human values should all be considered in designing buildings and cities and the urban development laws in order for architecture to return to the same eternal glory and respect.

Amos Rappaport, the prominent theorist of the contemporary era have had several and deep studies on the culture of life and its impact on the design based on the anthropology approach. indeed, the aim of architectural design is to form the human's living place and on the other hand, it is to make the container [building) for the content [human life] "*people react about a place and their surrounding environments based on the meanings they associate in their minds*" [3]. However, the studies done on the contemporary architecture works indicate paying excessive attention of the architects to the container and ignoring the spirit of humans' life, in the meantime, it is important to note that in order to make a good container, we should recognize its content [here, human life) well.

Touristic Totalities

Peregrinator

All people who leave their home and city and travel to another city for any reason are called *tourists*; if this travel from the source is to a destination out of the country, they are called *peregrinator*. “in 1925, the Census Committee of League of Nations recognized the following people as tourists: 1) the people who travel for entertainment and personal reasons or with medical and treatment purposes. 2) the people who travel for participating in conferences, exhibitions, religious ceremonies, sport events, etc. 3) the people who travel for marketing and commercial affairs. 4) the people who travel by ship and stay in a port in their way up to 24 hours.” [5].

Classification of Types of Tourism

Tourism has different types which can be classified based on numerous factors. The most important factors based on which different types of tourism can be classified and defined are as following:

In terms of time: the tourism activities can be separated from each other in short term [less than one day), medium term [one to three days), and long term [more than three days]

In terms of place: tourism is classified into three fields of near areas, intermediate areas and remote areas.

In terms of citizenship: tourists are divided into two groups of foreign and international tourists and domestic tourists.

In terms of incentive of travel: based on this factor, tourism is divided into the travels with incentives of relaxation, entertainment, treatment, pilgrimage, culture, economy, sport, etc.

In terms of tourism season: tourism season is classified based on different seasons of the year. In this classification, two seasons of winter and summer are more important than spring and autumn.

In terms of form and organization of travel: such as individual, group, family and the other travels which determine the tourism composition.

In terms of the vehicle used: tourism is classified based on the type of the vehicle used for travel.

In terms of the type and location of residence: tourists are both qualitatively and quantitatively classified based on the type and location of their residence; like the tourists resident in hotels, hostels, cottages or household pensions and camping.

Investigation of the Context of the Design

One of the primary conditions of the architectural design of any type of functions is better recognition of the designed context. This recognition includes all elements of climate, population, and site location, etc. In this path, recognizing factors is done in order for us to recognize all influencing factors on the design and make an appropriate response for eliminating them with investigating different conditions. The design approach which is also contextualized increases the importance of investigation of design and the designed context. In this chapter, the author tries to investigate all factors existing in the site; the climatic conditions are from the very important factors in designs and the author reviews them in this chapter.

Gilan

With an area about 14711 square km, Gilan province locates in the Alborz mountain range and Talesh in the north of Iran and includes 0.09% of the total area of the country. This province is linked to Caspian Sea from the north, to Mazandaran province from the east, to Ardebil province from the west and western north, and from the south, with passing Alborz Mountain range, it is linked to Zanjan and Qazvin provinces. Gilan province is located between the orbits of 36 degrees and 36 minutes and 3 seconds, and 38 degrees and 27 minutes and 7 seconds of the north latitude, and 48 degree and 34 minutes and 25 seconds to 50 degrees and 26 minutes and 42 seconds of the east longitude from Greenwich meridian; and the white raspberry river flowing among Chaboksar and Ramsar separates it from Mazandaran province. Gilan province consists of three coastal, flatland and foothill area. In Gilan province, the width of the coastal plain is low and in most parts, immediately after the coastline, terrain elevation rises to 900 meters. The geographical shape of Gilan province is in the form of a voluminous body including Western Alborz and Gilan plain in the south and a stable and erected neck including Talesh mountains and the coastal plain to the north. Regarding to its geographical location in the western south of Caspian Sea, it is one of the most beautiful and most fertile provinces of the country. Plenty of water, thick, dense, and diverse forests, vast meadows and eventually a prone alluvial or with gravel sea plain have excelled Gilan province in terms of the appearances of the natural environment. The only natural connection of the province with the plateau is established through Sefid Roud valley; in the whole of Iran's northern mountains, Sefid Roud tectonic valley is the only important terrain which naturally splits the mountain barrier and increases the importance of this story as

a gift. In addition to ease of communication, this valley directs a large volume of waters of Azerbaijan and Kurdistan to this land and has guaranteed its fertility and greenness more [6]. Based on the administrative divisions in 1996, this province [centered in Rasht) has 12 townships, 35 cities, 30 districts, 99 rural districts and 2763 villages. The townships of the province include: Astara, Astaneh Ashrafieh, Bandar Anzali, Rasht, Roudbar, Roudsar, Shaft, Fouman, Soume'eh Sara, Tavalesh, Lahijan & Langeroud ..

Rasht

As the most populous and largest city of the northern band of Iran, Rasht is considered as one of the important cities over two or three recent centuries in terms of policy, economy, and culture. "with an area of 136 km, Rasht city is located in 49 degrees and 36 minutes of the east longitude and 37 degrees and 16 minutes of the north latitude from Greenwich meridian" [Nikouyeh, 2008: 15] This city is limited to Khomam district from the north, Lakan village from the south, Some'eh Sara city from the west and Kouchesfahan district from the east. In its natural condition, Rasht city is considered as a small part of Gilan plain and southern plains of Caspian Sea. This plain which is located between Alborz mountains and the coastline in its northern and southern limits includes Rasht, Bandar Anzali and Lahijan cities.

Site Analysis

The desired land for this complex locates in the west and near Rash-Fouman exit path. It is accessible through Taleqani and Beheshti streets. A land with an area of 27809 square meters in the vicinity of Mafakher park. Due to the existence of an old natural glacier and ancient trees, this area is famous among the citizens. According to Rasht detailed plan announced in 2004, this land has been considered with the tourism use. Daneshjou park is located in the opposite side in front of the land. Location of site is in a close and direct relationship with the crowded and main street of Rasht city and its beltway; and this facilitates its use for the citizens and also passengers and the tourists from out of the city. The western side of the site is connected to the beltway and the eastern side touches a side street in a residential area; thus, it is easy accessible for pedestrians and riding and driving people. The most important neighbors of the target site are Mafakher Park and Daneshjou Park. Since parks are considered as the appropriate urban spaces for attracting and gathering people, so, the touristic-entertainment can interact with these two urban spaces and make a suitable relationship with them. In addition to the surrounding features of the mentioned site which make it appropriate to select it, its internal features can also be considered as strength points for this affair. The mentioned site is a green vast land with many natural trees. The green space and natural environment can be considered from the most important features of the tourism spaces for attracting domestic and foreign audiences [especially in the north of the country] Thus, except the parts used for constructing the required buildings, the rest of the natural and green space of the complex is better to remain virgin and so that there is no need to provide artificial green spaces for the complex. In addition to the natural green environment, the existence of old natural glaciers in the site is from the other features causing this site to be known among the people of Rasht with the same name of "Yakhchal" [Glacier, Refrigerator] It must be noted that this glacier can be reused again in the same form, with changing its use.



Fig: 1. location of site; source: www.google.com

Hence, regarding to the points mentioned, briefly, the main features of the site and the reasons of selecting it for designing the touristic-entertainment can be summarized in the following cases:

- Area of the site

- The natural green space of site
- The existence of the old natural glacier
- The appropriate location for it to be used by the citizens of Rasht, passengers and tourists
- Suitable access of pedestrian and riding and driving people
- Appropriate neighborhoods and surrounding related uses

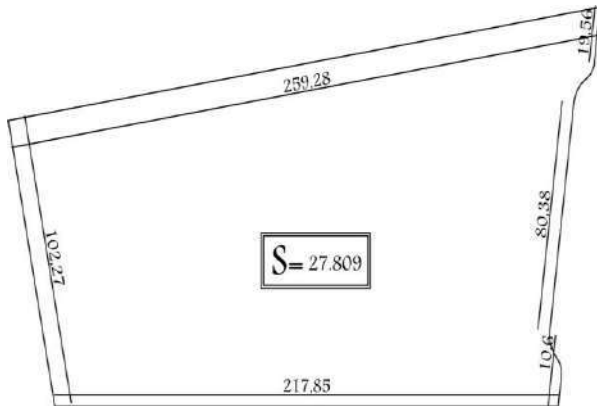


Fig: 2. Plan of site, accesses to the site; source: www.google.com



Fig: 3. The desired site for designing; source: author

The designing process with the contextualized architecture approach

In this section, we firstly analyze the designed site and then present the structural and facilitative strategies and finally introduce the desired plan with presenting maps and 3 dimensional simulations.

Structure

It is recommended to use metal beams and columns as the structure of the complex, the layout of beams and columns is presented in the plan.

Installations [facilities]

Using the floor heating system has been considered in the plan of this complex regarding to the advantages which were mentioned. The central heating system was also considered as the heat source which needs a room with an area of about 40 square meters. The location of this space has been introduced in the plan.

Designing process

To design the touristic-entertainment complex, some important factors should be considered. This complex should observe many factors in order to succeed and attract tourists and having desired function in accepting and respecting them. These cases are to create an appropriate context in order for the tourists to come to there and make economic benefits for the area. The observed cases in the plan are as following:

- 1) using physical symbols of Gilan's architecture
- 2) using places with different uses
- 3) creating gathering places
- 4) considering commercial uses for economic justification for the plan
- 5) using wooden shafers in order for the climatic functions
- 6) creating desired skyline by creation of the low height buildings
- 7) considering sport spaces

In the entrance part and during the path of accessing to the central parts of the complex and the main building, there is an open exhibition space which can provide the best chance for making people familiar with Gilan and Rasht in the different cultural, historical, geographical and other fields at the very first of entrance. Also, this space can be used as temporary exhibitions for artists in warm and low-rain seasons and this can be influential in attracting audiences from different groups of the society. Locating the space at the beginning of entrance to the complex amplifies its communication with the visitors more and more. The sport lands of the complex are put far from the other spaces and near the parking so that they can be the first accessibility for the people who just come for using them. However this complex is also for the entertainment, but the sport section is better to locate far from the residential and exhibition spaces as more as possible due to the special physical and appearance conditions of its users and possible loud sounds. Many entertaining parts of the complex have been considered outdoors. Regarding to the weather conditions of Rasht city, in some days of the year, some parts of the complex are not usable. Hence, the store and exhibition spaces are often indoors in order to be used in all seasons of the year. Also the space of using internet and computer games are in indoor areas.

The main façade of the building has been made of glass in order for the more use of the site's view and natural landscapes. However, it must be noted that the privacy and light control and prevention from inappropriate sunlight should not be ignored. For the same reason, some shafers have been considered on the main wall and the glass façade which can be used for controlling radiations and entrance of bothering lights; and if necessary, they can be desirably opened or closed for keeping the privacy of the internal spaces.

In addition to the applicable and functional cases of the complex which have had the most impact in organizing its different parts, some factors have influenced the formation of the appearance form of the building. Regarding to the different viewpoints of scientists about contextualization and the way of expressing it in architectural language and also with knowledge about the different types of contextualization, the physical contextualization has been considered as an appropriate method for progressing the design of this complex. As it was mentioned in the second chapter, contextualization take the most influence from its surrounding intermediate filed; and then, the public symbols and signs which are understandable by all people may be used in order for that to semantically save the communication with the context. Regarding to the mentioned issues, hence, the first case which is influential on the plan of this complex as the surrounding context is trees, green spaces and the natural surrounding environments. Even in the neighborhood of this complex, in addition to the parks mentioned before, the hulky trees and the green path of the ferries is significant to the eye more than the villatic residential texture. Moreover, since a small part of the whole complex is dedicated to the design of building, so, the main building is surrounded by the green space more and more.

Regarding to the surrounding conditions, it was decided to use the natural materials like stones and woods as more as possible for making connection with the natural surrounding environment. In addition, it has been tried to consider the volume of the main building a flexible and fluid volume in the site instead of considering it as an abstract static volume forced to the surrounding nature. The wooden walls, trass, floors, wooden shelters, wooden decorations on the body of the façade and ultimately, the wooden shafers combine the external wall of the building with the surrounding environment. Moreover, the vastness of the glass wall in the main view of the building puts the interior and exterior spaces in one direction and this is very influential in making connection between eh interior and exterior spaces. Therefore, it can be said that: in the contrary of the thought that the contextual architecture is always under the influence of the past and traditional architecture, the building of this complex is under the influence of the physical surrounding environment and in this environment almost there is

no sign of the local and traditional architecture; thus, the similarity to the traditional architecture is completely illogical and far from the mentioned contextual viewpoints.

Then, using a symbolic element which has been utilized in the complex is related to a significant building of Rasht's architecture in the first Pahlavi period. The buildings of municipality and the square in front of it and in other words the open urban space of the center of Rasht are considered as the beating heart of the city and the most important gathering place for the people. This point of the city has been always a place for visiting and friendly and public gatherings and various cultural and religious indabas. The walls of the buildings set of municipality and the most important and significant than all, the wall of the national library of Rasht and the semi-opened space below the library have been very nostalgic for many people of Rasht and even the passengers. With accepting the touristic-entertainment complex as a collective space and with considering the mentioned issues, a symbolic wall has been considered for this complex which most of its elements are directors of paths and it has been tried to design it inspiring from the wall of the national library of Rasht. So that, one of the important architectural elements of Rasht is symbolically recreated in the complex to have such space with similar use [in terms of gathering space), familiar appearance for the visitors in order for the fact that in addition to the communication with the surrounding physical environment, the identity node of architecture with Rasht city is also preserved.

CONCLUSION

With accepting the touristic-entertainment complex as a collective space and with considering the mentioned issues, a symbolic wall has been considered for this complex which most of its elements are directors of paths and it has been tried to design it inspiring from the wall of the national library of Rasht. So that, one of the important architectural elements of Rasht is symbolically recreated in the complex to have such space with similar use [in terms of collective space), familiar appearance for the visitors in order for the fact that in addition to the communication with the surrounding physical environment, the identity node of architecture with Rasht city is also preserved.

Interpreting the existing concepts in the architecture field, this approach is aimed to use them in the best way in today's buildings for meeting the needs of today's users. The two significant subjects of the contextualized architecture and the entertainment-tourist centers in the city of Rash made the author to study in this field. At the beginning of this paper, we investigate the contextualization concept and the needs and conditions of the tourist complexes; and ultimately, we will recommend a plan for the entertainment-tourist complexes in Rasht.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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FINANCIAL DISCLOSURE

None declared.

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ARCHITECTURE FACULTY DESIGNING BY THE USE OF EVAPORATION COOLING SYSTEM BY RELIANCE ON THE SPRING HOUSE MODEL TO REDUCE THE ENERGY CONSUMPTION

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ABSTRACT

Today the environmental pollution danger, energy consumption saving and stable development are changed to the important and frequent issues at the international level. Of the important solutions to deal with these issues is the conform designing with the climate. Because the main part of Iran land is located in the warm and dry weather, the need for the space cooling has high importance, also using the cooling stable systems in Iranian architecture has the old background, as in the traditional buildings, different elements are used in the thermal comfort providing. One of these techniques is the spring house. On the other hand agitation in the architectural training space and avoiding the student mental concentration in architectural designing learning is considered as the main subject of discussion in the architecture training. As the result the necessity to improve the training space and improving the architects toward the architectures which is adaptive to the country climate has led to designing an architectural faculty in the dry and warm climate by the use of efficient element of spring house to make thermal comfort and increase of training space quality. This research at first collected the related information in accordant to warm and dry climate and spring house and training space by the laboratory studies, then by the field studying method and by the use of temperature and humidity measurement, the spring house different data logger points are evaluated. According to the obtained results from this study, application of spring house in the complex designing will provide suitable model to inspire the architecture students to obtain the climate designing in addition to energy consumption reduction in high degree and providing the comfort climate condition.

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KEY WORDS

Architectural faculty,
passive cooling system, spring
house

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INTRODUCTION

The physical environmental climate and mental condition have inevitable effect on the building designing that based on the cold and warm condition, they are taken in to consideration. The building natural systems designing will assist the energy consumption saving according to the natural energies usage as the wind, sun, etc. in addition to make comfort condition in the environment. The Iranian traditional architecture in the desert regions has the deep background in different aspects. Evaluation of these specifications could be assigned in the programming, designing and popularization of the modern life environment [1].

The main purpose

Application of the renewable energies which is obtained by the spring house cooling and ventilation system lead to the energy consumption reduction in the warm and dry climate architectural faculty designing

The detail targets

By realization of the spring house system and proving the proper bed with the similar application through using the new technology in reliving the spring house in the training space, the environmental and mental comfort is provided in the climate.

Information gathering method

This research first is prepared by the use of laboratory studying in the relation with the climate and spring house and modern training spaces and then by the use of field studying method and based on the observations by the use

of humidity and temperature measuring tools, the spring houses are evaluated that such process is done frequently 3 times every day and after the note taking, the obtained scores are modeled by the software and finally the standards are provided that by the use of these scores we can proceed to reduce the energy consumption. In this research to measure the humidity and temperature, the data logger instruments are used and finally the Energy plus software or the design winder is applied to model these data.

The research method

Because the main purpose of this research is to evaluate the practical knowledge development in the special field, and from the purpose it is categorized in the practical studies cluster. The information gathering method at first is the laboratory method and then in the second phase it is the field study. The variables include the architectural factors in the architecture faculty as the independent variables and the applied variable of spring house to reduce the energy consumption is considered as the dependent variable. This research is the correlated type research. To respond to the research questions, data logger was realized as the most proper tool to collect data.

MATERIALS AND METHODS

Types of passive systems

The passive systems are considered as the most practical methods that are applied in the building thermal provision without using the fossil energies and mechanical power and by applying the renewable energies source like sun, wind and etc. [2], the passive systems are divided in to two categories of cooling and heating systems that in this research the applied cooling systems is intended, the passive cooling system itself includes the cooling through the ventilation, vaporization cooling and reflection cooling that in this research the evaporation cooling systems are discussed [3].

The vaporization cooling systems specifications

The vaporization cooling systems is categorized as the cooling systems that due to the low price, low maintenance cost and proper application have wide use in the warm climate. The vaporization cooling system compared to other cooling systems is described as below [4].

- Low energy consumption compared to compressing cooling system (about 1/4) and its accessibility that cause the energy consumption reduction and the fossil fuel consumption decreasing
- Using water as the coolant that due to safety and accessibility is one of the vaporization systems benefits
- The vaporization cooling systems simple construction and lack of necessity to design and construct with complexity and as the result avoiding the high costs
- Proper price and low maintenance compared to compression coolant systems.

The vaporization cooling system relation with the necessity of its application in the architecture faculty

The Iran traditional architecture without the using the modern technology managed to provide the safe region in every climate, [5]. In the modern societies the Iran traditional principals that is due to the stable architecture is forgotten and because the architecture faculty has the duty to train the architecture training, the form and its essences should also be the representation of its duties and it is better that its essence and form is regarded as the model and lesson for young architects, [6]. The necessity to apply the architectural correct principal to make cooling space and on the other hand architects tendency toward the past stable architecture that is matched with the climate has led that in this faculty the efficient and prominent element of spring house is used in the warm and dry climate of Shiraz city to make space cool. [7]

The traditional architecture elements to make stable cooling system

According to matter, that the Iran land is categorized in the warm climate, the land traditional architecture has more important and the traditional architects has used various architectural elements in making comfort stably. [8], assumed that of these elements we can point out to the spring house, wind louver, trench, garden and central yard that is intended in this research.

Spring house

The spring house is the covered space with the pool in the middle that is usually at higher level and it takes light from the roof. The innovation and establishment of pools in the dry and warm regions is due to freedom from hot weather in summer and it is the result of the local talent architects. The spring house performance was on a way that through the water spraying by the fountain, it caused the cool atmosphere in the place and in some of the spring house, by building the wind louver in high stature at the end of the building, the cold air was entered to the spring house, [9].

Spring house typical specifications

- from two to four rooms were constructed around the pool that was connected to the spring house by the wooden doors
- the rooms' floor was at higher level about 1 meter from the springhouse space
- the spring house light was provided by the windows and sometimes the roof holes
- the openings toward the yard [Figure- 1].

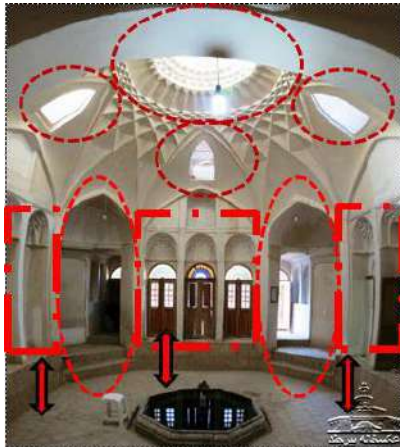


Fig: 1. the spring house specification

Analytical sample introduction

One of the Shiraz city historical regions is the Black Stone region. In the Black Stone region, there are 3 houses among the Qhajar era traditional buildings which have spring house. In this research among these houses, Foruqh Almolq was selected due to having required conditions of building and in order to analyze and measure the humidity and temperature.

Foruqh Almolq house

The foruqh almolq house is belonged to the late Qhajar era and one of the Shiraz old textures is the Black Stone region and it is located at the Bi Bi Dokhtaran shrine. The Forough Almolq building was established in 1930 by Forough Almolq Qhavam in the land at the area of 1020 square meters. This structure was built for the inhabitation purpose in three steps of underground, the surface and the first step and it has two sections of internal and external parts with two separate yards and the alcove, spring house, bath and kitchen. The external part was the living place for family and the internal part was considered for the servant use. One of the most magnificent parts of this building is the beautiful spring house that is located in the west north corner. The spring house plan has the eight angled shape and also the pool is located at the center in the form of octagonal shape. This spring house has two alcoves with two pillars and it has connected the external part to the internal part.[Figure- 2].



Fig: 2. Foruqh Almolq house

Analysis of Forough Almolk spring house

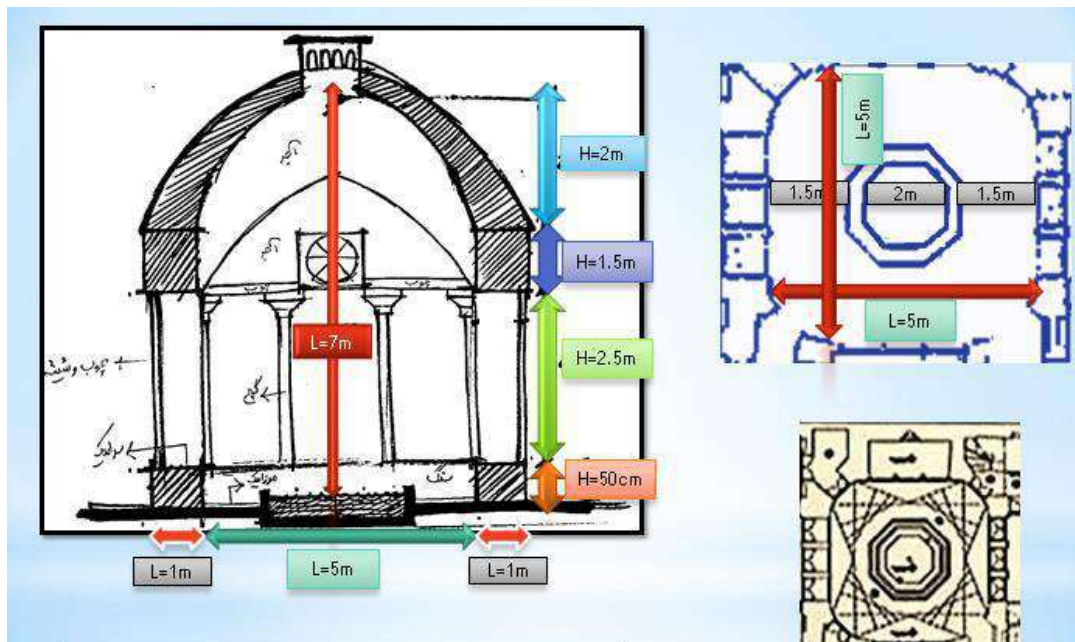


Fig: 3. the spring house space dimensions in the Forough Almolk house

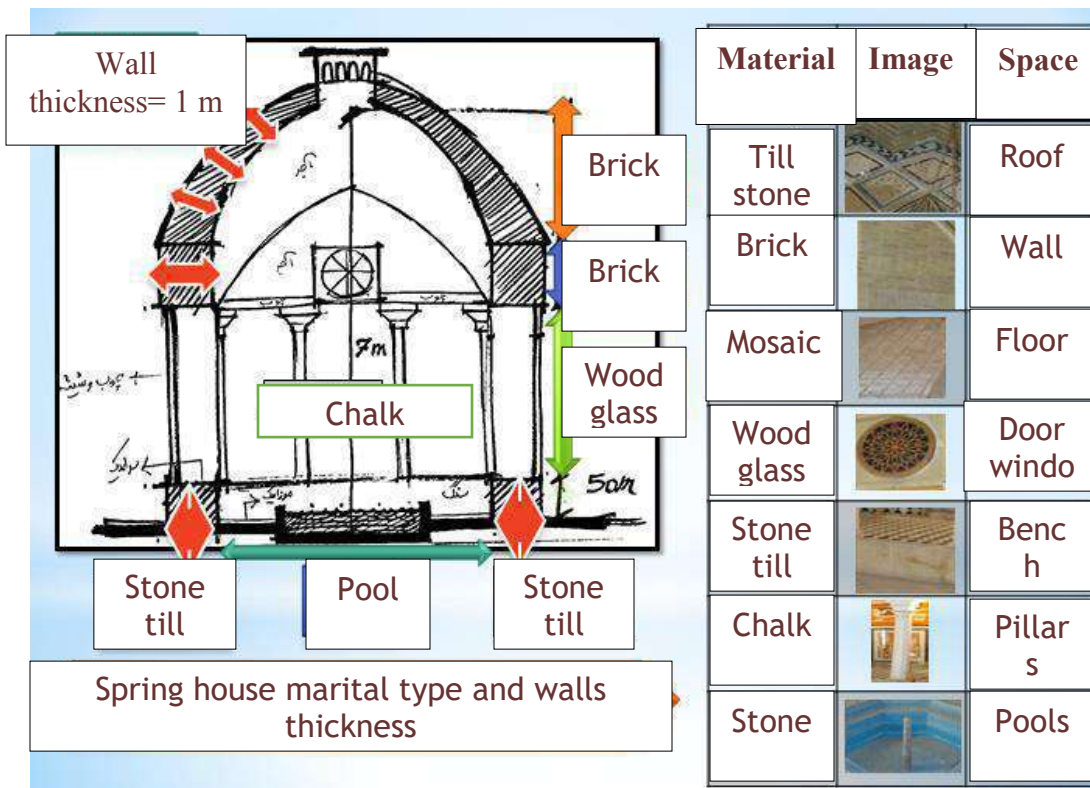


Fig: 4. the applied materials in Forough Almolk spring house

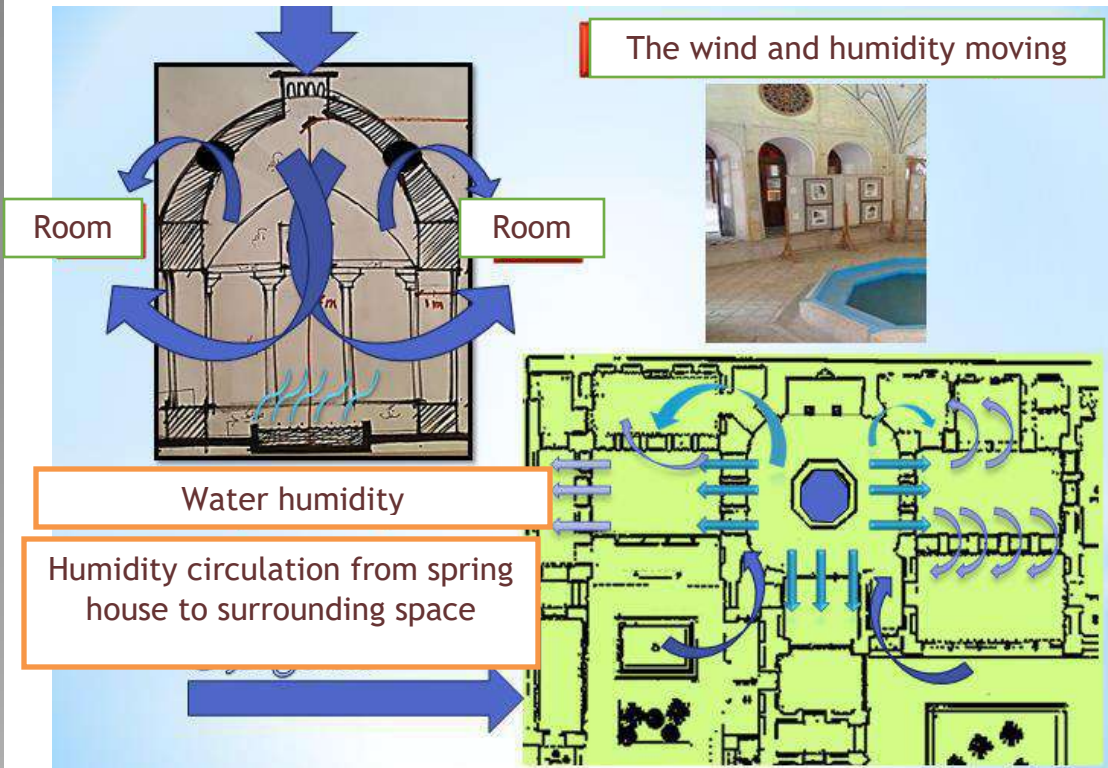


Fig: 5. the wind moving direction and humidity in the spring house at Forough Almolk house

The working method

The working method is done by the data measuring during two days by the temperature and humidity at the same level and every 3 days once the process is repeated.. As in the first day the humidity and temperature is evaluated in three times at morning, midday and evening with empty pool and then in the second day with the full pool and again in three steps in selected points the evaluation is done in different parts of spring house, [Figure- 6], the data measuring method for the humidity and temperature is done by the data logger instrument. The using method of this instrument is one a way that it must be located in the stature within 1.5 meters and without any contact with hand, the temperature and humidity is measured in different parts of plan [Figure- 7].



Fig: 6. the full and empty pool in the Forough Almolk



Fig: 7. the applied instrument to measure the temperature and humidity

Arrangement of points for measuring temperature and humidity in the spring house and the spaces around it

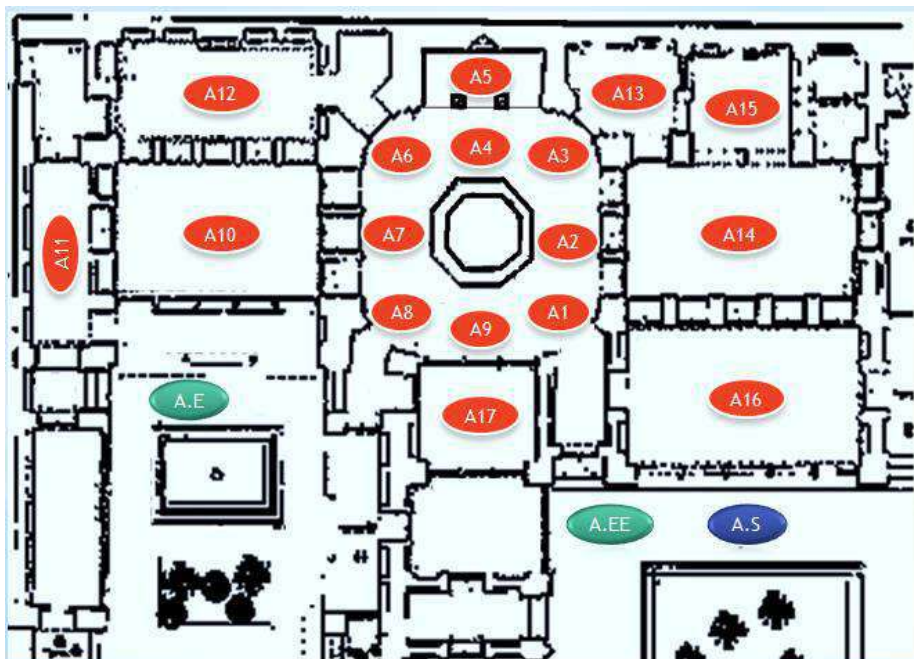


Fig: 8. the Arrangement of pointing in the Forough Almolk house plan

The weather condition in the spring house measurement days

Table: 1. the Shiraz city temperature and humidity condition in the measurement days

First day: the measurement with empty pool					
Date of measurement	month	Weather condition	Temperature in aerology	Humidity in aerology	
AD	2015/10/14	January	Sunny	7-15c 24-26 RH	
Helical	1393/10/24	Day			

Second day: the measurement with full pool					
Date of measurement	month	Weather condition	Temperature in aerology	Humidity in aerology	
AD	2015/10/16	January	Sunny	8-16 25-28 RH	
Helical	1393/10/26	Day			

Temperature data comparison and analysis

1-Analysis and comparison of temperature rate in the morning

Table: 2. temperature data in different points of spring house with full and empty pool, in the morning

Points and hours		First day	Second
External yard-going		Empty pool	Full pool
		8.3	8
3	A1- 8:28	11	7.5
4	A2- 8:29	10.5	8.1
5	A3- 8:30	10.2	8.3
6	A4- 8:32	9.5	7.3
7	A5- 8:33	9	7.5
8	A6- 8:34	9.5	7.7
9	A7- 8:35	9.7	7.6
10	A8- 8:35	10	7.2
11	A9- 8:37	9.7	7.3
12	A10- 8:38	10	8.7
13	A11- 8:39	9.3	7.4
14	A12- 8:40	9.6	7.8
15	A13- 8:41	9.3	7.8
16	A14- 8:42	9.3	7.8
17	A15- 8:45	9.1	8
18	A16- 8:47	9.6	8.2
19	A17- 8:50	9.7	8.3
20	Internal vard	8.8	7.3
21	External yard-return8:53	9.6	8.3

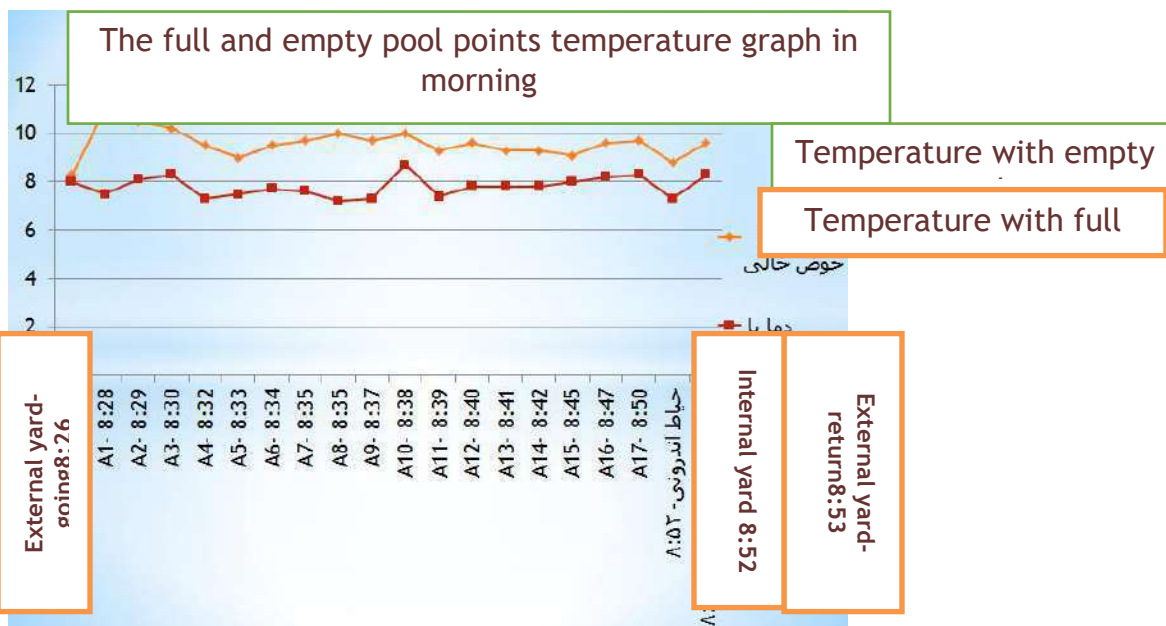
Morning

Between hour 8:30 to 9

Shiraz aerology
First day: 8c
Second day: 7c

Forough almolk
Empty Pool temperature average: 9.5
Full pool temperature average: 7.5

Graph: 1. the obtained graph from the above table data, in the morning



Analysis and comparison of temperature rate at midday

Table: 3. temperature data in different points of spring house with full and empty pool, midday part

Points and hours		First day	Second
External yard-going		Empty	Full pool
		15.6	16.3
3	A1- 12:42	15.5	12.2
4	A2- 12:48	13.5	10.3
5	A3-12:49	13.3	9.8
6	A4- 12:51	12.8	9
7	A5- 12:52	12.2	10
8	A6- 12:53	12.5	9
9	A7- 12:54	12.4	8.8
10	A8- 12:55	12.3	8.7
11	A9- 12:56	12.3	9.8
12	A10- 12:57	12.7	10.6
13	A11- 12:58	12.2	10.7
14	A12- 13:00	13.3	10.8
15	A13- 13:03	13.3	10.8
16	A14- 13:05	13.1	10.8
17	A15- 13:05	12.1	10.7
18	A16- 13:06	12.7	10.6
19	A17- 13:07	13.1	10.6
20	Internal yard13:08	14.7	11.9
21	External yard-return	14.1	13.9

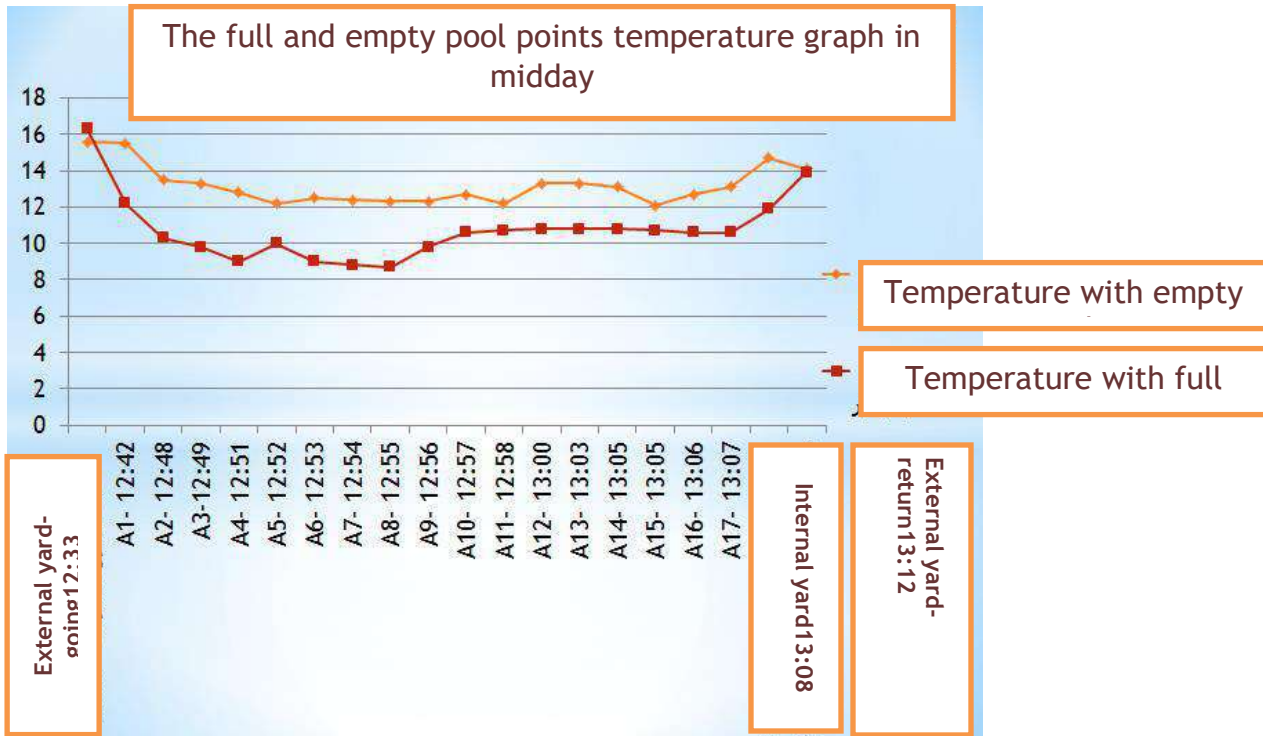
Midday

Between hour
12:33 to 13:10

Shiraz aerology
First day: 15c
Second day: 15c

Forough almolk
Empty Pool
temperature
average: 12.5
Full pool
temperature
average: 10.8

Graph: 2. the obtained graph from the above table data, midday part



3-analysis and comparison of temperature rate in the evening time

Table: 4. temperature data in different points of spring house with full and empty pool, evening time

Points and hours	First day	Second
	Empty	Full pool
External yard-going	10.7	10.7
3 A1- 17:15	12.4	12.7
4 A2- 17:17	12.4	12.4
5 A3- 17:18	12.5	12.1
6 A4- 17:21	12.5	11.6
7 A5- 17:22	12.2	11.3
8 A6- 17:24	12.1	11.2
9 A7- 17:24	12.1	11.1
10 A8- 17:25	12	11.1
11 A9- 17:26	12	10.8
12 A10- 17:28	12.3	10.8
13 A11- 17:29	11.8	10.8
14 A12- 17:30	12.8	10.9
15 A13- 17:31	12.1	10.6
16 A14- 17:32	12	11
17 A15- 17:32	11.8	10.7
18 A16- 17:35	11.7	10.8
19 A17- 17:37	11.8	10.8
20 Internal yard 17:38	11.5	10.5
21 External yard-	10.5	10.3

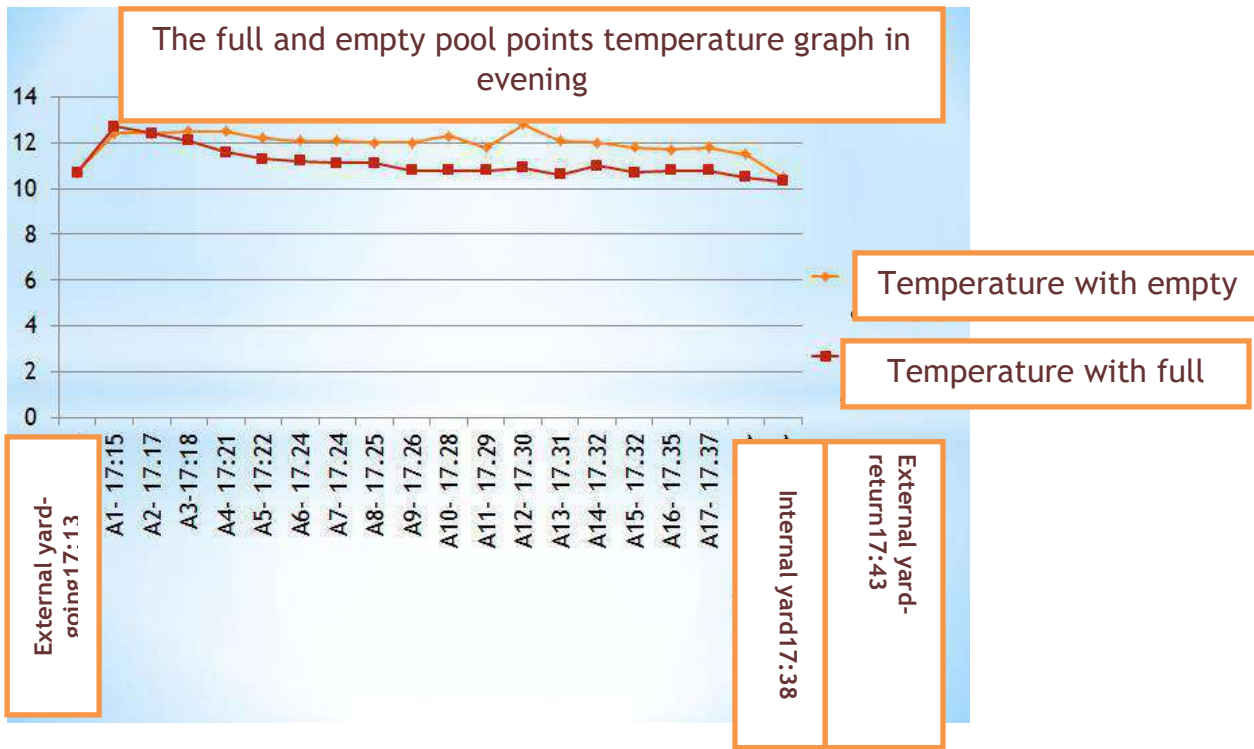
Evening

Between hour 17:13 to 17:40

Shiraz aerology (c)
First day: 11c
Second day: 11c

Forough almolk
Empty Pool temperature average: 12
Full pool temperature average: 10.8

Graph: 3. the obtained graph from the above table data- evening time



Humidity data comparison and analysis

Analysis and comparison of the humidity rate in the morning time

Table: 5. the humidity data in different points of spring pool with the full and empty pool- in the morning time

Points and hours		First day	Second
External yard-going		Empty	Full pool
3	A1- 8:33	21.3	28.8
4	A2- 8:34	24.2	46.3
5	A3- 8:36	24.5	46.4
6	A4- 8:37	24.5	45.3
7	A5- 8:39	24.7	43.6
8	A6- 8:40	24.9	43.4
9	A7- 8:40	25.1	44.7
10	A8- 8:43	25.3	46.4
11	A9- 8:44	25.5	46.6
12	A10- 8:48	25.5	48.3
13	A11- 8:50	25.7	44.3
14	A12- 8:53	25.4	48.1
15	A13- 9:00	26.4	47.6
16	A14- 9:02	26	47.8
17	A15- 9:05	26.2	45.4
18	A16- 9:06	26.5	45.3
19	A17- 9:07	26.7	45
20	Internal yard 9:10	26.7	44.3
21	External yard-	26.2	35.2
		21.6	28.5

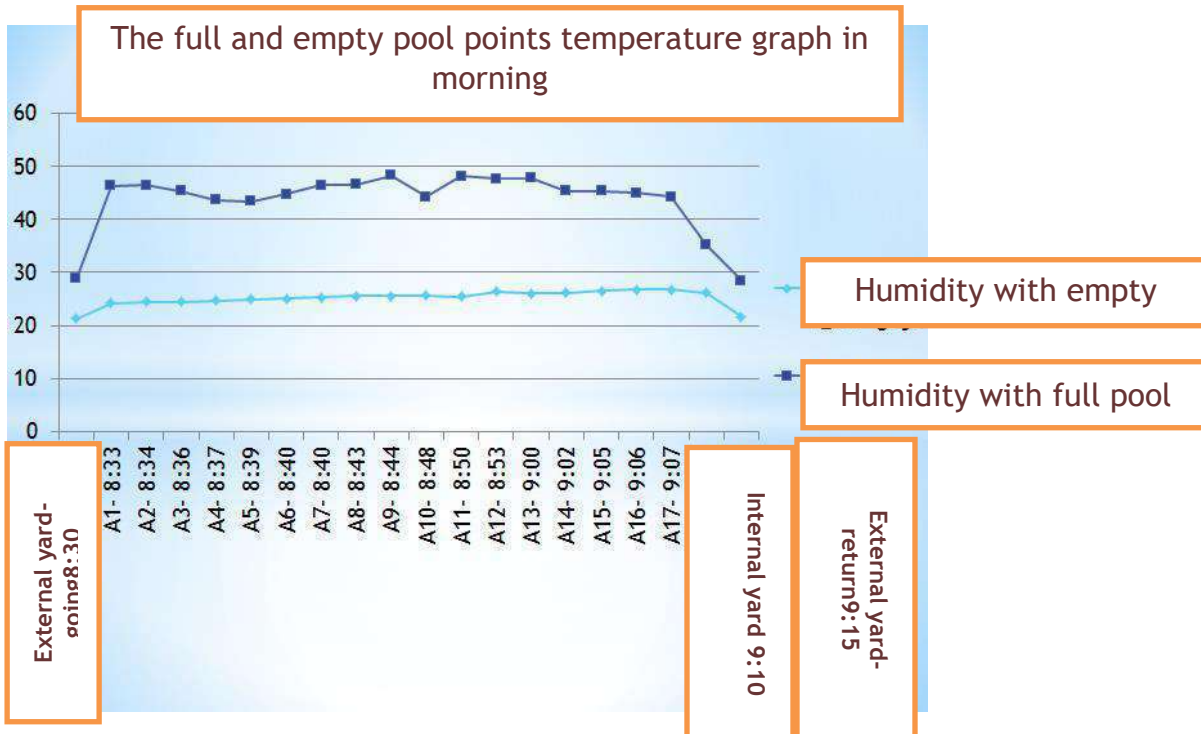
Morning

Between hour 8:30 to 9

Shiraz aerology
First day: C20
Second day: C25

Forough almolk
Empty Pool
humidity average: 25
Full pool humidity average: 46

Graph: 4. the obtained graph for the above table in the morning time



Analysis and comparison of the humidity rate in the midday time

Table: 6. the humidity data in different points of spring house with the full and empty pool in the midday time

Points and hours		First day	Second day
External yard-going		Empty	Full pool
3	A1- 12:31	24.2	26.1
4	A2- 12:33	24.5	28.2
5	A3- 12:35	24.5	30.7
6	A4- 12:37	24.7	34.3
7	A5- 12:39	24.9	35
8	A6- 12:40	25.1	35.7
9	A7- 12:41	25.3	35.9
10	A8- 12:42	25.4	36
11	A9- 12:44	25.5	36.3
12	A10- 12:45	25.7	37
13	A11- 12:46	25.4	37.3
14	A12- 12:48	26.4	36.5
15	A13- 12:50	26	37.3
16	A14- 12:51	26.2	37
17	A15- 12:52	26.5	36.8
18	A16- 12:54	26.7	36.5
19	A17- 12:55	26.7	37.7
20	Internal yard	26.2	36.3
21	external yard-return 13:00	26.3	30

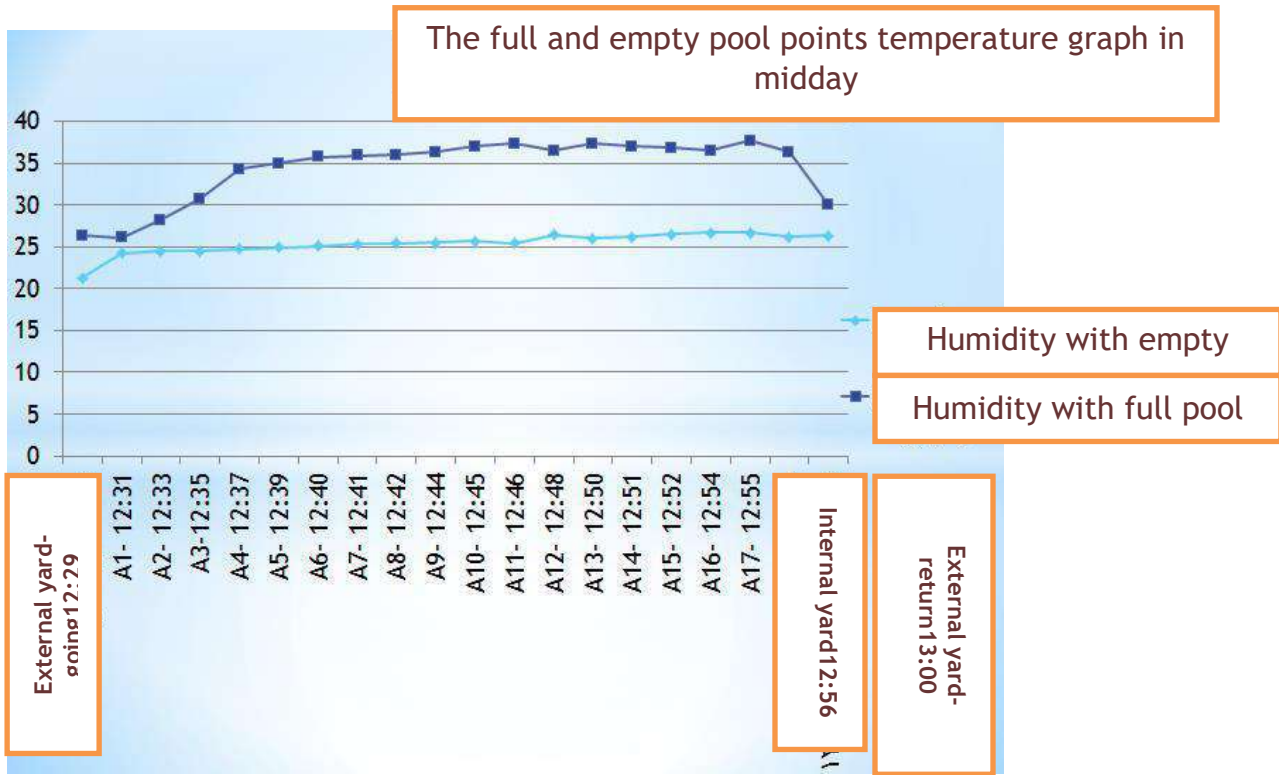
Midday

Between hour 12:33 to 13:10

Shiraz aerology
First day: C19
Second day: C 25

Forough almolk
Empty Pool
humidity average:
25.5
Full pool humidity
average: 35.5

Graph: 5. the obtained graph for the above table in the midday time



Analysis and comparison of the humidity rate in the evening time

Table: 7. the humidity data in different points of spring house with the full and empty pool in the evening time

Points and hours	First day	Second
	Empty pool	Full pool
1		
2	24.1	24.1
3	25	28.8
4	24.3	31.6
5	24.3	32.1
6	25.4	34.9
7	24.8	36
8	24.6	36.9
9	24.7	37.4
10	24.7	38
11	24.9	38.3
12	25.3	38.8
13	25.6	39.1
14	27.6	38.5
15	26	39.4
16	26.2	39.2
17	25.7	39
18	26.3	38
19	26.6	38
20	27	35
21	25.8	25

Evening

Between hour 17:13 to 17:40

Shiraz aerology
First day: 22 c
Second day: 25c

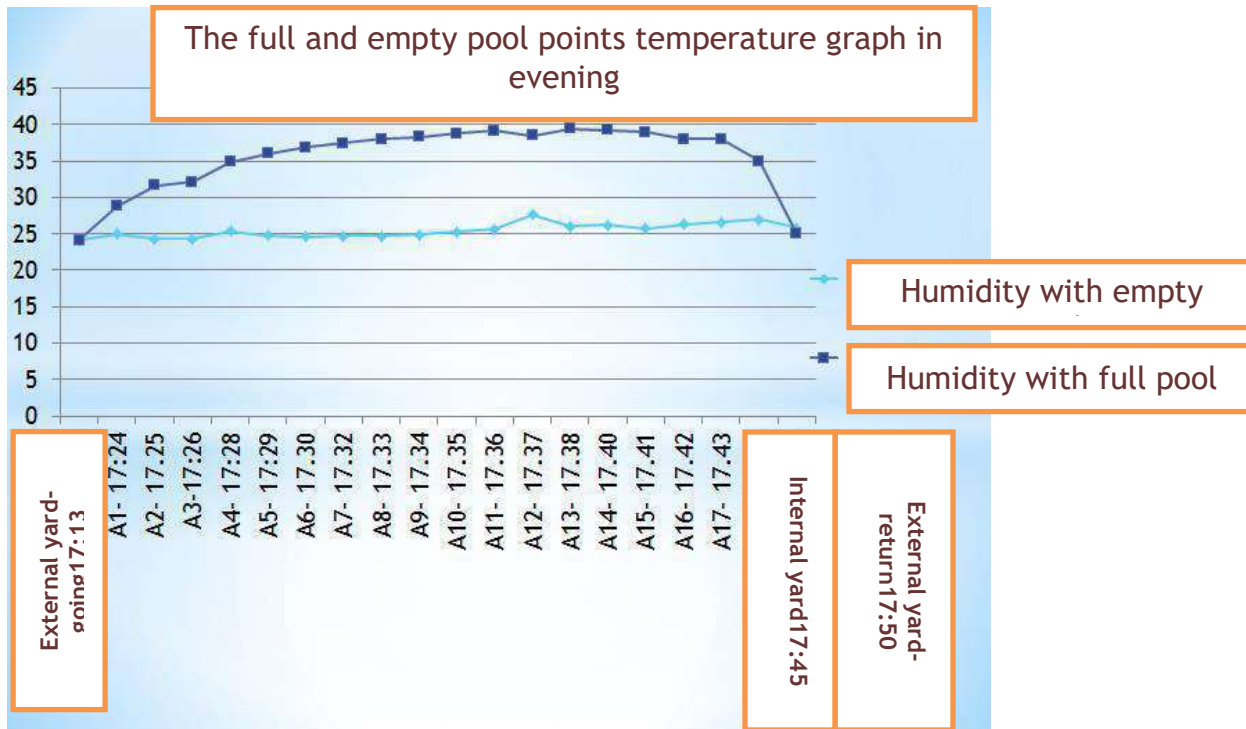
Forough almolk
Empty Pool humidity average: 25.5
Full pool humidity average: 36

External yard-going

Internal yard 17:45

External yard-return 17:50

Graph: 6. the obtained graph for the above table data- evening time



CONCLUSION

Analysis and comparison of the temperature rate conclusion

The results of tables analysis and temperature graphs in three times of morning, midday and evening is as below:

- Generally the temperature at the time of full pool in all points and in all hours is lower than the temperature with the empty pool
- As we close to the midday the spring house temperature either in the full pool or in the empty pool is more compared to the morning temperature.
- spaces which are in the direct sun shine both in the full pool and empty pools have more temperature
- points which are in the great yard surrounding, have more temperature compared to the beside small yard points

Analysis and comparison of the humidity rate conclusion

The result of humidity graphs and tables analysis in three times of morning, midday and evening is obtained as below:

- The humidity at the time of empty pool in all times of morning, midday and evening do not have considerable changes, but at the time of full pool, the humidity of all points in all hours has been increased
- The opening and holes existence to the yard assist the wind turbulence and it has effect on the humidity rate
- In every point of full pool, the humidity is more at the morning and it is decreased in midday due to the temperature increasing and in the evening due to the temperature reduction , it is increased again, so the temperature variation effects the humidity variation in every point
- Humidity in all rooms which are beside the spring house is more at the full pool compared to the time the pool is empty.

The finally analysis conclusion and temperature-humidity comparison in all points

According to the below table when the pool is full of water, the air temperature is reduced and the humidity is increased in all hours of day, so we can conclude that the dry and warm regions without the use of using the energy consumption and only by the presence of full pool we can achieve the favorable air in the space that could assist the students of this course in the architectural faculty (who are the future constructors) in order to apply the designing proper model in accordant to the dry and warm climate in making the space cooling condition and reduction of the energy consumption.

Table: 8. the humidity and temperature data average when the pool is empty or full

Temperature	Morning	Midday	Evening
Empty pool	9.5	12.5	12
Full pool	10.8	10.8	10.8
Humidity	Morning	Midday	Evening
Empty pool	25	2.5	25.5
Full pool	46	35.5	36

THE APPLIED STRATEGIES IN DESIGNING

According to the obtained results from the observations and humidity and temperature measurement in Feroqh Almolk house in Shiraz and also the performed studies in this field, a general plan was achieved that proved the inquiry of a main spring house and also using the smaller spring house in the required locations. Spring houses in this complex are similar to the Feroqh Almolk spring house on a way that they are located in the main spaces and other spaces as students classes are around because students spend more time in them. This space also could be changed to the beating heart of architecture facility for the students correspondences and it could have other applications in the essential occasions as the fairs, congress holding and etc. as it is observed in the spring house designing, one side of spring house is usually is opened to the external space due to the opening air circulation and in this project also it is attempted that the complex is connected to the yard by the windows and doors, so it will both has the relation with the green space and nature directly and the air ventilation is done properly. The spring house roof similar to the Feroqh Almolk spring house has the higher stature compared to the spaces and some wind louvers are located in the proper direction to enter the external air to the internal space and through passing the pool water, it will provide the surrounding space cool air and this model leads to make a void on the spring house space that assist the air regulation in higher steps. It is expected that according to the performed observations and experiments and measurements, we can achieve the proper thermal comfort and better space by application of designed spring pools capabilities.

THE FINAL DESIGN PROJECT

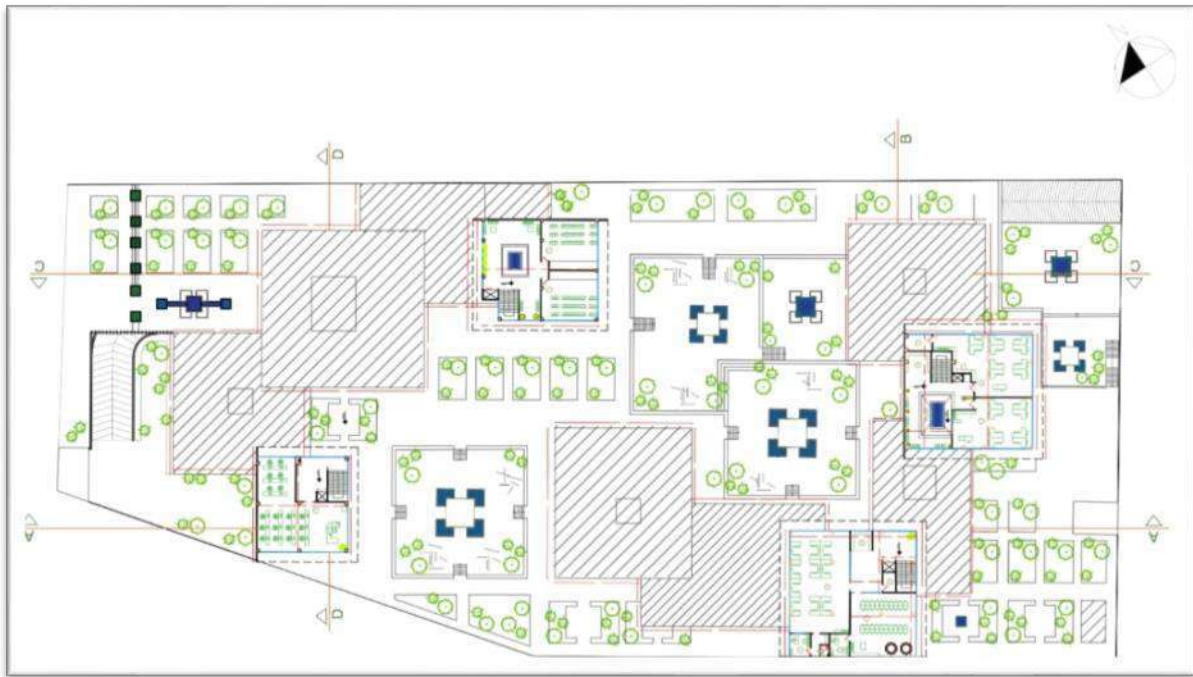
The designing documents including the furniture plan and D-D, C-C, B-B, A-A section and the project volume is presented.



Plan: 1. Ground floor plan



Plan: 2. First floor plan



Plan: 3. second floor plan

The project sections



SECTION A-A



SECTION B-B



SECTION C-C



SECTION D-D

The final volume of the project



Fig: 9. The final volume of the project

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None declared.

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AN OUTLINE OF LEGAL ORGANIZING OF TOURISM IN IRAN

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ABSTRACT

The increasing growth of economic costs among the states, have made officials identify the ways to earn money and utilize them with the best methods. By the change of energy consumption pattern economies relying on single product industry such as oil and natural gas, are inevitably about to upcoming failure for environmental reasons. On the other hand, energy resources will surely give out. In addition, tax revenues are not enough for government economic needs because of cultural reason and tax evasion in Iran. Thus, it is not only useful but also necessary for Iran developing society to place an industry other than oil and natural gas. With cultural background antiquities and beautiful natural views such as mountains tourists, seas, deserts and wildernesses, Iran has a high potential in the contest of tourism, the possible potentials could be used in the best way, and this industry could become a profitable area by correct policymaking. Codification and approval of special tourism rules, extensive international advertising for existing safety in Iran, fast issuance of visa for tourists without severity, avoidance of extreme severity in the clothes of foreign female tourists, reviewing the tourism fundamentals such as hotels, toll houses, highways and roads, establishment of entertainment places and promenades in the cities more aimed by tourists, establishment of washrooms and clinics on the way of tourists, management of traffic in the roads and big cities, to equip aviation service and airports, reparation, renovation and preservation of buildings representing the culture and civilization of Persian empire, Omission or minimizing the custom tariffs for tourists and such cases can dispatch a great stream of tourists towards Iran annually.

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KEY WORDS

tourism business, State earning,
Tourism of Iran

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INTRODUCTION

Nowadays, economy is one of indices of dominance and power of and country among the others. Economies relying on a single product industry always have frequent fluctuation because of policy makings of other states who are their associates or customers. An economy is strong and invincible if it foresees and implements its income programs strategically in different ways for a long time.

Since long ago people traveled by primary vehicles in order to buy, jaunt and visit historical places and big cities. They usually traveled collectively and with convoys. Many of these convoys had guised. Individual traveling was rare and dangerous. Sumerians could probably be considered the first nation to go trade travels, the safety and importance of tourism increased gradually, many advances were achieved, and this area turned out a profitable and significant business for officials.

Form the important types of tourism, one can name typical tourism nature- based tourism, adventuresome tourism and medical tourism each of which has a wide extent and all the tourism types have some intersection such as separation of an individual from their permeant location temporariness of the trip, and activities like entertainment, visit, and shopping that all of them need to spend economic and financial costs.

All over the world, because of its profitability, the tourism has an ordered and regulated management system that commits some affair such as observation of tarriance sites, transport issuance of visa preservation of cultural heritages and feats of ancient civilization. In Iran, these affairs are assigned to cultural Heritage Handcrafts and tourism Organization that is responsible for Preservation and management of historical sites and relics and museums, designing national and international advertising programs for Iran cultural Heritage and tourism attractivenesses through domestic

and foreign media, and attraction of domestic and foreign capital by observance of foreign investment support and encourage low in order to make ground for stable development of cultural Heritage and tourism.

Also formation of tourism supreme council for tourism policy making and attracting foreign tourists and issuance of visa and other cases that has meetings with President, largely the expansion of tourism Organization activities.

World tourism Organization locates in Madrid, Spain, and studies the tourism and publishes a report annually. As the location of states conversation about their policies and scientific exchange in tourism knowledge, this Organization has a central and significant role in improvement of commitment and abilities in developing countries based on tourism.

Tourism history

Tourism is a process that has existed with its special forms in human societies for a long time gradually by taking some steps has passed its evolution way to the present day. It had much developed and many states could improve their economic condition by earning income through it

Tourism in the world

From long ago, people traveled and visited ancient relics and natural views all over the world pedestrian or by livestock. After the invention of wheel, wheel and carts could not pass every way. Thus, the roads were made. Ur people, Babylonians, Egyptians, Iranians and Greek were pioneers of this field. Athens had become a city with enormous attractions for tourists form the second half the 5th century BC [1].

However, Roman Empire were of the primary countries to base a kind of tourism similar to the temporary tourism style by the wealth and equipment they had provider for their people and by building roads, ways tourist attraction and passenger radiance cit. Romans used travel in order to see ancient buildings such as famous temples around the Mediterranean Sea Specially Egyptian ancient relics and pyramids (Alvani, 2006: p 20). In third and fourth century AD The safety of leisure trips experienced a crisis by decline of Roman Empire and from the collapse time (beginning of middle Ages) to the renaissance era (14th century) travel was dangerous in Europe.

One of the factors, expanding travels in the ancient era was trade of goods especially silk and spice which was transported from east to west and for this reason Silk Road was made that was transmission path of merchants, passengers and governmental representatives for many centuries. This way should be considered the most important way of ancient world that began in Jasper Gate in Great Wall of China and elongated to Kashmar through two ways of Turpan (in the north) and Hotan (in the south) and after passing through Iran plateau, Mesopotamia and Syria reached Mediterranean sea in Antioch port (1). Travel was also very common among Muslims. Basically Islamic View is cosmopolitanism and universalism. Holy Quran has advised the trip in many verses¹. Totally, thirteen holy verses about travel, journey, tourism and exploration are included. Following these emphasizes and Holy Quran orders many Hadiths about travel and journey are quoted to holy prophet (PBUH) and Imams. One can point to Masalek Books in this field that discuss the roads, distances and intervals between the cities and staying cites on these roads [2].

Tourism in Iran

All over the ancient era (before Islam) Cities, roads, and staying cites were developing in Iran Empire and because of the relative safety, travel was prevalent between merchants and patricians. After the arrival of Muslim Arabs in Iran Prosperity declined over the centuries, however because of foundations existing in Iran from the ancient era there were some felicity and travel equipment. Since the Muslims were willing to discover and conquer new territories, tourism was promoted from 9th and 10th centuries AD in Iran. As an attractive country, Iran interested many European tourists in safavid Dynasty era (16th and centuries) specially in reign period of shah Abbas I. shah Abbas I to the end of safavid Dynasty time interval could be considered one of the most

important periods of tourism development in Iran and this development was associated with some factors the most important of which being security and development of traffic roads and staying cities [3].

The background of tourism in Iran is 75 years and the first formal authority in this context foreign tourists Attraction and Advertising office associated under home office in 1953. After the victory of Islamic Revolution in February 11 1979, all the activities related to tourism in the country was disciplined by journey and pilgrimage affairs assistance of Ministry of culture and Islamic Guidance, however Iran Exploration Tourism Organization” became the director of tourism and journey affairs in 2001. After that in 2003 cultural Heritage and tourism organization formed under president that was conceived a centralized organization for auditing of tourism in the country. In 2006 Handcrafts organization was dissociated from ministry of Industries and mines and cultural Heritage, handcrafts and tourism organization formed although the increasing of managerial hardware. Components by coherence in the context of tourism after the Islamic Revolution was a positive procedure, the major proceed in the country tourism after Islamic Revolution can be considered a restrictive and destructive proceed [4].

The restrictive and destructive proceeding can be described such that victory of Revolution and incidence of unsafety in the country as well as in creasing of security threats and different sanctions against Iran reduced the entry of tourists to the country very much from the first years after the revolution to early 1990s. Also in many cases some professionals of tourism exited the profession because of the government carelessness, as well a part of tarriance service equipment was given to official and military entities and social security and finally more than 20 thousand bed capacity exited Iran tourism capacity [4].

Of course, this procedure changed after the war. However, the damage and defects caused by this policy to the country tourism during the war led to drastic lag of tourism. However from 1990s tourism as a part development program lied under the vision document and found an acceptable position in documents and programs one to sour. However, these programming could not help the growth and development of this business so much in the country and regional competitors could make a significant difference from Iran in tourist attracting.

Iran tourism competitors in the region do negative advertising against Iran and pretend Iran unsafe [5]. Widespread international advertising for representing the real view of Iran can neutralize this action largely.

From the of tourism business Iran does not possess the the development it merits [6]. From the reasons one can name unreadiness of appropriate economic grounds in Iran for attracting investment in building hotels and other lateral resources in this aspect. Investor unawareness of condition and areas of tourism in Iran is one of the most important factors of unwilling of foreign companies to invest in this area. While Iran is one of 10 richest countries on the planet with respect to historical, cultural and natural resources, it earns less than one percent of global tourism income [6].

Some tourism problems of our country are: managerial shortcoming anti-iranism, lack of competitiveness of tourism costs in Tran compared to neighboring countries, vagueness of government programs in the area of tourism, inappropriate tourism bases in Iran compared to neighboring countries, weak culture of society about tourists and variable political behaviors. After many years tourism business not only has achieved an acceptable contribution in national income, but this little contribution reduces every year while according to global statistics Iran is one of 5 potentially strong countries with respect to foreign tourist attraction[7]

Tourism types

Because of multidimensional and interdisciplinary nature of tourism, this business can be considered from different economic, sociological and managerial viewpoints perhaps it is the reason that many definition of tourism regarding different fields of knowledge are presented.

Form the viewpoint of marketing and salespersons tourism is a set of activities that occur during the trip of a tourist. It includes any activity occurring during the trip of a tourist. It encompasses any process of programming for trip, traveling for the aim of staying, returning and even remembrance of memories, although it includes the activities that tourist do as a part of the trip such as buying different goods and interaction between the guest and the host too. Totally, any kind of action and reaction daring the trip of a tourist can be conceived as tourism [7].

In 1942, Swiss economists who focused mainly on tourism in their studies and researches presented a relatively better definition of this business and among them the definition of Honrico – Krapof could be considered. In his definition tourism is appearance of a set of relationships that are generated by the trip and transience of an individual without permanent staying and occupation:

World Tourism Organization has presented the following definition: tourism is the set of works an individual does in travel and in a place out of their bounded location. The travel does not prolong more than one year and its aim is entertainment, trade or other activities. By these definitions, tourism gets some categories.

Typical tourism

Typical tourism or mass tourism exists extensively all over the world. Moreover, against this tourism is alternative tourism that is a tourism type which was proposed in reaction to unbridled development of mass tourism in the 1970s and its purpose was utilizing new methods in tourism instead of destructive tourism methods [8].

This kind of tourism leads also to the culture and human relations to be a commodity. There is low space for relationship between the guest and that host and it results in exclusion of human senses. Traditional types of hospitality cannot keep responding to the constant stream of tourists. Specially, tourists are less interested in encountering and most of them are curious to native people [8].

Nature-based tourism

Nature tourism is a stable and natural kind of tourism that becomes achievable by participation of native operators and by utilizing local and natural tourism potentials. World Tourism Organization defines ecotourism as: a kind of tourism in which the trip to natural regions (keeping relatively undamaged) is done with the aim of research and visual use of natural views and plants and wildlife and regarding both the past and present cultural aspects [9].

Spatial domain of this pattern is natural environment such as beach, forest, mountain, desert, cove, and so on. This spatial pattern of tourism encompasses different types of tourism including environment tourism, marine tourism, and sport tourism, hunting tourism and animal and plant collection. According to environment tourism community, nature tourism and environment tourism occupy 20 percent and 7 percent of the global trip market, respectively.

Environment tourism is more common near the cities. As a result it can help economic development of regions near the cities and prevent the concentration of financial resources in city centers. Every programming and policy making for ecotourism must have the qualifications of firstly it results in economic development of societies and secondly minimizes the inequality between resources available to tourists and the life of native residents and tourism development method in this sector must not make difference with social, environment and cultural properties of local societies. Indeed, investment in environmental tourism is an effective step for deconcentrating the financial resources from central government domain to local governments domain to local government and inspiration of this issue can help increasing governmental earnings.

Adventure tourism

Adventure tourism includes the use of the natural resources of destination. Topography and natural properties of some countries is especially appropriate for this type of tourism. In some parts of the world there are concerns about long term stability of adventure tourism [10]. Another important issue respecting the safety of special activities and the need to precise training of tour staff of adventure tours. Such an attention is a result of increasing growth of the death and serious injuries occurred during the adventure [10].

Adventure tourism includes specific interest in lot, specializing the market and the growing number of specialist tour leaders that provide equipment, experienced tour guides and trip programs. Adventure tourism seems to be an adventure market together with growing development of adventure tours and improving information of relevant actors in this context and by tourist attraction, one can help government by increasing the government tourism income.

Medical tourism

According the definition of world tourism organization one of the purposes motivating the tourist for trip is trip for wellbeing. Medical tourism is a kind of tourism that is conducted in order to preserve, improve and recover the physical and mental health for a period more than 24 hours and less than a year.

Some factor such as change of consumers' values, changes of life, ageing of population and conditions of health care system could be considered as the causes of Medical tourism generation. The set of these causes led Medical tourism to be conceived one of the most growing and profitable types of tourism for example a large number of residents of the countries around Persian Gulf travel to Iran for the purpose of cure by Iranian doctors annually. Cannot government develop his income from this area of tourism by facilitating trip tariffs and considering custom imposition and tax exemptions for such tourists? Medical tourism can be categorized in various subsets such as cure tourism, medicine tourism and health tourism and some countries have defied medical tourism as a strategic and profitable business in their national development vision in twenty first century so that, medical tourism as an important business has a significant participation in providing of their economic and social purposes by presenting products such as trip package.

Given the travel of many citizens of near Persian Gulf countries that embark to Iran for the purpose of medication every year, there is an appropriate ground for increasing the incomes of this area in the country and it can be used optimally by adequate designs.

Tourism – related organizations in Iran

Regarding its beautiful natural views as well as rich historical and cultural heritages Iran territory has a great attraction for other nations and people of the world and for this reason has been intentioned by many tourists and explorers from long ago. Iran Exploration & Tourism Organization that serves under Ministry of Culture and Islamic Guidance is considered the official and major proctor of the country tourism business. Iran Exploration & Tourism Organization has various training centers and short, mean and long term tourism – relates courses are held under the observation or direct responsibility of this organization and Supreme Council of tourism is responsible for policy making in the area of foreign and domestic tourism.

Iran Exploration & Tourism Organization

Form the organizational and structural viewpoint management of tourism in Ministry of the Interior was established with the name “office of tourism affairs” in 1935[11]. After 1941 this office was replaced by “Supreme council of tourism”. This council weekly meeting in ministry of the interior. In 1953 proposition of tourist attraction importance in countries, attention for tourism increased and the office of tourism affairs established again in ministry of the interior. In 1963 the organization of tourists attraction was established that took some action for tourism development by providing, codifying and executing plans and by extended and high amplitude programing and in 1964 this organization was incorporated with the contemporary ministry of information and kept acting with the name of Ministry of Information and Tourism. After the Islamic Revolution in 1979 prevent job overlapping and for mote coordination, Revolution council approved the establishment of Iran Exploration and organization with new purposes and policies and tourism affairs concentrated in this organization. In order to modify a part of Iran exploration and tourism system in the country and for more coordination, exploration and pilgrimage Assistance of the Ministry of Culture and Islamic Guidance was incorporated with Iran Exploration & Tourism centers Organization in 1996 and with the new name of Iran Exploration & Tourism Organization associated with this ministry committed the jobs of programing policy making direction and observation of this sector, from 2004, Iran Exploration & Tourism Organization dissociated from the Ministry of Cutler and Islamic Guidance and together with cultural Heritage organization and Handcrafts Organization continued its activity under the name of cultural Heritage, Handcrafts and Tourism Organization[11].

The extent of authorities of this organization can be summarized in some segments.

A) Prescription of policies and doctrines of Iran exploration and tourism:

All the exploration and pilgrimage service offices and Iran exploration and tourism cites belonging to private and public sector, Islamic Revolution entities and un-governmental public associations are bounded to observe signficated policies and doctrines by the organization for Iran exploration and tourism.

B) License issuance for establishment and foundation of exploration and pilgrimage service offices and Iran exploration and tourism cites, of course it should be noticed that According to Iran exploration and tourism business development act issuance or revalidating any license for establishment and foundation of exploration and pilgrimage service offices and Iran exploration and tourism cites as well as matching or annulling it is committed to the Ministry of Culture and Islamic Guidance. However, by approval of the organization formation act in 2003 this authority was assigned to Cultural Heritage and Tourism Organization Chief.

C) Support attraction form governmental and non – governmental sectors, cooperation and private sectors for achieving the goals of cultural heritage and tourism sectors and facilitating the investment of non – governmental sector and increasing this contribution in issues related to cultural heritage and tourism in permission of assigning the maintenance and management of museums and historical places and cites to a selected

D) License issuance for establishment of exemplary tourism regions to non- governmental sector in order to assign decision-making duties

E) Some action of national and international advertisement for introducing Iran cultural heritage and tourist attraction through foreign domestic and mass communication media [12].

Iran exploration and tourism organization as a stock company associated with the Ministry of cultural and Islamic Guidance having independent legal entity, is formed and managed according to trade principal and regulation of governmental companies and some subjects of its formation are:

1) Declaring Islamic Republic of Iran and familiarizing country people and other nations with Iran cultural and Traditional specifications, ancient relics and civilization.

2) Continuous study and scrutiny of the country explorer and pilgrim attraction and providing necessary programs for introduction of attraction in order to utilize them

3) Communicating with domestic and international centers and organization and tourism and information interchange with them

4) Attempting to attract domestic and foreign tourists and providing necessary facilities to hold low cost excursions for Islamic Republic of Iran cultural, social economic and political departments.

5) Improving the level of presenting tourist services through adequate ways in order for providing safe job grounds

6) Motivating Iranian people to use leisure times and hours and observer country exploration and pilgrimage attractions.

7) To help improving country public and foreign exchange earnings through marketing and expanding correct exploration exchanges

8) Improving the level of services and industries associated with tourism and encouraging investment in building tarriance reception infrastructural installations for tourists more welfare.

9) Observation of the operation of different units working in tourism business sector.

10) Establishment of travel and exploration agencies Building hotels inns and service and amenity complexes.

Supreme Council of tourism

This council, its formation being approved in January 2004 and its chief being the President or his prime assistant held its first meeting 11 years after approval and signification of its act in August 2015. The main function of this council is considering and policy making for tourism. According to article 3 of Cultural Heritage and Tourism Organization Forming Act approved in January 13 2004 the session of supreme council of tourism is held with chairmanship of president or vice president and membership of Cultural Heritage and Tourism Organization chief and ministers of foreign Affairs, Housing and Urban Development, Road and Transportations, Interior, Culture and Islamic Guidance and the chiefs of management and programming and Islamic Republic of Iran Broadcasting Organizations and Department of Environment and four experts proposed by Cultural Heritage and Tourism Organization chief and appointed by President. Regarding the member arrangement of the Supreme Council of Tourism one can realize the extent of the Council importance, but unfortunately officials disregarded this issue and did not from the supreme Council of Tourism for 14 years after the approval of the act of its formation and attempted subjects around general policy making for tourists attraction specially foreign tourist attraction, and indeed forbared the large amount of foreign exchange earnings of profitable business of tourism.

Most of organizations possess a kind of small advisory structure relying on a larger advisory structure to attempt decision making and following the issues more effectively. Supreme Council of Tourism commissions are committed with this duty and in order to help doing council duties well, according to article 4 of the code of the procedure of the formation and management of the supreme council of cultural heritage and tourism approved by the council of ministers in 2004, specialized commissions with membership of vice presidents and ministers and the chiefs of related organization is formed

World Tourism Organization

World Tourism Organization located in Madrid Spain is one of United Nation representative that studies tourism affairs and published a report annually too. This is organization is the place of states debate on their policies and practical experiences about tourism knowledge and it has a core important role in improving the obligation and existing of developing countries in the context of tourism.

World Tourism Organization was established in 1975. Before the establishment of this organization the most valid international and tourism organization was international union of official travel Organization established in 1952 and later was replaced by World Tourism Organization. The union was formally inaugurated in Hague of Netherlands in 1947. Tourism activity was accompanied by modern life development. International aspects and the number of related sector such as travel, tarriance and service have developed too. In mid 1960s the need to a more efficient organization able to interact with people movement and tourism policies and effects well in order to manage this change and prepare international system, became more obvious.

After that the collaboration of this organization with United Nation become more frequent and closely so that its name changed to World Tourism Organization and it was supported globally as a specialized agency of United Nation and an organization responsible for stable development of tourism sector [13].

Through persuasion of member states as tourism destinations, this organization attempt to maximize the economic advantages, tourism can bring with it and minimize the social and cultural effects of tourism development as well as its environmental and negative social effects in order to implement global professional Ethics instructions in tourism.

Currently, 157 states, 300 members associated with private sector representation, training association, tourism companies and competent local authorities are members of this organization.

World Tourism Organization is bound to regard Millennium Development Goals reduce poverty and expand stable development [13].

The institutional interstate organization that United Nation System has assigned it the responsibility of tourism development promotion tries to make economic growth, create job, motivate the support of environment and heritage of tourism destinations, and provide support for peace and agreement among the nations all through the tourism.

World Tourism Organization is an international and interstate organization that is generated by the change of International Union of Official Tourism Organization. According to Article 2 of World Tourism Organization Statute the organization headquarter is determined by the decision of general assembly and it can be changed by the approval of general assembly any time. According to Article 3 of the Statute of the organization the basic goal of the organization will be tourism encouragement and expansion in order to help economic development, agreement between the nations, global peace, comfort and respect, observance of human rights and basic freedoms for all without discrimination by race, sex language and religion and the Organization does any action needed to achieve this goal. As well, in the way to this goal the Organization pay special attention to developing countries interests in tourism.

Obviously, advanced countries in the area of international tourist attraction recognize all the regulation and directive of world tourism Organization and accomplish all the provision by full respect to it and the tourists at appointed period

CONCLUSIONS

Today, tourism development as the most profitable business of the date is one of main goals of the programmers, collaborators, and official of the governments in most of the countries over the world. Regarding its beautiful natural views as well rich historical and cultural heritage Iran territory is very attractive for other nations and races of the world. After the war imposed on the country, rebuilding the country and economic, social, and cultural programming placed on top of the state plans. A sector always regarded highly or weakly by country development plans, has been tourism specially cultural- religious tourism.

This approach was regarding political social and cultural structure, the old history and civilization of the territory, the resources and importance of the country cultural- religious attractions, cultural- political exchanges and need to foreign exchanges and earning.

For tourists, one of highly sensitive and significant issues in tourism business is security and preservation of tourists' life and properties in any country. The higher is safely factor of tourist in a country, the the more they are willing to travel that country, basically, in security and safety aspects and cannot approve distinct, supportive and discriminatory rules for tourist, because separating and isolation of foreigners from country people is considered a kind of discrimination. However, one can protect the rights of tourist and explorers by forming tourism police.

Hoteling business that includes reception and production distribute and offering of food and drinks for passengers, forms a great deal of tourism business with respect to occupation and earning. Satisfying and preserving customers and in turn profitability has a special importance in this business.

Islamic Republic of Iran national program of tourism development is the first segment of a pervasive long-term plan to develop and manage the country tourism sector. Overall goals of tourism sector development are: to help improvement and reinforcement of relationship of Iran with other countries as a part of Islamic discourse strategy, to provide job for the youth and unemployed people, to provide economic port unities in rural regions, to increase the country foreign exchange earnings, to help the improvement of social welfare level and the most impotent, to assure the stability of tourism development environmentally social and culturally.

Tourism is regarded in all the political systems. Form developed countries such as Canada and America to developing countries such as Cuba and Srilanka, tourism development is highly regarded as an adequate strategy for economic development. Government is the area of values and interests contrast, therefore, recognizing and realizing the point that which values and interests influence political decision and action and what is the result of such decisions, policies and actions, requires doing vast studies and researches.

Realizing characteristic principles and recognizing the role and importance of state in tourism development in very important. However, unfortunately the role of state in tourism has often been disregarded, Realizing tourism public polices require understanding and recognizing characteristic principles through which tourism policies are designed and codified [14]

Such agreements vary in deferent countries and in deferent political segments of a single country. This variation influence: a) the method of expressing political disagreements, b) Strategies used by individuals and group for influencing on policy making process and c) the extent of which policy makers concern economic and social issues. There is no doubt that oil and in turn, oil incomes decrease during the time and will eventually end. Thus, the government should figure on replacement another business other than oil. Tax revenues, are good and convenient, but, given the lack of sufficient culture in this area, the end of oil after a period of time, and the lack of trust and rely on this area, it is suitable for the government to reflect replacing oil industry by the tourism sufficiently.

Through its multidimensional feature, tourism business engages different sector depending on the kind of activity so that it has been coveted by world trade organization.

However, Management weaknesses series at the macroeconomic level and the lack of support system and necessary guarantees prevent the compensation of its requirements.

For this reason the states set their domestic investment on tourism according to the domestic rule and regulation. Accordingly, in order to utilize the rules and regulation existing in international economic system including investment it is has been able to influence only a special area of industrial countries such as European Union. Thus, uniform or special rules and regulations should be provided in international tourism system and world trade organization so that tourist attraction potentials in developing countries attempt to provide special regulations for investment on supporting these countries substructures leading eventually to tourism development and in turn achieving stable tourism.

Proposed plans

In some cases countries' rules do not cover existing and new needs completely or are not accomplished because of management weakness that is called legislative defect and executive defect

Legislative defect has two estate of rule limitation and rule void Executive defect is a condition that there are rules in an area but they are not executed for some reasons.

Rules limitation condition in a state in which there is a rule but in another area there are rules that prevent the execution of that rule

Also the rule void is a condition that I as special area because of being a new condition no rule has been provisioned and approved so far.

Executive defect is a state in which there is a rule and there is no limitation but because of carelessness or disregardful of managers it is not accomplished .

Today, economy is considered one of predominance and power indices of and country among the states of the world. This predominance is not achieved but by recognizing income resources, programming, acuteness and utilizing adequate designs to apply this resources. Economies relying on single product industries always have enormous variation with policy making of the states that are their contracting parties and buyer of their products. An economy is strong and invincible if it foresees and implements its income programs strategically in different ways for a relatively long time. Tourism is a profitable business that most of the states of the world pay it a special attention and consider revenues coming from it specially. In order to reach revenues coming from this business a desirable level and avoid the coherence of the country economy to oil incomes, the need codifying rules in the area of tourism by international standards, regarding the tourists interest, the improvement of hotels and loading condition, to equip aviation system and healthcare centers, all can make Iran the global hub of tourism.

The development of construction in line with notation of damaged area and tourism area, together with the collaboration of private public and governmental sector and provision of highly adequate facilities for individuals participating in stable development of this area, providing different preparatory areas for stable tourism development, comprehensive supports of tourism management and obviating entertainment and leisure requirements of tourists while observance of rights and instituting life and property security for foreign tourists and promoting tourism and exploration culture in the country by establishment and exploiting tourism police as well as accepting the changes of international domain and global competitions while preserving national interests and precise programming in short, mid and long term instead of routine.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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STUDYING THE EFFECT OF REPLACEMENT OF DIFFERENT LEVELS OF WASTE RESTAURANT RICE WITH DIET BARLEY ON BLOOD PARAMETERS AND LIVER ENZYMES IN LORI FATTENING LAMBS

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ABSTRACT

Aims: Lab coats are known to act as vectors in transmitting the potentially pathogenic multi-drug. In order to evaluate the effect of replacement of different levels of rice waste of restaurant with diet barley on blood parameters and liver enzymes in fattening Lur lambs, 40 Lur male lambs with an average weight of 25 kg that were randomly divided into 5 groups were used. Experimental diets were set according to CNCPS tables of food requirements in accordance with 80% concentrate and 20% forage. Energy and protein contents all diets were equal, and waste restaurant rice with the ratios of zero, 25 percent, 50 percent, 75 percent and 100 percent replaced barley in diet of lambs. Feed and water were fed to livestock freely. Lambs adaptation period to the experimental diets is considered 15 days and fattening period is considered 75 days. To determine blood parameters and liver enzymes, on 90 day of the experiment, samples of the lambs were taken through the jugular vein in the neck and hematological parameters include Glucose, cholesterol, triglycerides, HDL, LDL, VLDL and liver enzymes include alanine aminotransferase, aspartate aminotransferase, and alkaline phosphatase that were measured. The results showed that the concentration of triglycerides, and VLDL Tri-blood serum and liver enzymes aspartate aminotransferase and alanine aminotransferase are under the significant effect of different treatments ($P < 0.05$). However, treatments did not have a significant impact on the concentration of HDL, LDL, glucose and blood serum cholesterol and liver enzyme alkaline phosphatase in fattening lambs ($P > 0.05$). Generally, the results showed that waste rice restaurant could be used in fattening lamb without detrimental effects on animal health.

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KEY WORDS

rice waste
hematological parameters
liver enzymes
fattening lambs

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INTRODUCTION

Due to population growth, protein need of society increase. This is while, based on the recommendations of the World Health Organization, at least one third of the protein intake should be provided from animal protein sources. The cost of food in a fattening period is one of the highest costs, 65 to 70 percent of the costs related to the breeding and keeping of livestock is in relation to nutritional issues. Therefore, identifying new sources of affordable food, as well as the proper use of these resources is a key priority for the industry. In this regard, the use of waste products of agriculture and processing industry has long been considered before. In many countries, food waste that does not fit for human consumption has been successfully used in livestock rations. The availability of waste in livestock rations is dependent on factors such as the amount of nutrients and anti-nutritional factors in it. The waste produced per person is equivalent to 72.6 kg. Nutrients available in 5 to 7 tons of household waste are roughly equivalent to 1 ton of barley, which can be used in the production of animal feed [1]. Buddha (1990) reported that waste generally has a dry matter of 31.6%, organic matter of 92.1% ash 7.9%, crude protein 17.6%, fat 20.1%, crude fiber 3.6%, raw energy of 87.8 MJ per kg, and 23.9 of MJ digestible energy per kg. Saki et al (2006) studied nutritional value of kitchen waste and reported that this material contains 4,300 kilocalories per kilogram raw energy and 1999 kilocalories per kilogram of metabolizable energy for broiler chickens [2]. These materials have no negative effect on the broiler diet. The researchers also used 0, 10, 20, and 30% levels of kitchen waste in broiler diet and expressed that no significant differences were seen in weight gain and feed conversion ratio between the different treatments and finally offered that 10% of these materials have no negative effect on the broiler diet. Hosseinkhani et al (2013) in a study examined the effect of different levels of barley replaced with restaurant waste in the diet of fattening lambs [3]. Diets contained three levels of barley replacement with restaurant waste levels (0, 50, and 100 percent),

the survey results showed no significant differences in the use of restaurant waste levels in the diet of fattening lambs. Moradi et al (2013) reported that replacement of barley grain at 50% and 100% levels with restaurant waste reduced price per unit increase in body weight compared to the control diet 24 and 37.7% respectively [4].

Studying the factors affecting the metabolism of lipids, including the construction of Tri-glycerides or neutral fats in animal husbandry is of particular economic importance. Neutral lipids in animal husbandry are important from two perspectives. First, the ratio of production efficiency is crucial in animal products and, secondly, these compounds have close ties to many metabolic side effects [5]. Although the impact of dietary lipids in cardiovascular disease of fattening lambs is not important due to short economic life, because of the impact that blood lipids have on the product quality that it is ultimately used for human consumption, they are important. In this regard, it has been reported that reduction in blood levels of very low-density lipoprotein reduces abdominal fat and total abdominal fat in poultry [5]. Neutral fats or triglycerides after absorption to digestion system in the stomach by two mechanisms, either directly or through the bloodstream enters the blood by special proteins called lipoproteins transferred to the tissues [6]. Triglycerides in the food and fat manufactured by the liver should be stored or transferred to help blood flow to tissues and organs. However, since lipids are insoluble in water their transmission by blood plasma is not possible, so non-polar neutral fats and cholesterol esters and phospholipids and free cholesterol associated with proteins called apoprotein and lipoprotein complexes formed there lipoprotein, miscible with water and can be transmitted by plasma [7]. The concentration of non-esterified fatty acid and triglyceride very low-density lipoprotein concentrations in plasma are important criteria for the synthesis of triglycerides in non-liver tissues. Moreover, any change in concentration of very low-density lipoproteins can be an effective tool for improving efficiencies in livestock production. For example, by reducing very low-density lipoprotein concentrations, carcass fat content can be reduced and thus increase production efficiency [8]. Thus, the aim of this study is to evaluate the effect replacement of different levels of rice waste of restaurant with barley diet on blood parameter and liver enzymes in Lur male lambs.

MATERIALS AND METHODS

For the study, 40 male Lur lambs, with an average weight of 25± 1.5 were used. The lambs were randomly divided into 5 groups of 8 and kept and fed in individual pens and a 15-day adaptation period was considered. After the period of adaptation, they were fattened for 75 days of the trial period. After calculating the amount of waste rice required for the project, the waste was collected from the restaurants in Khorramabad.

After collecting, the waste was spread on the bed netting, and dried under the light and heat of the sun and then used for animal consumption. After grinding with a one-millimeter sieve, samples were analyzed to determine the crude protein (CP), crude fat (EE) and ash (Ash) (1990AOAC.). Measurement of acid detergent fiber (ADF) was performed by method of Van Sousse and colleagues (1991) [Table- 1].

Table: 1. Analysis of the chemical composition of rice waste (based on dry matter)

Nutritional matter	Crude ash (percent)	Ether extract (percent)	Crude protein (percent)	Metabolizable energy	Insoluble fiber in acid detergent (percent)
	2.9	6.5	11.9	2.86	1.5

The diets used in this experimental were according to nutritional requirements tables Sheep CNCPS (2007) and by 80% concentrate and 20% alfalfa [Table -2]. In the experimental diets, restaurant waste rice was replaced barley, as a source of dietary starch, at 0, 25, 50, 75, and 100 percent. Diets were completely mixed and given to the animals. Food and water were freely available to livestock.

Table :2. The composition of the experimental diets (based on dry matter)

Food item (percent)	Experimental diets (% of replacement of waste rice with barley)				
	0%	25%	50%	75%	100%
Alfalfa	23.32	23.31	23.29	23.31	23.31
Barley	33.12	24.86	16.59	8.26	0
Rice waste	0	8.26	16.59	24.86	33.12
Corn	19.52	19.52	19.50	19.52	19.52
Soybean Meal	9.52	9.52	9.51	9.52	9.52
Sugar beet pulp	9.71	9.71	9.70	9.71	9.71

Bran	1.65	1.65	1.65	1.65	1.65
Limestone	1.07	1.07	1.07	1.07	1.07
Di-calcium phosphate,	0.10	0.10	0.10	0.10	0.10
Sodium Bicarbonate	1.00	1.00	1.00	1.00	1.00
Salt	0.50	0.50	0.50	0.50	0.50
Mineral supplements and vitamins	0.50	0.50	0.50	0.50	0.50
Total	100	100	100	100	100
Nutrients (calculated)					
Metabolizable energy	2.57	2.65	2.58	2.58	2.58
(Megacalories kg dry matter)	15.3	15.0	14.6	14.2	14.0
Crude Protein (percent)	26.4	26.3	26.1	25.9	25.7
Neutral detergent fiber (percent)	50.6	51.0	51.5	51.9	52.3
Non-fiber carbohydrates (percent)	0.79	0.79	0.80	0.80	0.80
Calcium (percent)	0.35	0.35	0.35	0.35	0.35
P (percent)	9651	9106	8555	8003	7458

To investigate the effects of diets on blood parameters livestock, blood samples were taken on 90 days of the experiment. For this purpose, four hours after eating the morning meal, blood samples were taken from jugular vein by sterilized syringes, immediately transported to the laboratory, and plasma was separated by using a centrifuge. The plasma was then transferred to a freezer and stored at -20 °.

Finally, blood parameters such as glucose, triglycerides, cholesterol, HDL, LDL and VLDL were determined by using spectrophotometer and test kits of pars Co. Measurement of liver enzymes including alkaline phosphatase, alanine amino-transferase enzyme was determined by coding method of Keiding et al. (1974) and Bergmeyer et al. [9].

The experiment were performed using a completely randomized design with 5 treatments. SAS version 9.1 software was used for data analysis. Data on blood parameters and liver enzymes were analyzed using GLM procedures. Least-squares multiple range comparison was done using Fisher least significant difference test. For all comparisons, significance was considered at the level of $P < 0.05$.

RESULTS AND DISCUSSION

Results of substitution effect of different levels of waste rice of restaurants on hematological parameters are given in [Table -3]. The results showed that the treatments had no significant effects on serum glucose, cholesterol, HDL and LDL blood serum did not fattening lambs ($P > 0.05$). Abedini et al (2012) studied the effect of replacement of different levels of dried citrus pulp instead of barley at 0, 33, 66 and 100 percent levels [10]. The researchers expressed that the experimental diets resulted in significant changes in blood glucose levels and blood serum glucose concentration in the treated animals and in 100 percent, treatment was lower than other treatments. These result contrasts with those results. Nikkhah et al (2008) reported increased blood glucose in line with increasing levels of concentrate in the diet due to high production rate and absorption in the rumen propionate and subsequently increased hepatic gluconeogenesis [11]. Since the amount and ratio of concentrate to forage was similar in all groups, and difference was in the components of the concentrate, it was expected to affect blood glucose levels, but as was said barley replacement with waste rice of restaurants did not cause significant changes in blood glucose levels of the lambs. Raisi et al (2012) studied the effect of feeding four levels (0, 7, 14 and 21%) of germinated barley on blood metabolites of Kerman male lambs and reported that none of the metabolites such as cholesterol were affected by diets [12].

Their results are consistent with the present study results. Very low-density lipoproteins are responsible for transmission of cholesterol made in the liver to peripheral tissues [13]. Very low-density lipoproteins are atherogenic lipoprotein, and their increase in serum is the most important risk factor for coronary heart disease. Low density lipoprotein, unlike chylomicrons and very low density lipoprotein that are for only a few hours in the bloodstream, remain stable in the bloodstream nearly 3 days. Then by oxidation of the fat inside it are swallowed by macrophages and transform into foam cells and deposit in the lining of the arteries and cause atherosclerosis plaques that clog arteries [14]. In this experiment, consumer of 75% of replaced rice had the least low-density lipoprotein.

However, serum triglycerides and VLDL in groups receiving different level of waste rice showed a statistically significant difference ($P < 0.05$). The least (16.39 mg per deciliter) and the highest (25.45 mg per deciliter) blood serum triglyceride concentrations are respectively related to control (0% of waste rice) and treatment 2 (25% rice waste). Moreover, the lowest (3.27 microns per liter) and the highest (5.09 microns per liter) concentration of very low Density Lipoprotein (VLDL) are respectively related to the control and treatment groups with 25% of restaurant waste rice instead of barley diet. VLDL in ruminants is similar to the micro Shiloh rich in triglycerides (50%), whose function is to transfer triacylglycerol made in the liver to other organs of the body. The combination of very low density lipoprotein triglycerides, fatty acids, fatty acid composition of the diet of ruminants, such as chylomicrons severely affect infants, but in adult ruminants are not affected. The reason for this difference could be severe hydrogenation of fatty acids by microorganisms in the rumen diet [15].

Table 3: Effects of waste rice of restaurant on hematological parameters of a fattening lamb

Parameter	Replacing level of the waste rice with barley diets					SEM	P-value
	Group 1(0) percent	Group 2 (25) percent	Group 3(50) percent	Group 4 (75) percent	Group 5 (100) percent		
Glucose ¹	58/73	51.98	60.48	54.02	69.52	3.28	0.083
Cholesterol ¹	45.48	45.81	48.48	45.23	46.52	2.99	0.856
Triglyceride ¹	16.39 ^b	25.45 ^a	24.08 ^a	20.45 ^{ab}	18.30 ^{ab}	1.86	0.005
HDL ²	19.04	18.87	21.45	22.12	20.20	1.10	0.610
LDL ²	23.25	22.94	21.17	19.77	23.57	2.56	0.619
VLDL ²	3.27 ^b	5.09 ^a	4.81 ^a	4.10 ^{ab}	3.67 ^{ab}	0.373	0.006

* The numbers in each row shown with dissimilar letters are significantly different ($P < 0.05$). ¹ mg per deciliter. ² microns per liter

Enzymes aspartate aminotransferase is one of the most important enzymes of aminotransferase that by transferring amino units catalyzes alpha-keto acids to amino acid. Assessing the activities of aspartate aminotransferase is a basic method for the detection and assessment of liver or muscle damage. In general, increased aspartate aminotransferase is highly correlated with the amount and intensity of cellular damage (16; 17). In this experiment, liver aminotransferase aspartate enzyme was affected by treatments ($P < 0.05$). The lowest (145.17 unit per liter) and the highest (204.89 units per liter) levels of aspartate aminotransferase enzymes were respectively related to treatment containing 50% of waste rice of restaurants and samples with 75% of restaurant waste rice instead of barley diet [Table -4]. Enzymes alanine aminotransferase is one of the most important enzymes of group aminotransferase that by transferring amino units catalyzes alpha-keto acids to amino acid. Liver alanine aminotransferase of the groups receiving different levels of rice showed no significant differences ($P < 0.05$). The lowest (20.90 units per liter) and the highest (38.37 units per liter) levels of the liver enzyme alanine aminotransferase were respectively related to treatment 3 (50% of waste rice) and group 4 (75% of waste rice). Liver enzyme alanine-aminotransferase concentrations in treatments containing 0, 25, 50, and 100 percent of waste rice have no significant difference, but they have significant difference with 75% treatment of waste rice [Table -4].

Alkaline phosphatase is a hydrolytic enzyme with optimal activity in alkaline pH and has various forms in the blood. This enzyme, which is normally one of the most commonly use enzymes of the liver in the laboratory to test, has the role of a single phosphate esters catalyzed by alkaline hydrolysis of various precursors [18]. Alkaline phosphatases in the liver is the bone of dominant form of blood serum in adults and identifying the item in the differential diagnosis of diseases of the liver or bone isoenzyme of alkaline phosphatase can be helpful (19). Alkaline phosphatase concentration in fattening lambs was not different between treatments ($P > 0.05$). But, numerically lowest and highest concentration of alkaline phosphatase were respectively in treatment 3 (50% of waste rice) with a concentration of 499.58 unit per liter and treatment 2 (25% of waste rice) at a concentration of 592.33 unit per liter [Table -4].

Table: 4. The effect of different levels of waste rice of restaurants in liver enzymes in fattening lambs

Parameter	GROUP					SEM	P-Value
	Group 1 control	Group 2 (25) percent	Group 3(50) percent	Group 4 (75) percent	Group 4 (100) percent		
AST (U/l)	146.25 ^b	147.50 ^b	145.17 ^b	204.89 ^a	192.17 ^{ab}	7.40	0.0039
ALT (U/l)	24.22 ^b	22.70 ^b	20.90 ^b	38.37 ^a	23.37 ^b	1.49	0.0001
ALP (U/l)	529.50	592.33	499.58	542.25	551.75	22.26	0.8135

* The numbers in each row shown with dissimilar letters are significantly different (P<0.05).

AST = aspartate aminotransferase; ALT = alanine aminotransferase; ALP = alkaline phosphatase

CONCLUSION

Generally, the results showed that as much as 50 percent of the barley in diet could be replaced with waste rice of restaurants with no negative effects on the health of fattening lambs.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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THE RELATIONSHIP BETWEEN SPIRITUAL INTELLIGENCE AND DYSFUNCTIONAL ATTITUDES AND DEPRESSION AND LIFE SATISFACTION IN MAHAN SECONDARY SCHOOL STUDENTS

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ABSTRACT

The aim of the present study is to investigate the relationship between spiritual intelligence and dysfunctional attitudes and depression and life satisfaction of students in Mahan high school. The research method is descriptive and statistical population is 364 students whom they were selected through census sampling. To collect the data, King Spiritual Intelligence (2008), DAS Wyman and Beck (1978), Beck (1997),) and life satisfaction Diner et al (1997) have been used. To analyze the data, Pearson and Spearman correlation coefficient and multivariate regression were used. Findings showed that there is a relationship between spiritual intelligence and dysfunctional attitudes and depression and life satisfaction in Mahan secondary school students. The best predictor of life satisfaction of students, are respectively, depression, and dysfunctional attitudes and spiritual intelligence.

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KEY WORDS

Spiritual intelligence, life satisfaction, depression, dysfunctional attitudes

INTRODUCTION

The sense of well-being or life satisfaction is one of the important psychological characteristics that a healthy person must have. Satisfaction with life is defined as a typical sign of a successful adaptation to changes in various life situations. Contrary to common expectation, satisfaction with life does not decline with increasing age and generally remain stable throughout the life course. (Lotfabadi, 2013).

Life satisfaction is the feeling of happiness and satisfaction with various aspects of life, that reflect positive attitude towards the world in which they live. Life satisfaction has a close but complex relationship with values, and is different from the criteria which people perceive their subjective happiness. In human life satisfaction not only reflects the combination of short, medium and long-term processes at the individual level but also the result of the interaction of individual and cultural levels. (Azimi Hashemi, 2004).

However, after extending the concept of intelligence to other areas, human capacities and capabilities, particularly the introduction of emotional intelligence in psychology, Emonz in 1999, raised a new structure as spiritual intelligence.

He said SQ is a set of capabilities to take advantage of religious and spiritual resources. Spiritual intelligence and spiritual intelligence structures have been combined in one construct. While spirituality is the search for sacred elements, meaning construction, high sharpness and excellence, spiritual intelligence includes the ability to predict function and compatibility of a person and to produce valuable results. On the other hand it is an interpersonal cognitive distortion of exaggerated beliefs, very dry, utterly irrational and individual relationship to life. Ellis says that the root of many human ailments and mental and behavioral disorders lies in a variety of irrational beliefs about the world around him. Rational - emotional - cognitive behavioral theory of Ellis is one of the theories that refer to a variety of irrational beliefs, the main cause of human problems. Irrational beliefs are beliefs that have dominated the mental and determinants of how they interpret and give meaning to events and regulate the quality and quantity of the behaviors and emotions. Irrational beliefs are not true and do not coincide with reality and bring "should" and "rule" for people, they destroy one's balance and prevent discipline and dealing successfully with irritating accidents

(Kaviani et al., 2013). Depression is a mood disorder characterized by varying degrees of despair, loneliness, failure and guilt and doubt. Depression is a common disease that most people in the world suffer from it and call it "psychological cold". It affects people's empowerment in behavior, thoughts and feelings. The individual becomes isolated and his relationship with others is reduced. Depression starts from a feeling of helplessness, incompetence and unwillingness to live and at higher levels and over time will lead to feeling absurd and suicide. Depressed people have a feeling of helplessness and numbness.

These people usually are not hopeful in life, see the future as dark their speech ability is weak and have less presence in social activities and generally are not satisfied with their lives (Shamloo, 2008). World Health Organization mentions defining aspects of human existence, the physical, psychological, social and spiritual, and the fourth dimension, is the spiritual dimension in human growth and development. It is enough to understand the importance of spiritual matters as Psychologists and Psychiatrists say, spirituality is outlined not only as mental health but also as an integral part of the process of treating mental disorders (Elkins, 1999).

Other factors that affect life satisfaction and reduce it are dysfunctional attitudes and irrational thoughts. So a lot of inconvenience and confusion in people's lives are due to irrational, unrealistic and inefficient beliefs that they have about themselves and the world around. In other words, mental health problems is a result of their incorrect understanding, because the world itself is neither good nor bad, but our perception of it is good or bad, and as a result, we can say that the excitement of each person, is due to his recognition (Vali zadeh, 2006).

Dysfunctional Attitudes include attitudes that make the individual vulnerable against the "depression". These attitudes, are activated immediately after the occurrence of negative life events and after activation, incite the pattern of processing information that have negative orientation, in other words they are specified with negative errors in thinking.

As mentioned, another effective psychological factor is depression. Depression is a disorder that declines mood and life force of the person and he reaches the point of distress. In such circumstances he may seem worthless and the world may lose its meaning and a sense of misery and despair appear in the person. (Farjad, 2005).

MATERIALS AND METHODS

The sample size in this study is 396 students who were selected through census sampling. It should be noted that 396 questionnaires were distributed among students and 364 were returned completed and 364 completed questionnaires were analyzed. The statistical population of this study consisted of secondary school students of Mahan in the academic year (2014-2015) and it is 400 persons.

To analyze the data, descriptive and analytical statistical methods were used.

Descriptive statistics: mean, standard deviation, frequency, frequency percentage, graph, table and so on.

Statistical methods: Pearson correlation coefficient and multivariate linear regression.

Before testing the hypotheses, normal (normal distribution) the variables studied. It was tested by Kolmogorov - Smirnov one sample was tested, and then the appropriate statistical tests were used. For data analysis software SPSS version 20 was used and the level of 0.05 was considered significant.

Research objectives

The main purpose

Investigation of the Relationship between spiritual intelligence and dysfunctional attitudes and depression and life satisfaction in students of Mahan

Subsidiary goals of research

1. Checking the relationship between spiritual intelligence (critical thinking, personal meaning production, transcendental consciousness and the development of consciousness) with the consent of secondary school students of Mahan
2. Checking the relationship between dysfunctional attitudes and life satisfaction of secondary school students of Mahan
3. Checking the Relationship between depression and life satisfaction of secondary school students of Mahan

Table 1: Population size and sample

Grade	Number of community	Number of samples
First grade	175	160
Second grade	225	204
Total	400	364

Inefficient attitudes
Table 2: Descriptive statistics of inefficient attitudes

Variable statistics	Inefficient attitudes
Number	364
Average	4.17
Middle	4.15
Mean	2.7
Standard deviation	0.586
skewers	-0.228
elongation	0.536
least	2.6
most	5.8
Score range	3.2

Life satisfaction among students

From 364 patients studied, 49 (13.5 percent), had low satisfaction with life, 190 patients (52.2 percent) had moderate satisfaction with life and 125 (34.4 percent) had high satisfaction from their lives.

Table 3. Distribution of life satisfaction among students

Cumulative percent	frequency	Frequency percentage	frequency	Life satisfaction
13.5		13.5	49	Little
65.7		52.2	190	average
100.0		34.3	125	Much
-		100.0	364	Total

Life satisfaction

Table: 4. Descriptive statistics, life satisfaction

Life satisfaction	Variable statistics
364	number
4.54	average
4.60	middle
4.4	mean
1.251	Standard deviation
-0.514	skewers
0.119	elongation
1.0	least
7.0	most
6.0	Scores range

Depression among students

From 364 patients studied, 102 (21%) did not have depression, 66 (18.1) percent had mild depression, 105 of (28.8%) had moderate depression and 91 patients (25%) had severe depression.

Scores of depression variable:

Table: 5. Descriptive statistics of depression

Variable statistics	Life satisfaction
number	364
average	10.21
middle	9.0
mean	3.0
Standard deviation	7.6
skewers	0.6

Investigating the assumption of normality of variables

elongation	-0.2
least	0
most	35.0
Scores range	35.0

Table: 6. Kolmogorov-Smirnov test for normality assumption of the variables

Depression	Life satisfaction	inefficient attitudes	Spiritual intelligence	
2.385	1.810	0.923	1.522	Kolmogorov-Smirnov statistic
0.001	0.003	0.362	0.019	significant
364	364	364	364	Number

The test results of normality of variables based on Kolmogorov-Smirnov test shows that the significance of variables of dysfunctional attitudes is above the significant $05/0 = \alpha$, therefore, at this level, hypothesis H_0 , the normality of the data is not rejected, so we can say that DAS is normally distributed and to test the hypotheses, Pearson and Spearman correlation test and multivariate linear regression can be used.

Table: 7. Analysis of variance, multiple regression model, the relationship between spiritual intelligence and dysfunctional attitudes and depression with life satisfaction of students.

Source changes	sum squares	of Degree freedom	of Average squares	of R	R2adj	Amount of F	Amount of -P
regression	2321.18	3	773.72	0.404	0.156	23.4	0.001
left over	11903.53	360	33.06				
Total	14224.71	363					

Spiritual intelligence and dysfunctional attitudes and depression can be predicted life satisfaction of students and the most important predictor of life satisfaction of students, respectively, depression, and dysfunctional attitudes are spiritual intelligence.

Table: 8. Coefficients of the regression model, the relationship between spiritual intelligence and dysfunctional attitudes and depression and life satisfaction students.

Variable	Estimated B	Criterion error	Standard estimates of B	Amount of T	amount of -P
Fixed	25/185	3/06	-	8/231	0/001
Spiritual intelligence	0/062	0/025	0/124	2/519	0/012
Inefficient attitudes	-0.026	0.013	0.097-	-1.98	0.048
Depression	-0.0279	0.04	-0.0339	-6.906	0.001

Table 9: Analysis of variance components of multiple regression model, the relationship between spiritual intelligence (although critical thinking, sense of personal, transcendental consciousness and the development of consciousness) with the life satisfaction of the students

Source changes	sum squares	of Degree freedom	Average squares	of R	R2adj	Amount of F	Amount of -P
regression	539.18	4	134.79	0.195	0.027	3.53	0.008
left over	13685.5	359	38.12				
total	14224.71	363					

Table: 10. Coefficients of the regression model, the relationship between spiritual intelligence (although critical thinking, sense of personal, transcendental consciousness and the development of consciousness) with the consent of the lives of students.

Variable	Estimated B	Criterion error	Standard estimates of B	Amount of T	amount of -P
Fixed	15.659	2.008	-	7.79	0.001
Critical thinking	0.08	0.09	0.06	0.96	0.33
Personal meaning production	0.03	0.113	0.019	0.313	0.754
Transcendent awareness	0.15	0.09	0.116	1.72	0.048
Development of consciousness	0.07	0.111	0.044	0.68	0.49

CONCLUSION

The main hypothesis of this study

There is a relationship between spiritual intelligence and dysfunctional attitudes and depression and life satisfaction secondary school students of Mahan. Data analysis through multivariate linear regression showed a significant linear relationship between spiritual intelligence and dysfunctional attitudes and depression and life satisfaction of students in Mahan.

On this basis we can say that when students feel frustration, aimlessness and isolation they do not have the full consent of their life, also when students have irrational attitudes and beliefs that are subject to being perfectionist like being happy depends on a person being attractive, intelligent, and wealthy and creative and if you fail at doing something then you are considered a loser and cannot be trusted, then they cannot get full satisfaction from life. Statistically, people who live their spiritual intuition and have ultimate goal in life, they are aware of the deeper relation between self and others, and have greater life satisfaction.

Secondary research hypothesis

1. There is a relationship among components of spiritual intelligence (critical thinking, sense of personal, transcendental consciousness and the development of consciousness) with the satisfaction of secondary school students in Mahan. Data analysis, through multivariate linear regression analysis shows that there is significant linear relationship between the components of spiritual intelligence (although critical thinking, personal meaning production, transcendental consciousness and the development of consciousness) with satisfaction of secondary school students in the region of Mahan. Critical thinking variable and personal meaning production, transcendental consciousness and the development of consciousness 0.027 explain variance of life satisfaction and the most important predictor of students' life satisfaction, is transcendental consciousness.

So when students have high intellectual intelligence and understand philosophical concepts well and be able to analyze them constructively, be aware of the deeper relation between self and others, and understand their existential dimensions which is deeper than physical object and to think about issues such as life and death, reality, consciousness, the universe, time, truth, justice and evil, then it will change their view towards life and its objectives and can have more life satisfaction.

2. There is a relationship between Dysfunctional Attitudes and life satisfaction among secondary school students of Mahan.

The analysis of the data, through the Pearson test shows that the correlation coefficient between the two variables dysfunctional attitudes and life satisfaction of students is -0.149 with -P value (significantly) 0.004, so there is an inverse relationship between dysfunctional attitudes and life satisfaction of students.

Accordingly, when students have attitudes and beliefs like being happy depends on being attractive intelligent, rich and creative, someone does ask for help, it is a sign of weakness, if someone cannot handle his work like others then his is groveling, if he fails at doing something then he is a loser, if we do not have someone to rely on, we'll be prone to sadness, and others cannot be trusted because they may harm us, these thoughts and actions will affect him in all areas and will lead to a decline in life satisfaction of various conditions, because these intrusive thoughts will always be a negative perception of oneself and one's life.

3 – There is a relationship between depression and life satisfaction of secondary school students of Mahan.

The analysis of the data, through the Pearson test shows that the correlation between two variables, depression and life satisfaction students -0.37 with p- value significantly is 0.001, which is smaller than the significance level $\alpha = 0.05$, so at this level H_0 which is the lack of relationship, is rejected. As a result, there is a significant and reverse relationship between depression and life satisfaction of students. The more the depression is less, the more the students will be satisfied with their lives.

These findings indicate that there is a significant inverse relationship between stress, anxiety, depression and life satisfaction among high school students of Mahan city and one of the factors affecting students' satisfaction with their lives is depression, so if students are hopeless about future and feel lonely they will regard life as repetitive and monotonous and have less happiness about life.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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EXAMINE THE RELATIONSHIP BETWEEN STAFF PERSONALITY TRAITS, WORK ENGAGEMENT AND ORGANIZATIONAL LEARNING (CASE STUDY: DEPARTMENT OF TECHNICAL AND VOCATIONAL EDUCATION IN SOUTH KHORASAN)

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ABSTRACT

Aims:The aim of this study was to investigate the relationship between staff personality traits, work engagement and organizational learning. The population in this study consisted of 210 employees of the directorate general of technical and vocational education in South Khorasan. The sampling method of present research is simple random sampling and using a Cochran formula and sample size is equal to 136 people. **Materials and methods:**In this research, the structural relations model was used to analyze the data. For data analysis and hypothesis testing and other analyzes in this paper was used lisrel statistical software. **Results:**The results showed that there is no significant relationship between staff personality traits and organizational learning, but was approved work engagement as a mediator variable in the relationship between staff personality traits and organizational learning.

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KEY WORDS

staff personality traits, work engagement and organizational learning.

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INTRODUCTION

Knowledge and how to knowing is the organization's strategic resources that must be managed and developed. Therefore the organizational learning and knowledge production in the last few years is taken into consideration [1-3]. Organizational learning is a dynamic process that enables organizations to quickly adapt to change. This process involves the production of new knowledge, skills and behaviors. Organizational learning is a way of creating a working knowledge and improve organizational performance. So successful organization must be active in learning[4]. Learning is the most important way to improve long-term performance and in the near future the organization that can claim superiority that be able to learn the capabilities and commitment and capacity to efficiently exploit people at all levels of the organization. In today's competitive and changing world, organizations can survive or can claim superiority capabilities that can benefit from commitment and capacity to learn people at all organizational levels, in other words, to be a learning organization[5]. Research in the field of personality shows that the ability to regulate the thoughts and time management is a prerequisite for any learning situation. In relation to character interaction and learning styles, research shows that people with different personality traits have different learning styles [6].

Moreover, on the other hand, since the personality characteristics of individuals act as agents for determining their behavior. It is possible to achieve behavior framework with identification of these characteristics. Knowledge of personality can help organization management to appoint qualified individuals to the organization in different positions, which it will reduce staff turnover and increase job satisfaction [7]. On the other hand, in recent years, a lot of interest shown in the issue of employee engagement. Due to the work engagement by creating positive synergies between individual employees and the organization in place that is associated with positive outcomes for both groups. These consequences may include: positive job attitudes and strong recognition with work; mental and psychological health including positive emotions and decrease burnout, inner working performance and better external jobs, enhancing intrinsic motivation, individual initiative and proactive behavior, achieving personal and professional resources.

A high level of employee engagement for the organization has following positive outcomes: retention of talented employees, a positive mental picture of the company, business performance, financial performance or service quality

[8]. When there is a sense of belonging and organizational loyalty, it creates an intimate and familiar atmosphere in the organization. In such an environment, people are familiar with each other over time and have found a sense of belonging and loyalty to live in a group, and getting things done is much easier and group activities progress well and quickly [9]. The aim of this research was to investigate the relationship between staff personality traits and work engagement and organizational learning.

LITERATURE REVIEW

STAFF PERSONALITY TRAITS

Each job has unique characteristics, and people have their personality traits, and like to work alone in the group. Personality is a set of psychological characteristics and there is sustainability in person and is affected in their thought and behavior. Or in another word, the personality characteristics is a combination of psychological features that we use it to identify that person's position in the classification [7]. The type of personality could play an important role in deciding on organizational matters. Personality is a set of psychological characteristics that are sustainable in person and is influenced on the behavior and their thinking. The results of investigating the personality characteristics traits show that people's behavior depends on their character and personality characteristics, so their behavior is underlying personality characteristics [10].

In many researches about the personality have focused on the five personality dimensions, is classified personality characteristic traits into five dimensions: Extraversion, conscientiousness, agreeableness, neuroticism and openness to experience and refers to the comfort of the person in the relationship.

Extroverted people: these people enjoy from interacting with others and presence in large gathering and extraversion includes the traits of energetic, talkative, and assertive. They like to simulate the sensation and typically are cheerful and compatibility refers to respect for others.

Agreeableness people: These individuals are caring for others, honest and eager to help others and believes others in turn are useful to people, in contrast, incompatible people are hesitant, manipulative, self-centered and are competitive; conscientiousness implies the trustworthy of person.

Conscientious people, are people focused, strong-willed and tend to depend on, hardworking, success-oriented and be healthy person. Robbins has identified the number of specific personality traits that can determine behavior in organizations, in the form of a special group distinct from the others and has shown that these features include: Locus of control, self-esteem, power, compatibility with the position [11]. Today, we believe that personality is evolving and any definition of personality, as a step on a process and personality in every moment of their evolution as an expression or manifestation of an inclusive adaptation capacity, that is, if the character is known as a complete range of Human psychological, in order to be motivated and directed behavior that we see in him. So in any moment of the individual development, we are in fact faced with some kind of mental manifestations that these manifestations considered as his comprehensive adaptation [12]. In the meta-analysis that took place by BRIC and Monte (1991) concluded that conscientiousness is the best personality trait of predictors of job performance and extraversion and neuroticism are the best predicted of job satisfaction. Employees, Shamir and Chen (2003), in analyzing the relationship between each of the five areas of personality traits and job performance and found that conscientiousness was the strongest correlation with job performance. Byrne et al (2005) to investigate the relationship between job performance and personality trait and the results showed that conscientiousness job performance is significantly predicted [13].

WORK ENGAGEMENT

During the last decade, work engagement is highly considered in the field of human resource management and organizational behavior. Structural work engagement has a positive role in explaining and predicting the optimal organizational performance [14]. Engagement as a new concept in recent years into organizational issues and has gained popularity over the past decade. In the engagement, people in play a role employed or express all aspects of physical, cognitive and emotional expression and in working have energetic and willing to spend their effort [14]. (Isa Khani et al., 2012). Engagement of employees in work is influenced by personal, occupational and organizational factors.

Many believe that employee engagement is predictors of the results of personnel work, organizational success and financial performance [15,16,17]. The definition of engagement does not exist cosmopolitan outlook. In individual engagement play role employed or express of all aspects of physical, cognitive and emotional dimension. The lack of engagement is isolated themselves from the role of their work. In the absence of engagement, people with physical, cognitive and emotional roles are separated from their job [18]. Shafley and Bekr define work engagement as positive mental states, satisfactory and work-related, that are differentiated by three indicators of vitality, devotee and fascination. Vitality is differentiated with a high level of energy and resilience of mind at work.

Dedicate is severe involvement to engage with the work and refers to the experience a sense of significance, enthusiasm and challenge. Fascination, is distinguished with full concentration and happily absorbed in work whereby the time quickly passed and separated themselves from the work is difficult for the person [19]. Macy et al. for engagement consider two dimensions of psychic energy and behavioral energy. In the psychic energy are also called a sense of engagement are raised four fundamental component of urgency, that a sense of being focused, intensely felt, and enthusiasm feeling. Behavioral dimension also includes four components of sustainability, innovation, expanding the role, and adaptation to change, [15].

Work engagement is emphasized that toward job performance has sense of responsibility and they care about the outcomes of performance. So, engagement is a motivational state that is created by self-responsibility and personal interest. May et al. have classification engagement to the physical dimensions (applying energy to do the work), cognitive (working is so fascinating for person that when working forgets everything) and emotional (put his best foot forward) [20,21]. Work engagement as a positive structure has a high potential to explain the organization's desired outcomes.

Organizational Learning

Learning requires that individuals have the knowledge that obtained in their organizations to apply in their behavior. The term of organizational learning apparently referring to the so-called individual learning, but organizational learning more refers to the group or organizational-level learning. Individual learning is done by reading, interviews, knowledge, experience, practice and develops effective mental models in the mind, but organizational learning occurs when the group learns to interact, share knowledge and act collectively so that combined capacity of group's increases and to obtain the ability to understand and take effective action [22]. Regardless of the exact date of the start of organizational learning, it not attracting much attention until the late 1970s. At this time, a number of theorists, focused its activities on organizational learning [23,24]. Although the research in this field was continued till the 1980s, in 1990 the issue of organizational learning was just one of the topics that covered in the various trends in management disciplines such as strategy and production management and from that date onwards, the discussion of organizational learning was overshadowed of new management topics such as learning organizations. Organizational learning is not a fixed position or limited purpose, but rather is a continuous process and evolution that is adapted to the environmental conditions that during it, the groups within the organization are encouraged to develop skills, knowledge and develop consensus about the destination [25]. Argyris and Schon (1978) have divided learning process into three categories of Single – Loop Learning, Double – Loop Learning, and Deutero- Learning.

From the opinion of Figueiredo (2002), Learning in organizations has four sub-process of knowledge acquisition from outside the organization, the acquisition of knowledge within the organization, general knowledge and to encrypt and development of knowledge [26]. Chu (2004) note that facilitators of organizational learning are key facilitators of interaction and communication are as follows, the interaction and communication between team members, job rotation and experience, interaction and communication modes, direction and frequency of information flow between team members and occupational groups and experience is referred to able to change and real exchange of jobs between Member [27]. Generally, learning has three stages: recognition, behavior and performance. According to Garvin opinion, an organization to use new ideas to improve organizational performance and converting them into practical programs, the five skills are needed that include problem solving, gaining experience, learning from their experience and history, learning from others and transfer or implementation.

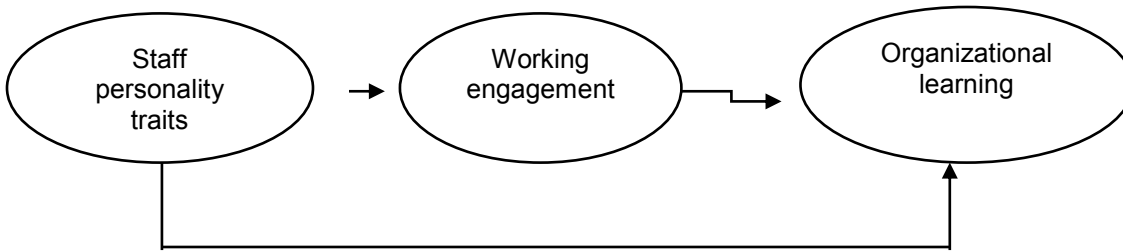


Fig: 1. Conceptual Model

Hypotheses

1. There is a significant relationship between staff personality traits and work engagement.
2. There is a significant relationship between staff personality traits and organizational learning.
3. There is a significant relationship between work engagement and organizational learning.
4. There is a significant relationship between staff personality traits and organizational learning through work engagement.

MATERIALS AND METHODS

Required data for this research have been collected with a questionnaire that its reliability was tested. To collect data researcher has used of questionnaire that consisted of 32 questions that all questions are five-item Likert. This data has been analyzed by LISREL software. The population in this research, was 210 employees of the department of Technical and Vocational Training Organization in South Khorasan. In this survey, using simple random sampling method, and 136 employees were selected. To determine the validity and reliability were used of content validity and Cronbach's alpha coefficient and the amount was obtained equal to 89. In this research, after drawing analytical model based on data by the Path diagram program with running the Perlis program from the LISREL software was obtained measurement model that in this model have been tested hypotheses using the coefficients B and t-test. Meantime the model fit indices with automatically performances of Perlis program is also calculated for the intended model.

DATA ANALYSIS

Table: 1. Fit indices of research model

Fit index	Standard values	Estimated values
Degrees of Freedom	-----	461
Chi-Square	Due to the dependence the sample size is not a suitable criterion	1089.15
RMSEA	0.05	0.083
NFI	0.90	0.91
NNFI	0.90	0.94
CFI	0.90	0.95
RMR	0.05	0.061
GFI	0.90	0.75
AGFI	0.90	0.71

As can be seen in [Table– 1], Indicators of compliance or goodness of fit indices are in a relatively acceptable level.

Structural equation modeling

In this research, using confirmatory factor analysis to test the measurement model and was used path analysis to confirm the structural model. Two following figure shows the overall model output of LISREL software that simultaneous involving the structural model and the measurement model and in the following we will be examined detail separation.

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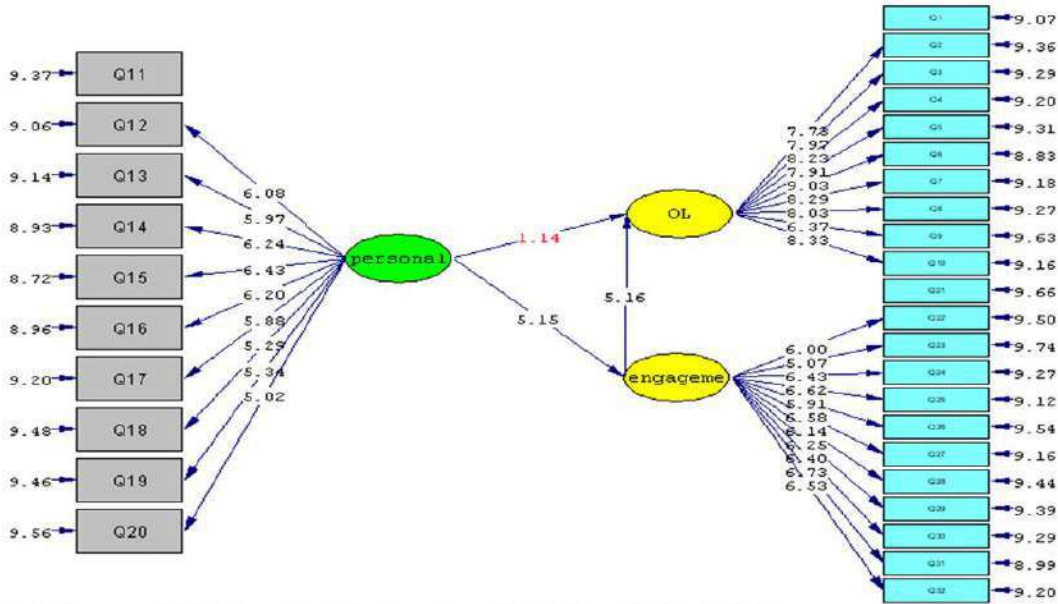


Fig: 2. The base model with T values

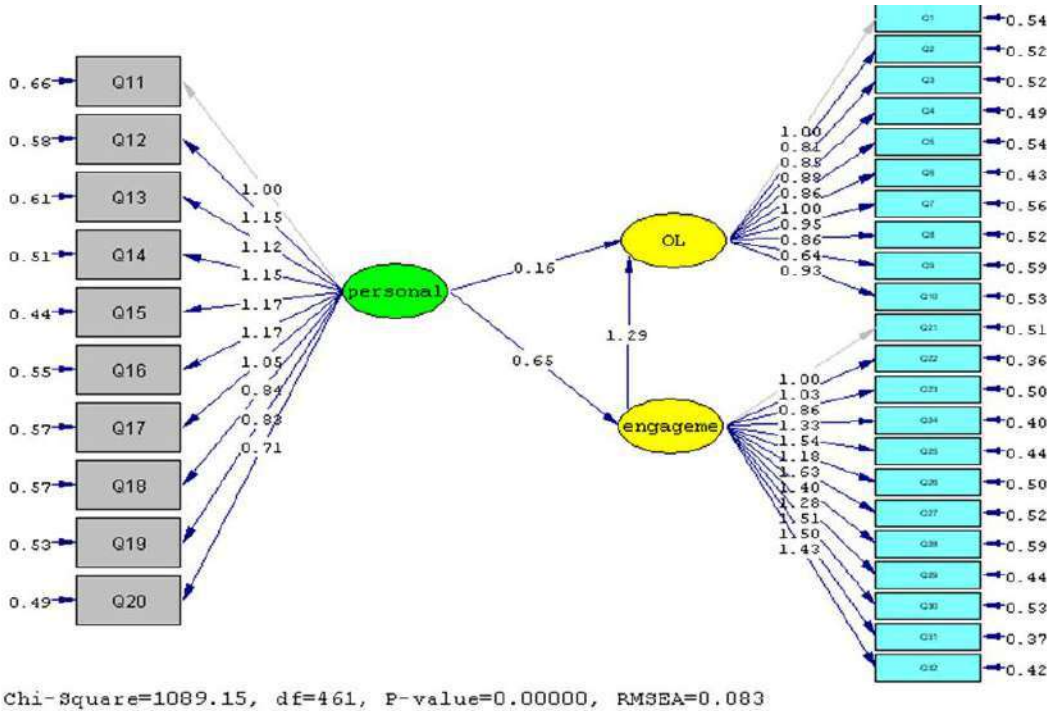


Fig: 3. The base model with path coefficients

In the structural equation modeling beta coefficients that represent the correlation between hidden variables and appear on the chart and related the hidden variables.

TESTING HYPOTHESES

The first hypothesis

Table: 2. Results of the testing first hypothesis

Result	T-statistic	Coefficient	Hypothesis
Accept	5.15	0.065	1. there is a significant relationship between work engagement and staff personality traits

Based on the results that shown in **Table- 2**, the impact of the independent variable on the dependent is supported by data and the path that are related these two variables to each other is a positive and significant (at the level of 5% is significance) ($t = 5.15, \beta_{22} = 0.65$) As a result, we can say with 95% confidence that there is a significant relationship between staff personality traits and work engagement.

The second hypothesis

Table: 3. Results of the testing second hypothesis

Result	T-statistic	Coefficient	Hypothesis
Reject	1.14	0.16	2. There is a significant relationship between staff personality traits and organizational learning.

Based on the results that shown in **Table- 3**, the impact of the independent variable on the dependent is not supported by the data and the path that are related these two variables to each other is not a positive and significant (at the level of 5% is significance) ($t = 1.14, \beta_{22} = 0.16$) As a result, we can say with 95 confidence that there is not a significant relationship between staff personality traits and organizational learning.

The third hypothesis

Table: 4. Results of the testing third hypothesis

Result	T-statistic	Coefficient	Hypothesis
Accept	5.16	1.29	3. There is a significant relationship between work engagement and organizational learning.

Based on the results that shown in **Table -4**, the impact of the independent variable on the dependent is supported by the data and the path that are related these two variables to each other is a positive and significant (at the level of 5% is significance) ($t = 5.16, \beta_{22} = 1.29$) As a result, we can say with 95 confidence that there is a significant relationship between work engagement and organizational learning.

The fourth hypothesis

Table: 5. Results of the testing fourth hypothesis

Result	T-statistic	Coefficient	Hypothesis
Accept	$0.65 \times 1.29 = 0.83$		4. There is a significant relationship between staff personality traits and organizational learning through work engagement.

The result of testing fourth hypotheses examined according to the data in **Table-5 (5)**. The coefficient of hidden variable of exogenous staff personality traits on work engagement endogenous variable is 0.65 and with a T value is equal to 5.15 of the confidence level is 0.05 with confidence of 0.95 the intendent statistic is significant and the coefficient of work engagement endogenous variable on organizational learning endogenous variable is 1.29 and a T value is equal to 5.16 of the error level is 0.05 with confidence 0.95 the statistics are significant. As a result, the influence of the mediating role of work engagement between staff personality traits and organizational learning is equal to $0.65 \times 1.29 = 0.83$ and is confirmed the researchers claim.

RESULTS

The results of the first hypotheses indicated that the path coefficient between staff personality traits and work engagement is equal to 0.65 and the amount of corresponding t is $5.15 > 1.96$, which according to t-test with critical value is 0.05 at a confidence level of 95% and can be rejected the null hypothesis as a result, the first claim of researchers is approved and can say with 95% confidence that there is a significant relationship between staff personality traits and work engagement.

The results of the second hypotheses indicated that the path coefficient between staff personality traits and organizational learning is equal to 0.16 and the amount of corresponding t is $1.14 < 1.96$, which according to t-test

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with critical value is 0.05 at a confidence level of 95% and cannot rejected the null hypothesis, as a result, the second claim of researchers not approved and can say with 95% confidence that there isn't any significant relationship between staff personality traits and organizational learning.

The results of the third hypotheses indicated that the path coefficient between work engagement and organizational learning is equal to 1.29 and the amount of corresponding t is $5.16 > 1.96$, which according to t-test with critical value is 0.05 at a confidence level of 95% and can rejected the null hypothesis, as a result, the second claim of researchers is approved and can say with 95% confidence that there is a significant relationship between work engagement and organizational learning.

The results of the fourth hypotheses indicated that the path coefficient between staff personality traits and work engagement is equal to 0.65 and the amount of corresponding t is $5.15 > 1.96$, and the path coefficient between work engagement and organizational learning is equal to 1/29 and the amount of corresponding t is $5.16 > 1.96$, which according to t-test with critical value is 0.05 at a confidence level of 95% and can rejected the null hypothesis, as a result, the fourth claim of researchers is approved and the effect of the mediating role of work engagement between staff personality traits and organizational learning is equal to $0.65 \times 1.29 = 0.83$.

CONCLUSION

The results showed that there is no significant relationship between staff personality traits and organizational learning, but was approved work engagement as a mediator variable in the relationship between staff personality traits and organizational learning.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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DETERMINATION OF THE OPTIMAL CAPACITY OF ELECTRIC HYBRID RENEWABLE ENERGY SYSTEMS USING A SMART OPTIMIZATION ALGORITHM

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ABSTRACT

Due to the abundance environmental concerns, since decades using renewable energies such as wind, solar, and fuel cells has drawn much attention as resources of electricity generation. To enhance the reliability of energy supply Hybrid Renewable Energy Systems (HRES) are increasingly used particularly in remote areas, where various energy resources are available. Hybrid Renewable Energy system (HRES) consists of two or more renewable resources that are used together for increasing the efficiency and achieving an optimum level of availability in energy supply. The combination of resources examined as HRES in literatures depends on various factors such as the geographic location of consumption, the availability and cost of energy in various renewable sectors as well as the price and availability of energy which could be delivered by the electric utility and diesel generators. Examples of such combination include solar arrays-wind turbines, biomass-fuel cells, etc. In this case study the combination of wind turbine-electrolyzer-fuel cells-biomass systems has been considered and as one option a compressor unit is added to check the effect of this addition on hydrogen storage tank capacity. The IEEE standard demand load curve with 500kW peak load assume in this case study. In this case study Particle Swarm Optimization (PSO) is used for getting the optimum size of each element of hybrid system to supply the above mentioned demand load. During the running PSO, various constraints has been considered such as amount of hydrogen tank capacity in begin and end of period of study. Finally optimum sizes of each element and total cost of mentioned system will be counted.

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KEY WORDS

biomass, determine the optimal capacity, fuel cell, Hybrid renewable energy systems, wind energy, optimization, solar arravs. wind power plant.

INTRODUCTION

Fossil fuels are a major source of greenhouse gas emissions and the main reason for global warming that account for 95 percent of Iran's electricity generation sources. Ecology is not only an environment for human life but also it is important for the economy and creates high economic value-added in many manufacturers and significantly contributes in human well-being. The ecological revolution that started in the 1970s in the industrialized world still did not have a significant impact on large parts of the developing world. Expansion of globalization process and the transfer of polluting industries to developing countries, increasing rates of urbanization, industrial development and the increasing need to energy, have caused significant environmental damage. In addition, electricity is a very useful energy in the process of developing a significant role in promoting economic growth. But the production of electricity depends on other energy sources, especially fossil fuels so that in 2011 about 67% of world electricity, 15 Percent of hydropower and 4% of other renewable energy sources are directly produced from these sources [33]. Generators used in power generation and renewable hybrid systems include: Wind turbines, Fuel Cell, Electrolyzer, and Reformer.

MATERIALS AND METHODS

Modeling of hybrid systems

Two hybrid systems discussed in this article are listed in Figure 3 and 4.

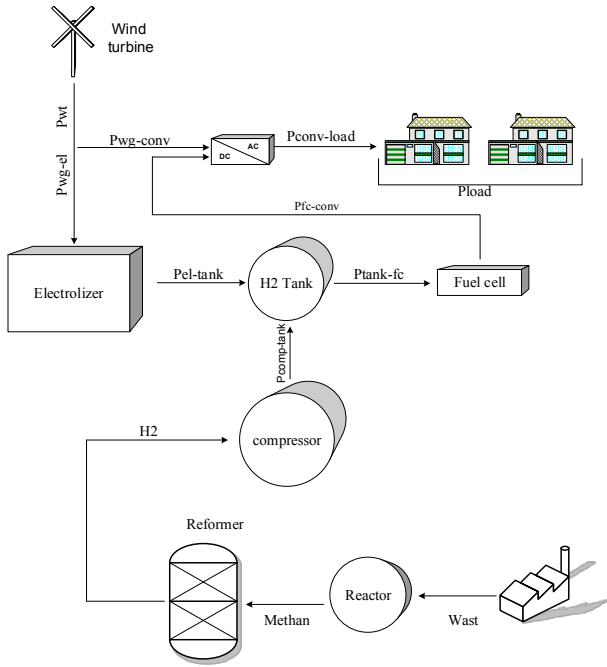


Fig: 1. Hybrid system (1)

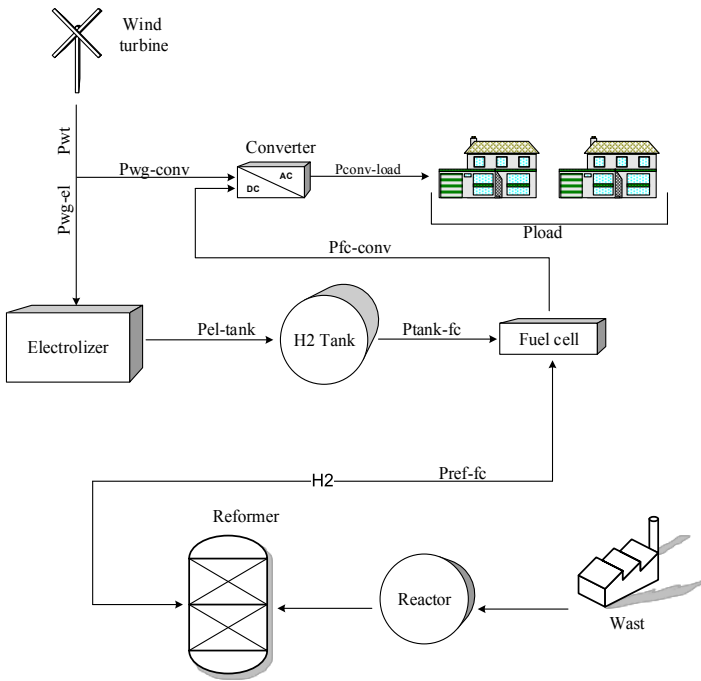


Fig: 2. Hybrid system (2)

Hybrid system model 1

In the system, the power produced by the wind turbine system is delivered to the load by converters and hydrogen is stored in tank by a reformer. If the power produced by the wind turbine is higher than load demand, excess power is fed into the electrolyzer and the hydrogen is produced. The hydrogen is stored in hydrogen tank. When the wind turbine can provide the load, the fuel cell is fed with hydrogen stored in tanks and helps provide wind turbine load.

The system has three modes:

(A) Power produced by the wind turbine is equal to load power

In this case, the total power produced by the wind turbine is delivered to the load and the excess power of the wind turbine is given to the electrolyzer and the produced hydrogen is stored in hydrogen tank. The equations are expressed as follows:

$$P_{wg_conv} = P_{wt}$$

$$P_{wg_el} = 0$$

$$P_{fc_conv} = 0$$

$$P_{el_tank} = 0$$

$$P_{tank_fc} = 0$$

$$E_{tank(i)} = E_{tank(i-1)} + P_{comp_tank(i)}$$

(B) Power produced by the wind turbine is greater than load power:

In this case, the power produced by the wind turbine is greater than the required power for load and excess power is delivered to the electrolyzer and the hydrogen is stored in hydrogen tanks. The system' equations are as follows:

$$P_{wg_conv} = P_{load} / \eta_{conv}$$

$$P_{wg_el} = P_{wt} - P_{wg_conv}$$

$$P_{el_tank} = \eta_{el} \times P_{wg_el}$$

$$P_{tank_fc} = 0$$

$$P_{fc_conv} = 0$$

$$E_{tank(i)} = E_{tank(i-1)} + P_{comp_tank(i)} + P_{el_tank(i)}$$

(C) Power produced by the wind turbine is less than the load power:

The system equation is as follows:

$$P_{wg_conv} = P_{wt}$$

$$P_{wg_el} = 0$$

$$P_{el_tank} = 0$$

$$P_{fc_conv} = P_{load} / \eta_{conv} - P_{wg_conv}$$

$$P_{tank_fc} = P_{fc_conv} / \eta_{fc}$$

$$E_{tank(i)} = E_{tank(i-1)} + P_{comp_tank(i)} - P_{tank_fc(i)}$$

In all three modes, the hydrogen produced by the reformer is compressed by the compressor and is stored in hydrogen tank.

Hybrid system model 2

In this system the hydrogen produced by the reformer goes directly to the fuel cell. While the power produced by the wind turbine plus the power produced by the fuel cell (fed by reformer) is more than the load power, excess power of wind turbine goes to the electrolyzer and as the power produced by the wind turbine plus the power produced by the fuel cell (fed by reformer) is less than the load power, more fuel cells are used and the cells are fed into the stored hydrogen in tanks.

The system has three modes:

(A) Power produced by the wind turbine plus power produced by the fuel cell is equal to load power:

The system equation is as follows:

$$P_{wg_conv} = P_{wt}$$

$$P_{wg_el} = 0$$

$$P_{fc_conv} = \eta_{fc} \times P_{ref_fc}$$

$$P_{el_tank} = 0$$

$$P_{tank_fc} = 0$$

$$E_{tank(i)} = E_{tank(i-1)}$$

Here the electrolyzer does not produce anything and the system equations are as follows:

(B) Power produced by the wind turbine plus power produced by the fuel cell is greater than the load power:

In this case, the extra power generated by the wind turbine is given and the produced hydrogen is stored in tanks. The equations are as follows:

$$P_{wg_el} = P_{wt} - P_{wg_conv}$$

$$P_{el_tank} = \eta_{el} \times P_{wg_el}$$

$$P_{tank_fc} = 0$$

$$P_{fc_conv} = \eta_{fc} \times P_{ref_fc}$$

$$E_{tank(i)} = E_{tank(i-1)} + P_{el_tank(i)}$$

(C) Power produced by the wind turbine plus power produced by the fuel cell is less than the load power:

In this case, the fuel cell is fed through the hydrogen tank in order to provide load power. The equations are as follows:

$$P_{wg_conv} = P_{wt}$$

$$P_{wg_el} = 0$$

$$P_{el_tank} = 0$$

$$P_{fc_conv} = P_{load} / \eta_{conv} - P_{wg_conv}$$

$$P_{tank_fc} = P_{fc_conv} / \eta_{fc} - P_{ref_fc}$$

$$E_{tank(i)} = E_{tank(i-1)} - P_{tank_fc(i)}$$

In any case hydrogen produced by reformer is delivered to fuel cell and cell fuel generates power.

Global Best algorithm (Global Best)

This algorithm corresponds to the star topology and one of PSO algorithms. In this algorithm, each particle motion is carried out by his experience and knowledge of all other particles. It is therefore clear that there is a lot of social interdependence and connectivity is established between the particles.

Steps of this algorithm are given in Figure 7.

Comparison of the optimal size of the hybrid systems

The nominal power of each wind turbine is 5.7 kW, each electrolyzer and fuel cell power is 1 kW, the capacity of each hydrogen tank is 1 kg and lifecycle of each project is 20 years.

Hybrid systems input

Input data in are given in Tables 1 and 2.

Table: 1. Wind speed inputs and wind turbine power

	Low disconnection speed	Nominal speed)(m/s)	(high disconnection speed) m/s	Nominal power (kW)
Wind turbine (7.5 K.W)	3	11	25	7.5

Table: 2. Inputs related to costs, efficiency and lifecycle of components

	Life cycle (yr)	h (%)	Maintenance and repair costs \$/yr	Replacement cost (\$)	Initial investment cost (\$)
Fuel cell (unit 1 kW)	5	50	175	2500	3000
Wind turbine (5.7 kW unit)	20	-	75	15000	19400
Electrolyzer (Unit 1 kW)	20	90	20	1500	2000
Reactor and reformer (per kg waste)	20	-	100	130	1450
The hydrogen tank (capacity 1 kg)	20	100	15	1200	1300
Compressors (Unit 1 kW)	15	90	9	10	10
Converters (Unit 1 kW)	15	90	10	750	800

Table: 3. Demographic information and waste and load peak

Peak load (kW)	Hydrogen energy value(kWh)	The amount of hydrogen produced per kg of waste	The amount of waste produced per person	Population
500	37.8	0.0454(Kg)	600(g)	800

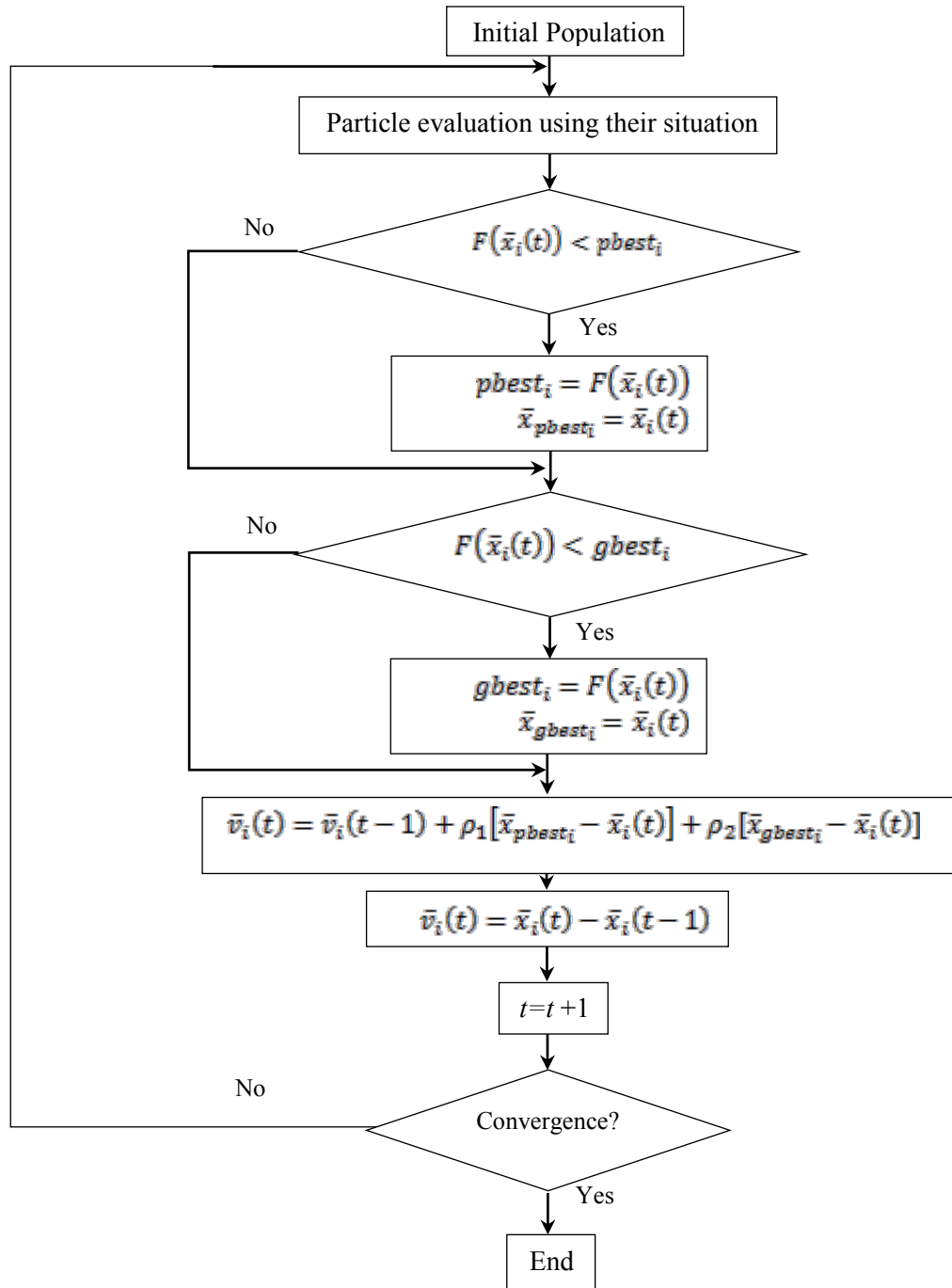


Fig: 3. Flowchart of particle swarm optimization

Table: 4. PSO Parameters

Population	Number of repetition	C1	C2	(Inertia) w
30	300	2	2	0.7

Load curve is considered based on the IEEE standard [39], this curve is based on per-unit. In this project it is assumed that a load peak equals to 500 kW, thus, the load curve of the IEEE standard curve is obtained by multiplying the peak times.

This curve is moved for six months to comply with the residential areas load curve in Iran. This study is consisted of 800 people and it is assumed that per person produces 600 grams of waste per day, and this waste is delivered daily to the anaerobic reactor and this reactor produced a fixed amount of methane during the day, the methane is converted into hydrogen by a reformer. Given to the amount of waste produced during day, the anaerobic reactor and the reformer size will be constant. The amount of hydrogen produced per kg of waste is equal to 0.0415525 kg, then the value of total hydrogen produced during the day will be about 20 kg 37.8 kw/h. which is equivalent to 756 kwh energy. It is noteworthy that the size of the reactor is determined according to the generated solid waste. The amount of waste is 480 kg of per day in the region. Reformer size is determined based on the amount of hydrogen from garbage in a given day which is equal to 20 kilograms per day (480*0.0415525). Amount of energy generated per kilogram of hydrogen is equal to 37.8 kw/h. As a result, compressor size is equal to 31.5 kW.

RESULTS

The results of the optimization program for the system (1)

The optimum number of system units 1 and the cost is given in Table 5.

Table: 5. the optimum number of system units and its cost of (1)

Number of wind turbine	Number of fuel cell	Number of hydrogen tanks	Number of electrolyzer	Cost (\$)
609	3248	4374	522	3.08638*10 ⁷

Note: In this article the estimated cost is calculated from the basic expenses in [7] and certainly with the advancement of technology these costs will be significantly reduced.

The results of the optimization program for the system (2)

The performance of the system 2 is similar to No. 1, with the difference that the in system 2 fuel cell always be generated, because the hydrogen produced by reformer moves directly to the fuel cell. Optimum size of system units (2) and their cost are shown in Table 6.

Table: 6. the optimum number of system units and its cost of (2)

Number of wind turbine	Number of fuel cell	Number of hydrogen tanks	Number of electrolyzer	Cost (\$)
756	1551	6059	520	3.249*10 ⁷

Note: In this article the estimated cost is calculated from the basic expenses in [7] and certainly with the advancement of technology these costs will be significantly reduced.

Comparison of the results of two hybrid system

The difference between the two systems is that the hydrogen produced by the reformer in the system is stored in the tank (1) and if needed is consumed by the fuel cell, but in system 2 the hydrogen produced by the reformer moves directly to the fuel cell. These differences gives rise to differences in the optimum size of system components which results in an increase in costs compared with the system system1. As compared to the second strategy, system 1 has better performance for the hydrogen produced by the reformer is stored in tanks and is used according to the load requirement.

CONCLUSION

In this study the optimal size and mode of operation of the hybrid system were studied. The system includes wind turbine, fuel cell, electrolyzer, hydrogen tank, anaerobic reactor, reformer, heat exchangers and compressors (for system 1), respectively. Wind and regional waste have been used as primary sources of energy production. The difference between the two systems is that the hydrogen produced by the reformer is stored in the hydrogen tank system 1 and if necessary is used by the fuel cell. While hydrogen produced by the reformer in system 2 is directly connected to the fuel cell. These differences give rise to differences in the optimum size of system components which results in an increase in costs in system 2 compared with system. System1 has better performance as compared to the second strategy because the hydrogen produced by the reformer is stored in tanks and used according to the load requirement. With increasing system reliability, system costs are increased as the result of increased hydrogen size. For the following reasons combined wind-fuel cell system is suitable for the area:

1. Suitable wind speed and steady approach during the years
2. Use of zone wastes
3. Lack of environmental pollution

In both systems fuel cell is as a supporter of wind turbines, so both systems are high reliability in power supply. Combine power systems are the best option to cover electrical energy in remote areas of the network. While these systems have an acceptable efficiency and less environmental pollution and their technology is faced with the enormous progress. Another advantage of these systems is reduced investment costs to develop the transmission grid, improved power quality, increased reliability in energy supply, reducing the purchase of electricity from neighboring countries and lack of construction of high-capacity plants

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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FINANCIAL DISCLOSURE

None declared.

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SALINITY TOLERANCE COMPONENTS AND RESPONSE OF IRANIAN WHEAT CULTIVARS TO NaCl STRESS

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ABSTRACT

Introduction and target: Salinity stress is a major constraint inhibiting yield of crops throughout the world. Salinity tolerance in crops can be categorized to three main mechanism including osmotic tolerance, ion exclusion and tissue tolerance. method: In this experiment, we try to quantification of these traits to increase salinity tolerance in future wheat genotypes. Selected cultivars for this aim named: Akbari, Sistan, Arg, Ofogh as salinity tolerant and Kohdasht and Morvarid as local cultivated wheat and finally Falat and Roshan as old and successful cultivars in last decades. The seeds planted in pots with sandy medium and irrigated with saline (150 mM NaCl) and nonsaline Modified Hoagland solutions. The growth rate reduction after salt application was used for calculation of osmotic tolerance. Na⁺ exclusion mechanism was quantified by measuring of the concentration of Na⁺ in leaves which exposed by salinity. Combination of Na⁺ content in salt stressed plants and measuring of salt induced leaf senescence was used to estimate tissue tolerance. Findings: Results showed that Ofogh and Roshan cultivars were best excluders than others. The strategy of osmotic tolerance considered as the best mechanism for all of experimental cultivars, and there were a little difference among them. Tissue tolerance was less effective in predicted total salinity tolerance and the cultivars of Morvarid, KohDasht and Falat were the best cultivars in this trait. Conclusion: It appears that cultivars with two tolerance mechanism either osmotic tolerance with Na⁺ exclusion (such as Ofogh and Roshan) or tissue tolerance with osmotic tolerance (such as Morvarid and KohDasht) have higher total salinity tolerance.

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KEY WORDS

Stress salinity stress, wheat, ion exclusion, osmotic tolerance, tissue tolerance.

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INTRODUCTION

Salinity is a major environmental stress responsible for reduced crop yield in many of the agricultural lands in all over the world. It's estimated that salinity is affecting 45 million hectares of irrigated lands [1] and it is expected that over 800 million hectares will be affected by salinity problem due to unsuitable irrigation practice and irrigation with saline waters [2]. The severity of salinity problem in Iran is so extended and is predicted to become a larger problem in near future. Also it's estimated that 30% of irrigated farms in Iran is irrigated with saline waters [3] and potential of this areas is half because of salinity stress.

Crop growth is reduced by salinity via two main processes, which are related either to the osmotic stress of salt accumulation in the root media or which are salt accumulation in photosynthesis organs of plant and ion specific damages [4, 5, 6]. This also can caused disruption in absorption of some essential nutrient elements [7]. Sodium and chloride are the two main ions responsible for both osmotic and toxicity damages of salinity effects. Based on Munns and Tester [8] salinity effects caused two main phases in plant growth. The first phase observed immediately after salt application and related to osmotic effects of salinity stress. This phase takes in minutes to a few days; so it's not related to the accumulation of ions in plant organs. Roy et al., [9] argued that stomatal closure and inhibition of shoot elongation are the two best documented for effects of this phase. The second phase takes in several days to weeks and more reduction of growth occurred in this period which is due to ionic toxicity and disruption in photosynthesis. Some plants or genotypes can tolerate to the second effects of salinity by sodium exclusion and/or sodium compartmentation in vacuoles thereby reducing the toxic effects of cytosolic enzymes and processes.

Mechanisms of salinity tolerance can be different due to different effects of salinity. Munns and Tester [10] classified three main mechanisms of salinity tolerance in cereal: Osmotic tolerance, Sodium exclusion and Tissue

tolerance or tolerance to the sodium in the tissue. In last decade the most experimental studies on salinity tolerance based on Na⁺ exclusion without considering of compartmentation of Na⁺ in particular cell types or organelles. Rajendran et al; [11] argued that consideration of tissue tolerance and recognizing of this component of salinity tolerance from Na⁺ exclusion is necessary to improve salinity tolerance in crops. It is so important that we understand difference of Na⁺ exclusion and tissue tolerance. Na⁺ exclusion, where Na⁺ transport processes in roots reduce the accumulation of toxic concentration of Na⁺ within leaves and tissue tolerance, where high salt concentration are found in leaves but are compartmentalized at the vacuoles and intracellular levels and shows less leaf senescence and necrosis. Also two main mechanisms of synthesis of compatible solutes and production of enzymes catalyzing detoxification of reactive oxygen species (ROS) attributed to tissue tolerance [12]. Some papers, reported success of tissue tolerance to improve salinity tolerance and some of them reported importance of Na⁺ exclusion in salinity tolerance. Also it is important that we know there are different and unknown genes are controlling of this mechanisms, so it is hard to combine them to improve salinity tolerance in crops. But it must be clear that determination of importance of mechanisms that controlling salinity tolerance within individual crop species will be showing us the way that we must go on. Unfortunately there is not enough evidence and data available to make sure which salinity tolerance mechanism would work best for certain crop. So we must find a way to quantifying of salinity tolerance components and determining of importance of each of them for each crop. This work is a study to find this challenge in Iranian wheat cultivars which introduced for saline areas with different climatic condition.

MATERIALS AND METHODS

In order to evaluation and determination of salinity tolerance components in some Iranian wheat cultivars released by Seed & Plant Research Institute this experiment was conducted at randomized complete block design with 3 replications. Selected cultivars for this aim named: Akbari, Sistan, Arg, Ofogh as salinity tolerant and cultivars of Kohdasht and Morvarid as local cultivated wheat in experimental area (Gorgan), and finally Falat and Roshan as old and parents of many new varieties which was cultivated successfully in extended saline and nonsaline areas of Iran in last decades. The same size seeds planted in pots with sandy medium and irrigated with saline (150 mM NaCl) and nonsaline Modified Hoagland solutions. To keep the levels of free Ca⁺⁺ constant with control condition, an additional 3.42 mM CaCl₂ was added. Plants exposed to salinity condition when 4th leaf observed in individual pots. The leaf areas of 3 plants measured by portable leaf area meter in each pot, to determination of growth rate in control and salinity treatments. Also 3 plants were cut daily to measuring of leaf area and dry matters of leaves for one week; then this operation was continued with frequency of 2 days for 2 weeks. In the end of 3 weeks after salt application, the 4th leaves of remained plants were cut and concentration of Na⁺ measured within 4th leaves samples and other parts of plant samples in all treatments. The leaf area meter calibrated base on the one safe leaf in control pot, to determination of leaf senescence in saline condition. The dry matter and leaf areas of died leaves measured during and end of the experiment in all pots.

The growth rate reduction of plants after salt application (for 1 week) was used for osmotic tolerance index. Cultivars which maintained similar growth rate under salinity condition when compared to plants in control were deemed as osmotic tolerant. To this purpose the mean of growth rate in salinity treatment divided to mean of growth rate in control. The cultivar that had lowest growth rate reduction in salinity condition, considered as best osmotic tolerant cultivar with osmotic tolerant index of 1 and others ordered based this one.

A cultivar's ability to exclude sodium was determined by measuring the concentration of Na⁺ in 4th leaf of plants which exposure by salinity for 3 weeks. Cultivars which accumulated low concentration of Na⁺ in their fourth leaves were assumed Na⁺ excluders. If we consider whole shoot Na⁺ it is not reality for Na⁺ excluder index, because some organs such as the sheath can be used for Na⁺ storage.

To determine tissue tolerance to sodium, we used combination of Na⁺ concentration and senescence in leaves. To this aim we considered that a cultivar which had low senescence and necrosis in leaves at salinity treatments rather than control and highest concentration of Na⁺ in shoot organs were deemed best tissue tolerant cultivar with tissue tolerance index of 1, while that with high leaf damages and lowest rate of Na⁺ concentration assumed as most sensitive cultivar and others arranged between them. Therefore tissue tolerance index can be calculated by: Tissue tolerance = ((Total shoot area - salt induced senescence) / Total shoot area) × 4th leaf Na⁺ concentration [13]. Salt induced senescence leaf area was calculated by: Total senescence leaf area in 150mM NaCl - Natural senescence leaf area in Control.

The osmotic tolerance index, Na⁺ excluder index and tissue tolerance index were combined to generate a total salinity tolerance index: Total Salinity Tolerance Index = (a × Osmotic Tolerance Index) + (b × Na⁺ Excluder Index) + (c × Tissue Tolerance Index). For determination of weight of each component (a; b; c) we used nlin method procedure in SAS software. Obtained equation was then applied for cultivars used in this experiment to calculate Total Salinity Tolerance Index. We also calculated total plant salinity tolerance by comparing the leaf areas and dry matter of plants in saline condition against those grown in nonsaline condition.

RESULTS AND DISCUSSION

Sodium Exclusion Index

Na⁺ exclusion by roots ensures that sodium does not accumulate to toxic concentrations within leaves [14]. Leaf Na⁺ concentration is best measured in a defined leaf of a defined age if the plant was exposed to Na⁺ at around the time of the emergence of that leaf [15, 16]. By considering that a plant transpires 50 times more water than it retains in leaves [17], so excluding of sodium ions from the leaf blades is very important. A large proportion of Na⁺ that is delivered to the shoot remains in the shoot and only a small proportion of them recirculate to the root, so that the processes that controlling the net delivery of sodium ions into the root xylem is very important. This process involve a range of transporters and their controllers at both plasma membrane and tonoplast [18, 19, 21]. Based on Na⁺ content leaf blade in this experiment there are a significant variation in the Na⁺ content of studied wheat cultivars, ranging from the low sodium accumulators, Ofogh and Roshan, to the medium (Sistan, Arg and Akbari) and high Na⁺ accumulators (Falat, Morvarid, KohDasht). To develop a standardized Sodium exclusion index, the fourth leaf sodium concentration of the lowest accumulating cultivar was divided by the sodium concentration of the cultivar in question. So in Ofogh cultivar with lowest sodium accumulation, a value of 1 was obtained (as best excluder) and in Falat cultivar a value of 0.152 obtained as the worst among experimental cultivars. Theoretically, worst genotype would be value of 0 by using this method.

There was a significant correlation ($r^2=0.58$) between concentration of Na⁺ in 4th leaf and conventional salt tolerance[Figure-1]. Poustini and Siosemardeh [18] also found a strong correlation between salt exclusion and salt tolerance in wheat cultivars. Roots must exclude most of the Na⁺ in the soil solution. To prevent salt building up with time in the shoot, roots should exclude 98% of the salt in the soil solution, allowing only 2% to be transport in the xylem to the shoots [22]. Difference between cereal genotypes with contrasting rates of Na⁺ uptake, when grown in 50 mM NaCl, range from 99% for Janz to 98% for other bread wheat [23]. In this experiment, cultivars of Falat and KohDasht with the lowest Na⁺ exclusion index (highest Na⁺ in leaf) had highest percent of salt induced injury in leaves[Table-1].

Osmotic tolerance index

Distinguishing the osmotic phase of salinity stress from the ionic-effect phase requires daily measurements of the leaf growth, or spot measurements of the stomatal conductance [24]. The decreased rate of leaf growth after application of salt to root media is primarily due to the osmotic effect of the salt around the roots. An increase in soil solution in earlier growth period reduces the ability of the plant to take up water, and this leads to reductions in cell elongation and cell division, so slower leaf appearance and smaller final size.

To develop an osmotic tolerance index, the relative growth rate for the 7 days after salt application in salinity condition was divided by the relative growth rate of the plants in control condition for the same period. The best osmotic tolerance cultivar (Sistan) had the nearest RGR to the control condition, so for standardizing of osmotic tolerance index, the results divided to this one to generate an index value where the most osmotic tolerance cultivar (Sistan) had an index value of 1 and the most sensitive cultivar within experimental cultivars (Falat) had an index value of 0.743. By theoretically, the most sensitive genotype will have an index value of 0. Under 150 mM NaCl, there is a different reduction in leaf growth and thereby relative growth rate(RGR) for all of the experimental cultivars in the first 7 days after salt exposure [figure-2]. This initial reduction in growth rate can be mainly attributed to osmotic effect of salinity stress [25].

The osmotic stress of salt in the root media quickly reduces the growth rate. The rate at which new leaves are produced depends largely on the water potential of the soil solution, in the way as for a drought stressed plant [26]. Munns et al., [27] argued that in the osmotic phase there are chemical signals such as abscisic acid (ABA) coming from roots that reduce leaf growth. ABA has been considered the obvious candidate for this signal; however there is still no conclusive proof that ABA is the only signal from the roots [28]. In general, leaves were smaller and greener in saline condition than control in this experiment. Munns et al., [29] explained it due to lower cell division, small cells and increase in density of chloroplasts. Also, all of local cultivars (Morvarid, KohDash and Falat) had higher specific leaf weight (SLW) in saline condition than control, which means that their transpiration efficiency (carbon fixed per water lost) is high. Munns et al., [30] believed that it will can a future trait that is common in plants adapted to both dry and saline soil.

Two-phase growth response

The effects of salts in root media and reduction of growth has two phases: The first phase of growth reduction is quickly apparent and due to the salt outside of the roots. In this time, the presence of salt in the soil solution reduces the ability of the plant to take up water and this leads to slower growth [31]. In this phase, the rate of the growth depends largely on the water potential of the soil solution and the salts taken up by the plant does not directly inhibit the growth of the new leaves, so it's called water stress or osmotic phase. The second phase of the growth response results from the toxic effect of salt inside the plant. In this phase of salinity stress, which takes time to develop, salts accumulated in transpiring leaves. The cause of the leaf injury is due to the salt load exceeding the ability of the cells to compartmentalize salts in the vacuole [32].

Based on the results of this experiment, the two-phase growth response observed within experimental cultivars in salt treated pots, but control plants show one phase of exponential growth over the experimental period [Figure-3]. This opinion it is shown in figure-3 and figure-4 between Sistan and Falat cultivars. These two genotypes had the same growth reduction for the first week after exposure of 150mM NaCl [figure-4: small scale of Figure-3 to show phase 1), however, leaf area reduction appeared before that immediately after salt application [Figure-2]. Based on calculation of relative growth rate, the genotype with the lower reduction in RGR relative to control (Sistan) considered as osmotic tolerance and Falat with higher reduction in RGR relative to control considered as sensitive [Table-2]. There is more difference in growth reduction after 3rd week of salt application between Sistan and Falat [Figure-3] so that Falat had lower dry production due to more Na⁺ accumulation in leaves [Table-1]. This growth reduction considered as salt toxicity phase or specific ion effect [33]. The two-phase growth response has been shown clearly for maize [34, 35] and wheat [36].

Tissue tolerance index

Tissue tolerance is a mechanism for salt tolerance species at the cellular level (on the tonoplast) involve keeping the salt out of the cytoplasm and sequestering it at high concentration within the vacuoles [37, 38]. This strategy allows plants to reduce or delay the toxic effects of high concentrations of ions on important and sensitive cytoplasmic processes. So that, the total leaf Na⁺ content of individual genotypes did not correlate with the percentage dead leaf, because of variation in the tissue tolerance [39]. The ratio of Na⁺ content to percentage dead leaf was calculated as an index of tolerance to Na⁺ (tissue tolerance) in the leaves. In order to determination of salt induced senescence it is necessary the measurement of natural leaf senescence in control plants, thereby enabling us to calculate the likely salt-induced senescent area. Rajendran et al., [40] assumed accessions of wheat with low degree of salt-induced senescence and high salt concentrations have a higher tissue tolerance. We used their formula to calculate tissue tolerance index (Materials and Methods section).

Based on the results of this experiment KohDasht cultivar had the highest concentration of Na⁺ in leaves [Table-1] and highest amount of tissue tolerance [Table-3] in the Falat and Morvarid cultivars, also tissue tolerance was calculated higher than other cultivars. Based on Table-3, the Ofogh cultivar had lowest rate of tissue tolerance index, which released as salt tolerance by breeders. Of course the weight of tissue tolerance index (effectivity) is important in total salinity tolerance.

A higher Na⁺ content in salt stressed plants per percentage of total dead leaf also indicate a higher degree of tissue tolerance to Na⁺. There was a good correlation ($r^2=0.95$) between them [figure-5]. This ratio ranged from 42.31 $\mu\text{mol Na}^+$ per percentage of dead leaves in Roshan cultivar to 208.11 in Morvarid [Table-3].

In saline condition the rate of the leaf death is crucial for the survival of the plant. The rate at which leaves die is the rate at which salts accumulate to toxic levels, so genotypes that have poor control of the rate at which salt arrives in leaves, or less effective at compartmentalization of that salt in cell vacuoles, have a greater rate of leaf senescence and necrosis [41]. Based on table1 Ofogh with lowest Na⁺ concentration had less salt induced injury and Falat and KohDasht cultivars with high Na⁺ in leaves had high leaves injury. On the other hand, Roshan had low Na⁺ in leaves but it produces high injury in leaf. The cause of the high injury in Roshan is probably due to the salt load exceeding the ability of the cells to compartmentalize salts in the vacuole (weak tissue tolerance: Table-4). In this condition, salts would rapidly build up in the cytoplasm and inhibit enzyme activity [42].

Total salinity tolerance index.

To generate a total salinity tolerance from the indices of Na⁺ exclusion, osmotic tolerance and tissue tolerance, we combined them together and calculated the weighting of each individual mechanism in total salinity tolerance by using of nlinmethod procedure in SAS software. Based on data, the weighting of osmotic tolerance was 0.528 and

weight of Na⁺ exclusion and tissue tolerance was 0.259 and 0.171 respectively. These values applicable to the cultivars used in this experiment by this formula: Total plant salinity tolerance = (0.528 × osmotic tolerance index) + (0.259 × exclusion index) + (0.171 × tissue tolerance index) + 0.0522. The total plant salinity tolerance index calculated for each of the experimental cultivars by this formula and showed in **Table-4**. These data showed that Roshan and Ofogh had the best tolerance cultivars as they had better salt tolerance mechanisms of exclusion and osmotic tolerance [**Table-4**]. These cultivars had lowest values of tissue tolerance index, with little effectivity on total plant salinity tolerance (0.171). The Falat cultivar generate lowest value of total salinity tolerance index (0.648) with lowest indices of osmotic and Na⁺ exclusion [**Table-4**]. The mechanism of issue tolerance was high in Falat (0.970), but it has lowest effectivity in total salinity tolerance. A good correlation was found between the conventional salinity tolerance index, as measured by the reduction of leaf growth in saline condition relative to control, against calculated plant salinity tolerance index, as contributed to the mechanisms of the osmotic, exclusion and tissue tolerance [**figure-6**].

CONCLUSION

Salinity has two main effects of osmotic and ionic on plants. Of course there are many different effects such as nutrient effect, morphologic effect, and physiologic effect in detail, so that there are many different mechanisms for tolerance plants to tolerate it. These mechanisms can be categorized into three main mechanisms of osmotic tolerance, ion exclusion and tissue tolerance. Based on the results, osmotic tolerance was a most effective component of total salinity tolerance with value of 0.528, another mean, effectiveness of osmotic tolerance was more than half of total salinity tolerance. Roy et al., [43] believed that differences in osmotic tolerance may be due to differences in long-distance signaling via processes such as ROS waves, Ca²⁺ waves and or even electrical signals, or they may involve differences in the initial perception of the salt or differences in the response to the signals. The second mechanism that was effective is Na⁺ exclusion index with effectivity of 0.25 of total salinity tolerance. Plants can reduce toxicity effect of ions by reduction of toxic ions (mainly Na⁺) in the leaf blade. Gorham et al., [44] concluded that salt tolerance in bread wheat associated with low rates of transport of Na⁺ to shoots, with high selectivity for K⁺ over Na⁺. This character controlled by a locus (Kna1) on chromosome 4D [45]. Durum wheat is less salt tolerance than bread wheat due to absent of D chromosome. The 3rd mechanism that enhanced salinity tolerance is tissue tolerance. This mechanism can increase the ability of plants to tolerate the salts that they have failed to exclude from the shoot by accumulation of Na⁺ in the vacuoles, synthesis of compatible solutes and production of enzymes catalyzing detoxification of ROS [46]. The value of this component was 0.17 of total salinity tolerance among experimental wheat cultivars. At last, we can consider Ofogh as salt tolerance cultivar with good osmotic tolerance and Na⁺ exclusion mechanisms. We considered Morvarid and KohDasht as high tissue and osmotic tolerance cultivars. They had good predicted salt tolerance index notwithstanding low Na⁺ exclusion [**Table-4**]. The Falat cultivar was sensitive to salinity among experimental cultivars. It had only good tissue tolerance and other salt tolerance components were lowest. It appears that cultivars with two tolerance mechanism either osmotic tolerance with Na⁺ exclusion (such as Ofogh and Roshan) or tissue tolerance with osmotic tolerance (such as Morvarid and KohDasht) have better estimated salinity tolerance than Falat cultivar which appear to use only one tolerance mechanism. Rajendran et al., [47] also concluded that two salinity tolerance mechanisms are better than one in *Triticum monococcum* species. To date, there is neither evidence that a particular plant is committed to only one strategy [48], nor that these mechanisms are mutually exclusive (49). It is clear that salinity tolerance is complex trait due to multigenic nature, and only little work was successful to release tolerant wheat cultivars by using traditional breeding methods [50]. It is therefore necessary to study the mechanisms of traits that are hypothesized to contribute to salinity tolerance and this experiment was an effort to this way.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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FINANCIAL DISCLOSURE

None declared.

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FIGURES AND TABLES

Table:1. Calculation of Na⁺ exclusion index and percent of salt injury in leaves

Cultivar	Fourth leaf Na ⁺ (mM Na ⁺ .g-1DM)	Na ⁺ exclusion index	% of Salt induced injury
Akbari	12.319	0.529	23.78
Sistan	15.362	0.424	30.94
Arg	12.754	0.511	21.63
Ofogh	6.522	1	22.65
Roshan	7.391	0.882	28.87
Falat	42.899	0.152	36.52
Morvarid	38.406	0.170	29.85
KohDasht	42.029	0.155	33.68

Table:2. Calculation of osmotic tolerance index

Cultivar	RGR(nonsaline)=X	RGR(saline)=Y	Osmotic tolerance=Y/X	Osmotic tolerance index	Relative specific leaf weight
Akbari	0.31132	0.27330	0.876	0.965	0.893
Sistan	0.31356	0.28392	0.908	1	1.035
Arg	0.33777	0.26726	0.794	0.874	0.946
Ofogh	0.40181	0.29772	0.750	0.826	0.916
Roshan	0.35254	0.28486	0.806	0.888	1.133
Falat	0.35783	0.24038	0.675	0.743	1.198
Morvarid	0.34086	0.29747	0.872	0.960	1.234
KohDasht	0.35685	0.28891	0.812	0.894	1.174

Table:3. Calculation of tissue tolerance index for experimental Iranian cultivars

Cultivar	Total leaf area in 150mM NaCl	Total leaf area in control	Natural senescence leaf area in control	Salt induced senescence leaf area	Tissue tolerance	Tissue tolerance index	Na ⁺ content / % dead leaves
Akbari	479.33	682.67	74.00	111.67	9.507	0.336	68.26
Sistan	390.00	555.33	73.67	118.33	10.407	0.368	79.63
Arg	489.00	718.33	66.00	105.67	9.942	0.351	74.78
Ofogh	394.67	554.33	52.67	85.67	5.036	0.178	49.11
Roshan	373.00	528.67	70.67	107.67	5.253	0.186	42.31
Falat	408.33	640.33	94.33	149.33	27.430	0.970	184.37
Morvarid	401.67	595.00	65.67	121.00	26.511	0.937	208.11
KohDasht	428.33	645.00	96.00	142.00	28.287	1	180.89

Table: 4. Total salinity tolerance index and components.

Cultivar	Conventional salinity tolerance index (leaf area in salt/leaf area in control)	Na ⁺ exclusion index	Osmotic tolerance index	Tissue tolerance index	Calculated total salinity tolerance index
Akbari	0.697	0.529	0.965	0.336	0.751
Sistan	0.703	0.424	1	0.368	0.748
Arg	0.681	0.511	0.874	0.351	0.701
Ofogh	0.710	1	0.826	0.178	0.767
Roshan	0.707	0.882	0.888	0.186	0.772
Falat	0.637	0.152	0.743	0.970	0.648
Morvarid	0.677	0.170	0.960	0.937	0.762
KohDasht	0.663	0.155	0.894	1	0.734

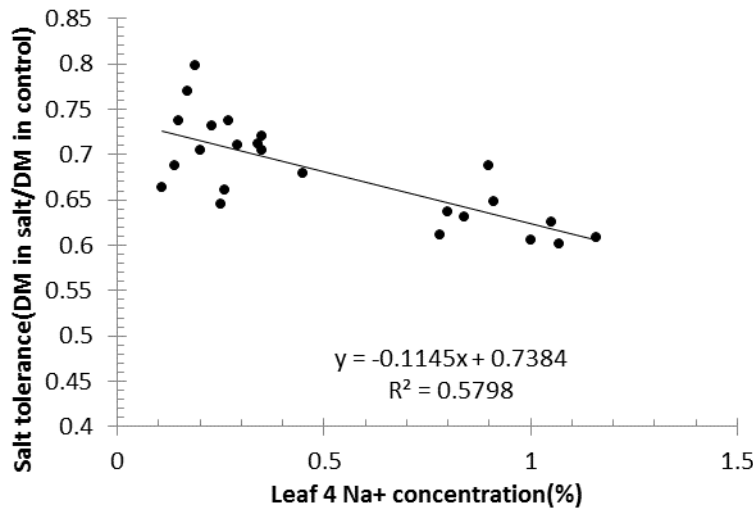


Fig:1. Relationship between salinity tolerance (% growth of control) and fourth leaf Na⁺ concentration were measured 21 days after 150mM NaCl was added.

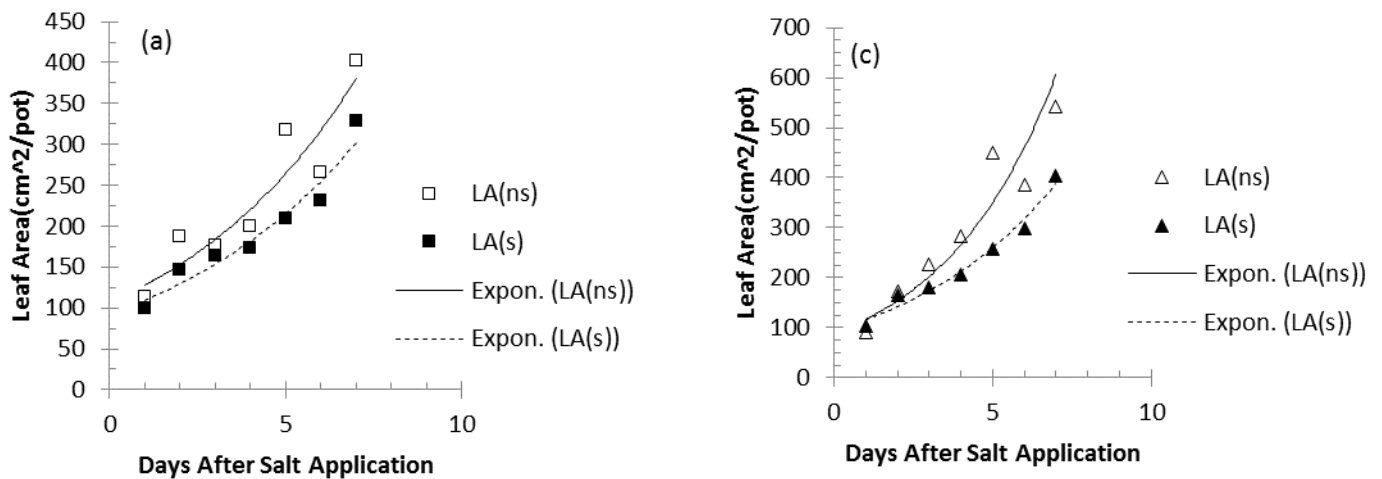


Fig:2. (a) Leaf growth response of Sistan cultivar (as osmotic tolerance) after addition of 0 (□) or 150mM NaCl (■). (b) Relative Growth Rate of Sistan cultivar after salt application (■) and in the control (□). (c) Leaf growth response of Falat cultivar (as osmotic sensitive) after salt application (▲) and in the control (Δ). (d) Relative Growth Rate of Falat cultivar. Each observation is the mean of 3 replications

ns : nonsaline ; s : saline ; RGR : Relative Growth Rate.

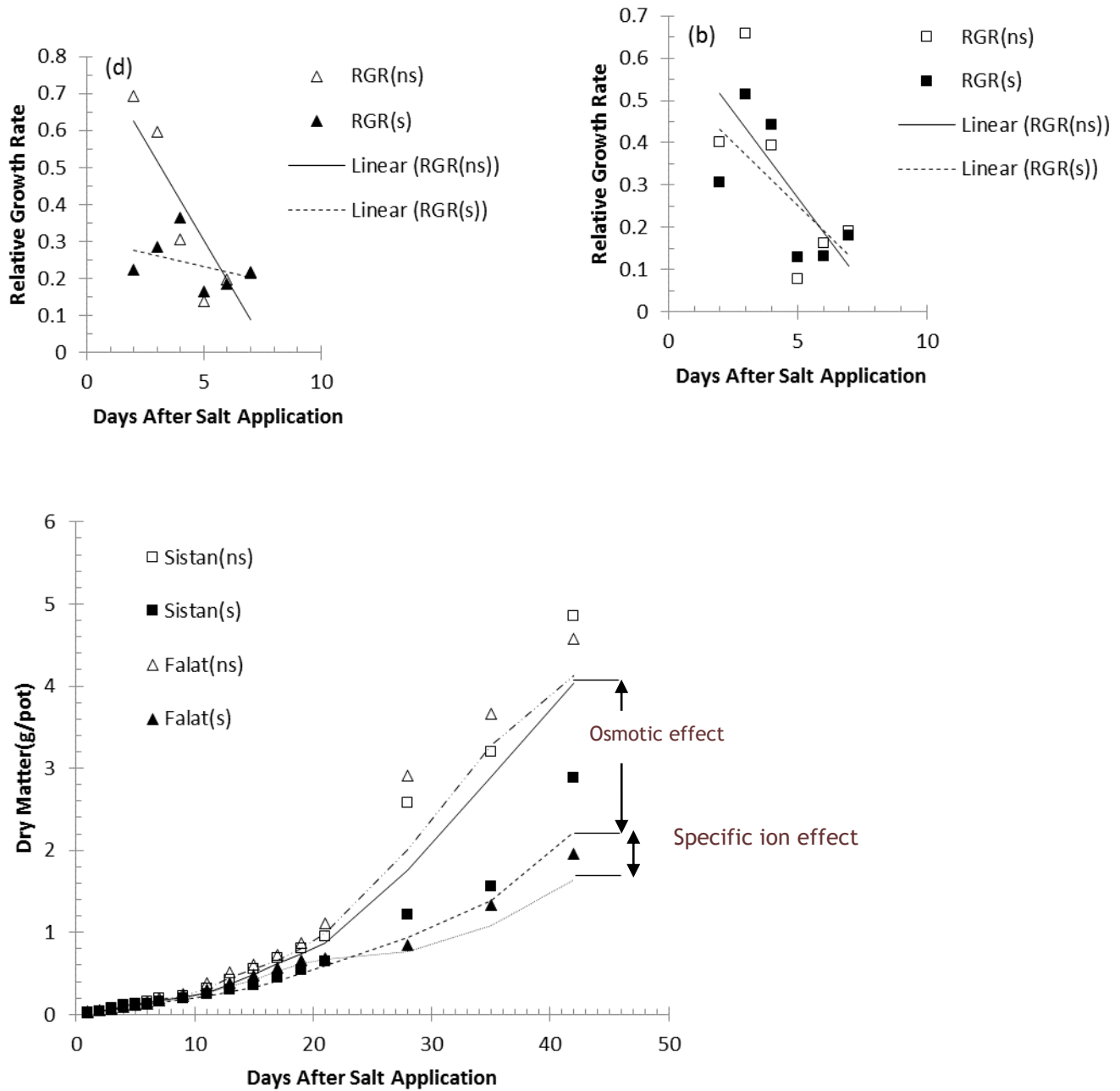


Fig:3. Response of two cultivars of wheat grown in control Hoagland solution (open symbols) and in 150 mM NaCl added to Hoagland solution (closed symbols). Squares denote the salt tolerant cultivar of Sistan and triangles the salt sensitive of Falat. Trendlines are (from above): control of Falat, control of Sistan, salt stressed of Sistan and salt stressed of Falat based on moving average in excel software. (ns: nonsaline and s: saline condition).

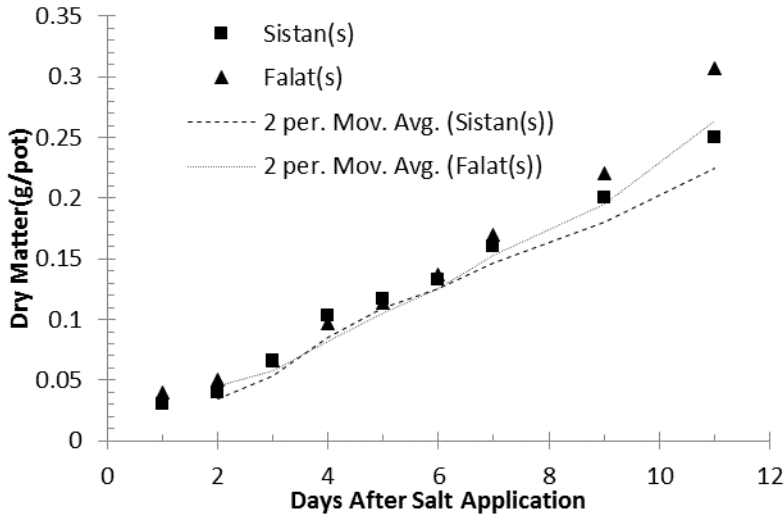


Fig:4. Response of two cultivars of wheat (Sistan ■ and Falat ▲) grown in 150 mM NaCl to clear differences of genotypes in osmotic tolerance. Trendlines are (from above): salt stressed of Falat and salt stressed of Sistan based on moving average in excel software (s: saline condition).

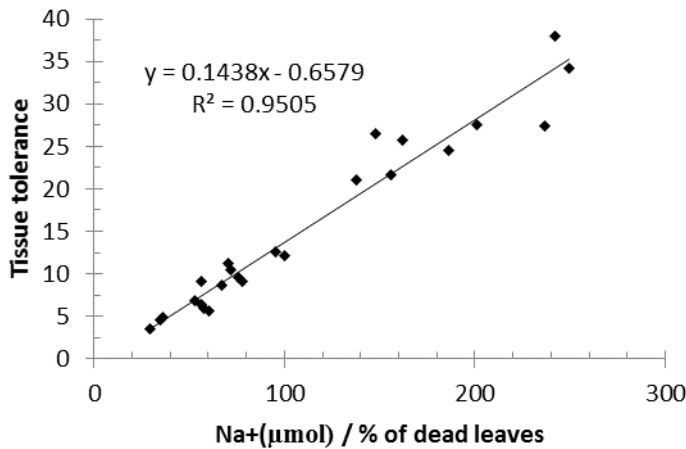


Fig:5. Relationship between leaves Na⁺ content per % of dead leaf and tissue tolerance of wheat cultivars

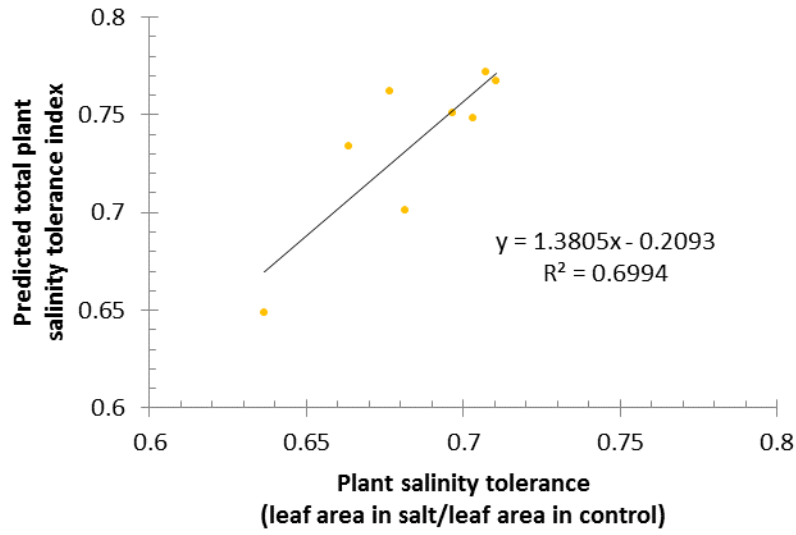


Fig: 6. Plot of conventional salinity tolerance index against the calculated total salinity tolerance index [Table-4].

COMPARISON OF PHYTOREMEDIATION POTENTIAL AND MAI INDEX IN PLATANUS ORIENTALIS, ROBINIA PSEUDOACACIA AND FRAXINUS ROTUNDIFOLIA

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ABSTRACT

Phytoremediation, or the use of green plants to extract, sequester, and detoxify pollutants, has shown considerable promise as a low-cost technique and has received much attention in recent years. Plants are capable of reducing environmental pollutions through uptaking contaminants in their tissues. This study was conducted to determine the uptaking ability of Cd and Pb by the leaves and shoots of *Platanus orientalis*, *Robinia pseudoacacia* and *Fraxinus rotundifolia* in Karaj city, the western Tehran, Iran. In the study site, twenty one-year-old leaves and shoots as well as twenty soil samples were sampled and analyzed by ICP. The results indicated that there was no significant difference in uptaking contents of Cd and Pb in the leaves among the trees. However, the mean concentration of the contaminants in shoots of *Platanus orientalis* was significantly higher than those of *Fraxinus rotundifolia*. No significant difference, however, was observed between the contaminants concentration in shoots of *Robinia pseudoacacia* and those in the others. The amount of Pb in the soil of the study area was significantly higher than Cd. Concentration of Cd and Pb in leaves of the species had the equal amount between all three species vary between 2.3 - 2.7 for Cd and 5.3 - 12.7 ppm for Pb. *Fraxinus rotundifolia* had the highest MAI value for leaves (2.22) and for shoots (2.75) further than the *Platanus orientalis* and *Robinia pseudoacacia*.

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KEY WORDS

Fraxinus rotundifolia, *Robinia pseudoacacia*, *Platanus orientalis*, Heavy metals, Phytoremediation

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INTRODUCTION

Phytoremediation, or the use of green plants to extract, sequester, and detoxify pollutants, has shown considerable promise as a low-cost technique and has received much attention in recent years. Additionally, this method can be accomplished in situ, it is environmentally friendly and the soil can be utilized immediately after treatment [1]. The term "heavy metal" refers to any metallic element with an atomic density greater than 6 g/cm³. These metals are ubiquitous, highly persistent and nonbiodegradable [2, 3].

Increasing industrialization and human activities intensify the emission of various pollutants into the environment and introduce various harmful substances into the atmosphere. Atmospheric pollution has harmful effects on humanity and plant growth [4]. Air pollution in urban areas could be caused by many sources and several methods have been developed to determine the sources and the level of this pollution. One of these techniques is using organisms as bioindicators and biomonitors [5]. Plants are able to reducing contaminants from the environment in different ways. They can achieve this through uptake, stabilization and translocation of materials [6, 7]. Excessive ability of some species in selective uptake of elements and contaminants, therefore, has provided a favorable use of plants in phytoremediation, use of plants to remove pollutants from the environment or to render them harmless [8, 9]. During the last decades, phytoremediation has grabbed researcher's attentions because of being cheaper than other common methods and also being in harmony with environment [10].

Environmental risk and damage occurs when the metals are available to living organisms [11]. Some heavy metals such as lead (Pb) and cadmium (Cd) which are not essential nutrients in organisms and exposure to low concentrations of them and cause high toxicity to plant and animal, can be removed from environment by plants. As well Pb and Cd can concentrate in aerial organs, annual and perennial shoots of some plants [12, 13]. Thus the researchs which probe the ability of the plants for remedy of the Pb and Cd will help us to introduce more suitable plants for phytoremediation in contaminated regions [14, 10]

The main goal of this study was to determine the ability of *Platanus orientalis*, *Robinia pseudoacacia* and *Fraxinus rotundifolia* in uptaking of Cd and Pb from air and soil in one of the biggest park in Karaj city, Iran. The selected trees were extensively planted in Karaj and exposed to varying extents of Cd and Pb due to industrial and other activities.

MATERIALS AND METHODS

Study Site

The study site is located in Karaj (Jahan park, with an area about 110753 m²), 20 Km west of Tehran-Iran (Latitude 35° 51' N, Longitude 50° 50' E and 1300 m above sea level). The climate of the area is semi-arid with mild- cold winters and 7 months (Mid April-Mid November) dry season. Average annual rainfall and average annual temperature are 232 mm and 13.3° C, respectively. The highest rainfall is in March (41.32 mm) and the lowest in August (0.89 mm). The warmest month occurs in August and the coldest in January (Fig. 1).

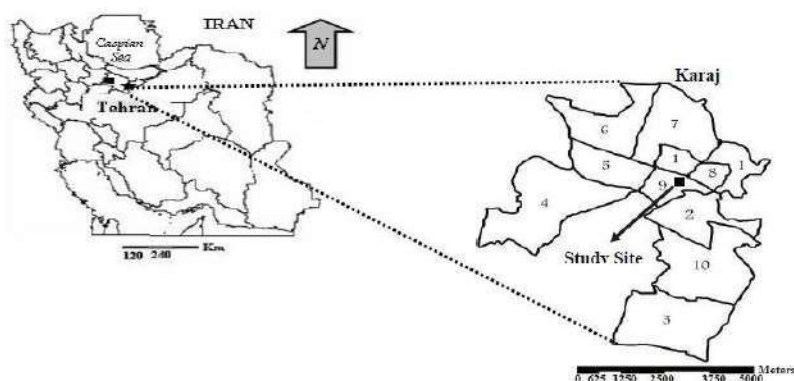


Fig. 1. Location of investigation area (Jahan Park located in district 9 of Karaj city)

Field Sampling

Twenty trees of the nearly even-aged trees of Plain tree (*Platanus orientalis*), Black locust (*Robinia pseudoacacia*) and Persian Ash (*Fraxinus rotundifolia*) were selected. 20 even-aged trees of each mentioned species were relatively even-aged, were selected. The annual shoots and leaves from the lower part of crown were collected in four different directions at October, 2015. In total, 20 samples were taken from leaves and shoot of each species (60 leaves and 60 shoot samples). To determine the concentrations of Cd and Pb in the soil of mineral depth, 20 soil samples were taken in the depth of 0-30 cm from surface to rooting layer.

Laboratory Measurements

Soil properties of the study area are shown in Table 1. For determining the concentrations of Cd and Pb in leaves and shoots, leaves samples were washed with a shaving brush and double-distilled water to eliminate surface contaminants. Then samples were dried in oven 78 °C for 48 hours and pulverized with a chipper. Then 4-mL sulphuric acid and 16-mL Hydrogen peroxide were added to 0.5-g sample for digestion process. The extracts were exposed at 440°C in the Digesdahl. After 5 min the digestion process were completed and metal accumulation of extracts were measured by ICP (OES) set. The calibration process was done by the 1,000 mg· Kg-1 solution for Lead and Cadmium (MERCK), respectively.

Table 1. Soil characteristics in the investigation region (Jahan park)

The investigation area	Soil texture	pH	EC (mS)
Jahan park	Sandy-clay-loam	8.1	0.74

Data Analysis

Finally, means of lead and cadmium in each organ were statistically compared using SPSS software and Games-Howell test.

We used an accumulation index to assess the overall performance of the trees. Since this index is for metals, therefore it was termed as metal accumulation index (MAI) [15].

RESULTS

The concentrations (ppm) of Cd and Pb in the leaves and shoots of the *Platanus orientalis*, *Robinia pseudoacacia* and *Fraxinus rotundifolia* as well as in the soil of study area are shown in Table 2. The total amount of Cd and Pb in the soil of this region are low and the pollution rate could not be announced as a problem [15, 16].

Concentrations of Cd and Pb in the leaves of *Platanus orientalis*, *Robinia pseudoacacia* and *Fraxinus rotundifolia* were shown in Figs. 2 and 3. The results showed that there were no significant differences among leaves of the species in concentration of Cd and Pb. However accumulation of Cd and Pb in shoots of *Platanus orientalis* was significantly higher than concentrations of Cd and Pb in shoots of the other species. The significance different between species in shoots opposite of leaves introduce a transporting process from leaves to shoot in all of the species at the end of October.

Table 2. The concentrations of Cd and Pb (ppm) in the leaves and shoots of the *Platanus orientalis*, *Robinia pseudoacacia* and *Fraxinus rotundifolia*.

Species		The average of concentration (ppm)	
		Cd	Pb
<i>Platanus orientalis</i>	Leaf	2.7±0.2	12.7±1.9
	Shoot	2.4±0.1	11±2.1
<i>Robinia pseudoacacia</i>	Leaf	2.3±0.1	11.3±2.1
	Shoot	2.6±0.1	9.7±1.5
<i>Fraxinus rotundifolia</i>	Leaf	2.3±0.1	6.2±1.3
	Shoot	2.4±0.1	5.3±0.9
Soil		3.4±0.3	11.2±2.4

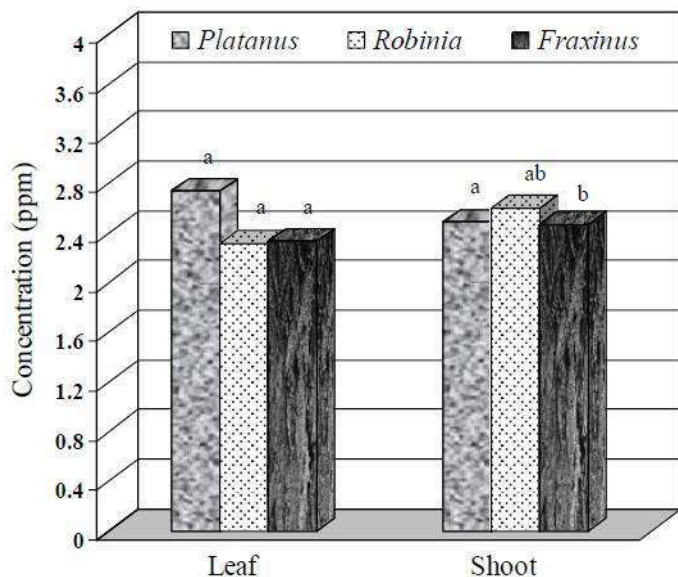


Fig. 2. Comparison of Cd uptake by the leaves and shoots of the studied species (Error bars show the Standard Error of Mean (SE); means with similar letters do not differ from each other ($p \leq 0.05$)).

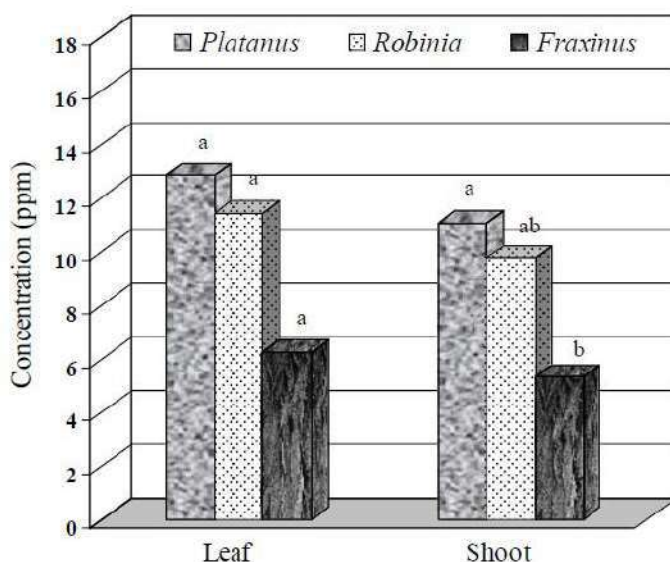


Fig. 3. Comparison of Pb uptake by the leaves and shoots in the studied species (Error bars show the Standard Error of Mean (SE); means with similar letters do not differ from each other ($p \leq 0.05$)).

Also the results indicated that there was a significant difference between absorption of Cd and Pb in leaves and shoots of the tree species. The concentration of pb in leaves and shoots of the species was heifer than Cd Figs. 4

and 5'. This could be due to the fact that the concentration of the Pb in the soil (11.2 ppm) was higher than Cd (3.4 ppm) (Table 2) [17].

As shown in Figs. 6 and 7 there was no significant differences between leaves and shoots in all of the species in absorption of Cd and Pb.

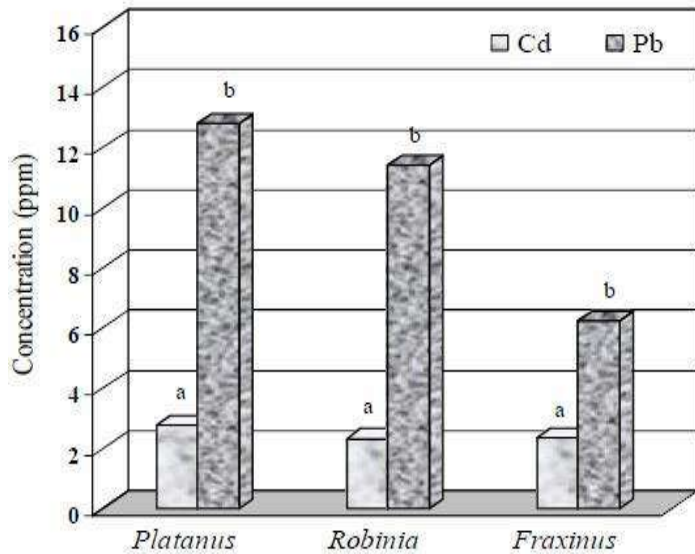


Fig. 4. Comparison of Cd and Pb uptake by the leaves in the studied species (Error bars show the Standard Error of Mean (SE); means with similar letters do not differ from each other ($p \leq 0.05$)).

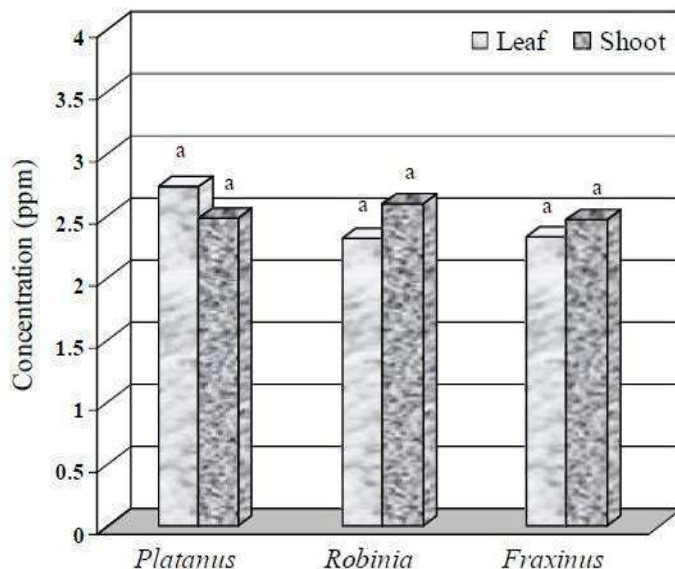


Fig. 6. Comparison of the leaves and the shoots uptake of Cd in the studied species (Error bars show the Standard Error of Mean (SE); means with similar letters do not differ from each other ($p \leq 0.05$)).

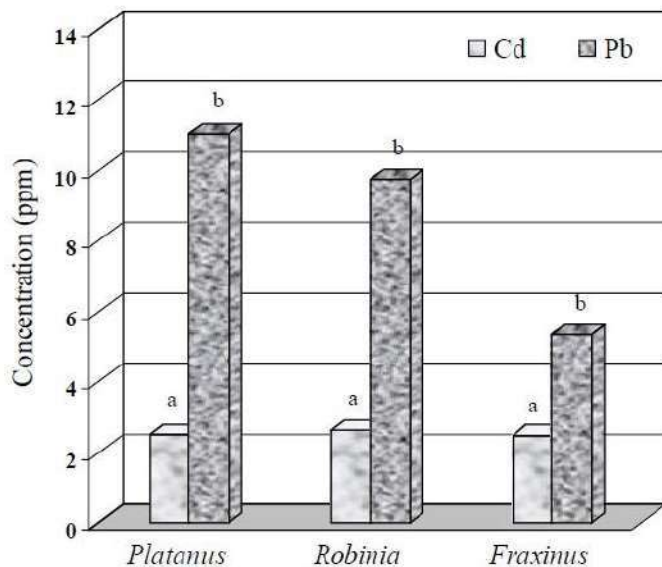


Fig. 5. Comparison of the amounts of Cd and Pb uptake by the shoots in the studied species (Error bars show the Standard Error of Mean (SE); means with similar letters do not differ from each other ($p \leq 0.05$)).

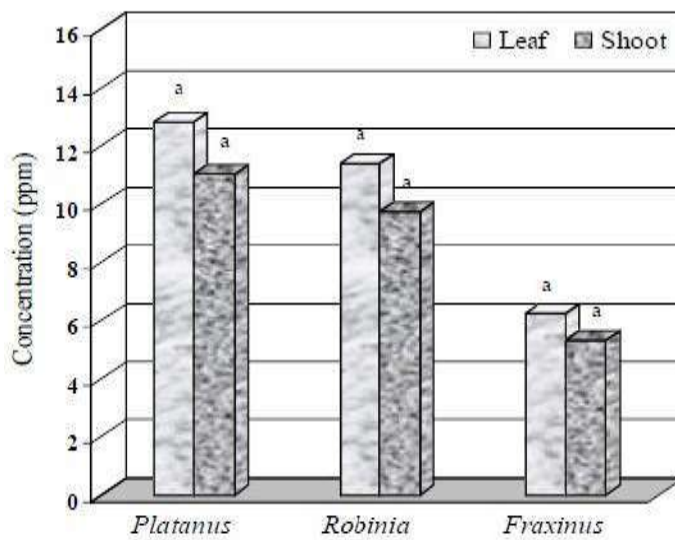


Fig. 7. Comparison of the stems and leaves uptake of Pb in the studied species (Error bars show the Standard Error of Mean (SE); means with similar letters do not differ from each other ($p \leq 0.05$)).

As explained before, we used metal accumulation index to assess the overall performance of the trees in terms of metal accumulation [15]. By applying this index to individual species, we found that Fraxinus rotundifolia had the highest MAI value for leaves (2.22) and for shoots (2.75) further than the Platanus orientalis and Robinia

pseudoacacia (Table 3). It is clear that the total amount of contaminant in this region is apparently very low and the pollution rate could not be announced as a problem.

Table 3. The values of metal accumulation index (MAI) for studied species

Species	Metal accumulation index	
	Leaf	Shoot
<i>Platanus orientalis</i>	2	2.68
<i>Robinia pseudoacacia</i>	1.95	2.53
<i>Fraxinus rotundifolia</i>	2.22	2.75

Concentration of Cd and Pb in leaves of the species had not any significance different between different species, whereas Aftabtalab (2008) demonstrated the higher amount of *Platanus orientalis* leave absorption in Cd and Pb versus *Cupressus arizonica*. Shoots absorption of Cd and Pb in *Platanus orientalis* was significantly higher than *Fraxinus rotundifolia* and *Robinia pseudoacacia*. While the MAI index for *Fraxinus rotundifolia* was a little higher than the other species both for leaves and shoots.

CONCLUSION

In conclusion, it seems that the little amount of pollutants in soil of the study area is the most important reason for lower absorption of Cd and Pb in the leaves and shoots of the trees. In addition the significance difference between species in shoots versus leaves suggested a transporting process from leaves to stem in all of the species at the end of October. We found out that *Platanus orientalis* is the most suitable species for phytoremediation as Zeynep and Atmaca (2011) announced similar condition for *Platanus orientalis*.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None.

FINANCIAL DISCLOSURE

No financial support was received to carry out this project.

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THE SURVEY OF THE RUNOFF WATERS CREATION AND THE FORMATION QUALITY WITH THE OBJECTIVE OF PREDICTING THE URBAN FLOOD OCCURRENCE AND ITS INFLUENCE RATE (CASE STUDY: THE CITY OF SALEH ABAD)

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ABSTRACT

One of the most important problems that the current societies are confronted with is the natural disasters and the unfavorable phenomena in various levels. Under such circumstances, the most logical and the most original method for keeping safe of the natural disasters unfavorable effects is to have information and recognition of the nature and the source of such incidents within the predicted timeline. One such unpleasant phenomena is the stream of the water flowing on the surface as a result of the precipitation and rain and snowfall in the periphery and within the urban areas which cause unsuitable and inappropriate conditions to appear due to passing through various regions in the cities and the situation worsens when the farm lands are destroyed and converted to urban territories which can further cause the impermeable regions of the land to expand and bring about the grounding for the creation and formation of runoff waters within the cities which can be studied from various aspects and in case that such runoffs resulting from the precipitations in the cities are not conveniently and appropriately discharged then this possibility heightens that floods can form inside the cities. In the current article the author is trying to study the urban natural and climatic statuses in the middle district of the city of Hamadan in the framework of an applied and field study and also to evaluate the city conditions in creation of the runoffs and the occurrence of urban floods. The researcher makes use of a runoff rational calculation method and attempts to estimate the impact coefficient at the time the runoff is formed and also measuring the runoff height and Debi in the case study investigated in the current study which is the city of Saleh Abad, then the researcher attempts to determine the probable time for the flood occurrence and with the information obtained the author tries to determine the urban runoffs during various seasons of the year.

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KEY WORDS

runoff, flood, storm water, rational calculation

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INTRODUCTION

If a country intends to keep pace with and advance in line with the development is incumbently obliged to sufficiently and most efficiently deploy its natural resources and to be familiar with the unpleasant consequences resulting from such exploitations. The topic of water, precipitation and the occurrence of the sudden and unexpected incidents stemming from the rainfall and snowfall in the cities which is accompanied with numerous problems and troubles and this can be studied from different perspectives. Runoffs and the urban storm waters are among the important problems in this area and it is focused on by the various fields of sciences from bioenvironmental, textural and hydrological aspects. Urban geographers, climatologists and geo-morphologists have dealt with the issue more than the others and according to the expansion of the city life which has mostly been accompanied with the environmental destructions and the occupation of the farm lands and natural resources for the purpose of building constructions and development of the cities have all led to the formation and creation of the runoffs the flowing of which in the form of surface waters and streams have brought about the flooding of the passage ways and streaming of the storm waters with their considerable destructive power and they have been found to be playing critical roles in demolishing the facilities and installations and the natural resources and the soils in the vicinity of the cities and thus such problems and cumbers regarding the city management plans and the bioenvironmental outcomes have attracted a great deal of attention and therefore, to gain a full and sufficient insight of their features and their source of

formation is considered as an unavoidable necessity for the city management plans within the spatial dimensions and under the specific temporal circumstances.

The introduction and the identification of the study area:

Since the case study in the present study includes the city of Saleh Abad in Hamadan Province, the researcher has tried to provide the reader with a brief realization of the province location characteristics in Iran and then the researcher deals with introducing the city of Saleh Abad and conducts the study normal investigation procedure.

The situation and the natural conditions of Hamadan Province:

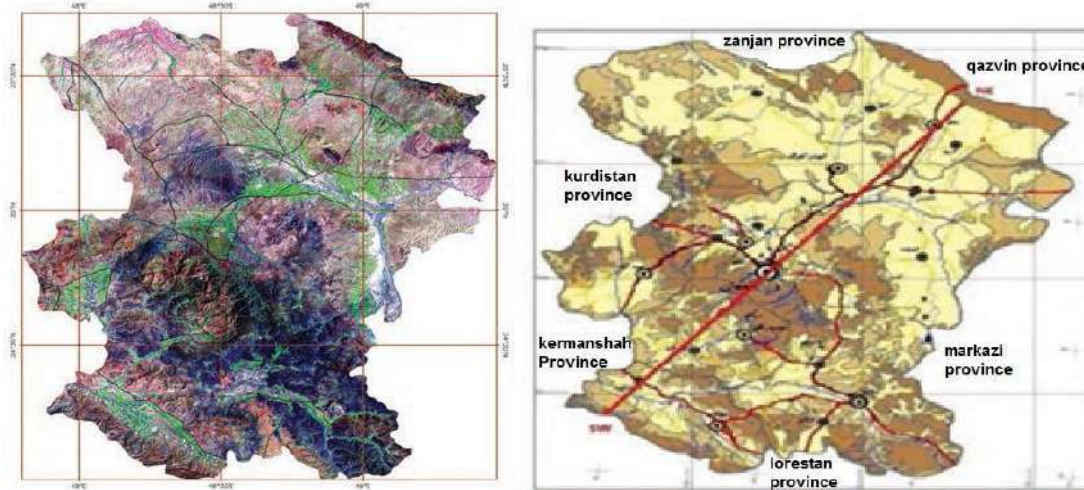
Hamadan province covers a 19493 square-kilometer area, and it embraces about 1.2% of the entire country area. The Province is located within 33° and 59' to 35° and 49' of the northern latitude and 47° and 34' to 49° and 36' of the eastern longitude from the prime meridian. The province has been located in the western section of the country and it shares the same border with Zanjan Province from the north, and Lorestan Province from the south and it is tangent with Markazi province from the east and from the west it is bordered to Kermanshah and Kurdistan Provinces.

The most elevated area in Hamadan Province is the 3574-meter-high Alvand apex and it is situated between Tuyserkan and Hamadan Counties and the lowest point in the province is Amr Abad lands along Qarreh Chai river in Shora' district. Hamadan Province at the present time possesses three main entrance routes and one secondary entrance route. The province is connected to Kermanshah and Sanandaj from the west. From the east it is located adjacent to the city of Arak. It is connected to Tehran and Qazvin from the north and the Mount. Alvand is positioned in the southern border of the city. The city's access points and its being situated on one of the important connective highway routes in the western part of the country and it connects Kurdistan, Kermanshah and Ilam provinces to the city of Tehran and vice versa and this has provided the province with a significant geographical position which is of a great value in terms of the effect it has on the economical activities.

Hamadan province covers part of the middle Zagros and the central Plateau in Iran and it is generally regarded as mountainous region. The region's elevations and mountains are generally oriented along the northwest-southeast direction. Therefore, the way the mountains and the elevations are oriented has caused the province to be divided the Province into two northeast and southwest districts. The topographical status of the region includes highly elevated plain lands and sedimentary savannas and in the elevated plains the land is found to be with a lot of rising and falling and degradation and weathering show intensified trend in some sloped sections of the region. The Alvand Mountain which is almost posited in the central part of the province is oriented in the northwestern-southeastern direction and as we know the city of Hamadan is located in the northern territories of the mountain Alvand and the city is bordered by the Mount Alvand in the southern section. There are many rivers originating from the various apexes on the Alvand Mount. Hamadan Province is situated in the area of three substantial catchment provinces in the country. Each of the rivers Gamasiab, Qarreh Chai and Taldar belong to the catchment area of Persian Guld and Omman Sea, central catchment area and Caspian Sea catchment area, respectively.

The precipitation rate in a 20-year period in the city of Hamadan airport station has been calculated to be 305.7 mm. The raining variations in the city of Hamadan have been generally estimated to be very low and the standard deviation for the precipitation variations has been found to be small. Also, with the survey of the statistical yearbook of the city of Hamadan in 2010, the highest raining rate has been reported in May (75.7 mm) followed by April (54.7 mm), then March (43.9 mm) and finally August with 36.4 mm precipitations. The survey of the precipitation seasonal distribution in provincial level has indicated that 38.9% of the precipitations (that is the highest rate) have been in winter, 33% in fall and 27.8% in spring and the lowest precipitation rate, 0.3, goes to the summer. The average annual precipitation geography of the Province has been 343 mm. therefore the province is in an intermediate level from the precipitation aspect.

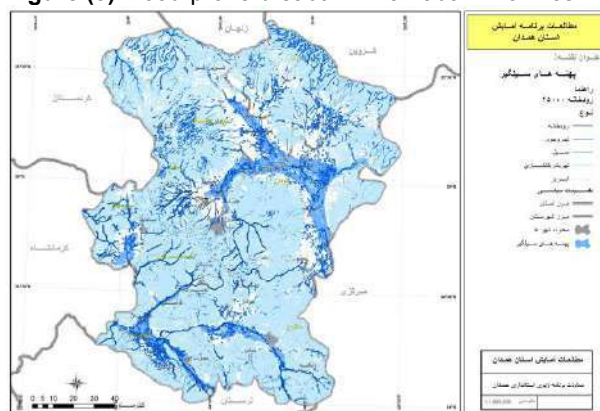
Figure (1): Hamadan Province aerial images/**Figure (2):** Hamadan Province topography map



Hamadan Province flood-proneness:

Topography, land slope orientation, the catchment area width and the precipitation regime has brought about the conditions for the vast breadth of the province to be exposed to the flooding raids on special occasions. In the northern hemisphere of the province these flood line breadth are far more extended and continuous. The land slope in the catchment area of the Qarreh Chai River is in a form that the surface streams are collected from a vast area of land and they join in a narrow passage way. Such flood-prone passage ways begin from Jorghan and Laljin areas and they continue along Qarreh Chai River to the southeastern part of Kabudar Ahang. In this section they join with the other flood-prone area which originates from the northwestern section of Kabudar Ahang and altogether they intensify the flooding risk on the more vast breadth of the sections located on the southern part of Famnin and along the Qarreh Chai River. Finally, they get connected to another flood-prone passage way which is stretched along south-north direction on the eastern section of Ghahavand and also along another tributary of Qarreh Chai River and these altogether form the widest flood prone breadth in the entire province. Another flood-prone breadth is located on the southern hemisphere of the province. This flood-prone breadth is located along and on the marginal section of Gamasiab, Ghelghelrud and Haram Abad rivers the latter of which originates from the southern section of the city of Malayer. Another breadth which is located in the southern section of the province and it is talked of here because of its flood-proneness is situated on the southeastern section of Asad Abad and along and on the marginal border of Qarreh Chai River. In sum, 1811.3 square kilometer of the entire area of the province (9.3%) is exposed to the destruction by flood. Getting information and becoming aware of the flood-prone areas in the province can be taken as an alarming siren for the officials to take the necessary measures and establish the required preps especially on the placement sites of the buildings and in forecasting and predicting the necessary steps regarding getting the strategic activities done.

Figure (3): flood-prone breadth in Hamadan Province

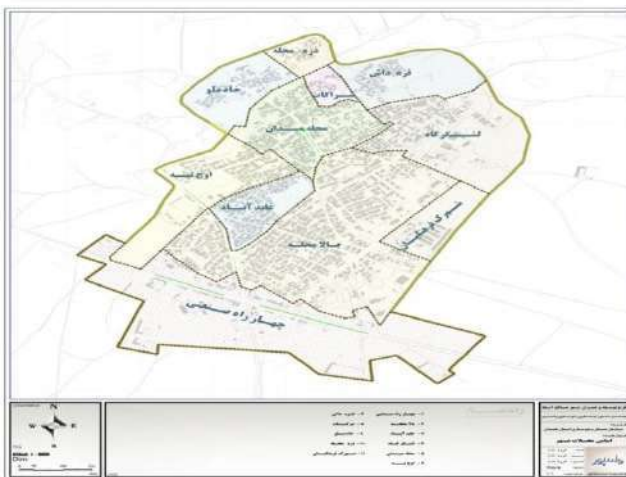
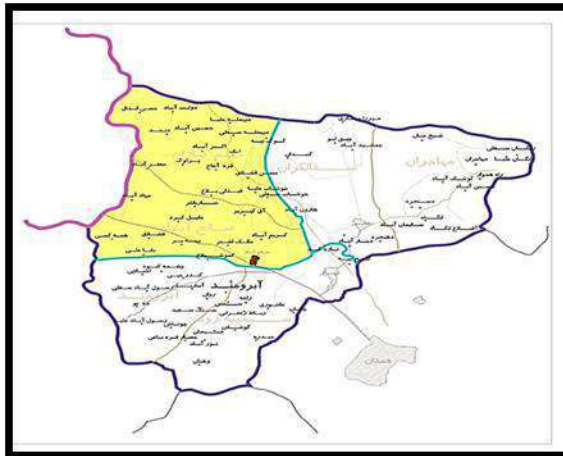


Saleh Abad is among the city points in Bahar County which covers the central part of Bahar County as the city center for Saleh Abad Section and the villages and the rural areas in Saleh Abad and Deym Karan Counties. The

city is located in 48° and 21' eastern longitude and 34° and 56' of the northern latitude and it is posited within a 20-kilometer distance from the city of Hamadan. The city average elevation from the sea level is about 1780 meters. Based on the studies performed and the information which was gathered from the local elders and the trustees and the reliable white-bearded individuals a region in a 3-kilometer northern radius of the city called Hasnan was the primary nucleus of the formation of the city. The city through its being positioned on the connective routes between Hamadan and Kermanshah and Hamadan Sanandaj has been stated to be enjoying a particular position. The current situation of the city alone and in itself can be marked as an outstanding feature which causes a lot of attractions to be directed towards its spatial and relational system. And this is in a manner that the district has been considered as the entrance gate from the two western provinces to Hamadan province which is deemed to be impregnated with a lot of commercial, business and even tourism competencies for the city of Saleh Abad.

It might be possible to say that the growth and formation stages for the city of Saleh Abad have been perfected in five stages. The primary formation stage has occurred on the southern section of Saleh Abad River, in an area between Hamadan-Qorveh Road and the second stage has taken place in a radius from the primary locus of the city formation basis according to the natural and environmental conditions. In the third stage, the city of Saleh Abad seem to be following an approximation approach towards the river in such a manner that in this stage part of the city growth has been transferred well beyond the other side of the river and in the next stages of the city development, the city follows a smaller and slower growth pace especially in the Pahlavi era which has been subsequently followed by a rapid growth rate after the victory of the Islamic Revolution and the city has been found to be stretched towards Hamadan-Sanandaj Road.

Figure (4): the city of Saleh Abad situation in Bahar County. **Figure (5):** the neighborhood zoning system in the city of Saleh Abad



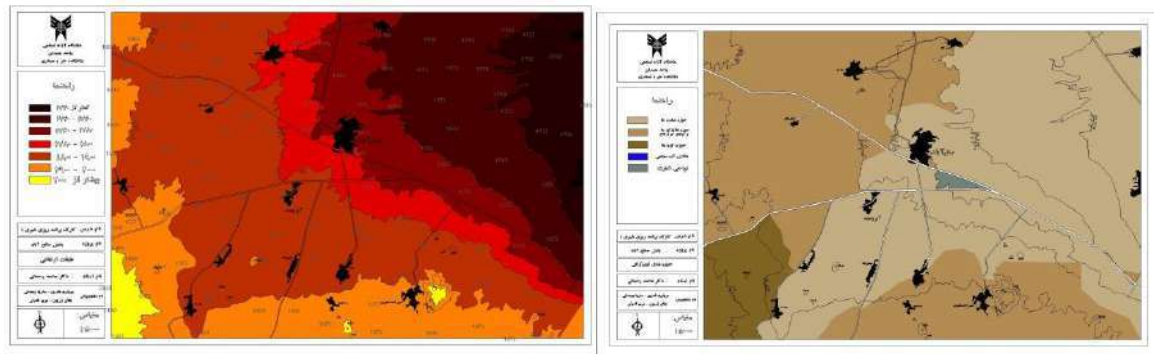
Based on the latest census performed by the Statistic center of Iran in 2011, the city of Saleh Abad's population was estimated 7830 people. The city is among the small cities in the province and its population has been allegedly estimated to be in a lower rate in contrast to the population in 14 cities in the province including

Hamadan, Malayer, Nahavand, Asad Abad, Toyserkan, Bahar, Kabudar Ahang, Laljin, Meryanj, Famnin, Rezen, Ghorveh Darjazin, Jorghana, Azandaryan and it is estimated to be greater than the population in the other 9 cities in the Province.

The study area topography:

In studying the various forms of uneven terrains in the region, it has been discovered that the mountainous units of the region are oriented westward-southwestward and the hills are also in the form of low-elevated foothills which have come to take this shape as a result of schists and slates undergoing weathering and they are figured out to be enjoying a very soft slope. The plains are also situated on level lands with soft slopes. The topographical status of the city is in a form that the most important topographical features are to be seen in the western part of the region. A vast area of the city is situated in elevations lower than 2000 meters. In this way, in a general schematic overview of the city it can be said that the elevations in the city of Saleh Abad are directed southwest-northeastward. In the survey of the topographical status of the region we come across the high lands and the sedimentary terrains which are located on elevated plains with a lot of risings and fallings and the weathering can be easily understood to be more intensified in some of the sections with more steep slopes. In the alluvial terrains and on the weathering plates the slope is trivial and the studies performed by the consultant researcher indicate irrigational farming on these areas and the peripheral areas located on the suburban localities of the city. The city of Saleh Abad is located on the Bahar Plain. Hamadan-Bahar plain is limited to Alvand highlands in the south, it faces the Almabolagh Sheikhi Jan highlands from the western side and it is bordered by the Arjani Mount. Highlands from the eastern section and it is also found to be limited to the Kamarzard and Sheikhi Jan high lands from the northern section [1].

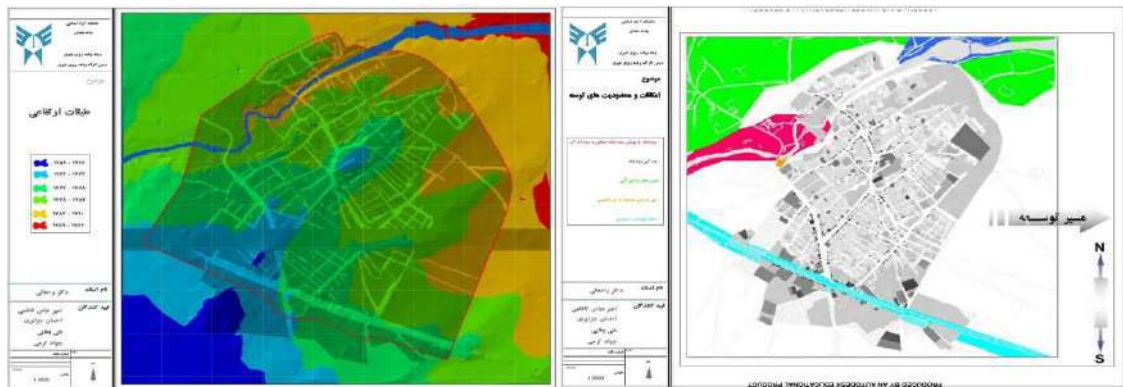
Figure (6): Saleh Abad Region elevation layer map **Figure (7):** Saleh Abad Region topographical zoning map



In surveying the topographical status and/or the appearance characteristics of the city of Saleh Abad the overall dip has been measured to be ranging from 0% to 2% and the lateral slope in a range from 2% to 5% with prominent intermediate rising and falling ground. Saleh Abad Plain has occurred on level land with soft slope. In investigating the forms of the topographical unevenness of the region we can observe that the mountainous units are directed west-southwestward and the hills are in the form of low elevated foothills which have come to take this shape as a result of schists and slates great capacity for being easily degraded and weathered and they are found to be of a very soft slope. Among the natural barriers in the face of city development plans is the Saleh Abad River in the western section of the city which is also covering some areas in the northwest and south western section of the city and semi-sparse forest cover along the river can be also named as the hindering factor on the way of the city growth and the urban textural development. Although it does not come as a surprise but it is worth mentioning that the dam built on the northern part of the river which has a very low level difference from its peripheral land has formed a semicircular line which has imposed the city traffic in a narrow bottleneck and it occasionally plays a critical role in the occurrence of the floods and flowing of the streams or the intensification of the floods and the surface water streaming and it has also been reported to have caused financial losses and damages to the peripheral lands and especially the irrigation farm lands and fortunately no life loss has been reported in the recent decades. The presence of some foothills on the west and the southern part of the city which have caused the region to take a new shape in this section does not seem to be lending itself to urban development particularly regarding the establishment of the residential areas. The irrigation farm lands on this section of the city are considered among the other factors inhibiting the city growth and among the non-natural and to some extent man-made barriers on the path to the city development there can be made reference to the placement of the city graveyard on the west and on the both sides of the subsidiary route (the old road to Alisadr cave) which ends

in the main Hamadan_Bijar road within a less than one kilometer distance immediately after passing over the river and the bridge which is reminded of as the English Bridge. Another non-natural barrier is Hamadan-Sanandaj Road which is located on parts of the southern and southwestern sections of the city on which the heavy traffic and the road limit and the pedestrians' safety does not allow the development of the city to the other side of the road.

Figure (8): the topographical zoning and the elevation strata map of the city **figure (9):** the map of the barriers and the hindrances to the city development



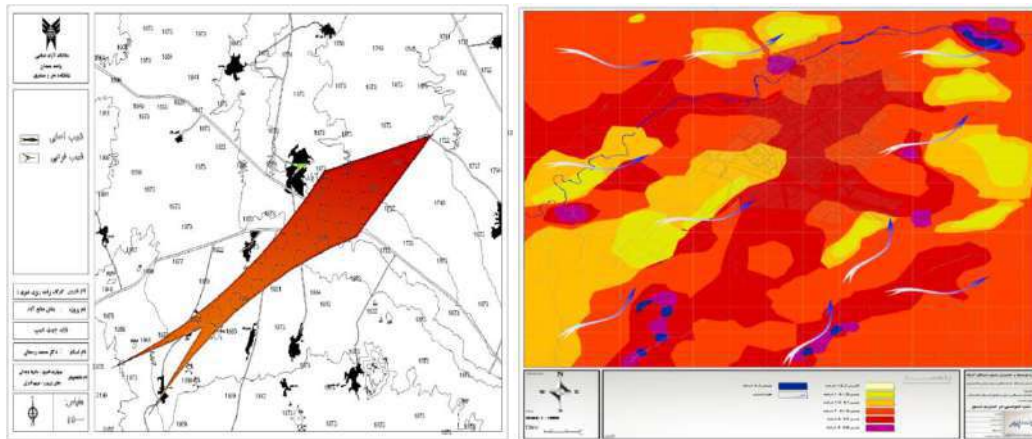
Slope:

In the survey of the topographical features and statuses of the suburban areas of the city of Saleh Abad the general slope has been estimated to be in the range from 0% to 2% and the lateral slope of the area ranges from 2% to 5% with an intermediate rising and falling uneven ground. In studying the topographical features of the city of Saleh Abad one should not neglect the catchment area topography and the role played by the topographical features and the river located within such topography. The city of Saleh Abad's catchment area in the southern part of the Greater Qarreh Chai Catchment area on the border line between the two northern and southern hemisphere of the province accounts for approximately 1.3% of the entire catchment areas leading to Qarreh Chai catchment system [1].

There can be observed a less than 1% slope on the both sides connected to each other with a narrow width which are located on the eastern and southeastern section and cover the lands on the plain. The cities Bahar, Saleh Abad, Mohajeran and Laljin which are considered the fourfold cities of Bahar County are all situated in this area which are all found to be positioned on a soft slope. The slope ranging from 1% to 33% is stretched in the direction from the east towards the west and it also covers sections of the northeastern and the central area of the city of Bahar [1].

The slope area ranging from 3% to 5% dip is scattered on the southwestern section of the city and it is mostly found in the northern section. This way, the slopes reaching to a maximum degree of 5% cover a vast area of the city of Bahar. In the above slopes (below 5%) every developmental activities are estimated to be appropriate and feasible. Since the best farming lands are located on this breadth of the city, preserving such lands is a hindering factor which has to be taken into consideration regarding urban, industrial development. Slopes greater than 10% are merely only scattered on the southern and southwestern sections of the city and they do not seem to be covering a considerable area in terms of distribution [1].

Figure (10): the map of the dip orientation in the city of Saleh Abad/ **Figure (11):** the study area overall slope



The survey of the climatic conditions in the city of Saleh Abad:

In climatic categorization, it is not readily possible to recognize the overall climatic conditions of the area and there exists this possibility that substantial variations arise in different classifications. There has been proposed various methods for the climatic typology by the experts among which De Martin and Ambrege methods are very popular and common in Iran and they have also been practically used in the present study and the results of the climatic studies indicate that a semi-dry supra cold climate is prevalent in the area based on adjusted De Martin method [2].

Precipitation:

In Saleh Abad region the average annual precipitation level is 382 mm. The highest precipitation rate has been reported for 1979 with 670 mm precipitation and the driest year has been calculated to be 1983 with a precipitation rate of 195 mm. April with 64.1 mm is the wettest month of the year and September with 2.4 mm precipitation level is the driest season of the year. Winter with 42% precipitation rate is the wettest season of the year and summer with 2% precipitation rate is the driest season of the year. The number of the rainy days in the study area has been calculated to be 71.7 days per year, and February with 10.5 days has been reported to be having the most rainy days during a year and it is followed by April and then March with 9.8 days. The investigations about the maximum twenty-four hour precipitation is one of the most important factors in evaluating the likelihood for flood occurrence in a region and based on the calculations and investigations this factor has been computed to be 56 mm.

The ground water in the study area:

In the terrains and plains in Hamadan region the ground water aquifers are formed in various strata and it has been figured out that such layers and strata are somewhat connected and they altogether form the main aquifer. Ground water reservoir are mostly occurred in the alluvial layers but it has been discovered that in some of the regions, the lime strata are found to be containing springs (Vasmagh and Jeyhoon Abad) and it also has been discovered that the springs basin has been located in a relatively small area.

Generally speaking, the region has been consisted of four main plains: Hamadan-Bahar, Kabudar Ahang, Saleh Abad and Ghahavand, and Komijan. In terms of the ground water reservoirs, the plains are separated from one another by scists, Granite shales, Diorite, Maroon, and Argillaceous Limestones which are impermeable layers and

strata. In each of such plains the ground waters have been reported to be following a unique streaming trend but the entire waters in the northern section of the region have been explored to be flowing into the central section of the plain towards Simineh Rud River and this central section to which the entire systems of the ground water pour is known as the central plain. This plain starts from Bahar Plain exit mouth in the proximity of Kushk Vilage and it is continued along the Simineh Rud River to the area the river exits the plain in the vicinity of Ghezel Hesar village. As it was mentioned before, the ground water exiting Bahar, Kabudar Ahang and Saleh Abad plains enter the central plain. The water in such areas is exploited via digging wells and aqueducts and the rest is either vaporized or it is drained by the river. Hamadan-Bahar Plain enjoys a triangular morphology which is surrounded from every direction by the peripheral high lads and the only underground passage way is a narrow strait which is located on the northeastern section of the region the apex of which is in a triangular form. The seasonal variations of the ground water is about 3 to 4 millimeters but such variations and changes have been found to be of a lesser fluctuation in the northwestern part between Bahador Beig and Saleh Abad and they are generally about 1.5 to 3 meters. The maximum ground water level has been reported on the ending days of May and early June and the minimum level has been reported in October or November and even it has been reported for December in some of the years. The hydrologic gradient can be seen in the southern, southwestern and the western section of the Plain. Exploiting the ground water was predominantly conducted on Hamadan-Bahar Plain for farm land irrigation purposes and unfortunately the substantial part of the consumptive water extracted from the plain has been for the purpose of imbibing drinkable water for supplying the drinkable water for cities such as Hamadan-Bahar, Saleh abad and other cities.

The rivers in the study area:

The intra-city watercourse and rivers are considered as the structural elements of the city and natural city corridor in causing bioenvironmental runoffs inside the city which play an effective role and also they are stated to be protecting the city ecosystem. But, in the meantime, according to their natural statuses, the river beds with a great deal of various ing effects are indicative of constant and perpetual changes and variations and they bring about weathering and in the meanwhile reconstruction of their edges. In this regard, the necessity for preserving and reclaiming the river bed and routes and at the same time paying attention to their safety and security for the city residents against the occurrence of the floods is one of the important issues among the urban problems which needs to be considered from the ecological, bioenvironmental and designing perspective free from any diminishing and negative consideration of the city rivers through the use of the rivers natural and general characteristics and finally turning their threats into opportunities for the city environment [3]. The most important rivers in the study area are as stated below:

- a) **Harim River:**
The river existing in the northern section of the city covers an area of about 1.70 with a 1.95-square meter capita which accounts for about 1.79% of the entire city lands.
- b) **Saleh Abad River:**
Saleh Abad River is comprised of several tributaries and it is explored to be originating from southeastern Alvand, Alusan, Kuhkar and Faravel Khaneh Mountain.
- c) **Bahador Beig River:**
The river originates from the 2690-meter high elevations of the Mount. Almutragh and meanwhile being joined with by a secondary tributary coming from Khalil Kurd side, it pours into Saleh Abad River.
- d) **Simineh Rud River:**
Simineh Rud River or Ghuri Chai is formed by the connections and the adjunction of the eastern-southern section rivers from the Alvand Elevations.
- e) **Khmigan River:**
The maximum height in this area is 2520 meters. Khamigan River stems from the southern sections of the northern elevations in the Province.

The study area flood-proneness:

In spite of the scarcity of the precipitations in our country and the year-round water requirements, we are witnessing the occurrence of numerous floods with millions of cubic meter water running wasted and these floods other than causing a lot of damages and ruins and the great losses provide for the loss of millions of cubic meter water and the destruction of millions of tones of the soil. Furthermore, such floods and runoffs can cause a lot of damages to the water-delivery installations and networks. The floods in 1987 in Zahedan and Tehran and the floods in 1990 in Rasht and 1993 in Gilan and the numerous floods in 1998 in Gilan, Golestan or Mazandaran and

the other provinces and tens of other floods which have taken place during the recent years are but a few examples.

Based on the statistics obtained for Hamadan Province, it has been reported to be the tenth province in its rank for flood-proneness. Reportedly, every ten years we are witnessing on average 20.3 floods occurring in the region. In a period from 1990 to 2000, there has been 25 floods reported during which 12 cities and 224 villages have been damaged, so what is clear is that on a provincial level the floods occur frequently and the reasons for such repeated flooding of the area can be two human and natural factors.

Undoubtedly, floods are recognized as natural disasters but practically spates have been realized to be even heavier in terms of life losses and they are also considered as the most dreadful natural disaster in terms of the financial losses and damages they cause. In the period from 1977 to 1988 about 390000 individual have lost their lives as a result of the natural disasters and based on the reports about 58% of the casualties have been pertaining to the spates and floods and 26% have been found to be related to the earthquakes and 16% as being caused due to storms and the other disasters. The total sum of the damages caused during this ten-year period has been 700 billion dollars out of which 33%, 29% and 28% has been pertained to floods, storms and earthquakes, respectively. In this regard, the area of concern is the increasing trend seen in the casualties and damages worldwide during the recent years. But, the floods are known to have occurred as a result of two critical factors.

1. Natural factors

1.1. Natural factors include the following parameters:

- a) Climate; b) ground unevenness, involving the slopes and their orientation, stone texture and the soil structure, vegetative cover.

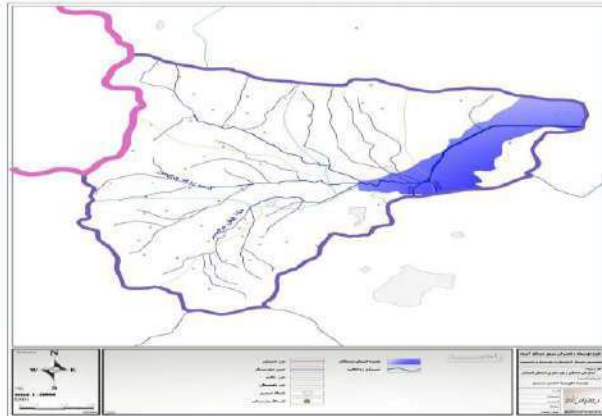
2. Human factors:

The human beings are themselves considered as one of the most important factors in flood occurrence. Population growth and the lack of sufficient information have set the grounding for the cultivation of the river limits and beds and the flood natural gullies and in case of a flood occurrence the river cannot afford to discharge its extra volume of the water and it causes huge damages in the form of runoffs and flooding. However, it is worth mentioning that the occurrence of the floods in every region is a result of the human-natural factors contrastive and parallel actions. The city of Saleh Abad is among the regions in which the human and natural factors concomitantly have formed the underlying stimulating factor for the appearance of floods in the province.

Identification of the high risk regions in the study area:

Generally, every watercourse and/or river existing is somehow a place for the transferring of the adjacent lands surface waters and in many of the cases, especially in case of normal rains, the precipitation do not seem to cause flood occurrence but when the aforementioned lands are used for urban development constructions and city building activities and as a consequence a road network is created which is substantially impermeable then the peripheral land will be deprived of about 70% of its permeability. The waters coming from the precipitations do not find a chance to infiltrate the ground and if such considerations have are taken into consideration by the city building designers and planners the waters resulting from the rains are guided towards the sewage networks and surface waters conductance grids through taking advantage of the ground's natural and non-natural slopes directly to the rivers and water canals and in doing so the rivers receive about 70% excess water to their normal water-holding capacity which has been estimated to be about 40% in Saleh Abad River and due to the appropriate organizing activities performed on the river walls on the one hand and the proper sloping of the river on the other the water is directed towards the outside of the city but it is not prevented from damaging the lands outside the city and it has also been found to have damaged the farm lands in some of the places in which the water in the river finds higher velocities in a less than 500-meter distance outside the city; thus, sufficient recognition and identification of the natural environmental conditions including topography, slope, and the ground type and also the climatic circumstances are among the critical issues in the investigations regarding collecting the surface waters. And in case of the current study, computations regarding the runoff waters or the surface waters are among the necessary issues for the estimation and prediction for the purpose of correct decision making in guiding the surface waters and also reduction of the likely and probable damages. There are various methods used for performing such activities. One such method is runoffs rational computation which is widely used in the global level and it is shown to be very promising for the small areas of about 1000 ha. In such methods, it is assumed that the raining rate is identical in the entire area. The method simplicity is one of the principal reasons behind its use.

Figure (12): the study area highly risky flood-prone breadth



RESULTS

Runoff rational computation in the city of Saleh Abad:

In the natural environment, the water from the precipitations flows over the ground level and it is re-circulated after infiltrating the ground. City building activities exert a heavy influence on the water cycles and such effects have also been discovered to be effective on the soil and the fauna and flora of a land. The streets' paved sections, buildings and the other factors like these act as barriers to the water infiltration to the soil and, subsequently, a great deal of the surface waters in the cities are directed towards the watercourse systems [4].

The surface water runoffs resulting from the rain is generally a function of the intensity and the amount of the rain, evaporation and transpiration, topography, soil characteristics and land use. Reviewing the historical study literature extant regarding the current study topic, we can conclude that the amount of the runoff produced in various land uses can be subject to various managerial strategies, since the evaluation and the investigation of the surface runoff variations can be useful in various land management scenarios and also the recognition of the variables effective on the runoff occurrence can be found promising in improving the management recommendations and suggestions improvement and quantification of the runoffs variations [5].

Runoff waters rational computation has been used widely in a universal level and it is generally used for small areas of about 1000 ha. In such a method it is supposed that the precipitation rate is identical in the entire area. The method simplicity is a reason why the method is widely applied and the main deficit of the method is that the factors such as soil relative humidity and the environment temperature are not considered in terms of evaporation and transpiration.

The rational method or better-known as Lloyd-Davis relation is as below:

$$Q = \frac{1}{36} CIA$$

Where,

I= the rainfall intensity in cm/sec;

Q= runoff Debi in cubic meter/sec;

A= the area of the land in ha;

C= surface runoff coefficient which is extracted from the related table.

Determining the runoffs coefficient (c) in the study area:

In the above relation, one contributing factor is C or the area runoff coefficient and it is defined as the ratio of the rainfall which flows over the ground. Every runoff coefficient in any region depends on factors such as the ground surface permeability rate, vegetative cover, land slope ad rainfall intensity.

Table (1): coefficient (c) to be used in the rational relation formula

	Land slope in %		
	0-5	5-10	10-20
Pastures			
Sandy and gravel			
Clay and silt	0.1	0.16	0.22
Loamy	0.3	0.36	0.42
Heavy clay	0.4	0.55	0.66
Sandy and gravel			
Clay and silt	0.1	0.25	0.3
Loamy	0.3	0.35	0.5
Heavy clay	0.4	0.5	0.6
Sandy and gravel			
Clay and silt	0.2	0.4	0.52
Loamy	0.5	0.6	0.72
Heavy clay	0.6	0.7	0.82
30% asphalt	0.4	0.5	
50% asphalt	0.55	0.65	
70% asphalt	0.65	0.80	

Runoff estimation method in the city of Saleh Abad:

It is evident that for the accurate recognition of the intensity of the runoff waters on an urban level there is a need for the runoff height to be determined. The runoff height estimation method is one of the other computation methods in this part of the calculations which are required for completing the urban hydrology studies. For the calculation and determination of the runoff height we can take advantage of the relation **H=CP**.

Where,

H= runoff height;

P=rainfall or precipitation rate; and,

C= runoff coefficient.

According to the fact that the approximate area of the city has been calculated as being equal to 136 ha and the objective observations indicate that 70% of the road system is asphalted, C coefficient has also been computed as being equal to 0.80 and thus the numerical calculations for this urban area are as follows:

P has been calculated based on the maximum 24-hour average rainfall during March and April.

$$H=0.80 \times 30.97$$

$$H \text{ (runoff height)} = 24.77$$

The study of the runoff and flood Debi and height in the city of Saleh Abad:

In this section, we compute the runoff Debi of the waters flowing across the city during March and April and then finally we deal again with the runoff Height.

$$Q = \frac{1}{36} CIA$$

Where,

$$Q = \frac{1}{36} \times (0/80) \times \frac{31}{10} \times 136 = 9/37$$

So, based on the aforementioned formula, the runoff Debi of the road system in the city of Saleh Abad has been obtained as equal to 9.37 in cubic meter/sec. And this figure is considered very high and considerable and thus in case of a heavy rainfall it will unavoidably result in the occurrence of floods and therefore the municipality and the related administrative offices are required to get prepared for the flood occurrence during March and April with a height of 24.77 mm and a Debi of 9.37 (cubic meter/sec).

The runoff and flooding images taken in 2007 for the city of Saleh Abad and the flooded area and the urban road system filled with water streams is well reflective of the incident and it is a testimony for the accurate management and investigation importance.

The calculation of the coefficients influencing the creation of the water streams and runoffs across the city:

To get more detailed information of the water streams flowing in the area and the likely risks that may bear we need to have more informed awareness of the impact factor of the flood occurrence and intensity. The most significant factors regarding the theme of the current study are:

- The maximum 24-hour precipitation average;
- Snowfall rate;
- Soil permeability type;
- Slope;
- Graluis coefficient;
- Vegetative cover;
- Urban area shape and form. One coefficient which needs to be studied in the investigation on runoffs and floods occurrence is the sum of the maximum 24-hour precipitation rates and this has been found to be happening more during March and April for Hamadan Province with its climatic conditions and characteristics and every precipitation level has been found to be indicative of a different impact coefficient.

Table 2: the 24-hour precipitation impact coefficient rate

The index of interest	Months of interest	Precipitation rate
The average sum of the maximum 24-hour precipitation	March and April	Less than 32
The average sum of the maximum 24-hour precipitation	March and April	32- 37
The average sum of the maximum 24-hour precipitation	March and April	37-42
The average sum of the maximum 24-hour precipitation	March and April	42 and higher

Heavy rains result in the river bed overflow or the rising of the free aquifers water table and these are per se factors contributing to the occurrence of runoffs and floods. Such forms of heavy rains have been observed to sometimes be the cause of floods and landslides which are usually followed by disastrous [6]. The average sum of the maximum precipitation rate within a 24-hour period in the city of Saleh Abad during March and April in some of the years has been reported to be 31 and in some others it has been calculated to be 32. And it is worth mentioning that according to the existing studies in the development plan of the city the precipitation impact factor for the occurrence of the runoffs and floods has been obtained as being equal to 3 for the city of Saleh Abad and in order to get aware of the likely risks there is a need for the other indices and subjects to be studied and also according to the cold climate of the province the precipitation distribution system of the province and the number of the snow falling days which accounts for 45% of the precipitation total during a year can be studied from other aspects and dimensions and with having the following information available we can better map the impact factor of the interest for the city of Saleh Abad.

- The sum of the precipitation levels from November to February in the form of snowfall of less than 45 mm
- The sum of the precipitation levels from November to February in the form of snowfall from 45 mm to 60 mm
- The sum of the precipitation levels from November to February in the form of snowfall from 60 mm to 75 mm
- The sum of the precipitation levels from November to February in the form of snowfall 75 mm and higher

The climatic studies of the city of Saleh Abad indicate that the snowfall rate has been 63.6 mm and considering this precipitation rate the impact factor in the occurrence of the runoffs and floods has been obtained to be equal to 6.6.

The runoffs resulting from the precipitation is a critical source of pollution which exerts a great deal of effect on worsening the quality of the water in the urban areas and it has been known to sometimes be carrying heavy metals, fertilizers, pesticides, bacteria and some organic matter [7] and dealing with such issues is out of the current study scope and in continuation to this part of the study it can be stated that, in sum, and up to the present time the 24-hour precipitation impact factor obtained for the present study area is indicative of a considerable figure and in order to figure out the real status quo of the runoffs creation in the current study area there is a need for the other indices to be also investigated and in the following sections it is noteworthy that after precipitation (snowfall and rainfall) the theme slope and the survey of its status in the study area seem to be of the highest priority and its effect in the present study area on the flood and runoff occurrence can be classified as below:

- The area average slope of less than 6
- The area average slope of between 6 and 12
- The area average slope of between 12 and 18
- The area average slope of above 18

The studies conducted show that the average slope in the city of Saleh Abad is about 7.91 and its impact factor for the occurrence of the floods and runoffs in the city of Saleh Abad has been obtained as equal to 4, but it has to be noted that the effect and the intensity of the runoffs and floods across the cities is in an integral factor related to the ground structure type and the soil permeability which is evaluated under the title of soil class within the flood comprehensive categorization schemes. The rainfall effect and impact on the ground depends on its individual droplets energy and its physical characteristics as well and when these droplets hit the ground cause degeneration and weathering on the soil surface and the soil constituents and cause the constituent particles of the soil to disintegrate and this is what predominantly affecting the runoffs intensity and strength [8]. In line with what was just said, the topic of the soil permeability class should be taken into special consideration. The soil permeability class which is determined based on the soil type is one of the other factors contributing to the occurrence or intensification of the runoffs along the city road networks and passage ways and it is mostly investigated in various studies within 4 classes:

- Permeability class A: 7.5-11.5 mm per hour
- Permeability class B: 3.5-7.5 mm per hour
- Permeability class C: 1.5-3.5 mm per hour
- Permeability class D: 0.5-1.5 mm per hour

It should be noticed that as soon as the rainfall intensity exceeds the maximum permeability threshold in an urban area, the excess rain feeds the potholes and then it will flow in the form of a thin layer on the road surface and it is called the surface water. The surface streams flowing on the surface also exert an influence on the ground which depends on the intensity of the runoff waters [9] and it is usually calculated by computing the amount of the water passing a cross-section per time units. In the studies carried out based on the soil type and the city of Saleh Abad's geological surveys it has been found out that the soil permeability is classified as Type Cand it has also been figured out that its impact factor in the emergence of the surface waters and runoff waters and finally flood across the city is 5.1 which is considered an intensifying figure in creating runoffs and floods in the city but it comes as a surprise that under such circumstances dense vegetative cover can be an assisting factor and it can reduce the intensity of the damages and unfortunately the vegetative cover in the city of Saleh Abad is semi-sparse which has been shown to have a high coefficient in classifying the impact factor in creating floods and runoffs and as for the city of Saleh Abad this coefficient has been figured to be 6 and it has to be mentioned that the studies performed on the region regarding the impact factor has been revealing unpromising results which warns us for an increasingly greater focus on the issue. Of course, the vegetative cover classification in the studies on the creation of the runoffs in various areas is as stated below and the writer reckons making reference to such classifications can be of great importance in order to find a more comprehensive insight of the issue:

- dense vegetative cover,
- semi-dense vegetative cover,
- semi-sparse vegetative cover,
- sparse vegetative cover

The effect of the vegetative cover on the soil erosion is usually more complicated than it is imagined. The vegetative cover on the farm lands and the arboreal plants in striping cultivation which is corresponding to the contour lines reduces the runoffs and floods speed [10].

The area shape is one of the other factors influencing the floods and runoffs formation. And it has to be pointed out that in the subareas and the hydrological subunits there is made use of Gravelius coefficient.

To investigate the shape factor effect on the creation of the runoffs and floods in urban areas the Gravelius coefficient is used corresponding to the area shape as below:

- Gravelius coefficient: 1.7-2, very close to rectangular shape
- Gravelius coefficient: 1.5-1.7, close to rectangular shape
- Gravelius coefficient: 1.2-1.5, close to circular
- Gravelius coefficient: 1-1.2, very close to circular

And the studies undertaken based on the above-mentioned coefficient corresponding to the study area shape have indicated that the impact factor evaluated for the occurrence of the runoffs in the city of Saleh Abad is 4.5 and this impact factor is one of the most influential ones on the formation of the runoffs and floods in the areas across the city.

According to the factors and the indices which have been pointed out in the evaluation of the flood occurrence impact factor up to this point we can introduce an output to the runoff intensity estimation and model even flood-proneness discussed in the present study as below:

Table 3: flood proneness and runoff intensity estimation model output in the city of Saleh Abad

Name of the area	Maximum 24-hour precipitation	Snowfall rate	Area slope	Area shape	Ground texture	Vegetative cover	Total scores
Saleh Abad	3	6.6	4	4.5	5.1	6	29.2

It is deduced from the section just stated and the material presented therein that the entire cited factors and the impact factor as well are indicative of the significance of the surface streaming waters importance flowing in the city of Saleh Abad and the total sum of the study coefficients in contrast to the other areas in the province is suggestive of the idea that the city is among the highly risky flood-prone areas and when combined with the lack of the water collection systems and sewage systems and installations and fixtures multiplies the flood-driven damages to the residential locations, offices, road network and so forth and water accumulation across the city as well.

CONCLUSION

Since the researcher in the current study has attempted to determine the flood and runoff occurrence conditions and intensities within a specific temporal window and in the format of a field study therefore it can be stated that the most logical and most principle method and mean for staying secure and safe of the unpleasant outcomes resulting from the runoffs and urban floods and the damages and the losses they are usually accompanied with is the full-scale recognition of the conditions and the factors contributing to their occurrence in a local and regional scale because the more information and the more recognition is acquired about the nature, origins and the factors and particularly the occurrence timing the more the management authorities will be able to get prepared for neutralizing and resisting its inauspicious effects, dangers and dilemmas and regarding the issue it is worth mentioning that the most important dynamic parameter for the purpose of controlling the surface runoffs and reducing the flood risks and dangers should be sought out in the catchment areas management plans and the way the land uses are distributed and then these should be blended with the urban natural conditions (topography, slope, soil texture, vegetative cover, climate) in such a manner that the city development plans should not be allowed to proceed and executed without paying attention to this important theme studied within the context of the current study and it should be taken into consideration by the urban planners and designers in preparing the city building and development plans; the possibility for the flood occurrence in such plans should be combined with the determination of the ground flowing capacity and the landslide danger for every two hectares of the urban lands through the determination of an array of the ground conditions strength and weakness in creating and resulting in runoffs and undoubtedly one of the other most basic methods for combating the floods and water outflows in the urban areas is performing logistic programming in the entire spectrum of the river areas and preventing from the accumulation of garbage, dross, levees and wasted material on the river beds, city canals and streams and in case these activities are performed well the proper guidance of the concentrated waters can be easily fulfilled and it is here suggested by the researcher of the present study that the city should be divided into different physiological and hydrological areas in order for the surface water conductance projects to be better exercised and then the waters guided within such systems can be later deployed in the urban watercourses and

rivers and finally such a usability can be applied for taking advantage of the surface water systems in line with improving and enhancing the natural conditions at the periphery of the city and feeding the springs and the aquifers and ground waters would be a promising and sure outcome.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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THE EFFECTS OF METABOLISM IN RESPONSE TO WATER STRESS OF THREE POA SPECIES UNDER GERMINATOR AND GREENHOUSE CONDITIONS

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ABSTRACT

In order to determine the reaction of three Poa species to drought stress, two separate experiment were conducted in both germinator and greenhouse conditions using factorial experiment based of completely randomized design with three replications in 2010 in Tehran, Iran. The drought treatments were four levels of osmotic potential (0, -0.3, -0.6 and -0.9 MPa) in germinator and four levels of osmotic potential (FC, 25% FC, 50% FC and 75% FC) in greenhouse that were made by poly ethylene glycol (PEG 6000) solution and field capacity method, respectively. Data were collected and analyzed for germination percent, root length, shoot length, seedling length, root/shoot length ratio (RSR), seedling weight, seedling dry/fresh weight ratio (DFR) and seed vigor index. In greenhouse, chlorophyll, carbohydrates and proline contents were also measured. The results showed significant differences among species, droughts levels and species by drought interaction effects for the most of traits in both conditions. However, the relationship between germinator and greenhouse, quantified using correlation was high. It was concluded that evaluation under germinator conditions is desirable for selection purposes. In both conditions all of seedling traits except RSR, DFR were increased and proline and carbohydrate content were increased by increasing osmotic potential. The results showed that the P.bulbosa species had higher values for the most of seedling attributes than other species. Results of probit analysis of LD50 and LD90 showed the same trend.

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KEY WORDS

Drought, PEG6000, germination, Seed vigor, Poa.

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INTRODUCTION

Poa is one of important perennial grass species belong to is belong to genus of Poa, subgenus of Festuceae and family of Poaceae. It naturally grows in Zagros and Alborz mountains rangelands in the west and north of Iran. It is being used for grazing and hay production and consumed by livestock. Poa bulbosa grows in areas with 750 m to 2900 m altitude [4, 16]. It has early growth in spring and good quality for animal productivity and good adaptability in vast range of sever conditions in all over the country. In recent years, higher grazing pressure and unpalatable weed invasion had led to increasing soil erosion and consequently decreasing population of this species. Therefore, re-vegetating of those areas by new improved grass varieties is the most economical and possible means of recovery.

Poa genus has an important role in grassland productivity in Iran. Little breeding work has been done on this species especially under Iran climatic conditions [13]. Under water deficiency conditions, the rate of water loss from transpiration exceeds the rate of water absorption by the roots, and plants undergo water stress. Water stress can vary from a small decrease in water potential to the lethal limit of desiccation [21]. Among the different abiotic stresses, drought is by far the most complex and devastating on a global scale [17]. Although range plants have mechanisms that help reduce damage from water stress, water deficiency conditions lasting a month cause plants to experience water stress severe enough to reduce herbage production [4,12]. We anticipate a growing interest in wild relatives of crops and

landraces in an attempt to identify superior alleles among these that the domestication bottleneck and modern agriculture have left behind [1, 8, 14, 18, 24].

Drought is one of the major causes for crop loss worldwide, reducing average yields with 50% and over. In addition, water stressed plants could be more sensitive to other biotic or abiotic stresses such as pathogen attack, chilling or air pollution, which limits plant productivity. Plant stress resistance can be studied at molecular, cellular or physiological levels [16, 28, 29]. In water stress, plant height and herbage biomass accumulation are reduced. Leaf senescence increases and as a result, nutritional quality of forage decreases. The rate of sexual reproduction is diminished as a result of a decrease in seed stalk numbers and height and a reduction in numbers of seeds in the seed heads. Rate of vegetative reproduction is reduced because the number of axillary buds and the number of secondary tillers decrease [7, 16, 23]. In order to respond to drought, plants have developed the capability to rapidly perceive stressful factors and trigger the accumulation of a large number of newly synthesized mRNAs and polypeptides [11, 17, 20, 26]. Responses to drought are multiple and interconnected. It leads to growth reduction, reduction in the content of chlorophyll pigments and water, and changes in fluorescence parameters [3, 9, 10, 14, 18, 22]. Rangelands are areas unsuitable for cultivation, but provide forage for animals [15].

Rangeland degradation is often manifested by decreases in plant yields. The dispersal of seeds through over sowing is an important strategy to actively restore vegetation in degraded areas as their seed banks are usually depleted of viable seed. One of the greatest challenges in restoration ecology is to sow a seed type or cultivar that has the capacity to produce abundant biomass and cover in a short period of time [5, 12, 14, 17, 24]. In addition to grazing by domestic livestock, rainfall patterns are the most important factors influencing rangeland condition [25, 28]. Drought, extreme temperatures, increased soil salinity, soil crusting or sand covering, as well as pathogens and herbivores all adversely affect the germination and growth of seedling. Grasses, with strong development of underground organs, tend to have efficient adaptive mechanisms to cope with drought, fire and herbivory and provide superior protection against soil erosion than most woody shrub and tree species [2]. Iran is one of the countries that majority of its extent is located in arid and semi arid regions. 64% of Iran (100 million hectares) is covered by dry lands, and their area is increasing [12, 18]. Only 35% of the whole area of Iran has more than 250 mm of annual rainfall [20]. Therefore, in Iranian rangelands, water is one of the most important factors that limits plant growth and causes the failure of range improvement plans. The objective of this study was to identify Physiological and morphological responses of three *Poa* species to drought stress in germinator and greenhouse.

MATERIALS AND METHODS

The study was conducted in the germinator and greenhouse. For each trail a factorial experiment based on completely randomized design was conducted in Gene Bank division in Research Institute of Forests and Rangelands, Tehran, Iran, in November 2014. Three *Poa* species: *P.bulbosa*, *P.annua* and *P.pratensis* were used in this study.

Germinator Experiment

Water stress treatment was applied during 15 days by adding PEG 6000 (50 gL⁻¹) (Fluka, Buchs, France) to the watering solution in germinator condition. In germinator, For each accession 100 pure seeds were sterilized with 70% ethyl alcohol for five minutes and washed with distilled water. Four replicates (25 seeds per replicate) of sterilized seed were placed in Petri dishes on double Whatman papers (TP). For protection against molds, the water used to moisten the seed samples and substrata contained 0.002% Benomil fungicide. The samples were immediately transferred into a germinator at (20±4°C) with 1000 Lux light for 15 days.

After growth of seedlings for 15 days, the length of roots and shoots of 10 randomly-selected seedlings from each replicate were measured. The vigor index measures seedling performance, relating together the germination percentage and growth of seedlings produced after a given time [9, 11]. It was calculated by following equation:

$$Vi = \frac{\%Gr \times MSH}{100}$$

Where:

VI = vigour index

%Gr. = final germination percentage

MSH = mean seedling height

Greenhouse Experiment

The seeds of the same ecotypes were sown on pots with fluctuation temperatures $20\pm 5^{\circ}\text{C}$ during day and $(5-12)^{\circ}\text{C}$ during night of greenhouse. In order to vegetative growth development, the pots were irrigated normally for three weeks. Water stress treatment was applied using four levels of osmotic potential (FC, 25% FC, 50% FC and 75% FC) for three weeks by using the field capacity (FC) method [7]. At the end of each treatment, the seedling were counted to estimate germination percent. The root length and shoot length (the distance from soil surface to upper end of the longest leaves) was measured (mm/plant). The fresh (g/FW) and dry (g/DW) biomass of the seedling and vigor index was also determined.

The carbohydrates content of drought stressed and irrigated (control) plants were determined using the method of Irigoyen et al., (1992). Carbohydrates were extracted from leaf samples (20 mg DW) according to Weimberg (1987) with minor modifications. The absorbance of the sample extract was Spectrophotometrically determined at 535 nm. The proline concentration was determined as ($\mu\text{mol g/DW}$) using a standard curve.

For proline content, the method of Bates et al., (1973) was used to determine praline content. Proline was extract from leaf samples (20 mg DW) according to Weimberg (1987) with minor modifications. The absorbance of the sample extract was Spectrophotometrically determined at 520 nm. The praline concentration was determined as ($\mu\text{mol g/DW}$) using a standard curve.

The factorial experiments based on completely randomized design were analysed using ANOVA a. Differences among the treatments as well as the cultivars and their intraction effects were tested using the DMRT method. The relationship between germinator and greenhouse, quantified using phenotypic correlations. Probit analysis were used to determination of lethal dose concentration of PEG6000 for stopping 50% (LD50) and 90% (LD90) of seed germination in three *Poa* species. All statistical analyses were conducted by SAS9.

RESULTS

Germinator Experiment

The results of analysis of variance in germinator, showed significant differences among species, droughts stress and species by drought interaction effects for the all of traits (**Table 1**). All of traits except RSR and DFR, were decreased by increasing osmotic potential (**Table 2**). The maximum values of traits were obtained for the control treatment and its minimum level was in the drought treatment -0.9 MPa in the germinator. For germination percent there was no difference between control and -0.3 MPa and for other traits this treatment were ranked as the second. The traits tends to drop sharply by increasing osmotic potential to 0.6 MPa and 0.9 MPa (**Table 2**). The average values of both RSR and DFR were significantly decreased by increasing osmotic potential and the highest values were obtained for 0.9 MPa (**Table 2**).

The comparisons among three species in germinator are show in **Table 3**. Results showed that, *P.bulbosa* species with average value of 79.25 had higher germination percent that of two other ones.

The species \times drought interaction effects for all traits are shown in Fig 1. The comparison among species for every levels of drought stress indicated that *P.bulbosa* species were stable by increasing osmotic potential. Suggesting that it was more resistance to drought than other species (data are not shown). Using probit analyses LD50 was estimated as -0.99 MPa osmotic potential for *P.bulbosa* species. The results indicated that *P.bulbosa* was more resistance than other species for drought stress and it could be used for cultivation in moderate rainy rangelands with 300 mm annual precipitation (**Table 4**).

Greenhouse Experiment

The results of analysis of variance in greenhouse, showed significant differences among droughts stress and species by drought interaction effects for germination percent, root length, shoot length, seedling length, vigor index, RSR, seedling fresh weight, seedling dry weight DFR, chlorophyll index, proline and non structural carbohydrates (**Table 5**). By increasing osmotic potential, all germination traits except RSR, DFR were decreased, in contrast proline and carbohydrates content were increased by drought stress (**Table 6**).

For germination traits, the higher values were obtained for the control treatment and their minimum level were obtained in the drought treatment of 75% FC. For germination% there was no difference between control and 25% FC and for other traits the 25% FC treatment were ranked as the second. The traits tend to drop sharply by increasing osmotic potential to 50% FC and 75% FC (**Table 5**). The average values of RSR and DFR, proline and

carbohydrates content were significantly increased by increasing osmotic potential and the highest values were obtained for 75% FC (**Table 5**).

In comparisons among three species in greenhouse (**Table 7**), results showed that, *P.bulbosa* species had higher value for germination%, seedling length and vigor index. In comparison among species for every levels of drought stress indicated that *P.bulbosa* species were stable for germination percent by increasing osmotic potential. The declines of seedling length and vigor index in *P.bulbosa* species was less as compared to other species by the results indicated that both species of *P.bulbosa* and *P.pratensis* were more resistance than for drought stress and they could be used for cultivation in moderate rainy rangelands (data are not shown).

Relationship between Germinator and Greenhouse

The relationship between germinator and greenhouse for all traits is important. Since, selection in germinator could be more efficient than that based on germinator and field depending on the correlation between characters. The phenotypic correlation between two environments were estimated. The estimates were high and significant for germination percent ($r=0.99^{**}$), root length($r=0.76^{**}$), shoot length ($r=0.98^{**}$), seedling length ($r=0.91^{**}$), vigor index($r=0.97^{**}$), RSR($r=0.75^{**}$) and seedling fresh weight($r=0.75^{**}$) indicated that results based on germinator were strong indicators of greenhouse and probably field experiment (**Table 8**).

DISCUSSION

Drought stress tolerant cultivars are the varieties which have no meaningful decrease in germination indicators against increasing the water deficiency level. The *P.bulbosa* species in both germinator and greenhouse conditions is considered as more tolerant varieties. Generally, the results showed that the drought stress had negative effect on the germination percent and seedling growth characteristics. The dryness cause delay in germination characteristics. In the similar results Rice and Dyer (2001) working with *Poa tectorum* showed that late emerging seeds has lower competitive ability than early emerging seeds.

The results showed that the drought stress had negative effect on the growth characteristics. The results obtained from other researches [10, 22, 26, 28] confirm this issue that increasing the water stress decreases the seedling growth. Drought stress cause increasing the salts viscosity in plant organs. So, by increasing the salts viscosity increase the osmosis stress of soil solution, so the amount of energy which the plant need to absorb the water from the soil will be increased, this action cause to increase the respiration and decrease the plant performance [6, 13, 15]. Rice and Dyer (2001) working with *Poa tectorum* showed that late emerging seeds have lower competitive ability than early emerging seeds. The studies of Sharifi Kashan (2010) and Plauz (2003) showed that the growing up of water stress causes the decrease in shoot dried weight and increase in root dried weight and root:shoot ratio. The capacity of the root system for rapid and early development is an important factor in drought resistance. It is well known that increased efficiency of moisture absorption is primarily due to the development of an extensive root system. Also, it is a common feature among the arid and semi arid environment perennials that these plants develop root systems that are larger than their shoots. This is an important factor in survival. The moisture collected by the extensive root system is drawn upon for the consumption of a reduced shoot. The preponderance of the root system over the above-ground shoot system facilitates adjustment of the water balance of desert plants. One of the depressant factors photosynthesis in the severe drought stress is the reduction of chlorophyll content [20, 29]. Some researches stated that the increase of dryness level in the plant decreased the chlorophyll viscosity in the leaves and cause to decrease the photosynthesis in the plant [7, 16, 17]. The proline and carbohydrate content increased in cultivars of *Poa bulbosa* species during the drought stress. This increase caused to establish the state of transparent phase (vitreous) in lost water protoplasm which can protect the membranes. Also increase of carbohydrate/ion ratio prevents the establishment of toxicity state and chaotic, this increase cause the persistency during drought stress and makes a chance in order that adaptation solutions to be able to provide the conditions of agitation effects decrease.

All of seedling traits except RSR, DFR were increased and proline and carbohydrate content were increased by increasing osmotic potential. The results showed that the *P.bulbosa* species had higher values for the most of seedling attributes than other species. The phenotypic correlation estimates between two environments was high and significant for for the most of traits (**Table 8**) indicated that results based on germinator were strong

indicators of greenhouse and probably field experiment. This result were in agreement with Pourhadian and Khajehpour (2010), that found percent of seeds emerging during the first 2-4 days of emergence is a valuable laboratory index for field emergence of wheat. In contrast Wang et al (2004) were unable to predict field emergence using laboratory tests.

Table1. Analysis of variance of germination properties of Poa species in germinator condition

Source of variance	DF	Germination %	Shoot L. (mm)	Root L. (mm)	RSR (mm)	Seedling L. (mm)	Vigor index	FW (g)	DW (g)	DFR (g)
Drought(D)	3	16556 **	26469 **	27157 **	0.7655 *	106937 **	127659 **	0.077 **	0.00004 ns	0.0979 **
Species(S)	2	1868 **	125 *	5916 **	5.3066 **	4660 **	2730 **	0.0041 *	0.0008 **	0.0727 **
E × D	6	260 ns	241 ns	399 **	0.7122 **	1147 *	1275 *	0.0005 ns	0.00005 ns	0.0062 ns
Error	132	334	142	129	0.215	417	603	0.0013	0.0001	0.0044
CV %		24.8	23.2	21.8	41.04	19.7	28.5	23.4	35.4	33.5

*, ** = Means of squares are significant at 5%, 1%, respectively.

Table2. Effect of drought stress on seed germination properties of Poa species in germinator condition

Drought Treatment	Germination %	Shoot L. (mm)	Root L. (mm)	RSR (mm)	Seedling L. (mm)	Vigor index	FW (g)	DW (g)	DFR (g)
Control	92.67 a	79.94 a	83.06 a	1.34 a	163 a	151.46 a	0.221 a	0.031 a	0.253 a
-0.3 MPa	88.78 a	66.64 b	65.78 b	1.12 b	132.42 b	118.29 b	0.157 b	0.030 a	0.229 a
-0.6 MPa	66.22 b	39.18 c	36.32 c	1.04 b	75.50 c	53.21 c	0.125 c	0.029 a	0.177 b
-0.9 MPa	46.55 c	19.62 d	22.63 d	1.03 b	42.25 d	20.92 d	0.118 c	0.028 a	0.135 c

Means of the columns with the same letter had no significant differences based on DMRT (P≤0.05).

Table3. Means comparison of seed germination characteristics in three Poa species

Ecotypes Name	Germination %	Shoot L. (mm)	Root L. (mm)	RSR (mm)	Seedling L. (mm)	Vigor index	FW (g)	DW (g)	DFR (g)
<i>P.annua</i>	68.94 b	52.36 a	50.82 b	1.04 b	103.18 b	79.33 b	0.16 a	0.02 b	0.17 c
<i>P.pratensis</i>	69.25 b	47.95 a	77.03 a	1.90 a	124.98 a	95.64 a	0.13 b	0.03 a	0.27 a
<i>P.bulbosa</i>	79.25 a	51.18 a	46.81 b	1.03 b	97.99 b	90.19 ab	0.15 a	0.03 a	0.21 b

Means of the columns with the same letter had no significant differences based on DMRT (P≤0.05).

Table4. Probit analysis for determination of lethal dose concentration of PEG6000 for stopping 50% (LD50) and 90% (LD90) of seed germination in three Poa species

Species	LD ₅₀		LD ₉₀	
	PEG lethal dose concentration	SE	PEG lethal dose concentration	SE
<i>P.annua</i>	7.57	0.10	14.27	0.21
<i>P. pratensis</i>	7.60	0.19	14.30	0.26
<i>P. bulbosa</i>	9.75	0.13	16.45	0.24

Table5. Analysis of variance of germination properties of Poa species in greenhouse condition

Source of variance	DF	Germ %	Root L. (mm)	Shoot L. (mm)	Seedling L. (mm)	Vigo Index	RSR (mm)	FW (g)	DW (g)	DFR (g)	Chlorophyll index	Proline μmol g/DW	Carbohydrates μmol g/DW
Drought (D)	3	16556 **	99651 **	727280 **	1359843 **	2103857 **	0.89 **	1315**	74.53 **	0.07 **	7982 **	0.15 **	0.03 *
Species (S)	2	1868 **	5002 *	11081 *	29054 **	135557 **	0.11 ns	78.8 **	9.11 **	0.01 ns	7.31 ns	0.01 ns	0.03 ns

D x E	6	260 ^{ns}	749 ^{ns}	2112 ^{ns}	3073 ^{ns}	14070 [*]	0.1 [*]	16.13 ^{ns}	3.24 ^{**}	0.01 [*]	37.65 ^{ns}	0.003 ^{ns}	0.002 ^{ns}
Error	132	334	1429	3029	3673	6484	0.04	7.78	0.68	0.007	24.30	0.008	0.01
CV %		24.85	21.60	17.88	12.55	20.97	31.44	33.74	40.20	31.62	16.13	5.74	30.59

*, ** = Means of squares are significant at 5%, 1%, respectively.

Table6. Effect of drought stress on seed germination properties of Poa species in greenhouse condition

Drought	Germination %	Root L. (mm)	Shoot L. (mm)	Seedling L. (mm)	Vigo index	RSR (mm)	FW (g)	DW (g)	DFR (g)	Chlorophyll index	Proline μmol g/DW	Carbohydrates μmol g/DW
Control	92.6 a	239 a	465 a	704 a	654 a	0.53 c	15.4 a	3.82 a	0.25 b	42.3 a	1.45 c	0.32 b
25% FC	88.7 a	190 b	378 b	568 b	506 b	0.51 c	10.8 b	2.57 b	0.23 b	41.8 a	1.53 b	0.36 ab
50% FC	66.2 b	153 c	242 c	396 c	258 c	0.66 b	4.82 c	1.19 c	0.27 b	27.6 b	1.58 b	0.40 ab
75% FC	46.5 c	116 d	144 d	261 d	116 d	0.85 a	1.96 d	0.62 d	0.33 a	10.7 c	1.67 a	0.43 a

Means of the columns with the same letter had no significant differences based on DMRT (P≤0.05).

Table7. Means comparison of seed germination characteristics in three Poa species in greenhouse condition

Ecotypes Name	Germination %	Root L. (mm)	Shoot L. (mm)	Seedling L. (mm)	Vigo index	RSR (mm)	FW (g)	DW (g)	DFR (g)	Chlorophyll index	Proline μmolg/DW	Carbohydrates μmol g/DW
<i>P.annua</i>	68.9 b	166 a	300 ab	467 b	345 b	0.60 b	7.94 b	2.05 b	0.29 a	3.01 a	30.4 a	1.57 a
<i>P.pratensis</i>	69.2 b	170 a	285 b	455 b	345 b	0.73 a	11.2 a	3.01 a	0.26 a	3.06 a	29.8 a	1.50 a
<i>P.bulbosa</i>	79.2 a	184 a	320 a	504 a	432 a	0.65 ab	7.85 b	1.81 b	0.26 a	3.37 a	30.8 a	1.56 a

Means of the columns with the same letter had no significant differences based on DMRT (P≤0.05).

Table8. Phenotypic correlation between germinator and glasshouse for seed germination traits

TRAITS	GER %	SHOOT L.	ROOT L.	SEEDLING	VIGOR	RSR	Fresh W.	Dry W.	DFR
CORRELATION	0.99**	0.98**	0.76**	0.91**	0.97**	0.75**	0.75**	0.63*	-0.08 ^{ns}

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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THE EFFECT OF CONTEXT-ORIENTED ARCHITECTURE ON TOURISM QUALITY ENHANCEMENT

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ABSTRACT

The contemporary architecture is replete with theories, approaches and ideas of any sort some of which underlie the audiences and spectacles' feelings and culture and the reflections they have in respect to the architecture of a building. These are the ideas and notions that will surely result in the creation of highly identified cities if they are taken into practical use. One of the aforementioned approaches encompassing the architecture besides city-building sciences is context-centeredness. Such an approach takes various urban features, regional traits and building grounding characteristics into consideration and it seems to have taken a very long step in enhancing the urban landscape quality and attracting the audiences. In the present study which follows a qualitative-analytical research methodology we deal with the survey of the features and the aspects of context-centeredness and the effects it has on enhancing the tourism quality.

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KEY WORDS

Architectural grounds, architectural identity, context-orientation, tourism, tourism attraction

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INTRODUCTION

With the elapsing of the modernism years, the result of which has been an international style and very beautiful buildings within the paradigm of the architectural designs which lack identity and therefore are devoid of any common feeling between them and the users thereof, the conflicting theories emerged in confrontation with such a movement and this later movement directed architecture towards Nativism attitudes and a retrospective look and reflection on the regional culture of every site in designing the buildings. Furthermore, they believed that every building should be built in cohesion with its grounding and the city as a whole, not apart from them. Robert Ventury believed that designing activities should be seeking to find solutions for the dual phenomenon of the individual and the collective groups (architecture and the urban landscape), and this should not arbitrarily emphasize one at the price of losing track of the other [1]. These novel theories caused the architecture quality to improve and thus the urban landscape enhanced resultantly and both of them to wit architecture and city building can be of a great influence in attracting urban tourists. That is because, according to Berulin, context-centeredness emphasizes on the land-centeredness and the bond between the environment and the space and it is somehow formed through conceiving the message delivered by its grounding and bedding and it is in fact actualizing and designing the message delivered to it by the architectural grounds. Therefore, a building is a small part of its peripheral nature. In such type of architecture every building is designed and implemented based on the social-cultural, textural-climatic grounds and the special conditions of the site and the building [2].

MATERIALS AND METHODS

Context-centeredness concept

Context or grounding is an English word and it points to the relationship between the words and the cohesions between them and in its verb form it conveys the meaning of being intertwined and interlaced. In another definition context is intended to mean the collection of the conditions and the realities which embraces a situation or a group of conditions and it also bears the meaning of conditions and circumstances under which an incident occurs and they help you to understand it. By context the same very contextual grounding and environment is meant in which architecture is formed and it incorporates both the content and the form. Every phenomenon influences the peripheral environment in its specific way and it is also influenced by it and they are seemingly in mutual relationship with one another [3].

Social-cultural relationships and the economical system of a city can be of substantial help in defining the context to a great extent. For example, in those cultures that make use of high roof elevations in order to induce a feeling of comfort and presence,

there are a lot of differences with the cultures which take advantage of low-roof heights to provide the residents with the same feeling and comfort. The textural difference between these two types of buildings per se defines part of the context. Context should not be considered as a static factor in the course of time; rather it is a dynamic and variable factor which is fluid and flowing. In a sense, the context-oriented architectural grounding is in itself variable and mobile and it is due to the same reason that the architectural building which has to be taken as the context cannot be designed statically in an architectural context which is variable and moving, a type of grounding which apart from the intact and natural visage of the land it is built in is constantly undergoing rebuilding and change in the majority of the human-inhabited regions (such as the cities). Every building constructed is proposed to represent part of the context and it is somehow acting as if it is paving the way for the next building to come out. The ability of the context-oriented architecture in satisfying human needs in various aspects and dimensions can be one of the important indices in evaluating the context-oriented architecture and the buildings' assessment index in such an architecture is not a global index rather it has to be considered as a native and region-driven one [2].

The approach's intellectual foundation can be sought in perceptive aesthetic post modernism theories or in phenomenological ideas which are apparently held up against the performance-oriented modernism theories. Despite the performance-oriented/plan-driven urban landscapes which are products of the modernism teachings and especially belief in the inside-outward designing logic and also the belief in the building's architectural program are the chief generators of the form, perceived/context-oriented urban landscape which is laid upon the foundations of the post modernism attitudes relies on the outside-inward designing logic. Post modernist theoreticians, especially Robert Ventury, have always been concentrated on the necessity to pay attention to the mutual effects and dialectic influences extant in the spatial requirements of the interior spaces (the building) and the exterior spaces (urban context).

Native architecture potential in tourism/ context-oriented solutions

If we look into context-oriented theories with a little more subtlety, it will be found out that these thoughts are somewhat interwoven with the native architecture mindset roots. It is now for half a century that the native architecture (since 1965 that it was presented by Bernard Rudofsky and by the contributions from the pictures which had been procured from all around the world and exhibited in "architecture without architect" fair), has been posited as part of subjective and partial discussions concluded from the architectural experimental researches [4]. But, it had been already emphasized in the theories and opinions posed by philosophers and architects and the artists with an attitude to the human life origin and source and the need for returning to the historical originality and roots. In post modernism history-centeredness and the new regional orientation also one can trace such an attitude towards native architecture. It is sometimes proposed merely through the native plans being liked and favored by the general public (due to reasons such as nostalgic feelings or even advertisement) to which post modernism has paid a special credit and validity after the Ventury's book (learning from Las Vegas) was published. A specimen of such an issue, with reference to the American native architecture (for instance something more like the colonial times architecture) has been pursued by Dewani and Zaiberg who are the founders of some sort of traditionalism in urban designs (TDN). But, a more subtle consideration of the subject can be seen in the discussions regarding regionalism. Regionalism is an approach to the native architecture, but in a larger scale in contrast to the nativism which excerpts the past architectural forms as a result of enabling itself to respond to the today's original needs and especially functional requirements and the close match between the building and the environment and conscious endeavors for making an optimum use of the native masonries and resources and the regional opportunities are among its indicators [3].

There are numerous studies regarding the relationship between the native architecture and attracting the tourists all of which prove that the unique architectural characteristics in every region and the culture and civilization reflection thereof in the architecture can contribute a great deal to the tourism quality enhancement, since the today's tourist is looking for new cultures and spots to which s/he has no confrontation in his or her daily life. For instance, it has been asserted in an article that the imported architecture and the use of new masonries which are lacking the required visual and aesthetic coordination with the native architecture cause a reduction in the urban and rural tourism attractiveness and fascination and also it is dealt with the relationship with the tourists' education level and the native architecture therein and finally the above-mentioned article comes up with the conclusion that the tourists with MA degree and higher assign a high value to the native architecture of the tourism destinations[5].

In another article, the various aspects of the cultural and its constituent building blocks and the role that culture, for specimen, has in developing Iran's tourism have been investigated. In the aforementioned study it has been stated that the culture of every society is an appropriate ground for the tourism evolution and growth and tourism can be defined based on the prevalent culture therein. Many of the cultural and civic capabilities within the framework of the country's history and culture can and has to be offered to the world travelers and the people from the other lands[6].

Context-oriented scales

Context-centeredness is presented in various scales and levels. It starts from the building itself, the site and the ground on which the building is located in its micro scale, then it is manifested within the neighborhood level units and the local area. In this stage, the context-oriented architecture moves from mere architecture to city-building. In larger scales within the city environment, it deals with the districts and sections and then with the regions around the cities and the extra-city regions and suburbs. Context-centeredness does not cease its move in here and it is not limited to this level; rather it travels from single building structures to neighborhood, then it considers districts and regions and it still can move out further to include the global aspects. Thus, context-centeredness can span its aspects and dimensions within the planet earth boundaries.

In a general term, it can be said that the context-oriented approaches start with neighborhoods, and then it expands in two directions, micro- and macro-scales. Context-centeredness reaches to regionalism in its macro-level, and it narrows down to the internal building atmosphere in its micro-scale. But the regionalism global aspect transcends well beyond the regional boundaries and finds a global dimension. This way, although the context-oriented architecture is deeply immersed in “spatial locus”, it unleashes its presence to spread out to the far away to the cities and countries, to the world and the universe [7].

Adrian Smith and Gordon Gill, who believe in sustainable architecture in its international level, state that “the buildings should be designed according to their role within a regional, district and global groundings. Within the context of the global development and at the time that the entire cities are being designed and built with imposing harms and damage to the environment, the environmental objectives are not only achievable but they are also necessary and compulsory for the survival[8].

Context-centeredness aspects

Context-centeredness has aspects including textural context-centeredness, historical context-centeredness and social-cultural context-centeredness, each of which deals with a particular context-oriented concept.

Textural context-centeredness

In context-centeredness, the city form components are not evaluated and studied in separation; rather they are looked upon in a wider environmental background. An architectural work finds its relevance in a bigger urban system and it has to be perched in a hierarchy of the systems. Therefore, context-centeredness is the anchoring link between the architecture and city-building regarding certain grounding. In other words, the grounding or context is the location in which the architecture and city building meet. The city builders’ inclination towards construction within the ‘existing system’ has to be taken as meaning intertwining of the new to the old in such a manner that it can be considered as a viable and optimum whole. So, there is a need for a particular commitment to be perceived regarding the new architecture entrance to an extant background [9].

There are issues posited in today’s tourism which endorses the necessity to pay attention to the cities’ physical and textural elements and the buildings therein; to put it differently. Although the industry firstly targeted the welfare and comfort, nowadays it has been turned into something of a more cultural-economical importance the development of which is a mean to exchange cultures. In line with this, an approach can be recounted as successful that can simultaneously involve both the objective and subjective dimensions of the city[10]. Thus, the buildings in every city should be a manifestation of the regional culture in order to succeed in attracting tourists.

Historical context-centeredness

If a society separates itself from its past it means that it renders the efforts taken by its previous dwellers useless and the human historical continuation cutoff is belittling his past life, one should benefit from what one’s ancestors have carried out, and if one intends to make a progress then s/he is needed to keep up his or her pioneers’ works[9]. The background should be taken as a sort of history. The background should not be envisaged as a static factor during the course of time, rather, it should be considered as a dynamic and variable factor which is fluent. In a sense, the context-oriented architecture is itself variable and moving. Every building constructed is per se a part of the background already there and it is part of the background and paves the way for the later buildings to be constructed[7]. Also, the society is essentially anchored to and develops via the tradition. The same way that the theories are applied for discovering the realities in sciences, traditions and customs play the same role for the society. Although tradition can be criticized and changed, it creates specific order and it is regarded as a foundation upon which ground actions are set out [10].

Now, we can clearly see that the tourism researchers have pointed to the importance of the historical aspects of a location or spot in optimizing the tourism. Mottos such as a type of tourism is victorious that can lead to recognition and perception within an appropriate area and make the tourists acquainted with the city concepts and elements in order for them to get a better understanding of the city, in fact, the tourists besides spending their leisure time and amusing themselves in the city need to recognize the city’s meaning and history[11].

Cultural-social context-centeredness

The cultural-social context-centeredness proponents believe that culture creates a collection of rules that are a reflection of the constructed form. The people give meaning to their immediate environment aided by culture which is a system of values, beliefs, ideologies and common symbolic systems and in doing so the empty spaces are turned into locations[12]. The architects’ duty is to create sustainable and stable spots which provide for the best proportion between the users’ cultural and textural needs and expectations. Their discussions are mostly based upon semantics than on formative rules, since in their opinion the spatial forms are being created following to the semantic residing therein and the meaning of a phenomenon is perceived within the context from which it emerges[13]. Successful tourism can be realized as, besides spending leisure time, gaining knowledge about the art and civilization, the other territories rituals and cultures, securing one’s own spiritual, psychological and mental needs [14].

In the following table, the key context-oriented approach characteristic and the way it is reflected in a building’s design have been dealt with:

Context-oriented architecture	Reflection in project deigns
In context-centeredness the city form components are not studied and evaluated solitarily, rather, they are placed in a wider environmental background.	The selection of an appropriate grounding for the project to be implemented in the first stage, the study and survey of the adjacent regions’ characteristics and the city as a whole and designing the project parallel and in cohesion with it should become a routine work procedure.
The background should be considered as a type of history, every building which is constructed is proposed as a part of the background and it paves the way for the later buildings to be built.	The building project should not be looked at as static, rather, a dynamic entity which flows in the course of time, consequently, the building of interest is not considered as apart from the background, rather, it will be seen as an integral part and in the future it will also act as a background for the later buildings.
Rapaport says culture is a system of rules and the constructed form is a reflection thereof.	Before dealing with the designing work, there is a need for a precise evaluation of the region and even the city to be conducted and it has to be reflected in the designing works to the maximum extent possible.
As put by Ventury, the chief generator of the form is not the building’s architectural program, rather, it is the urban context and background.	In the designing process, we move from texture and background to form and it is not from aesthetic considerations to form.
According to Norberg Schulz, location is a space to which meaning has been granted and it is the architect’s duty to embody the semantic aspects.	To create context-centeredness there is a need to search and discover the historical, natural and cultural semantics within the format of the urban environment and to incarnate them within the contextual and visual paradigms. So, it is the project that conveys its background semantic to the onlookers.
The building’s unification with its place of construction, with the society and the peripheral region causes the building to become more cohered with its immediate background and it is through successful interaction with the environment that it can elevate the energy productivity in the building.	With the study of the project background, in terms of its natural competencies, the climatic characteristics should be taken into consideration in order for the results to advance more consistently with the climate which will finally yield more attentiveness to and thoughtfulness of the environment and the energy.

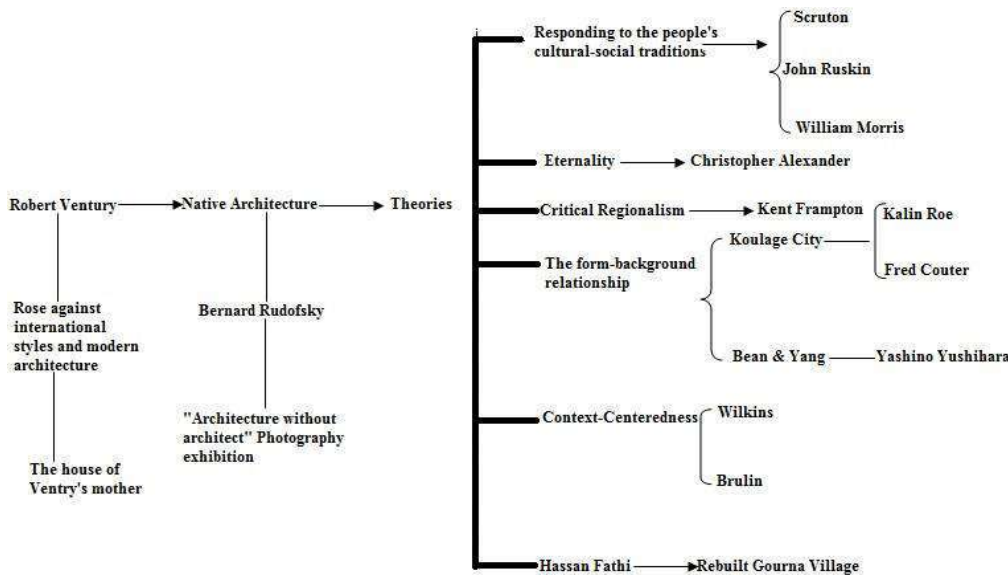
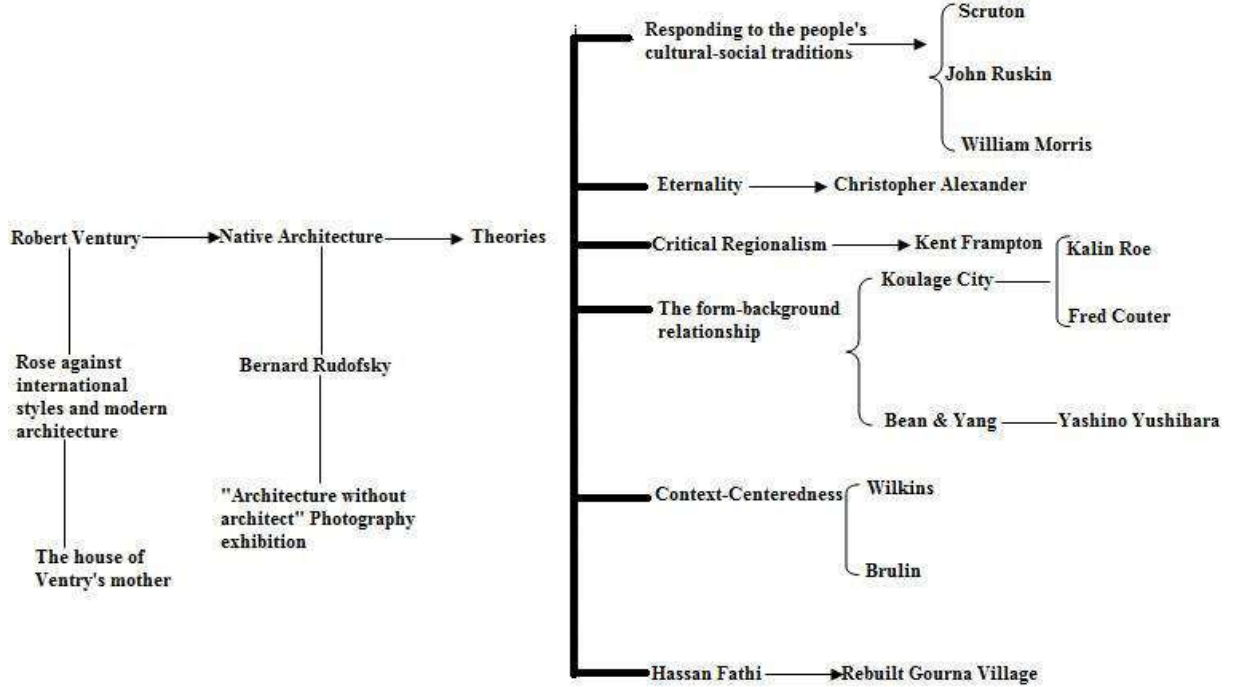
The importance of context-orientation in enhancing the urban landscape quality

Perhaps one of the most succinct and at the same time the most precise phrases and expressions which have been posited in describing the importance of the streets and the visual environment is the saying by Jane Jacobs; She says “she thinks of the city and what does she remember? The streets therein! When the city streets are beautiful and fascinating the city is lively, and when the city streets are ugly and dull, the city is remembered as dull”. Essentially, the urban landscape is the contact point between the “human being” and “the urbanization phenomenon” and therefore a considerable amount of the knowledge, affections and the citizens’ environmental behaviors are formed subject to it [15].

The context-oriented/perceptive urban landscape perspective[1] which is in contrast to the modern atomized architecture, realizes the “urban background and context” and not the “building’s architectural program” as the main generator of the form and therefore the urban landscape resulting from such an approach has to be considered as a context-oriented landscape. The

objective of the perceptive urban design is the creation of a strong urban landscape”[16]. And, in so doing, it mainly focuses on “the environments’ analysis, design and management according to the places and spots analyzable qualities”[17].

If we add the saying by Christian Norberg Schulz that “a place is a space to which a semantic meaning has been contributed” and then accept that “architect’s duty is to embody such a semantic meaning”, then the designers who are seeking to create context-centeredness are assigned with the duty of seeking to find and discover historical, natural and cultural semantics within



A context-centeredness sample

Looking at the most attractive cities we can find out that tourism is booming in cities where it is interlaced with the history and culture and the buildings and constructions have preserved and maintained their subjective and objective originality, for example some European cities such as the cities in Switzerland, Austria, Italy, etc.



<http://www.myswitzerland.com/en/swiss-cities.html>



<http://www.travelchannel.com/destinations/austria>

One of the most considerable projects regarding the issues set forth in this section of the study is the Galicia cultural center by Peter Eisenman in Spain, which can be considered among the context-oriented works attracting a great number of tourists due to its site's particular topographical features and the corroboration of such features in the project and also the reflection of the peripheral and adjacent roads background and the cultural element of Santiago region which is projected on this building. The preliminary design plan originated from three types of information. At the first place, the streets plans are taken into consideration which enjoys some sort of medieval centrality in the topographical foothill maps. The second element is a modern plan and pattern which stands higher in rank to the streets and in the third place, computer-aided software is provided by means of which the best regional topography map is drawn. The city building system in the city of Santiago is formed in such a manner that the buildings are combined and cohered and the streets are equipped with empty and extra spaces. Through taking advantage of the map a city can be obtained which is a combination of the today and the past architecture and in the mean time the old and historical city building rules and regulations have all been attended to and focused on.



Source: The internal and specialized journal of guild association of Fars Anbuh Sazan mass accommodation buildings constructors, tr.Maryam Shomaliyan, 1st year, no.2, Summer and Fall, 2007, pp.21, 22, 23 and 24. Photo: site (Arcspace)

The context-centeredness effect on attracting tourists

The tourists do not seem to select the destinations solely for the purpose of recreation and respite, they travel to such spots to search in the heart of the cultures and other civilizations, look into them, learn from them and escape the repetitive streets and buildings in their periphery. Context-centeredness is a way through which one can deal with both culture and history and in the meantime the buildings can be constructed texturally coordinated with their immediate spectacular background. That is because culture is one of the main fundamental pillars of context-centeredness and at the same time it is one of the most fascinating elements attracting the tourists. There are numerous studies conducted in connection to dealing with the culture and native architecture which concomitantly encompass the tourist attraction topics. In the following section we are going to deal with the relationships between context-centeredness and tourism from the experts' points of view and within the format of various and the great number of the articles written on the subject which is dealt with in the current research paper.

A type of tourism classification divides it to urban tourism (including the cities and the suburban areas) and rural tourism; and, according to the present study intention we are mostly dealing with the first type of the tourism in the current study.

Muhammad Taghi Rahnama'ee in the comprehensive studies on Ardabil Province (2002), defines tourism as "it is the collection of the travels and journeys which occur between a source and a destination with goals such as respite, recreation and resort, sporting, watching spectacular sceneries, business, cultural or spending leisure time and the tourist individual does not work or live in the tourism destination".

Piers in "tourism development" (1989) has stated that "tourism can be taken advantage of as means for cultural interaction". Muhammad Hassan Akbarzadeh Ebrahimi in an article entitled "local tourism development, urban tourism growth" (2007) has written that "because the urban tourism is constantly and stably in a sort of relationship with the intra-city and city suburbs recreational and leisure time needs, it is found closely associated to the environmental values and cultural and historical heritage of every city".

Shervin Goudarziyan in an article entitled "landscape approach, the success factor of the urban tourism" (2015) expresses that "urban tourism which is now anchored and tied to the cities' culture and identity, plus being very important, is of a great sensitivity due to its being close to the city-related topics and life in urban communities".

Seyyed Amir Mansouri has asserted in "Iranian landscape tourism" (2012) that "the expectations from successful tourism can be realized in defining the quality of the human beings' securing of the spiritual, psychological and mental needs besides providing for the human beings leisure time activities, the recognition of the other nations' and territories' art and civilization and identification of the other nations' traditional rituals and cultures".

Love in his "drawing tourism attraction to larger urban localities" (1996) has acknowledged that "a tourism can be recounted as successful that can result in recognition and comprehension in an appropriate area and make the tourists acquainted with the urban concepts and elements in order for them to acquire a correct understanding of the cities. In fact, the tourists need to recognize the cities' semantic concepts and historical features in addition to making use of them for leisure time activities and recreation. Therefore, an approach can be characterized as accountable for tourism which attends to and incorporates both the

objective and subjective aspects of the city within a conceptual grounding. On the other hand, the business and culture are the two main objectives taken into consideration for urban tourism”.

in an article entitled “culture-oriented recreation in the historical texture of the city of Qazvin with an emphasis on the urban tourism” (2012) written by Aminzadeh and Dadras we read “although at first the objectives sought for by the industry were welfare and comfort, for the time being it has been turned into something of a more economical and cultural nature and its development can be a tool for exchanging and interaction between the cultures. Successful urban tourism creates a sort of mutual cultural reaction that causes the cities to gain a civil development meanwhile the communities’ cultural heritage undergoes identification process and is appreciated accordingly. Up to this point, reviving of the cultural values, history and the ancestors’ ways and collective incidents and memories can be realized as one of the most important tourism enhancement strategies”.

Seyyed Amir Mansouri in the “Iranian landscape tourism” (2012) has expressed that “an approach that can actualize the urban tourism success is the one that concomitantly incorporates the various urban aspects such as time, place, history and civilization and the intervening measures chosen are not biased towards partial and specific matters and it has to consider them within the format of the entire city and in relation to all the effective factors. In other words, a holistic approach to the city which realizes it as a dynamic entity not mere texture can be highly effective in advancing and accomplishing the urban tourism.

Inse Kippe in his book “tourism planning” (1991) has said that “during the recent decades, the growth in tourism industry and the competition arisen therein have made the planners to pay attention to two important issues in order to elevate the quality of tourism: firstly, increasing the tourists’ satisfaction and enhancing the quality of tourism experience and, secondly, making efforts in reserving the host’s interests. This is suggestive of the idea that one of the successful tourism indicators and scales is particularly attending to the addressees and audiences which include the tourists and the residents, as well”.

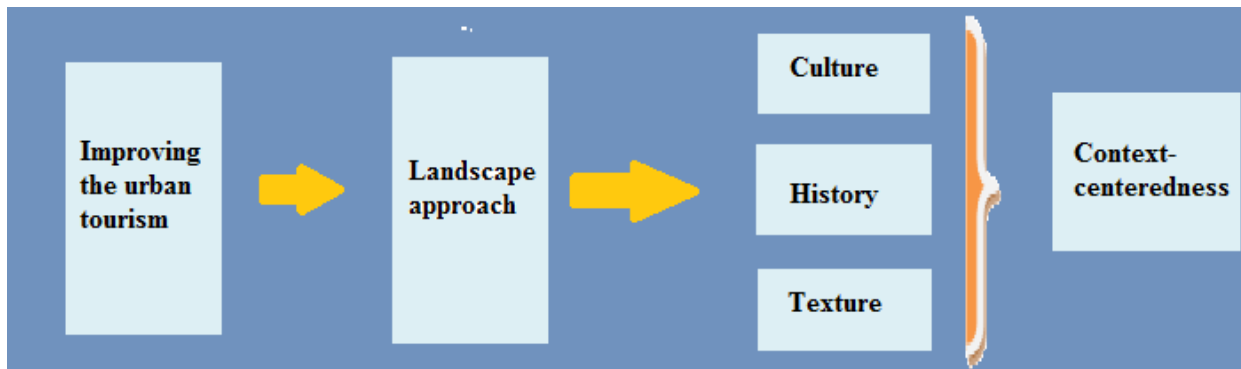
Orbasely in his book “tourism in historical cities” (2000) has stated that “securing the citizens’ needs in respect to the creation of the appropriate and convenient infrastructures in order to accommodate tourism is a priority”.

Muhammad Hassan Sharbatian in “contemplating over urban tourism in Iran and offering solutions for the sustainable development in such an urban industry” (2011) realizes that “part of urban tourism is a mutual interaction between the tourists and the host which leads to the generation of tourism spaces regarding taking a trip to urban regions”.

Shervin Goudarziyan in an article “landscape approach, the urban tourism success factor” (2014) states that “such an approach should take the society and the collective memory into consideration and regard them as a common and linking factor which binds the audiences to each other, that is because the tourism intervening actions causes the urban residents and their social interactions with the visitors to take place and this is besides the tourists needs satisfaction and providing them with an appropriate understanding of the situation. Such an approach can make the citizens and tourists feel that the city belongs to them. There cannot be done such interventions for the tourists and simultaneously remained negligent of the effects it has on the other parts of the city”.

There has been emerged a type of approach which is called “landscape approach” which is not irrelevant to the context-oriented architecture and city-building; from this approach point of view, landscape is a general whole and the landscape approach is a holistic one. It is pointed out in the former article that “in fact, it is the landscape approach that performs a thorough investigation of the urban tourism with all its urban aspects and dimensions and deals with the required actions and interventions along the entire city grounds and backgrounds and takes all the effective factors into consideration. Based on the landscape nature, it can be said that the urban landscape approach incorporates the various aspects such as spatial-temporal, historical-civilization and subjective-objective, simultaneously and gives a general meaning to the concerned urban phenomena in conjunction with the historical and natural past environment. In adopting such an approach the city is envisaged as a live entity which does not solely lend itself to the textural interventions. Such an approach is seeking to find scales for enhancing the urban optimal qualities and providing the human beings with a correct conception of the issues. Also, this approach identifies the urban background according to the cultural aspects and provides for the persistence of the historical continuation and keeps the cities connected to their historical identities. Urban tourism in line with the today’s tourists’ objectives and expectations and as a factor for the identification of the history, culture and collective memories has been transformed into a perceptive element of the city. Therefore, nowadays, the tourism industry has been proposed not only for filling the individuals’ leisure time, but it is also claimed to have turned into an arena for the recognition of the cities’ identities and civilizations. Thus, the textural and partial strategies have been found no longer capable of responding to the tourism requirements.

It is evident that the landscape approach encompasses the entire elements pertaining to the landscape improvement such as culture and the neighborhood or locality relations with its past and the urban landscape coordination and harmony as a whole which is deemed as the prerequisite condition for the context-oriented architecture and city-building processes.



Source: The author

RESULTS

Camel A succinct and explicit survey of the relationship between the tourism and context-oriented approach has been given in the following table:

Cases mentioned regarding enhancing the tourism	Important elements of the context-oriented architecture and city-building
An approach is called successful that can concomitantly incorporate various aspects of the city such as time, place, history and civilization.	Time, place and history are context-oriented aspects.
The successful approach should adopt interventions which are holistic, not partial.	Holistic approach is the most critical principle in context-centeredness
Among the most significant strategies for enhancing tourism is reviving the cultural values, history and the ancestors' methods, collective incidents and memories.	Culture and history are the context-oriented aspects and the ancestor's methods and the collective memories are among the considerable elements and concepts focused on by context-centeredness.
An approach to tourism can be recounted as successful which takes both the subjective and objective aspects into consideration.	The context-oriented approach does not only attend to aesthetic characteristics and objectivity, rather, subjectivity and the architectural and city-building mental and psychological effects are also among the priorities.
The today's successful tourism is the recognition of the traditions and the cultures of the territories, thus tourism is intertwined with the urban culture and identity.	Context-centeredness is the manifestation of identity and culture of its background.
Successful tourism should adopt an approach in which the concepts and the elements of the city are made familiar to the tourists in order for them to acquire a correct understanding of the city.	The audiences and spectacles correct perceptions of the plan's background and the creation of a mental relationship between the plan and the audiences are among the context-centeredness objectives.
Landscape approach in tourism is an approach which envisages the city as a live entity which does not lend itself to only the textural interventions.	Context-centeredness realizes city as a dynamic and moving entity. The city background is not considered as a static factor during the course of time rather it is regarded as a dynamic and variable factor which is spirited.

Source: the author

CONCLUSION

From the evaluations and the studies performed in the current study it can be understood that if the contemporary architecture revives the cultural values of a region and pays attention to its audience perceptive needs and if it incorporates the time, place, history, culture and the civilization, concomitantly, the way the context-oriented approach deals with the various aspects, then it can take step on a path which leads to the maximum attractiveness of the city for the urban tourists.

The study performed came up with this conclusion that the context-centeredness features and accomplishments can be applied in architecture and city-building to improve and enhance the tourism quality through creating an optimized perception in the tourist and consequently attracting the tourist.

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EFFECT OF HOT CLIMATE ON CITRUS TRISTEZA VIRUS DAMAGES IN JAHROM REGION (IRAN)

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ABSTRACT

Citrus are strategically and economically important crop in Iran and around the world. Tristeza is considered among the most important viral diseases of citrus, producing severe economic losses worldwide. Thermal therapy is a management method to viral diseases of plants. Jahrom has the hot dry climate. In order to assess the effect of the environment heat on Citrus Tristeza Virus (CTV) in the field conditions, 20 CTV free plants and 20 CTV infected plants were selected from each variety (Mexican lime, Washington-navel orange and Kinnow tangerine varieties). Different characteristics of healthy and diseased trees were compared. In all varieties, the results showed that virus infection reduces the fruit yield. In most cases, however, characteristics of the Mexican lime fruits were not significantly changed but important characteristics such as sugar contents, contents of the vitamin C in fruit juice, juice pH, peel/flesh ratio and juice percentage (purity) showed significant differences between healthy and infected trees of orange and Kinnow tangerine. In general, Citrus Tristeza Virus makes damages in Plants that ripening of their fruits comes with cooler temperature of autumn. But in Mexican lime that is an early fruit, tristeza damage is inconsiderable.

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KEY WORDS

Citrus Tristeza Virus, Effect of Virus on physiology, Hot Temperature

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INTRODUCTION

Citrus are considered as the strategic products in the global agricultural industry. They are used in more than one hundred industries. Because of its destructive effects on citrus industries in several countries, CTV is economically regarded as the most important virus of citrus [1]. To date, the disease has destroyed millions of citrus trees grafted onto the sour orange rootstocks in Argentina, Brazil, Peru, America, Spain and Venezuela. In Florida, CTV was reported first in 1950s but the severe strain of the virus speeded in the 1980s and made heavy damages [2].

Under field conditions, in general, CTV symptoms exhibit a complex range based on the virus isolates, citrus varieties, infection time and environmental circumstances [3-5]. CTV leads in three types of economically important symptoms including quick decline in trees grafted on sour orange rootstock, stem pitting on scion - regardless of the rootstock- and seedling yellows causing mass losses in nurseries and greenhouse conditions [6]. Citrus Tristeza Virus (CTV) belongs to the genus Closterovirus (family: Closteroviridae). CTV has a flexuous filamentous particle with the size of 2000×10^{-11} nm. Two capsid proteins (P25 & P27) cover 97% and 3% of the viral particle, respectively [1, 7, 8]. Each particle contains a ss(+) RNA that is about 20 kb [4, 9-11] and $6.3-6.9 \times 10^6$ in molecular weight [12].

In Iran, CTV was first reported from unshu tangerine seedlings imported from Japan in Mazandaran province, in 1978 [13]. CTV distribution in southern Iran was identified in 1998. Infected regions included Khafr, Kazeroun, Fasaroud, Jannat shahr, Dalaki, Rood fariab, Khiz and Jam [14]. In 2006, the first evaluation on distribution and genetic diversity of CTV isolates was performed in Kerman province, Iran [15]. During the same year, three monoclonal antisera (3CA5, 3DF1 & MCA13) and three polyclonal antisera (Bioreda, Agritest & Shiraz)

were used in two indirect ELISA methods (I-ELISA) and (I-TPIA) to identify the CTV infection in all Iranian southern provinces (Fars, Kohgeluyeh-Boyer Ahmad, Hormozgan, Sistan & Baluchestan and Kerman) [16].

The optimum temperature for viral infection and replication is 15-25 °C. Examinations showed that under thermal treatment, infected seedlings had less viral particles compared to the control samples [17]. In addition, some strains don't generate symptoms like seedling yellows in response to the thermal conditions. Further investigations suggested that the heat effect on the virus depends on the heat tolerance of the host plant [18].

Thermal therapy is a control method to viral diseases. Heat reduces the concentration of viruses within the plants. In the spring and summer, temperatures are very high in Jahrom and the maximum temperatures of above 40 °C have been recorded for most of its summer days. Despite the high investments on CTV research efforts in Fars province, damages of the virus have not been surveyed in Jahrom to date. Given the importance of citrus in Jahrom, the global importance of CTV and the controlling role of the heat on the plant viruses, it is necessary to conduct research efforts in the field of CTV induced damages in different citrus varieties in Jahrom. Information on the damage extents and their economically assessing can be helpful in future research policies. If the disease's damages are not economically significant, there will be no need to perform costly researches.

MATERIALS AND METHODS

In order to evaluate and select the healthy and CTV infected trees in Jahrom, randomly leaf sampling was conducted from several Mexican lime, kinnow tangerine and Washington-navel orange yards in autumn and winter 2013 and spring 2014. The samples were placed in plastic bags. After recording the characteristics, samples were transported to the laboratory in cooling chambers.

ELISATest

According to the manufacturer's instructions, ELISA test (DAS-ELISA) [19] was performed using the virus specific antiserum (Bioreba) to identify the infected plants. Then, optical density was measured at 405 nm by ELISA reader (Mikura). Positive sample was defined as having two fold OD₄₀₅ value of the negative control sample.

RNAExtraction

Total RNA was extracted using the RNA extraction kit (RNase plant mini kit) according to the manufacturer's instructions. Extracted RNA was stored at -20°C for further uses.

cDNASynthesis

To synthesize the cDNA with the final volume of 20 µl, 9 µl of total RNA was heated with 1 µl of Oligo(dt) at 65 °C for 5 minutes. The mix was immediately transferred to ice and was added by other reaction compounds including 2 µl of 10X buffer, 2 µl of dNTPs and 1 µl (200U) of Reverse transcriptase enzyme (Sinagen). The reaction mix underwent 25 °C for 10 minutes, 42 °C for 60 min and 70 °C for 10 min. Obtained cDNA was stored at -20 °C for future uses.

Polymerase chain reaction (PCR)

PCR was performed in a total volume of 25 µl. Reaction compounds included 2.5 µl of 10X buffer, 0.75 µl of each primer (CP1 & CP2), 0.75 µl of MgCl₂, 0.5 µl of mixed dNTPs, 1.25 units of Taq DNA polymerase enzyme and 4 µl of cDNA. Polymerase chain reaction consisted of a cycle at 94 °C for 3 min, 35 cycles at 94 °C for 1 min, 56 °C 1 min, 72 °C 1 min and 72 °C for 10 minutes in the last stage. The PCR amplified fragments were separated on 1.2% agarose gel and stained in 0.5µg/ml with ethidium bromide and analyzed using BIO imaging system. The primers used in this research were CP1: 5'- ATGGACGACGAAACAAAGAA-3' and CP2: 5'- TCAACGTGTGTTGAATTTC-3'.

Sugar contents

Fruit juice sugar contents was measured by volumetric method of Lane-Eynon.

Vitamin C contents

After juicing the fruits, 2 ml of 1% starch and 20 ml of distilled water were added to 10 ml of filtered juice. The mix was titrated using Lugol to create the olive green color. Finally, the vitamin C contents in 10 ml of fruit juice were calculated based on the following formula: Used Lugols solution × 0.88.

Titrateable acid (TA)

5 ml of the filtered fruit juice was added by 2-5 drops of phenolphthalein. The mix was titrated using 3.0 normal sodium hydroxide to create the light red color. Finally, citric acid contents in 100 ml of fruit juice were calculated based on the following formula:

$$\text{mg of acid in 100 ml fruit juice} = \text{ml of NaOH} \times \text{normality of NaOH} \times \text{Equivalent Weight of dominant acid} \times 100 / \text{Sample Weight} \times 1000$$

Fruit Juice pH

After filtering the fruit juices, their pH values were read by using of a pH meter.

Fruit firmness

Fruit firmness was measured by a handy penetrometer (Mc Cormic FT-327) with the 11 mm tip. The firmness value was expressed in kilograms.

Tree yield

Trees products were completely harvested and weighted.

Peel thickness

The fruits were longitudinally peeled off and the thicknesses values of their various parts were measured by a caliper. Mean values of peel thicknesses were obtained.

Juice density

A glass hydrometer was used to measure the juice density values.

Peel/ flesh ratio

Fruits were peeled, the flesh and peel of the fruit were weighted by a digital scale (0.01 gr) and the ratio was calculated.

Percentage of Fruit juice

Percentage of fruit juice was measured by this formula: weight of fruit juice/weight of fruit ×100.

Total Soluble Solids Content (TSS) (Brix)

TSS content of fruit juice was measured by handy refractometer. The measured values were expressed in percentage.

Data analysis

The results were analyzed in a randomized complete block design and the means were compared using the LSD test.

RESULTS

Selecting the healthy and infected trees

After collecting the samples, ELISA and PCR tests were performed. From Mexican lime, Washington-navel orange and kinnow tangerine varieties, 20 CTV free trees and 20 infected ones were selected for further studies.

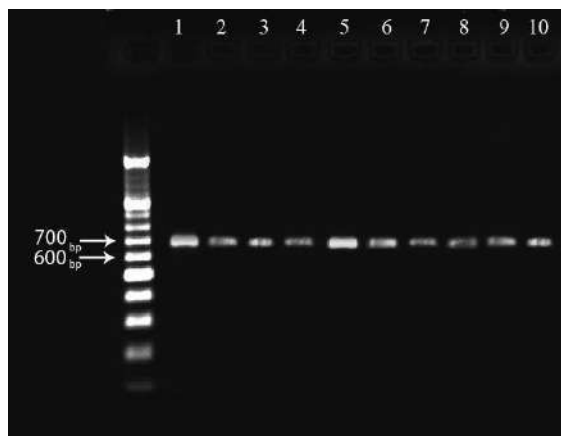


Fig: 1. Amplified coat protein genome of Citrus Tristeza Virus isolates from some infected trees

Measuring the various factors

Results of data analysis of Citrus Tristeza Virus free and CTV infected trees

Table: 1. Data analysis of Washington navel orange

Sources of variations	DF	Mean Squars (MS)										
		Fruit sugar	Vitami n C	TA	pH	Fruit firmnes s	Yield	Peel thicknes s	Juice Densit y	Peel/Fles h	% Fruit juice	TSS
Variety	1	1.892*	883.6**	0.00625*	0.930*	0.225**	5040.0*	0.016 ^{ns}	0.178**	0.0176**	469.2*	2.116*
Error	38	0.020	3.8	0.00025	0.011	0.008	37.9	0.011	0.003	0.0002	2.8	0.013
%Coefficient Variance	%(CV)	2.0	3.0	1.4	2.2	3.0	3.7	2.3	3.8	2.7	2.1	1.2

** and ns = significant and Non-significant at 1%

Table: 2. Comparison of measurements data of healthy and tristeza infected Washington navel orange

Factors	%Fruit sugar	Vitamin C (mg)	TA (mg)	pH	Fruit firmness (kg/cm ²)	Yield (kg)	Peel thickness (mm)	Juice Density (g/cm ³)	Peel/Flesh	% Fruit juice	%TSS
Plant											
CTV free	7.44a	69.8a	1.148b	4.90a	3.00b	178.3a	4.46a	1.424a	0.438b	83.8a	9.58a
CTV infected	7.00b	60.4b	1.173a	4.60b	3.14a	155.8b	4.42a	1.290b	0.480a	76.9b	9.12b
LSD %5	0.092	1.248	0.010	0.066	0.059	3.942	0.066	0.033	0.008	1.077	0.074

*- In each column numbers with the same alphabetic are non-significant at %5 of LSD test.

Table: 3. Data analysis of Mexican lime

Sources of variations	D F	Mean Squars (MS)										
		Fruit sugar	Vitami n C	TA	pH	Fruit firmnes s	Yield	Peel thicknes s	Juice Densit y	Peel/Fles h	% Fruit juice	TSS
Variety	1	0.056n s	2.50ns	0.00072n s	0.081 **	0.001ns	950.6 **	0.036ns	0.064 **	0.0048**	8.10 *	1.056 **
Error	38	0.015	2.47	0.00284	0.006	0.009	15.7	0.009	0.007	0.0001	1.74	0.023
%Coefficie nt Variance % (CV)		2.6	2.9	3.7	3.6	6.2	2.8	5.3	7.3	3.3	1.7	2.2

** = significant at 1%; * = significant at 5%; ns = Non-significant at 5%

Table: 4. Comparison of measurements data of healthy and tristeza infected Mexican lime

Factors	%Fruit sugar	Vitamin C (mg)	TA (mg)	pH	Fruit firmness (kg/cm ²)	Yield (kg)	Peel thickness (mm)	Juice Density (g/cm ³)	Peel/Flesh	% Fruit juice	%TSS
Plant											
CTV free	4.79a	54.6a	1.435a	2.20a	1.51a	145.6a	1.78a	1.210a	0.348b	79.2a	7.07a
CTV infected	4.72a	54.0a	1.426a	2.12b	1.52a	135.8b	1.84a	1.130b	0.370a	78.2b	6.74b
LSD %5	0.079	1.006	0.034	0.050	0.060	2.536	0.061	0.055	0.008	0.846	0.097

*- In each column numbers with the same alphabetic are non-significant at %5 of LSD test.

Table: 5. Data analysis of kinnow tangerine

Sources of variations	D F	Mean Squars (MS)										
		Fruit sugar	Vitamin C	TA	pH	Fruit firmnes s	Yield	Peel thicknes s	Juice Densit y	Peel/Fles h	% Fruit juice	TSS
Variety	1	33.581 **	354.02 **	0.243 **	0.552 **	0.272**	2325.6 **	1.849**	0.225 **	0.0292**	180.6 **	5.625 **
Error	38	0.123	4.18	0.003	0.011	0.006	25.0	0.077	0.001	0.0005	1.8	0.063
%Coefficie nt Variance % (CV)		3.7	6.5	4.8	2.3	3.6	4.4	8.9	3.5	6.3	1.6	2.2

** = significant at 1%

Table: 6. Comparison of measurements data of healthy and tristeza infected kinnow tangerine

Factors	%Fruit sugar	Vitamin C (mg)	TA (mg)	pH	Fruit firmness (kg/cm ²)	Yield (kg)	Peel thickness (mm)	Juice Density (g/cm ³)	Peel/Flesh	% Fruit juice	%TSS
Plant											
CTV free	10.31a	34.3a	1.116b	4.56a	2.14b	121.4a	2.90b	1.292a	0.320b	85.8a	12.06a
CTV infected	8.48b	28.4b	1.272a	4.32b	2.30a	106.1b	3.33a	1.145b	0.374a	81.6b	11.32b
LSD %5	0.224	1.308	0.036	0.066	0.052	3.198	0.178	0.027	0.014	0.865	0.161

*- In each column numbers with the same alphabetic are non-significant at %5 of LSD test.

Tables 1, 3 and 5 show data analysis and tables 2, 4 and 6 represent the comparative results of various mean data from Washington navel oranges, Mexican limes and Kinnow tangerines, respectively. According to the results, contents of sugar and vitamin C were significantly higher in fruit juices from healthy trees of Washington navel oranges and Kinnow tangerines than the CTV infected trees. The mentioned parameters showed no significant differences between healthy and infected Mexican limes. Compared to the healthy trees, total acidity (TA) values were significantly lower in CTV infected fruits of Washington navel orange and Kinnow tangerine trees. However, TA values didn't show a statistically significant difference between healthy and infected Mexican limes. The pH values were significantly higher in fruit juices from healthy trees of Washington navel orange, Kinnow tangerine and Mexican lime than the CTV infected trees. The fruit firmness values of the healthy orange and tangerine trees were significantly lower than the CTV infected trees, while no statistically significant differences were observed between the healthy and CTV infected lime trees. In all species, total yields of the healthy trees were significantly higher than the infected ones. Peel thickness values of the healthy trees were higher than the infected ones but the difference was only significant in Kinnow tangerines. In all species, the juice density and TSS values of the healthy trees were significantly higher than the infected ones. In all species, the peel/flesh ratios of the healthy trees were significantly lower than the CTV infected trees. Moreover, CTV infected trees had significantly lower juice percentages than the healthy trees.

DISCUSSION

Based on the research, leaves of the virus-infected plants had higher respiration rates than the healthy plants. This led in carbon partial loss and less starch production. However, older infected leaves didn't produce more carbon dioxide values [20]. According to the tables 2, 4 & 6, sugar contents in fruit juices from healthy trees of Washington navel orange and Kinnow tangerine were significantly higher than the CTV infected trees but healthy and infected Mexican lime trees showed no significant differences in sugar contents. Reduced sugar contents can be the result of higher respiration rates of infected plants. On the other hand, Whitehead examined the impacts of the leaf curl virus on the harvested potato tubers. Based on this study, respiration rates of the infected tubers were much higher than the healthy ones at the beginning of the harvest stage. Respiratory rates gradually decreased below the values of the healthy tubers [20]. Resulted from the higher respiration rates of CTV-infected fruits, sugar content reduction consisted to Whitehead's study. Sugar contents were not statistically significant different between healthy and infected lime fruits. According to unpublished data from Jahrom weather station, the mean maximum temperatures in the months of 2014 were as follows respectively: 14.1, 17.4, 22.8, 27, 33.3, 39.5, 41.4, 41, 37.8, 33.9, 24.7 and 20.7 °C. In Jahrom, lime fruits are harvested in September while oranges and Kinnow tangerines are picked after December. Therefore, growth and ripening seasons of lime fruits occur in the hot weather of June, July and August. Intense heat reduces the virus concentrations and thus, the viral impacts on the plant. This makes no statistically significant differences in sugar contents of the healthy and infected fruits. On the contrary, orange and tangerine fruits grow and ripen in cool autumn temperatures, increasing the virus concentration within the plants. Therefore, the viral impacts lead in a significant difference between fruit sugar contents of the healthy and infected trees.

Many researchers have evaluated total carbohydrate contents in various cases. A study suggested that abnormally high contents of carbohydrates accumulate in leaves of the mulberry trees which are infected by Mulberry dwarf.

Investigation on several potato varieties showed higher total amount of carbohydrates in leaves of the infected plants than the healthy ones and their lower contents in tubers. In addition, carbohydrate contents in leaves of the infected spinach plants were higher than the healthy plants. In a research, it is proved that dark mosaic areas have higher sugar than the healthy tissues. Another study showed that leaves of the infected spinach plants contain 25-250% higher sugar contents than the healthy tissues. The contents of sucrose and other disaccharides have also been investigated in several studies. Mulberry leaves infected by leaf curl virus have exhibited higher sucrose contents than the healthy plants. In another experiment, sugar contents of infected grape leaves were significantly lower than the healthy plants. No significant differences were found in sugar contents between sugarcane plants infected by stripe virus and the healthy ones. In several studies, the contents of starch in infected leaves were higher than the healthy ones. Various reasons have been addressed for higher carbohydrates in leaves of the infected plants compared to the healthy plants. One of the reasons is reduced movement of carbohydrates within the plant, resulted from the phloem necrosis or changed permeability of the protoplasts. In such conditions, carbohydrates are not able to leave the leaf. Based on the studies, the carbohydrate accumulation takes place before the visible necrosis of the vessels [20]. The results are consistent with our findings. In the present study, sugar contents were higher in healthy fruits as well as the density and TSS values of fruit juices. Therefore, CTV also has led in lower contents of carbohydrates and sugar in infected fruits as the probable result of the blocked transfer from the leaves to fruits. Reduced respiration may be considered as another reason. An experiment was performed to examine the photosynthesis levels in healthy grape plants and those infected by Fan Leaf and Rupestris stem pitting viruses. The results showed that photosynthetic activity is reduced in infected plants [21]. The effects of CTV on photosynthetic activity and antioxidant metabolism of the sensitive lime plants were studied too. In this experiment, two severe (T318) and mild (T385) strains were used. CTV infection reduced the photosynthetic capacity [22]. These studies confirmed our results.

In contrast to the lime trees, vitamin C contents and total acidity of fruit juices and texture firmness were significantly different between healthy and infected trees of Kinnow tangerine and Washington navel orange. As explained above, ripening and picking the lime fruits occur in warm months with the mean maximum temperatures around 40 °C but it happens during cooler months for oranges and Kino tangerines. Thus, no differences were observed between healthy and infected lime trees. Given the permanent presence of the virus and its increased concentrations in cooler periods within the plants, characteristics such as total yield, fruit peel thickness, peel/flesh ratio and juice percentage are affected regardless of ripening in hot months. These results are consistent with Bassanezi et al. (2007) results [23]

CONCLUSION

Citrus Tristeza virus (CTV) is considered as a destructive viruses of citrus around the world. Since the reductive effects of high temperatures on the virus concentrations within the plants, summer maximum temperatures over 40 °C reduce the viral concentrations. Given the summer temperatures in Jahrom, early fruit trees are less physiologically affected by virus regardless of their virus resistances. However, CTV affects the quality and quantity of the fruits, leading in economic damages. Accordingly, it is necessary to control the disease in Jahrom city as a hot region.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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FINANCIAL DISCLOSURE

None declared.

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PHYSIOLOGICAL AND MORPHOLOGICAL RESPONSES SEEDLING OF FOUR *BROMUS INERMIS* ECOTYPES TO DROUGHT STRESS IN GERMINATOR AND GREENHOUSE CONDITION

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ABSTRACT

The effect of drought stress was studied on seed characteristics including: percent of germination, seedling length (mm/plant), root/shoot length ratio, seedling weight (g), seedling dry/fresh weight ratio (g/dfw) and seed vigor index (VI) in four ecotypes of *Bromus inermis* (Alborz 303, Mazandaran 3151, Firozkuh 3966 and Esfahan 200060) in germinator and greenhouse condition. In greenhouse experiment, three more physiological characteristics as chlorophyll, carbohydrates and proline contents were measured. The drought treatments were four levels of osmotic potential (0, -0.3, -0.6 and -0.9 MPa) in germinator and four levels of osmotic potential (FC, 25% FC, 50% FC and 75% FC) in greenhouse that were made by poly ethylene glycol (PEG 6000) solution and field capacity method, respectively. With regard to results, for all seed characteristics Esfahan (200060) ecotype was superior compared to other ecotypes. Increasing osmotic stress decreased the chlorophyll content and increased proline and carbohydrate content. The phenotypic correlation between measurements of two conditions was determined. The estimates were significant for most traits. Results of probit analysis of LD50 and LD90 the same trend were obtained.

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KEY WORDS

Physiological, Morphological,
Drought stress, *Bromus inermis*.

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INTRODUCTION

Bromus inermis Boiss is one of important perennial grass species belong to *Bromus inermis*. It naturally grows in Zagros and Alborz mountains rangelands in the west and north of Iran. It is being used for grazing and hay production and consumed by livestock. *Bromus inermis* grows in areas with 750 m to 2900 m altitude [1]. It has early growth in spring and good quality for animal productivity and good adaptability in vast range of sever conditions in all over the country. In recent years, higher grazing pressure and unpalatable weed invasion had led to increasing soil erosion and consequently decreasing population of this species. Therefore, re-vegetating of those areas by new improved grass varieties is the most economical and possible means of recovery. *Bromus inermis* has an important role in grassland productivity in Iran. Little breeding work has been done on this species especially under Iran climatic conditions. Water deficit is one of the most important factors affecting plant physiology and development [2, 3]. Among the different abiotic stresses, drought is by far the most complex and devastating on a global scale [4, 5, 6]. The sustainable and economically viable solution for increasing crop productivity in arid and semiarid zones is genetic improvement [7, 8, 9]. It is often discussed and emphasized that crop genetic improvement lies in exploiting the gene pools of the wild relatives of the crop plant [10, 2, 11, 12]. We anticipate a growing interest in wild relatives of crops and landraces in an attempt to identify superior alleles among these that the domestication bottleneck and modern agriculture have left behind [13, 14, 10, 15, 16].

Drought is one of the major causes for crop loss worldwide, reducing average yields with 50% and over [17]. In addition, water stressed plants could be more sensitive to other biotic or abiotic stresses such as pathogen attack, chilling or air pollution, which limits plant productivity. Plant stress resistance can be studied at molecular, cellular or physiological levels [18, 19, 20, 21]. The strategies developed by plants against water potential decrease depend on drought-inducing factors such as water retention kinetics, low temperature or high salinity [6, 22]. In order to respond to drought, plants have developed the capability to rapidly perceive stressful factors and trigger the accumulation of a large number of newly synthesized

mRNAs and polypeptides [23, 8, 9, 15, 22].

Responses to drought are multiple and interconnected. It is well established that drought stress impairs numerous metabolic and physiological processes in plants [24]. It leads to growth reduction, reduction in the content of chlorophyll pigments and water, and changes in fluorescence parameters [13, 25, 11, 26, 27, 12]. Rangelands are areas unsuitable for cultivation, but provide forage for animals [28, 5]. Rangeland degradation is often manifested by decreases in plant yields. The dispersal of seeds through oversowing is an important strategy to actively restore vegetation in degraded areas as their seed banks are usually depleted of viable seed. One of the greatest challenges in restoration ecology is to sow a seed type or cultivar that has the capacity to produce abundant biomass and cover in a short period of time [20, 29]. In addition to grazing by domestic livestock, rainfall patterns are the most important factors influencing rangeland condition [30, 5, 26]. Drought, extreme temperatures, increased soil salinity, soil crusting or sand covering, as well as pathogens and herbivores all adversely affect the germination and growth of seedling. Grasses, with strong development of underground organs, tend to have efficient adaptive mechanisms to cope with drought, fire and herbivory and provide superior protection against soil erosion than most woody shrub and tree species [21]. Grasses with network root systems bind soil better than woody species with taproot systems [4, 1, 10]. The objective of this study was to identify Physiological and morphological responses of four *Bromus inermis* ecotypes to drought stress in germinator and greenhouse.

MATERIALS AND METHODS

The study was conducted in the germinator and greenhouse. For each trail a factorial experiment based on completely randomized design was conducted in Gene Bank division in Research Institute of Forests and Rangelands, Tehran, Iran, in November 2013. Four *Bromus inermis* ecotypes: Alborz 303, Mazandaran 3151, Firozkuh 3966 and Esfahan 200060 were used in this study.

Germinator experiment

Water stress treatment was applied during 15 days by adding PEG 6000 (50 gL⁻¹) (Fluka, Buchs, France) to the watering solution in germinator condition. In germinator, For each accession 100 pure seeds were sterilized with 70% ethyl alcohol for five minutes and washed with distilled water. Four replicates (25 seeds per replicate) of sterilized seed were placed in Petri dishes on double Whatman papers (TP). For protection against molds, the water used to moisten the seed samples and substrata contained 0.002% Benomil fungicide. The samples were immediately transferred into a germinator at (20±4°C) with 1000 Lux light for 15 days.

After growth of seedlings for 15 days, the length of roots and shoots of 10 randomly-selected seedlings from each replicate were measured. The vigour index measures seedling performance, relating together the germination percentage and growth of seedlings produced after a given time [31, 22]. It was calculated by following equation:

$$Vi = \frac{\%Gr \times MSH}{100}$$

Where:

VI = vigour index

%Gr. = final germination percentage

MSH = mean seedling height

Greenhouse experiment

15 days by using the field capacity (FC) method in greenhouse condition. the seeds of ecotypes were provided from gene bank were sown on pots with fluctuation temperatures 20±5°C during day and (5-12)°C during night of greenhouse in order to vegetative growth development.

When vegetative growth was completed, at the end of each treatment, the seedling length (the distance from soil surface to upper end of the longest leaves) of the *Bromus inermis* cultivars was measured (mm/plant). The fresh (g/FW) and dry (g/DW) biomass of the seedling was also determined. The

carbohydrates content of drought stressed and irrigated (control) plants was determined using the method of Antron (1992). Carbohydrates were extracted from leaf samples (20 mg DW) according to Weimberg (1987) with minor modifications. The absorbance of the sample extract was Spectrophotometrically determined at 535 nm. The proline concentration was determined as ($\mu\text{mol g/DW}$) using a standard curve.

For proline content, the method of Bates et al. (1973) was used to determine praline content. Proline was extract from leaf samples (20 mg DW) according to Weimberg (1987) with minor modifications. The absorbance of the sample extract was Spectrophotometrically determined at 520 nm. The praline concentration was determined as ($\mu\text{mol g/DW}$) using a standard curve.

The experiments were performed in a randomized block design with four replicates. Differences among the treatments as well as between the cultivars were tested using the SAS statistical program. Statistical variance analysis was performed using ANOVA and compared with least significant differences (LSD).

RESULTS

Germination percentage

The results of variance analysis indicate the meaningful effect of drought stress ($P \leq 0.01$) on germination in germinator and greenhouse conditions (Table 3 and 6). Increasing tolerance against dryness decreased the germination percentage in ecotypes significantly (Table 4 and 7). The comparison of average germination characteristics for different ecotypes, indicate that the seeds of ecotypes (3966) and (200060) have the better quantity for germination indicator in two germinator and greenhouse conditions. Generally the ecotype (3151) has lesser value in point of germination percentage among studied genotypes and has meaning difference with other ecotypes (Table 5 and 8). The comparison of average germination of drought different treatments in both environments in every genotype indicated that the maximum germination was in control drought stress and the minimum germination percentage was in the treatment -0.9 MPa in the germinator and was 0.75 FC in the greenhouse (Figure A and B).

The Seedling length and the proportion of the root length to the shoot

The results of variance analysis in the germinator conditions indicated the meaningful effect of drought stress ($P \leq 0.05$) on the seedling length and the meaningless effect on the R/S length ratio (Table 3). The increase of tolerance against the dryness in the plants increased the seedling length in cultivars in both germinator and greenhouse condition while the proportion of R/S length ratio decreased (Table 4 and 7-Figures C, D, E and F). The results of variance analysis in the greenhouse conditions indicate the meaningful effect of water stress ($P \leq 0.01$) on the seedling length and R/S length ratio (Table 6). The comparison of average seedling length in germinator conditions indicator that the seeds of ecotypes (303) and (3151) have the better quantity while the seeds of ecotypes (3966) and (200060) have the highest level of proportion of R/S length ratio (Table 8).

The seed vigor index

The results of variance analysis in both germinator and greenhouse conditions indicate the meaningful effect of drought stress on the seed vigor index (Table 3 and 6). Overall the increase of osmosis stress decreased the seed vigor index in the studied cultivars. The average seed vigor was decreased in the control treatment with the indicator 44.71 in treatment -0.9 MPa in the germinator (Table 4). Also, the average seed vigor with the indicator 577 decreased in the control treatment (FC) to indicator 120 in treatment 0.75 FC in the greenhouse conditions (Table 7). The comparison of seed vigor index for different genotypes indicates that the ecotype (200060) has the highest level of seed vigor index in both germinator and greenhouse conditions (Table 5 and 8).

Dry weight and seedling dry/fresh weight ratio

The results of variance analysis indicate the meaningful effect of drought stress ($P \leq 0.01$) on the average dry weight in the germinator and greenhouse conditions (Table 2 and 6). The increase of water stress decreased the average dry weight significantly (Table 4 and 7). The maximum average of dry weight occurred in the control dryness treatment and it's minimum level was in the dryness treatment -0.9 MPa in the germinator and was 0.75 FC in the greenhouse (Figure I and J). The results of variance analysis in

the germinator conditions indicate the meaningful effect of dryness tension ($P \leq 0.01$) on the D/F weight ratio in germinator and the meaningful effect ($P \leq 0.01$) in the greenhouse condition (Table 3 and 6). The comparison average of D/F weight ratio in the germinator conditions indicates that the seeds of ecotypes (3151) and (200060) have the better quantity in the greenhouse (Table 5 and 8). According to the average of D/F weight ratio in different water potentials, it was observed that the maximum of these amounts in the germinator was -0.9 MPa in the dryness treatment and was 0.75 FC in the greenhouse and increasing by increase stress (Figure K and L).

Proline content, carbohydrate and chlorophyll

The drought stress in this study had the meaningful effect ($P \leq 0.01$) on the proline, carbohydrate and chlorophyll content (Table 6). Increasing osmosis stress decreased the chlorophyll content and increased praline and carbohydrate content (Table 7). The comparison of average level of these three factors (Proline, carbohydrate and chlorophyll content) for different cultivars indicates that the seeds of genotype (3966) have the highest chlorophyll content and the seeds of genotype (200060) have the highest proline and carbohydrate content (Figure M, N and O).

The relationship between germinator and greenhouse for all traits is important. In terms of time, and economy, evaluation in germination is easier than greenhouse and filled. In other words, the evaluation based on greenhouse in depending on the correlation between characters in both environments. The phenotypic correlation between measurements of two conditions is summarised in Table 1. The estimates were significant for most traits. Overall, the data showed that results based on germinator were strong indicators of greenhouse performance.

Results of probit analysis for determination of lethal dose concentration (LD50) showed the ecotypes (200060) and (3151) with average values of 11.90 and 5.01 had higher and lower toleration to drought stress. For LD90 the same trend were obtained (Table 2 and Figure 1).

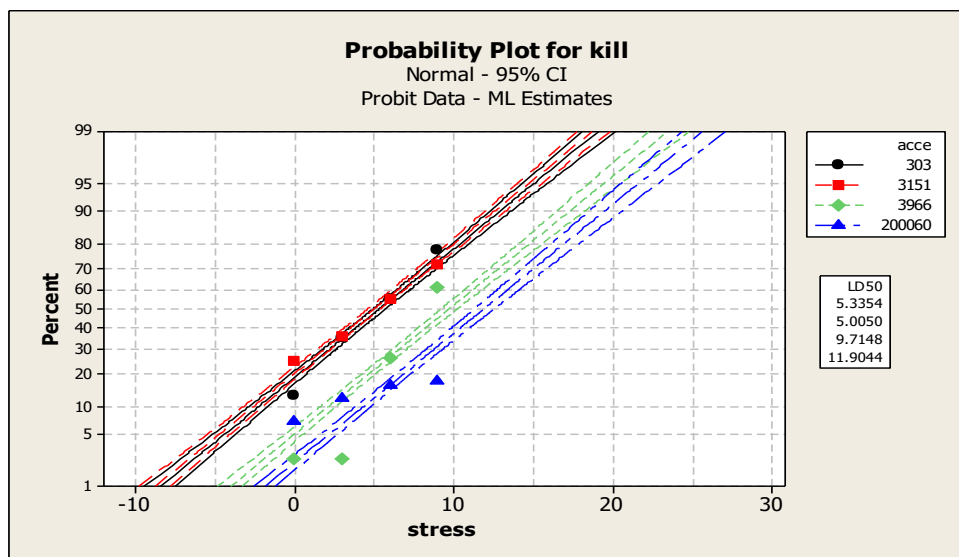


Fig 1. Probit analysis for determination of lethal dose concentration of PEG6000 for stopping seed germination in four ecotypes of *Bromus inermis*

Table 1. Phenotypic correlation between germinator and glasshouse for seed germination traits

TRAITS	GER %	SHOOT L.	ROOT L.	SEEDLING VIGOR	Root/Sh	Fresh W.	Dry W.	Dry/Fresh	
CORRELATION	0.99**	0.88**	0.81**	0.90**	0.96**	0.01 ^{ns}	0.83**	0.32 ^{ns}	0.06 ^{ns}

Table2. Probit analysis for determination of lethal dose concentration of PEG6000 for stopping 50% (LD50) and 90% (LD90) of seed germination in four ecotypes of *Bromus inermis*

Ecotypes	LD ₅₀	SE	LD ₉₀	SE
303	5.34	0.20	12.90	0.34
3151	5.01	0.20	12.57	0.33
3966	9.71	0.26	17.28	0.45
200060	11.90	0.32	19.47	0.52

Table3. Analysis of variance of germination properties of *Bromus inermis* in germinator condition

Source of Variance	DF	Germination %	Shoot L.(mm)	Root L.(mm)	R/S (mm)	Seedling L. (mm)	Vigor index	FW (g)	DW (g)	D/F (g)
Drought(D)	3	6234 **	1823 **	9824 **	9309 **	0.1063 ns	38081 **	44840 **	0.0369 **	0.00003 ns
Ecotype(E)	3	4493 **	1492 **	376 *	122.6 ns	0.3259 *	895 *	7693 **	0.0148 **	0.0010 **
E × D	9	558 **	99.6 **	177 ns	421.7 **	0.2816 **	877.4 **	1032 **	0.0016 *	0.0001 **
Error	48	122.7	27.88	110.7	88.29	0.100	293.3	248.6	0.0006	0.00001
CV %		16.07	19.72	20.09	18.49	30.66	16.59	19.87	16.31	16.67

*, ** = Means of squares are significant at 5%, 1%, respectively.

Table4. Effect of drought stress on seed germination properties of *Bromus inermis* in germinator condition

Drought Treatment	Germination %	Shoot L.(mm)	Root L. (mm)	R/S (mm)	Seedling L. (mm)	Vigor index	FW (g)	DW (g)	D/F (g)
Control	89 a	37.27 a	77.53 a	78.29 a	1.01 a	155.81 a	140.05 a	0.22 a	0.03 a
-0.3 MPa	79.75 b	33.39 b	66.01 b	61.69 b	1.01 a	127.71 b	103.40 b	0.17 b	0.02 a
-0.6 MPa	63 c	22.72 c	44.54 c	39.93 c	0.97 a	84.47 c	53.44 c	0.13 c	0.02 a
-0.9 MPa	44 d	13.68 d	21.36 d	23.36 d	1.15 a	44.71 d	20.41 d	0.12 c	0.03 a

Means of the columns with the same letter had no significant differences based on DMRT (P≤0.05).

Table5. Means comparison of seed germination characteristics in four *Bromus inermis* ecotypes

Ecotypes Name	Germination %	Shoot L. (mm)	Root L. (mm)	R/S (mm)	Seedling L. (mm)	Vigor index	FW (g)	DW (g)	D/F (g)
Alborz (303)	55.75 c	21.93 c	48.15 b	49.73 a	1.11 ab	97.88 b	62.77 b	0.15 bc	0.02 c
Mazandaran (3151)	54 c	16.03 d	48.99 b	47.63 a	1.20 a	96.63 b	58.30 b	0.16 b	0.03 a
Firozkuh (3966)	78 b	13.39 b	53.61 ab	51.84 a	0.93 b	105.54 ab	94.92 a	0.13 c	0.01 d
Esfahan (200060)	88 a	37.71 a	58.68 a	54.08 a	0.90 b	112.75 a	101.31 a	0.20 a	0.03 b

Means of the columns with the same letter had no significant differences based on DMRT (P≤0.05).

Table6. Analysis of variance of germination properties of *Bromus inermis* in greenhouse condition

Source of Variance	DF	Germ %	Root L. (mm)	Shoot L. (mm)	Seedling L. (mm)	Vigo index	R/S (mm)	FW (g)	DW (g)	D/F (g)	Chlorophyll Index	Proline $\mu\text{mol g/DW}$	Carbohydrates $\mu\text{mol g/DW}$
Drought (D)	3	5837 **	48700 **	300037 **	585785 **	824177 **	0.17 **	636 **	35.53 **	0.07 **	3468 **	0.08 **	0.03 **
Ecotype (E)	3	4221 **	5646 **	26215 **	12734 **	48383 **	0.19 **	31.49 *	7.73 **	0.02 **	124 **	0.05 **	0.22 **
D x E	9	509 **	3353 **	6207 **	9930 **	6784 *	0.02 *	11.12 ns	2.98 **	0.01 **	43.63 **	0.0007 ns	0.002 **
Error	48	69.12	602	922	1953	3176	0.014	7.53	0.30	0.004	15.41	0.001	0.0003
CV %		10.35	14.71	10.10	9.45	16.33	19.69	34.55	26.88	23.66	12.89	2.51	5.45

*, ** = Means of squares are significant at 5%, 1%, respectively.

Table7. Effect of drought stress on seed germination properties of *Bromus inermis* in greenhouse condition

Drought	Germination %	Root L. (mm)	Shoot L. (mm)	Seedling L. (mm)	Vigo index	R/S (mm)	FW (g)	DW (g)	D/F (g)	Chlorophyll index	Proline $\mu\text{mol g/DW}$	Carbohydrates $\mu\text{mol g/DW}$
Control	83.5 a	237 a	455 a	692 a	577 a	0.55 b	15.54 a	3.93 a	0.26 b	43.05 a	1.45 d	0.28 d
25% FC	72 b	178 b	369 b	548 b	396 b	0.49 b	10.58 b	2.53 b	0.23 b	39.88 b	1.54 c	0.33 c
50% FC	70.4 c	141 c	225 c	366 c	257 c	0.66 a	3.87 c	1.07 c	0.28 b	28.37 c	1.58 b	0.36 b
75% FC	46 d	109 d	152 d	261 d	120 d	0.72 a	1.78 d	0.66 d	0.38 a	10.49 d	1.70 a	0.43 a

Means of the columns with the same letter had no significant differences based on DMRT ($P \leq 0.05$).

Table8. Means comparison of seed germination characteristics in four *Bromus inermis* ecotypes in greenhouse condition

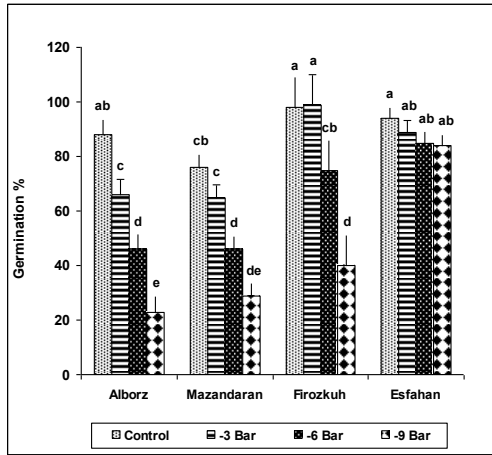
Ecotypes Name	Germination %	Root L. (mm)	Shoot L. (mm)	Seedling L. (mm)	Vigo index	R/S (mm)	FW (g)	DW (g)	D/F (g)	Chlorophyll index	Proline $\mu\text{mol g/DW}$	Carbohydrates $\mu\text{mol g/DW}$
Alborz (303)	52 c	193 a	266 c	459 b	239 b	0.71 a	9.19 a	3.05 a	0.34 a	26.60 b	1.61 b	0.49 a
Mazandaran (3151)	50 c	149 b	358 a	508 a	254 b	0.45 c	6.60 b	1.48 c	0.24 c	30.17 a	1.47 d	0.21 b
Firozkuh (3966)	67 b	162 b	291 b	454 b	304 a	0.61 b	6.86 b	1.70 bc	0.28 cb	32.64 a	1.53 a	0.20 b
Esfahan (200060)	82 a	160 b	285 bc	446 b	366 a	0.64 ab	9.11 a	1.96 b	0.3 ab	32.37 a	1.66 c	0.50 a

Means of the columns with the same letter had no significant differences based on DMRT ($P \leq 0.05$).

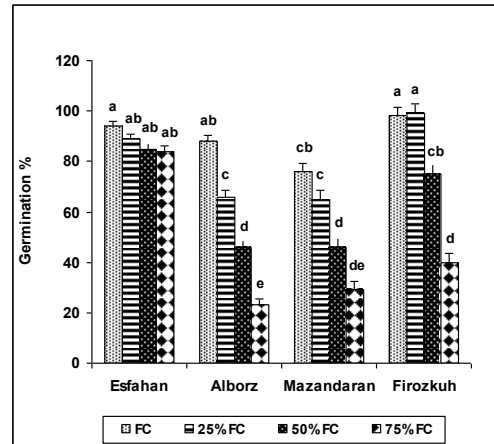
DISCUSSION

Drought stress tolerant cultivars are the varieties which have no meaningful decrease in germination indicators against increasing the water deficiency level. The ecotypes (3966) and (200060) in both germinator and greenhouse conditions are considered as more tolerant varieties. In seeds (303) and (3151), increasing drought stress decreased the average percentage of germination, so it could be said that in the condition in which there is the possibility of water stress in the germination stages, because of sensitivity of these ecotypes, it is better use these seeds not to be used because these genotypes are sensitive to the drought stress.

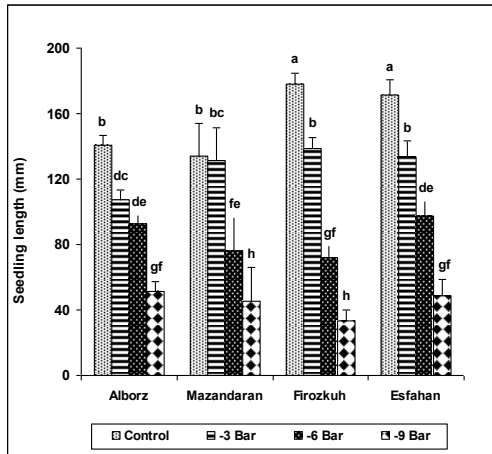
Generally, the results showed that the drought stress had negative effect on the growth characteristics. The results obtained from other researches [32, 9, 33, 27] confirm this issue that increasing the water stress decreases the growth of plant organs because increasing the salts viscosity increase the osmosis stress of soil solution, so the amount of energy which the plant need to absorb the water from the soil will be increased, this action cause to increase the respiration and decrease the plant performance [28]. One of the depressant factors photosynthesis in the severe drought stress is the reduction of chlorophyll content [16]. Some researches stated that the increase of dryness level in the plant decreased the chlorophyll



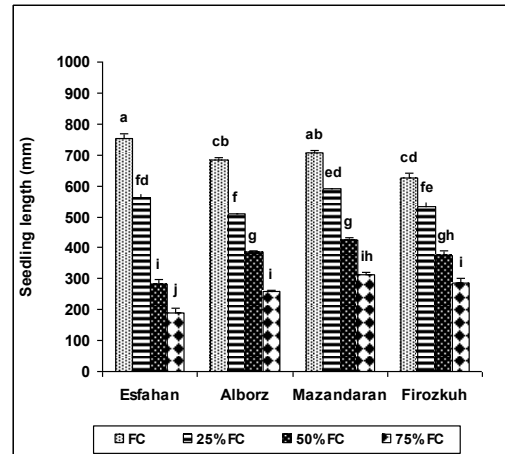
A- Germination% (Germinator)



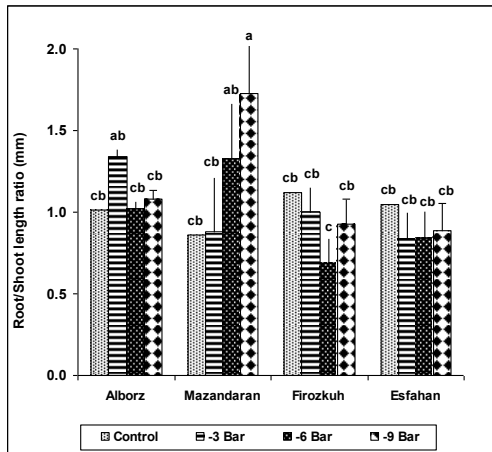
B- Germination% (Greenhouse)



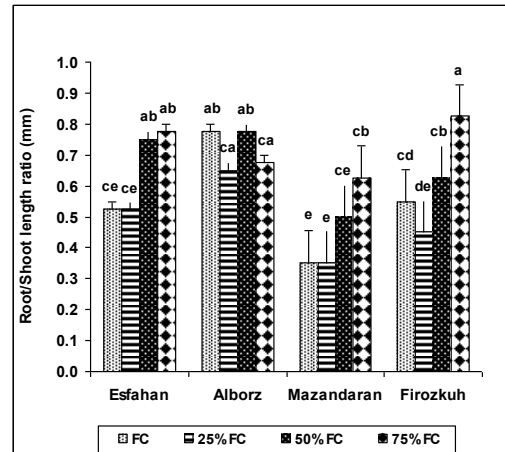
C-Seedling Length (Germinator)



D- Seedling Length (Greenhouse)



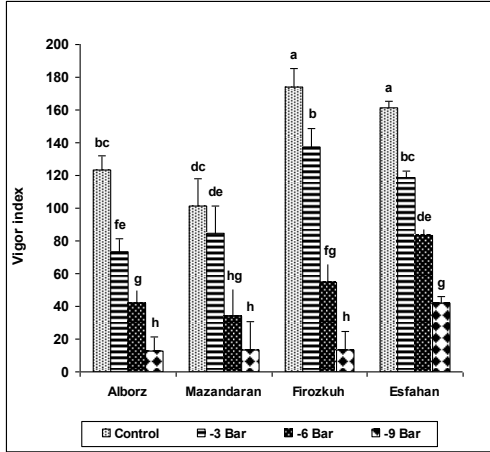
E-Root/Shoot Length ratio (Germinator)



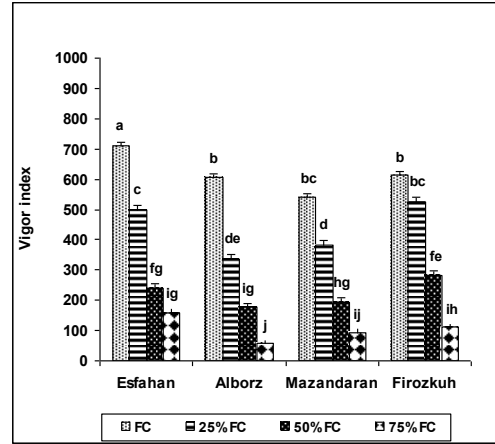
F-Root/Shoot Length ratio (Greenhouse)

viscosity in the leaves and cause to decrease the photosynthesis in the plant [29, 25]. The proline and carbohydrate content increased in cultivars of *Bromus inermis* species during the drought stress. This increase caused to establish the state of transparent phase (vitreous) in lost water protoplasm which can protect the membranes. Also increase of carbohydrate/ion ratio prevents the establishment of toxicity

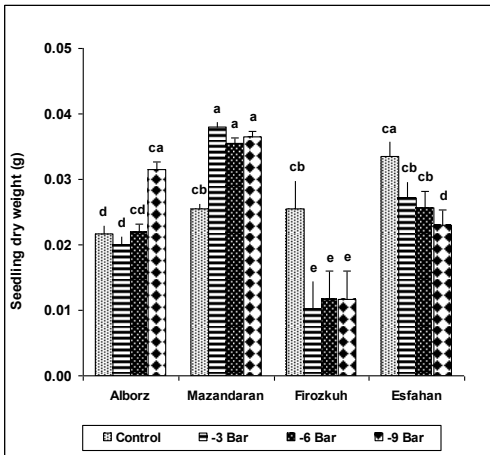
state and chaotropic, this increase cause the persistency during drought stress and makes a chance in order that adaptation solutions to be able to provide the conditions of agitation effects decrease. Comparison of (Germination percentage, Seedling Length and Root/Shoot Length ratio) four Br. inermis ecotypes under drought stress sown in germinator and greenhouse condition (Means of the columns with the same letter had no significant differences based on DMRT ($P \leq 0.05$)).



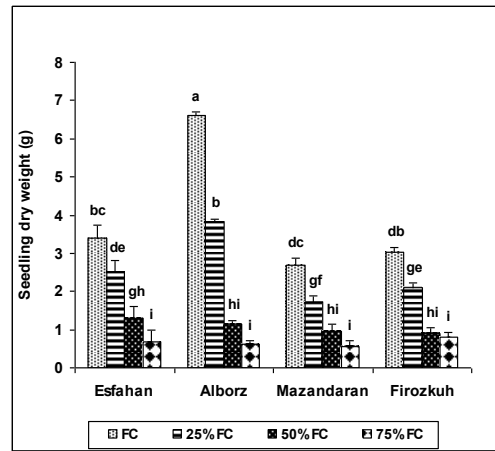
G-Vigor index (Germinator)



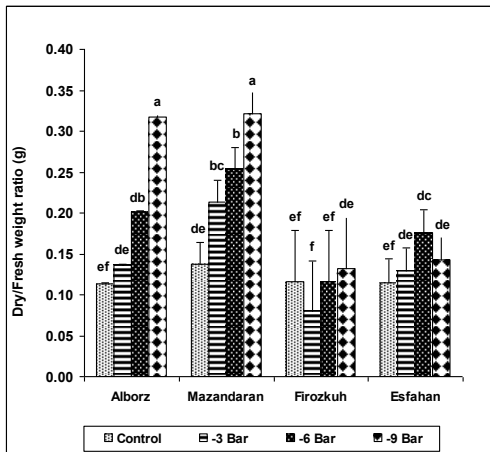
H- Vigor index (Greenhouse)



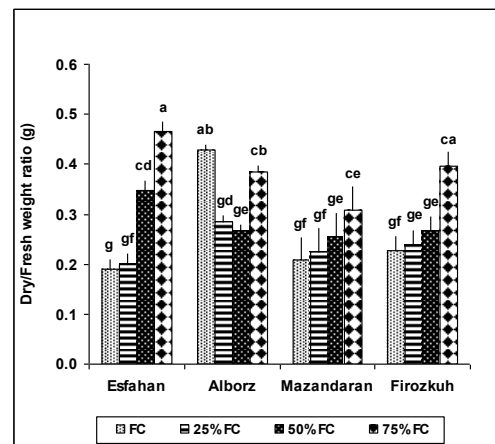
I-Seedling dry weight (Germinator)



J- Seedling dry weight (Greenhouse)

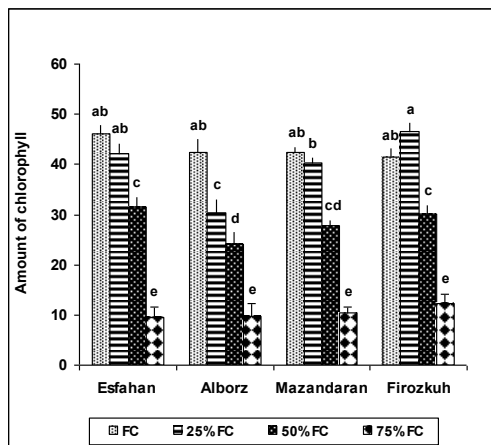


K-Dry/Fresh weight ratio (Germinator)

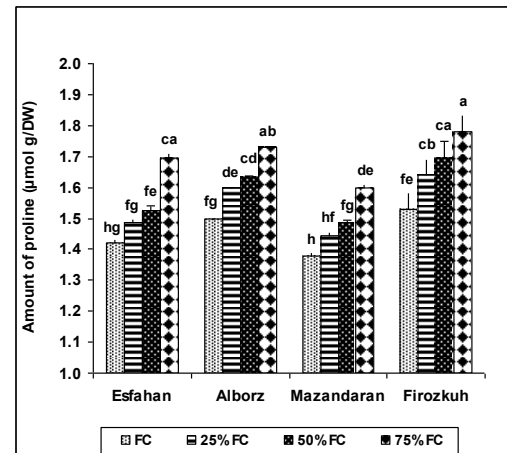


L- Dry/Fresh weight ratio (Greenhouse)

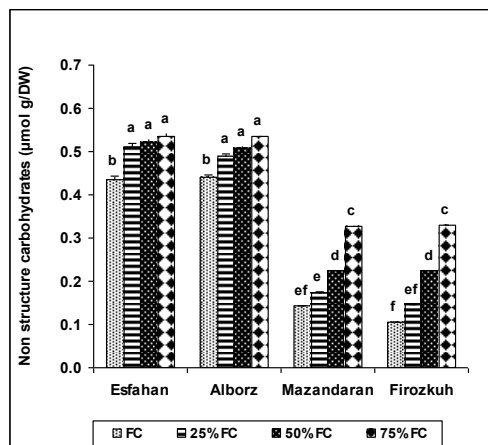
Comparison of (Vigor index, Seedling dry weight and Dry/Fresh weight ratio) four Br. inermis ecotypes under drought stress sown in germinator and greenhouse condition (Means of the columns with the same letter had no significant differences based on DMRT ($P \leq 0.05$)).



M-Amount of chlorophyll (Greenhouse)



N- Amount of proline (Greenhouse)



O-Non structure carbohydrates (Greenhouse)

Comparison of (Amount of chlorophyll, Amount of proline and Non structure carbohydrates) four Br. inermis ecotypes under drought stress sown in greenhouse condition

CONFLICT OF INTEREST

Authors declare no conflict of interest.

ACKNOWLEDGEMENTS

None.

FINANCIAL DISCLOSURE

No financial support was received to carry out this project.

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ARTICLE

EVALUATION OF HEAVY METALS (CHROMIUM, NICKEL AND LEAD) IN TOPSOIL OF THE RESIDENTIAL AND INDUSTRIAL AREA OF KERMANSHAH, IRAN

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ABSTRACT

Densely industrialization in metropolis vicinity and also human activities leads to rapid growth of urbanization and make great changing of ecosystem such as soil of urban area. Release of heavy metal to urban area soil has been arisen as conclusion of human activities. Soil containing Heavy metal is closely related to human health and threat the environment by accumulation in soil. In present study 75 point samples (15 composed samples) were collected. The experiments were carried out after extraction by acid digestion and by applying of ICP the heavy metals concentration including chromium (Cr), nickel (Ni) and lead (Pb) were analyzed. The result of this study revealed the average concentration of Chromium, nickel and lead in three various application were 124.04, 175.68, 632.97 mg/kg, respectively. The highest and lowest concentration of chromium were 151.58, 97.75, respectively that was observed in industrial and reference areas, respectively. The maximum and lowest concentration of nickel were 281.88, 113.34 mg/kg, respectively in urbanization and reference areas, and maximum and lowest concentration of lead were 796.89, 582046 mg/kg in reference and urbanization areas, respectively. Base on obtained result in industrial and urbanization area the chromium and nickel concentration were more than in references areas and as well as the lead concentration in reference areas was more in compared to industrial and urbanization area application. It was revealed that in industrial application the average concentration of lead was lower and in residential areas was more in respect to Canadian Council of Ministers of the Environment recommendation and as well as average concentration of chromium and nickel was higher in all of application.

INTRODUCTION

Soil is one the most fundamental component of the earth which also has great deal of importance in food production chain [1]. By Rapid growth of intensive urbanization, industrialization and subsequently increment of human activities has pose to considerably change in soil composition. Nowadays urbanization has become a global phenomenon and base on statistic more than half of the world population living in cities. According to prediction, urban population of the world will be rising about 68.7 percentage of the population in 2050 [2]. It is obvious that the industrialization not only increase the urban population, but also directly make the contamination. Due to increment of densely population in urban areas, in order to achieve the desired living standards, monitoring health effects and appropriate control should be considered [3]. Urban soil is an important component of urban ecosystems, which often affected by a variety of contaminants including heavy metals content which have been released from various sources to urban soil [4]. Heavy metal approximately exist in all of soils, but the urban soils characterized by higher concentration of heavy metal in compare to natural soil which is related to human activities [5]. Soil plays an important role in biochemical reactions directly and indirectly, natural cycles and consequently affected the life quality in residential areas of cities. Urban soil has more diverse properties in compared to natural and agriculture soils. In addition, urban soil often have more unusual characteristics such as poor structure, different composition, high pH, low organic matter and high pollution than in rural and agriculture soil [6]. Hence Environmental importance of HMs in the soil associated with relationship between human health and land by different ways. Since, the heavy metals in urban soils are exposed to human through inhalation, ingestion and skin contacts, and it can be accumulated in body and human's tissues. On the other hand, it can also be dangerous for human health by food through contaminated water, and soil containing heavy metals [2, 6, 7]. Growth of population and related activities, by considering the accumulation of heavy metal in surface sweeping in cities can be harmful for human health with inhalation [7]. Heavy metal (HMs) is considered often as one of the principal sources of environmental pollution which can be dangerous for human and animal health and by suspension in the air that make the reduction of air quality, affected the soil biological cycle, and because not composed by physical process, it can be accumulated in tissues. Correspond on various studies which have been carried out, heavy metal in street sweeping and topsoil can be accumulated in human body directly through breathing system and skin contact [8]. HMs affected the soil quality which makes negative impact on soil ecosystems. According to various researches in relation to contaminated soil, the accumulation of HMs in soil can reduce the activity and microbial population and as a result it leads to reduce of mineralization [7]. The HMs concentration in the air, water and soil is considered as a proper index for urban areas quality [2]. HMs accumulation in urban soils poses to reduce the biomass in soil and make the efficiency decreases in terms of agriculture and recreational soil [9]. Several extensively studies has been surveyed about the agriculture soil content heavy metal by considering the importance of food production from agricultural soils [10]. the HMs release from many sources to sweeping roadside and topsoil in cities including traffic (exhaust particles, tire particles and skids), industrial activities (industrial emissions and chimney exhaust), household emissions (fuel combustion for cooking and heating), particle

KEY WORDS

Topsoil; Heavy metal;
Urban Area;
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erosion of buildings and construction and anthropogenic discharges[7, 11-14]. Li et al. (2001) have been investigated the HMs contamination of urban soils and street dusts in Hong Kong, suggested the topsoil and street dusts can be represented as proper indicators for HMs pollution [15]. Generally air and soil have mutual effect because atmosphere can release large quantity of heavy metal in to soil by sedimentation and on the other hand soil cause the increment of heavy metal in the air [16]. In addition, the soil containing HMs have been reported as an indicator of the quality of the urban environment [17]. Therefore, the presence of HMs in the soil has been considered as one of most significant health concerns, in this regard, continues assessment of these agents may have an important role in the development of strategies for health. The aim of present study was to compare assesses the concentration the heavy metals concentration of chromium, nickel and lead in topsoil with refrence soil (far away from cities) that covering the residential and industrial area of Kermanshah, Iran.

MATERIALS AND METHODS

Geographical location of study area

The study area is located in metropolis of Kermanshah the capital of Kermanshah province, the ninth most populous city in Iran, the population of this city was over 851405 people and has area of 93 389 956 km². Kermanshah is the most important city in west of Iran [18]. The geographical location of Kermanshah in Iran is presented in [Fig. 1].



Fig.1: Graphical location of the Kermanshah in Iran map

Regions and sampling place

At first 10 regions in terms of industrial and residential applications were selected. Then 5 areas as reference area (which was not affected by any source of contamination) were determined. Each of the applications were coded that are displayed in [Table 1].

Table 1: Sampling point characteristic in the different application of study area

Sample Code	Sampling site	Longitude	latitude
A-1	Cement factory	47.286559	34.355086
A-2	Power houseplant	47.356852	34.348241
A-3	Industrial Park Road Sanandaj	47.038347	34.417458
A-4	Industrial park of Road Sanandaj	47.280359	34.345202
A-5	Petrochemical area	47.132295	34.202119
B-1	Maskan residential area	47.142689	34.377905
B-2	Zafar residential area	47.158138	34.379782
B-3	Elahieh residential area	47.071106	34.357591
B-4	Dolatabad residential area	47.046478	34.338826
B-5	Kasra residential area	47.047008	34.291477
C-1	TaqBostan Mountain Taq area	47.129015	34.400702
C-2	Kuzaran plain	46.603128	34.491739
C-3	Mahidasht plain	46.795558	34.269277
C-4	Faraman area	47.117783	34.280219
C-5	Sarab Qanbar Sarab area	47.055656	34.385941

Sampling collection method

In each application five areas were considered, and in each of determinate region, five points (area of 1 m²) were selected aim to collecting from topsoil. Topsoil in the determinate point were collected through shovel, pickaxe and sweep in depth of 0-20 cm, and after it was stored in coding polyethylene bags. Samples taken from 5 points were composed together and finally a composite sample was prepared. Generally in each application 5 samples were obtained and overall 15 composite samples (75 point samples) were collected. It should be noted that collected samples were transported to laboratory in polyethylene bags undergone standard condition [7, 8, 13, 17].

Preparation and samples extraction

At first, the samples were grinded by using of mortar and Crucible and screened through laboratory sieve (Mesh of 20), then the samples were put in in oven for 24 hours at 60 ± 5 °C [14, 19]. afterward 0.5 gr of soil sample were sited in a test tube and then 6 ml HCl (30%), 2 ml HNO₃(65%) and 3 mL of concentrated HClO₄ were added. Subsequently compost samples was placed in oven for 6 h at 90 ° C. after make cold the present compost samples, each samples were filtered through filter paper (Whatman 42.5mm Ashless 1442 O42). The filtered solution was poured in 25 mm volumetric flask and reached to volume of 25 mm via pure distilled water (6 times distillation) [20]. Finally the present solution were injected to (ICP) Inductively Coupled Plasma (Perkin elmer 7300 DV) and heavy metal concentration of chromium, nickel and lead were analyzed. The detection limit of ICP for chromium, nickel and lead were 0.12, 0.5, 1 ppb or µg/L, respectively.

Samples analysis through inductively coupled plasma atomic emission spectroscopy

According to atomic emission spectroscopy method, plasma use as agitation source aim to quantities and qualities analysis of elements. In this method the flow of argon gas ionized by magnetic field with radio frequency of 27-40 MHz, and produced the temperature almost of 1000 kelvin. The sample via nebulizer sprayed to Argon plasma and in high temperature the sample convert to atomic particles and create emission and the emission amount was analyzed [21].

Statistical analysis

The raw data obtained from ICP base on ppm were converted to mg/kg, afterward the central tendency (mean, medium and mode) and dispersion (field changes, mean deviation, variance and standard deviation) were calculated thorough employed of Excel and SPSS software. The average concentration of each heavy metal in various applications, and also the average concentrations of heavy metals with together in a special application, compared via applied of one-way ANOVA at a significance level of ($\alpha=0.05$). In addition, the average concentration of heavy metals in each special application with concentration of heavy metals in refrence soil samples were compared as well as the standard reference by One Sample T-test at a significance level of ($\alpha=0.05$). The analysis of variance was done by Tukey tests to calculate the difference between groups.

RESULTS

In five diferent industrial areas a significant difference (p-value <0.05) was showed between the average of chromium, nickel and lead concentration. So based on obtained result the maximum concentration of lead was in the cement factory and the lowest concentration relate to Faraman industrial park. It was resulted that the highest concentration of chromium was in the petrochemical and in Faraman industrial park the lowest concentration was examined. The highest concentration of nickel was 179.35 mg/kg and in range between of 174.35-179.35 in Faraman industrial park. And the lowest concentration of nickel was in the cement factory. [Table 2].

Table 2: The Chromium, nickel and lead concentration (mg/kg) in topsoil of industrial areas

Metal	Sampling	The number of repeat test	mean ± SD	P-value
Cr	Cement factory	3	88.95±2.5	<0.001
	Powerhouse	3	47.35±1	
	Industrial Park Road Sanandaj	3	67.25±2	
	Industrial Park Faraman	3	42.55±1	
	Petrochemical	3	361.80±8	
	Total	15	121.58±125.52	
Ni	Cement factory	3	99.85±2	<0.001
	Powerhouse	3	131.2±5	
	Industrial Park Road Sanandaj	3	145.05±4	
	Industrial Park Faraman	3	176.85±2.5	
	Petrochemical	3	106.15±3.5	

	Total	15	131.82±29.05	
Pb	Cement factory	3	614.5±15	<0.001
	Powerhouse	3	515±15	
	Industrial Park Road Sanandaj	3	563±10	
	Industrial Park Faraman	3	501.25±7.5	
	Petrochemical	3	539±18.5	
	Total	15	546.55±42.99	

It was concluded that the average concentration of chromium, nickel and lead, in five different residential areas, had a significant difference (p-value <0.05), as can be observed, the maximum concentration of chromium and lead were in residential areas of Zafar and the lowest concentration of chromium and lead were in residential areas of Kasra. It was also found that Nickel in the residential areas of Elahieh was the highest concentration but and in the residential areas of Maskan the Nickel was at lowest concentration [Table 3].

Table 3: The Chromium, nickel and lead concentration (mg/kg) in topsoil of residential areas

Heavy Metal	Sampling point	Regional Municipality	The number of repeat test	Mean ± SD	P-value
Cr	Maskan	5	3	112.9±3.5	<0.001
	Zafar	5	3	165.85±7	
	Elahieh	6	3	137.85±5.5	
	Dolatabad	2	3	112.9±4	
	Kasra	4	3	84.4±1.5	
	Total	-	15	122.78±28.62	
Ni	Maskan	5	3	164.6±1.5	<0.001
	Zafar	5	3	349.8±2.5	
	Elahieh	6	3	364.45±3.5	
	Dolatabad	2	3	293.4±3.5	
	Kasra	4	3	237.15±2.5	
	Total	-	15	281.18±76.55	
Pb	Maskan	5	3	401.1±4.5	<0.001
	Zafar	5	3	1034.5±12	
	Elahieh	6	3	575.5±6.5	
	Dolatabad	2	3	521±5.5	
	Kasra	4	3	380.2±4	
	Total	-	15	582.46±245.9	

Table 4: The Chromium, nickel and lead concentration (mg/kg) in soil profile reference

Metal	Sampling	The number of repeat test	mean ± SD	P-value
Cr	Mountain Taq	3	148.75±3.5	<0.001
	Plain Kuzaran	3	102.7±3	
	Plain Mahidasht	3	110.2±2.5	
	Faraman area	3	53.4±2.5	
	Qanbar Sarab area	3	74.2±3	
	Total	15	97.85±33.7	
Ni	Mountain Taq	3	137.85±1.5	<0.001
	Plain Kuzaran	3	127.45±2	
	Plain Mahidasht	3	139.95±1.5	
	Faraman area	3	68.75±1	
	Qanbar Sarab area	3	92.7±2	
	Total	15	113.34±29.02	
Pb	Mountain Taq	3	914±8	<0.001
	Plain Kuzaran	3	934±12.5	
	Plain Mahidasht	3	1101±17	
	Faraman area	3	341.95±3.5	
	Qanbar Sarab area	3	558.5±5.5	
	Total	15	769.89±287.42	

It was also revealed in the reference soil areas a significant differences between 5 diferent of chromium, nickel and lead concentration was reveled (p-value <0.05). As shown in [Table 4], the maximum concentration of nickel and lead relates to Mahidasht plain and also the highest concentration of chromium was in Taq Boston Mountain and the lowest concentration of chromium, nickel and lead were detected in Faraman area. In reference application and far away area from contaminated source, the natural sources such as precipitation, wind erosion and natural rock erosion may be attributed to cause of

releasing of heavy metal to soil. On the other hand, sedimentation of particles that heavy metal containing can be released of heavy metal to topsoil of faraway areas.

The Chromium, nickel and lead concentration (mg/kg) in different applications are presented in [Table 5]. Corresponding to Kelly and his colleagues study in Great Britain in 1996, the topsoil of industrial zones in compared to topsoil of non-industrial areas had highest concentration of heavy metals [22].

Table 5: The Chromium, nickel and lead concentration (mg/kg) in different applications

Metal	Application	The number of repeat test	Median	Mean ± SD	P-value
Cr	industrial areas	15	67.25	121.58±125.52	
	residential areas	15	116.4	122.78±28.62	
	soil profile reference	15	102.7	97.85±33.7	
	Total	45	89	106.98±65.47	
Ni	industrial areas	15	131.2	131.82±29.05	
	residential areas	15	293.4	281.18±76.55	
	soil profile reference	15	127.45	113.34±29.02	
	Total	45	194.45	253.37±376.89	
Pb	industrial areas	15	539	546.55±42.99	
	residential areas	15	521	582.46±245.9	
	soil profile reference	15	914	769.89±287.42	
	Total	45	539	626.06±417.16	

Table 6: Comparison of metal concentration in different applications couple

Metals	Comparis on couple	industrial areas		residential areas		soil profile reference	
		residential areas	soil profile reference	industrial areas	soil profile reference	industrial areas	residential areas
Cr	P-value	1	0.991	1	0.987	0.991	0.987
Ni		0.980	1	0.980	0.954	1	0.954
Pb		1	0.866	1	0.954	0.866	0.954

As shown in [Table 6] the Comparison of metals concentration in different applications couple are presented. Despite intensive industries such as chinaware production, production of automobile spare parts, lock and ignition switch, printing and packaging, printing, coating and packaging, production of citric acid and raw materials of food, polyethylene pipes double production, casting, rolling and effluent containing metal which discharge into the environment has pose to increasing the concentration of metals in the topsoil. The deposition of dust from mining and industry can be increased the concentration of heavy metals in soil. Due to the high traffic of vehicles in industrial areas to transport goods and fuel consumption by various devices in these areas, the concentration of heavy metals has been increased. According to the results of the present study it was assigned to largest concentrations of heavy metals was detected in industrial areas.

Based on obtained result by Marjorie and Hurley at the University of South Carolina in 2006 which has been detected, the highest concentration of heavy metals was arsenic, and in residential areas, the concentration of arsenic, chromium and lead were 0.39, 210 and 400 mg/kg, respectively [23].

Erosion in residential building, construction, painting of building, pesticides usage and cleaners can be the possibility of releasing of heavy metals to topsoil. Historical , texture, density, distance from the park center, type of fuel ,heating appliances in homes, home workshop and setting up some applications, such as doors and windows, repair of household appliances and etc. have a significant role in respect to increase the of heavy metals concentration in residential areas topsoil. In comparison point of view, the average concentration of metals in residential area of Kermanshah in terms of subjected to CCME recommendation, chromium, nickel and lead concentration were higher than the concentration which has been recommended by CCME, and As well as compare to monitoring and control standards of Taiwan, chromium and lead were lower than standard and nickel concentration were higher than standard which has been determined [24].

Base on the Alloway result about chromium concentration in earth crust was 100 mg/kg and according to Kabata et al. result the chromium concentration in topsoil and natural soil were 122 mg/kg [25, 26]. In comparison point of view, the chromium concentration was lower to mentioned studies and monitoring and control standards in Taiwan and was higher than CCME recomandation. Shacklette in 1984 was reported the soil nickel concentration in the world was varying range between 0.2-450 mg/kg [27]. And also base on Adriano study in 2001 the nickel concentration was approximately 80 mg/kg [28]. The nickel concentration in topsoil of Kermanshah was 113.34 mg/kg that had the limitation of Shacklette report but it was also reveled higher concentration than earth crust. the nickel concentration was higher In compare

to mention study and according to CCME recommendation and was lower based on Monitoring and control standards in Taiwan [24].

The lead concentration in topsoil of Kermanshah city was 769.89 mg/kg and was significantly higher in compared to 14.8 mg/kg in earth crust [29].

The mean lead concentration in non-contaminated in throughout the world has been surveyed and it was 17 mg/kg [30]. This lead concentration in topsoil has been confirmed by various research [27, 31-32]. In other soil study in large scale the lead concentration was higher [33, 34].

But on respect to the some document the lead concentration which was measured in many areas has been originated from human activities [35-37].

Base on result the lead concentration was higher in compare to declared study and CCME recommendation and was lower in respect to Monitoring and control standards in Taiwan [24].

CONCLUSION

In present study, assessment of chromium, Nickel and lead concentration in study area of Kermanshah, Iran that covering industrial, residential and reference area in topsoil were taken place. The result of this study showed the chromium and nickel concentration in topsoil of industrial and residential were higher than reference soil and the lead concentration in reference soil was more in compared to industrial and residential topsoil. It was concluded the average concentration of chromium, Nickel and lead in three covering application were 124.04, 175.68, 632.97 mg/kg, respectively. In comparison point of view, the chromium concentration was lower in respect to Monitoring and control standards in Taiwan and was higher than CCME recommendation. the nickel concentration was higher In compare to to CCME recommendation and was lower based on Monitoring and control standards in Taiwan. Lead concentration was higher in terms of CCME recommendation and was lower in respect to Monitoring and control standards in Taiwan.

CONFLICT OF INTEREST

There is no conflict of interest.

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FINANCIAL DISCLOSURE

None

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ARTICLE

POST-TREATMENT OF BAKER'S YEAST WASTEWATER BY COMBINATION OF TWO STAGE SEQUENCING BATCH REACTOR (SBR) AND INTERMEDIATE O₃/GAC

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ABSTRACT

Background: The baker's yeast wastewater characterized by high contents of organic load and dark brownish color by melanoidin pigment content. At present study, a pilot scale of combination system involving two stage of sequencing batch reactor and intermediate advanced oxidation process by O₃/GAC was evaluated for simultaneous removal of COD and color from baker's yeast wastewater as post-treatment process. The influent was subjected to anaerobic baffled reactor-biological activated carbon as pretreatment. To analyses the results, response surface methodology was applied to gain the optimize operating of interactive effect of 2 independent variables on the response. It was revealed that initial COD concentration and HRT influenced COD and color removal, respectively. The interactive effect of HRT of (6, 12 and 24 h) for both SBR and initial COD concentration of 2000, 3000 and 4000 mg/L were conducted as experiment variables. The optimal result has revealed the COD, BOD₅ and decolorization reached to as high as 97.4%, 97.9% and 66.35% in series collective result, respectively, as far by underwent condition the HRT: 24h in both SBR system and initial COD concentration of 2000 mg/L as the best performance of COD and color removal in combination system. Based on obtained result a post-treatment combination of (SBR1-O₃/GAC-SBR2) in baker's yeast wastewater verified as operative and satisfies technology for high strength wastewater in terms of attain the direct environmental regulation.

INTRODUCTION

Molasses widely used as sugar-rich by product from sugar product process that uses as raw material in fermentation industries. Molasses wastewater containing high organic load and have dark color, which makes restriction for direct aquatic environmental discharge and even wastewater plant. In view, the dark brown melanoidin pigment are the primary cause in molasses wastewater that are product of the non-enzymatic reaction between sugar and amino acids, peptides or proteins (Millard reaction) [1]. Dearth of comprehensive understanding about melanoidin structure, has led to preventing the progressing of sufficient process removal [2]. Mainly the baker's yeast wastewater content high chemical oxygen demand (COD) of 4000-130000 mg/L, Biological oxygen demand (BOD₅) of 200-96000 mg/L, have dark brownish color and nonbiodegradable pollutants [3,4]. Due to requirement of high energy and environmental conservation point of view, the anaerobic digestion process has been attracted as promising technology. several research have been focused on high strength wastewater by different anaerobic treatment such as anaerobic filter (AF), biopack system, anaerobic membrane bioreactors (AnMBR), fluidized bed reactor (FBR), immobilized cell reactor (ICR), up-flow anaerobic sludge fixed film (UASFF) reactor, up-flow anaerobic sludge blanket (UASB) reactor, anaerobic hybrid digester, membrane anaerobic system (MAS), and modified anaerobic baffled reactor (ABR) [5,6,7,8,9,10]. As far the aerobic treatment disadvantageous such as high energy consumption, the alone usage of it does not applicable and moreover up to 50% of COD convert to sludge [11]. It is regarding that cost effective of anaerobic treatment of baker's yeast wastewater by biological treatment as pretreatment and subsequently the aerobic treatment as supplementary method can be raised as desirable technology [12,2]. The individual usage of biological treatment cannot be obtain complete and acceptable reduction of organic contaminant and it can be employed with other processes such as AOPs, membrane processes, bio composting, oxidation by Fenton, enzymatic treatment, electro coagulation, and ultrasound treatment [13,12,14]. Generally AOPs related to methods in which oxidant hydroxyl radicals (●OH) generation in the reaction process. Radicals (●OH) act as highly reactive that have oxidation potential of 2.80 volt, which can improve the biodegradability [15]. The reaction occurs at the temperature and pressure of environment. The combination system such as O₃/H₂O₂, UV/TiO₂, UV/O₃, catalytic ozonation (O₃/GAC, O₃/TiO₂), and the O₃/GAC oxidation processes, based on AOP is further common reacted by ●OH and oxygen radical [16,17,18,19]. The advanced oxidation processes such as ozonation have been documented as promising technology which has been expansively used for organic compound treatment into carbon dioxide and water [20]. Oxidation by Ozone can be effective as oxidation process that reach to 80% for simultaneous decolorization for biologically treated and COD reduction between 15-25% [21,13]. Generally ozonation process does not satisfactory and appropriate in terms of meeting the stringiest discharge standard [22]. Activated carbon has been known for organic pollutant removal in wastewater treatment but relatively high cost of it leads to limitation of applying [23]. Activated carbon adsorption is one of the methods among various technologies that has been assessed for color and COD removal in wastewater contain of melanoidin [24]. Using of activated carbon following ozonation has been proved the effectiveness processes for decrease the specific and non-specific toxicity but generally the necessity of renewed and regeneration has been needed due to kept the adsorption capacity of activated carbon [25]. Regarding the usage of ozonation processes has been evaluated in the presence of granular activated carbon as an

KEY WORDS

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appropriate combination, owing to the adsorption and catalysis of activated carbon, GAC/O3 that has been verified as effective on powerful synergic aim to removal of refractory organic[26]. Hence the combination of GAC/O3 in comparison to individual ozonation process of textile wastewater proved the higher efficiency for COD removal and it enhanced 20-40 percent in compare to either method alone [27,28]. In wastewater treatment processes in order to approach the optimal operation, the HRT of system is considered as effectiveness parameter. The effect of HRT in both real and synthetic wastewater treatment processes in wide range has been examined by numerous researchers [27,30]. And the removal of COD in most of studies were reported up to 60-95% and about 33-94 % for organic compound [27,31,30]. is taken in to account that individual usage of addressed method does not encounter the environmental regulation, which base on published result, the proper combination of biological treatment along with other methods can be more functioning as pre-treatment or post-treatment [32]. Due to high cost required by using of activated carbon, it was justified for high organic content of baker's yeast treatment contribute to a necessity of pretreatment by anaerobic digestion aim to reducing the organic load and energy cost point of view, but the effluent cannot afford the discharge in to aquatic environment. So it would be gained the objective through sequencing batch reactor (SBR) in terms of providing advantageous include high operation of MLSS and resistance to shock load. [33]. has been demonstrated that biological processes based upon a SBR are effective for COD, BOD and nutrient removal from industrial wastewater. On the other hand, Due to prove the applicably and effectively method for Treatment of molasses wastewater which in confined published about being raised as environmental challenges in science and lack of effective design, so presenting a beneficial study suggestion about providing combined operation of treatment processes should be required. So far by literature review about treatment of high organic load and color through biological system and subsequently O3/GAC as intermediate treatment was not evaluated. The aim of this study was to develop a combination of two stage SBR system along with O3/GAC as post-treatment for simultaneous removal of COD and color from baker's yeast and determining the operational variable for the optimal removal of COD and color from baker's yeast wastewater through RSM.

MATERIALS AND METHODS

Characterization and generation of baker's yeast wastewater

Wastewater was procured from Razi Alcohol and Baker's yeast industry, Ahvaz. Iran. Large quantities of wastewater produce in this industry which was consisted of low, medium and strength wastewater, that first produce in the equipment cleaning, floor washing and second through manufacturing, centrifuges, rotary vacuum filters and yeast separator that produce the strength wastewater. In local plant Combination of these wastewater treated anaerobically. the real wastewater was used after being subjected to integrated anaerobic baffled reactor-biological activated carbon (ABR-BioGAC) which was run in another simultaneously project as pretreatment, nevertheless its final effluent still has brown color and it must be further treated supplementary by an aerobic post-treatment, when the effluent samples of anaerobic digestion system attain to the desirable concentration in terms of different level of COD, the effluent were collected and refrigerated at 4°C. The detail chemical properties of influent are presented in [Table 1].

Configuration and operation of SBR1-O3/GAC-SBR2

Table 1: The chemical properties of used baker's wastewater through the study

	Initial COD (mg/L)		
	2000	3000	4000
COD (mg/L)	2000±120	3000±120	4000±120
BOD (mg/L)	990±50	1429±50	2018±50
Color (absorbance)	0.954	1.111	1.321
Turbidity (NTU)	3.6	10.8	8.5
Alkalinity	2000±200	2500±200	2800±200
pH	8.07	8.22	8.67
ORP	-69	-66	-103

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scale of 3 containers that was involved of two independent stage of SBR with working volume of 1Lit was combined with an intermediate O3/GAC stepwise with equal volume which was set in series. It should be mentioned that three reactor operated individually in the series. The schematic diagram of SBR1-O3/GAC-SBR2 reactor is presented in [Fig. 1]. In setup phase the activated sludge of soft drink factory treatment plant (Zamzam Company), Kermanshah, Iran was used, the range value of mixed liquor suspended solid (MLSS) of 4000-6000 mg/L was maintained for both SBR. COD concentration was diluted to attain the desired COD value (2000 mg/L) for startup phase. The temperature was kept constantly at 25 °C during the startup and operation phase. Primarily in startup phase the samples were collected in HRT of 48h in every 12h and afterward, reduced to HRT of 24h, it was continued as long as steady- state accomplishment. To afford the appropriate condition for microorganism growth in startup phase, nutrients such as nitrogen and phosphorous was added to the reactor to gain the COD: N: P ratio of 100:7:1. And it allows to the biomass to acclimation the influent substrate. The 3 consequence stages were composed of a primary biological system, O3/GAC located as middle step and the effluent was subjected too by second SBR. Operational phase of SBR was done in five stage of conventional SBR treatment which were consisted of filling, reaction, settlement, decant, and idle. For aeration of SBR to support microbial growth,

the aeration pump was installed through porous stone that was equipped at the bottom of reactor to supply steady distribution. The aeration pump (Model ACO-5505), power of 6.5W, pressure of 0.25 Mpa and output rate of 5.5 L.min was used. The different HRT were conducted in biological stage, and then the aeration pump was quitted and allowed the system to fully settle of sludge that was lasted about 1h, then the wastewater was exhausted, and the reactor was set up again with fresh influent.

Granular activated carbon

The commercial carbon material was applied in present study. It must be noted that, the optimal constant rate of 100 mg/L of GAC was identified previous by pre-testing. The GAC has total surface area of 900 (m²/g), length of 3 mm, Diameter of 1 mm in the experiment, and it should be mentioned that GAC was not replaced and regenerated during the experiments of operational phase.

Ozonation procedure

Before the operational phase, the optimal time of 1 h was determined for ozonation process. Based on the characteristic of ozone generator, it was operated base on the 50 mg/h in constant determinant time of ozonation. Correspond on detailed feature, the ozone generator (Model UVOX 300), power of 1.5A, ozone output of 50 mg/H, the maximum ozone concentration of 70 ppb, and the proper temperature of 0-30 °C was used. The ozone experiments were performed in bubble column reactor with working volume of 1lit. Aimed at ozone generation a mercury lamp with power of 300 watt was used, the lamp was covered with stainless steel vessel. By employing the aeration pump, the oxygen molecules were broken down through exposed to UV light and distribution of ozone gas in forms of bubble gas was fed in to wastewater entirely.

Analytical chemical

Chemical oxygen demand (COD) was measured according to titrimetric method, five day Biological oxygen demand (BOD₅) was analyzed following incubator method, pH and Turbidity were measured using digital pH meter (WTW Co) and Turbidity meter (HACH Co). All of experiments were carried out based on standard method for water and wastewater [43]. For analyze the decolorization of the combined system the spectrophotometer (JENWAY Co) was used. For prevent turbidity, the samples were filtered with centrifuging at 6000 rpm for 20 min, finally the max wavelength of 435 nm was determined by spectrophotometer. Samples were kept in 4 °C and all of the experiments at least repeat 3 times. To calculate the percentage removal of parameter (degradation and decolorization), the following equation 1 was used:

$$(1) \% \text{ Removal} = (C_0 - C) / C_0 \times 100$$

Where C₀ and C are the initial and final concentrations of organic compounds and color, respectively.

Experimental set up

In this study full factorial experiment design was used to study the effect of two or more independent variable upon a response variation, the factorial experiment design was determined the experimental run, which proposed all possible experiment in order to diminishing the error. By considering of two factor (a*b), the maximum possible experiments will be proposed. The two independent variables, hydraulic retention time (HRT) and the initial COD concentration were identified at three levels, 1(minimum), 0(central) and 1(maximum) which are demonstrated in [Table 2]. Totally 27 experiment run were carried out throughout the operational phase.

Table 2. Experimental range and levels of the independent variables

Variables	Range and Level		
	-1	0	1
Hydraulic retention time in SBR1 (h)	6	12	24
Hydraulic retention time in SBR2 (h)	6	12	24
Initial COD (mg/L)	2000	3000	4000

Mathematical modeling

In the present study RSM was used which involves the estimation of coefficient in a mathematical modeling that predicted the response and was employed for the model adequacy [34,35].It was applied for interpretation of data that obtained from experimental run which were analyzed through the applied of design expert 6.0.1 version aim to optimal removal of COD, BOD₅ and color with respect to simultaneous effect of 2 independent variable of hydraulic retention times (HRT) and initial COD concentration. All of data were subjected to analysis of ANOVA, regression analysis to investigate the interaction between the variables and response and the three dimensional response surface plots for explore the optimum condition with respect to the simultaneous effect of variables on response.

RESULTS

Startup phase

The startup phase of reactor was continued in order to obtain the desirable configuration of system by comprehensive daily analyze in startup phase through COD removal, pH, turbidity and alkalinity test of effluent. It was lasted about 30 days. By considering the longer time to achieve the acclimation of microorganism in regard to conducting the higher value of COD to the reactor, while the desired value of COD reached below 1000 mg/L.

Table 3: Results for all responses throughout the operational phase in SBR1-O3/GAC-SBR2

Run	Variables			COD removal (%)			BOD removal (%)			Color removal (%)		
	Initial COD (mg/l)	HRT in SBR1 (hour)	HRT in SBR2 (hour)	SBR1	O3/GAC	SBR2	SBR1	O3/GAC	SBR2	SBR1	O3/GAC	SBR2
1	2000	6	6	61.27	65.22	85.36	37.6	62.86	90.59	1.78	34.38	47.48
2	2000	6	12	61.27	65.22	88.23	37.6	62.86	93.09	1.78	34.38	55.45
3	2000	6	24	61.27	65.22	91.81	37.6	62.86	94.19	1.78	34.38	59.43
4	2000	12	6	68.23	92.47	93.03	69.59	91.49	95.19	3.7	32.7	49.58
5	2000	12	12	68.23	92.47	93.74	69.59	91.49	96.19	3.7	32.7	58.17
6	2000	12	24	68.23	92.47	95.34	69.59	91.49	96.79	3.7	32.7	62.36
7	2000	24	6	77.41	84.94	96.98	79.87	81.48	97.69	4.82	41.29	55.97
8	2000	24	12	77.41	84.94	97.22	79.87	81.48	97.99	4.82	41.29	62.57
9	2000	24	24	77.41	84.94	97.74	79.87	81.48	98.34	4.82	41.29	66.35
10	3000	6	6	50.98	77.86	85.46	52.02	75.92	88.55	2.07	31.53	45.18
11	3000	6	12	50.98	77.86	89.83	52.02	75.92	92.65	2.07	31.53	52.92
12	3000	6	24	50.98	77.86	96.64	52.02	75.92	96.99	2.07	31.53	56.88
13	3000	12	6	60.29	76.94	77.33	57.8	71.55	85.02	5.6	35.49	48.42
14	3000	12	12	60.29	76.94	83.12	57.8	71.55	87.82	5.6	35.49	54.54
15	3000	12	24	60.29	76.94	86.21	57.8	71.55	89.5	5.6	35.49	58.68
16	3000	24	6	64.4	72.86	76.28	67.77	67.66	79.28	7.9	37.44	49.32
17	3000	24	12	64.4	72.86	81.44	67.77	67.66	87.4	7.9	37.44	56.43
18	3000	24	24	64.4	72.86	86.74	67.77	67.66	88.94	7.9	37.44	60.75
19	4000	6	6	56.04	82.16	87.88	63.2	80.42	90.85	2.04	31.41	46.55
20	4000	6	12	56.04	82.16	91.04	63.2	80.42	93.45	2.04	31.41	52.46
21	4000	6	24	56.04	82.16	94.02	63.2	80.42	95.83	2.04	31.41	54.88
22	4000	12	6	66.57	78.9	81.94	61.1	74.03	85.38	3.25	37.62	49.35
23	4000	12	12	66.57	78.9	89.22	61.1	74.03	89.75	3.25	37.62	60.1
24	4000	12	24	66.57	78.9	92.23	61.1	74.03	94.44	3.25	37.62	63.66
25	4000	24	6	69.92	72.25	72.81	72.37	69.17	77.69	6.8	40.42	52.38
26	4000	24	12	69.92	72.25	76.67	72.37	69.17	83.29	6.8	40.42	61.92
27	4000	24	24	69.92	72.25	78.42	72.37	69.17	86.07	6.8	40.42	65.7

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Statistical analysis

The independent value (Variables A and B) and 27 experimental data runs are presented in [Table 3]. In the present study Central composite design (CCD) was used to explore relationships between process variables and responses. Factors coded models as well as analysis of variance (ANOVA) for all responses are demonstrated in [Table 4]. In order to appraise fitting data the different polynomial models were used aimed at fitting the data from the experimental result to higher degree polynomial equation i.e. Quadratic vs 2FI for all the responses. To determine the significant models in each responses the significant (P-value) was assessed that is shown in [Table 4]. (P-value) was obtained for the removal of COD, BOD5 and color as well as significant equations for the responses which are presented in [Table 4]. The P-value less than 0.05 show the higher significance of corresponding model and based on obtained result of statistically analysis, in this study P-value was greatly less than 0.05 results for all responses. Additionally for validating the fitted model the predicted Model via R2, Adjusted R2 and Pred R-Squared between the experimental and model predicted values were used. R2, Adjusted R2 and Pred R-Squared are nearby to each other and nearly close to 1 except in O3/GAC for COD, BOD5 and color removal. The value of 4 and more in Adequate precious indicate the validity and reliability of analysis result. Based on [Table 4], the value of Adequate precious for all responses were significantly than desired values and were between the varying amounts of 5.830-52.232, it implied the proper values in analysis validated. Base on Design Expert software it was revealed that COD and BOD5 removal were significantly influenced by initial COD although color removal, influenced by HRT in SBR1 and SBR2, respectively.

Response	Modified equations (A: initial COD. B: HRT in SBR1. C: HRT in SBR2)	Model type	R2	Precision	Adj R2	Pred R2	P-value
BOD by SBR1	+63.94+0.82A+11.20B-7.04AB+4.76A ² -4.98B ²	Quadratic vs 2FI	0.8280	14.068	0.7871	0.7217	0.0001
Color by SBR1	+6.00+0.35A+2.27B+0.50AB-1.46A ² -0.79B ²	Quadratic vs 2FI	0.9432	23.177	0.9297	0.9093	0.0069
COD by SBR1	+62.61-2.49A+7.24B-0.8AB+8.02A ² -4.62B ²	Quadratic vs 2FI	0.9845	52.232	0.9808	0.9748	0.0001
BOD by Ozonation/GAC	+76.49-2.72A-0.15B-6.12AB+4.86A ² -6.81B ²	Quadratic vs 2FI	0.5108	5.830	0.3943	0.2133	0.0001
Color by Ozonation/GAC	+36.21+0.18A+3.60B	Linear vs Mean	0.7554	12.539	0.7350	0.6894	0.0001
COD by Ozonation/GAC	+81.64-2.25A+0.8B-6.30AB+3.44A ² -8.05B ²	Quadratic vs 2FI	0.6040	6.830	0.5097	0.3634	0.0009
BOD by SBR2	+89.54-3.82A-2.18B+2.84C-4.02AB+1.32AC+0.1BC+ 3.58A ² +0.37B ² -1.81C ²	Quadratic vs 2FI	0.9208	18.091	0.8788	0.7993	0.0001
Color by SBR2	+59.02-0.56A+3.36B+5.82C+0.11AB+0.022AC+0.18BC+3.23A ² -1.70B ² -4.44C ²	Quadratic vs 2FI	0.9520	22.128	0.9266	0.8698	0.0001
COD by SBR2	+85.75-4.73A-2.62B+3.38C-5.92AB+0.93AC-0.59BC+ 4.31A ² +0.35B ² -1.59C ²	Quadratic vs 2FI	0.8966	15.427	0.8419	0.7489	0.0001

Performance of first SBR

It should be noted that collective removal efficiency was reported. Based on three dimensional plots, there is an improving trend of decolorization with increase of HTR in SBR1 in [Fig. 2]. But by increasing the initial COD concentration of 4000 mg/L, the efficiency was reduced. The maximum removal efficiency was observed in HRT of 24h and initial COD of 3000 mg/L that efficiency equal to %7.9. The low decolorization of SBR may be attributed to melanoidin which is high molecular weight polymer that is known as non-biodegradable substance consider as the origin of molasses wastewater. [36]. Therefore it was suggested the combination of processes aim to operative and sufficient that was not achieved by individual usage of SBR in terms of the high strength of baker's yeast wastewater. [37]. It means that, first SBR could not bring expectation and necessity of another processes to promote decolorization of system in term to getting the stringent standard regulation to aquatic environment due to declared difficulties should be

considered in series of combined system.

3D plot of COD removal with respect to HRT in SBR1 and initial COD concentration is presented in Fig 2. By increasing HRT in SBR1, the COD removal efficiency was enhanced in different initial COD concentration. And by increment of initial COD, the efficiency of system for COD removal was reduced in 3000 mg/L, but during the conducting of different initial COD concentration in SBR1, the removal efficiency was at nearly constant rate varied 56%- 77.41%. The highest performance for COD removal was happened in HRT of 24h and initial COD concentration of 2000 mg/L, which achieved to 452 mg/L that reflected the COD removal efficiency up to 77.41%. Based on obtained result likely the low rate of system for reducing of organic load arisen to getting endogens phase.

Three dimensional plot of BOD5 removal with respect to HRT and initial COD concentration is presented in [Fig. 2]. By increasing HRT in SBR1 and initial COD of 2000 mg/L the BOD5 removal efficiency dramatically improved, but increment of initial COD concentration has pose to the slightly decrease of BOD5 removal rate. The maximum of BOD5 removal efficiency in SBR1 reach to 420 mg/L in HRT of 24h. The optimal result for BOD5 was shown in initial COD of 2000 mg/L which was reflected 79.87%.

Table 4: The ANOVA results for equation base on design expert 6.0.6 for all responses

Response	Modified equations (A: initial COD. B: HRT in SBR1. C: HRT in SBR2)	Model type	R2	Precision	Adj R2	Pred R2	P-value
BOD by SBR1	+63.94+0.82A+11.20B-7.04AB+4.76A2-4.98B2	Quadratic vs 2FI	0.8280	14.068	0.7871	0.7217	0.0001
Color by SBR1	+6.00+0.35A+2.27B+0.50AB-1.46A2-0.79B2	Quadratic vs 2FI	0.9432	23.177	0.9297	0.9093	0.0069
COD by SBR1	+62.61-2.49A+7.24B-0.8AB+8.02A2-4.62B2	Quadratic vs 2FI	0.9845	52.232	0.9808	0.9748	0.0001
BOD by Ozonation/GAC	+76.49-2.72A-0.15B-6.12AB+4.86A2-6.81B2	Quadratic vs 2FI	0.5108	5.830	0.3943	0.2133	0.0001
Color by Ozonation/GAC	+36.21+0.18A+3.60B	Linear vs Mean	0.7554	12.539	0.7350	0.6894	0.0001
COD by Ozonation/GAC	+81.64-2.25A+0.8B-6.30AB+3.44A2-8.05B2	Quadratic vs 2FI	0.6040	6.830	0.5097	0.3634	0.0009
BOD by SBR2	+89.54-3.82A-2.18B+2.84C-4.02AB+1.32AC+0.1BC+ 3.58A2+0.37B2 -1.81C2	Quadratic vs 2FI	0.9208	18.091	0.8788	0.7993	0.0001
Color by SBR2	+59.02-0.56A+3.36B+5.82C+0.11AB+0.022AC+0.18BC+ 3.23A2 -1.70B2 -4.44C2	Quadratic vs 2FI	0.9520	22.128	0.9266	0.8698	0.0001
COD by SBR2	+85.75-4.73A-2.62B+3.38C-5.92AB+0.93AC-0.59BC+ 4.31A2 +0.35B2 -1.59C2	Quadratic vs 2FI	0.8966	15.427	0.8419	0.7489	0.0001

Performance of O3/GAC

it was evident the Simultaneous effect of initial COD and HRT on color removal efficiency has been shown on 3D plot In[Fig .3], that by increasing HRT in SBR1, the color removal efficiency in O3/GAC was increased in different initial COD, but in the COD concentration of 3000 and 4000 mg/L, the color removal was reduced slightly. It was found that the optimal decolorization was shown in HRT of 24h which the efficiency reach to up than %41.2, while the initial COD concentration of 2000 mg/L. a constant trend of decolorization in O3/GAC during the different initial COD concentration was seen, and it was the range between 31.41 -41.29 percent.

The simultaneous effect of two factors on COD removal efficiency obtained from equation Y1. So by considering the O3 /GAC has been placed after the first SBR reactor, HRT in that reactor can be affected the O3/GAC removal efficiency. It depicted an enhancing trend that by increasing of HRT in SBR1 in the initial COD of 2000 mg/L, but further HRT from 6 to 12 h have positive effect on COD removal efficiency, but poor reduction of COD removal was seen in HRT of 24h. The maximum removal efficiency was observed in HRT of 12h and initial COD of 2000 mg/L which COD concentration reach to 150 mg/L that reflected efficiency of 92.47%. [Fig. 3].

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In another study a combination of ozonation with conventional aerobic oxidation for distillery wastewater treatment showed the integrated process (ozone-aerobic oxidation-ozone) accomplished 79% for COD removal, along with Decoloration of the effluent sample when compared to 34.9% of COD reduction for non-ozonated samples, by considering similar treatment period. [32].

The optimal result for BOD₅ removal was observed in HRT of 12h in SBR1 that the BOD₅ reach to 85 mg/L, while the initial COD concentration of 2000 mg/L, which reflected the efficiency up to 91.4%. Initial COD concentration does not positive effect for BOD removal efficiency. As it can be seen by increment of initial COD concentration, a reduction removal trend of BOD₅ was showed and in the initial COD of 4000 mg/L, the lowest removal efficiency was observed that reach to 69.17% in HRT of 24h in SBR1. [Fig. 3] It should be mentioned that different ozone dosage of 25, 50 and 75 mg/h were conducted in pretesting, and finally 50 mg/h was determined as optimum time, and by increasing the further ozone dosage of 75 g/h, the drastic removal rate was not showed. As stated by Wu et al a slight enhancement of COD removal showed by increasing of dose of ozone, that may be attributed to two possibilities that including, the optimum ozone dosage was sufficient aim to operative oxidation of the existing organic compound and second relate to remaining fraction of the organic compound which has not been oxidized in the ozonation processes. [38].

Based on studies, increasing of ozonation time has not showed positive effect but also decreased the COD reduction that it assigned to oxidization of dye molecules to smaller organic fragments including aldehydes, acetic acid, and ketones which cannot be completely removed by Ozonation process [39,36]. As stated by another result the integrated process which combines of adsorption and biological process in recycled paper mill wastewater showed the combination system could remove COD in the range of 53-92 percent, and maximum removal efficiency was recorded in the longest HRT of 48 h. [40]. Application of ozonation subsequently the biological treatment due to non-biodegradable material provided change the molecules structure of compound by ozonation as chemical oxidation which are biodegradable and breakdown theses compound to smaller molecules [41].The combination of ozonation and activated carbon adsorption has revealed that GAC acts as an adsorbent and catalyst in promoting ozone oxidation, and the combination system adsorption provide strong synergistic effects on the textile wastewater treatment [28]. It was logical to location SBR in first step owing to treating the wastewater contribute to biological treatment that led to reducing of organic compound and the ozonation/GAC as middle processes for reducing the ozonation value which required, indeed significantly decrease and finally placing second SBR that led to satisfy reducing of organic compound.

Performance of second SBR

In this study the second SBR was located as final stage aim to eliminated the nonbiodegradable compound that are changed to smaller molecules and incomplete treatment due to the biodegradable compound treated the effluent of O₃/GAC as middle step. Three dimensional plot of the model for 2 independent factor for decolorization of system is shown in [Fig 4]. Based on response surface for color removal, the increment of HRT in SBR2 in COD of 2000 mg/L was positive and significantly trend of increment for the decolorization of combined system was observed, the increment of the initial COD makes decrease the efficiency of system in initial COD of 3000 mg/L and the optimal result reach to 66.3% in HRT of 24 in SBR1 and 2, and initial COD of 2000 mg/L, the enhancement of decolorization was occurred until the initial COD value reach to 3000 mg/L and afterward the performance of system was prompted again in COD of 4000 mg/L. By increasing HRT of SBR1 in combined system, a significantly positive effect was showed.

Correspond on simultaneous effect of two independent factor obtained from equation in [Table 3] for COD removal a progressively increment with increasing HRT in SBR2 was seen. The increment of initial COD operation was assessed and was not effective in the initial COD of 3000 and 4000 mg/L. The maximum reduction of COD reach to 60 mg/L in HRT of 24h in SBR2 and initial COD of 2000 mg/L which reflected up to 97.74% of COD removal. During the conducting of different HRT and initial COD concentration the trend of COD removal efficiency were not dramatically different and the lowest COD removal was in HTR of 6 h and initial COD of 4000 mg/L that the efficiency was 72.81%.

The simultaneous effect of HRT in SBR1, 2 and initial COD concentration are shown in [Fig. 4]. The BOD₅ removal efficiency was promoted gradually by increment of HRT in initial COD concentration to 2000 mg/L, and finally a fairly decrease was observed. It should be noted that the maximum removal efficiency was found in series collective result of system. The maximum of BOD₅ removal reach to %98.34 in HRT of 24 h and initial COD of 2000 mg/L, the lowest efficiency reach to 79.28% in initial COD of 4000 mg/L and HRT of 6 h in combined system.

Corresponding on soft drink factory effluent the combined of SBR contribute to advanced oxidative processes (AOPs) has confirmed the maximum COD removal efficiency reached to more than 95% [42].The application of combined ozonation and biological treatment verified the ozonation process as post-

teratment increases the dye degradation rate. And increment of ozonation time led to dye concentration reduction in hydrolysed dye synthetic effluent. Pre-treatments with ozonation is economically point of view, due to decrease the ozone required in terms of mineralization of compound and the usage of biologically process subsequently would be effective in terms of complete mineralization with lower cost of operation in compare to chemical process [39].

CONCLUSION

In the current study a combination process of two stage SBRs with intermediate O₃/GAC for simultaneous removal of COD and brownish color of baker's yeast industries wastewater was assessed as post-treatment after an anaerobic digestion of effluent that treated through the ABR-BioGAC. Series reactors has been established to fulfil the expectation in terms of meet the environmental standard discharge. Due to that fact that ozonation process make to poisonous by product it was logical to placing subsequently biological system. RSM was used to evaluate the interactive effect of two independent variables on the responses to optimization of the experiments. From the experiment which has been conducted, the maximum removal efficiency in SBR1-O₃/GAC-SBR2 for COD and color removal reach to up 97.4 %, and 66.3% in optimal operating condition in HRT of 24 h in both SBR and initial COD concentration of 2000 mg/L, respectively. The result indicated that combination of biological system with and O₃/GAC as intermediate stepwise was considered as satisfy pre-treatment option for treating of baker's yeast wastewater

CONFLICT OF INTEREST

There is no conflict of interest.

ACKNOWLEDGEMENTS

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FINANCIAL DISCLOSURE

None

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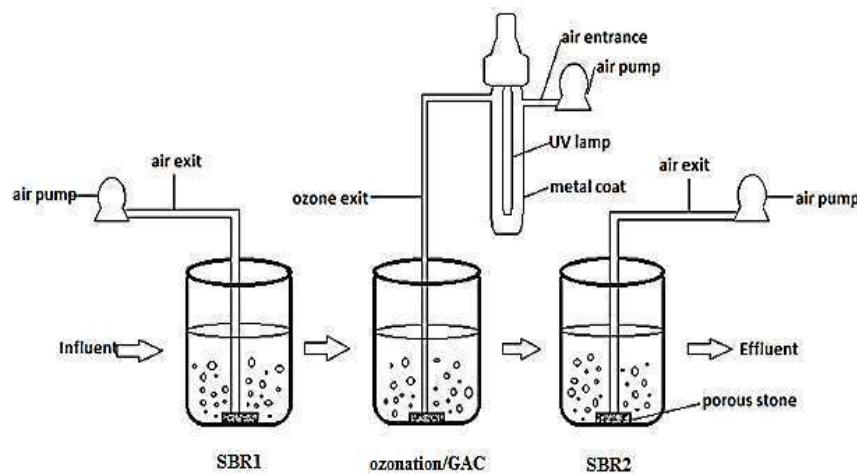
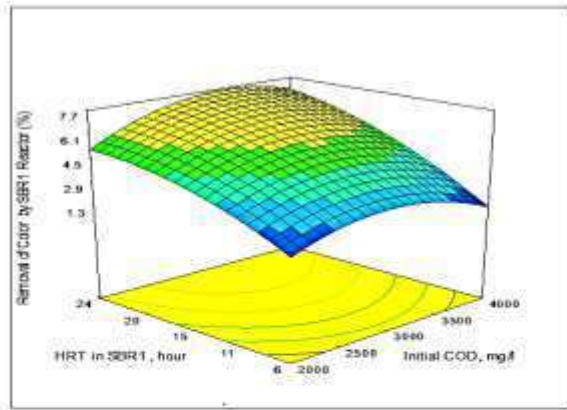
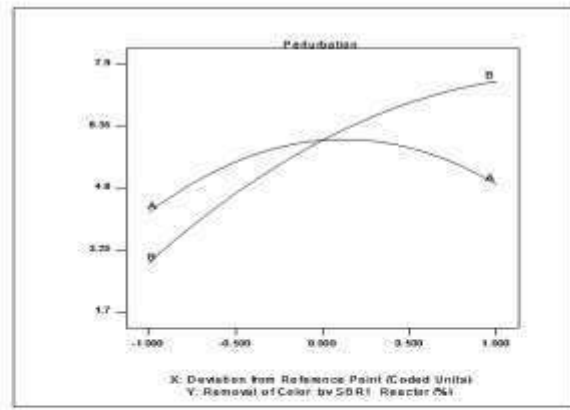


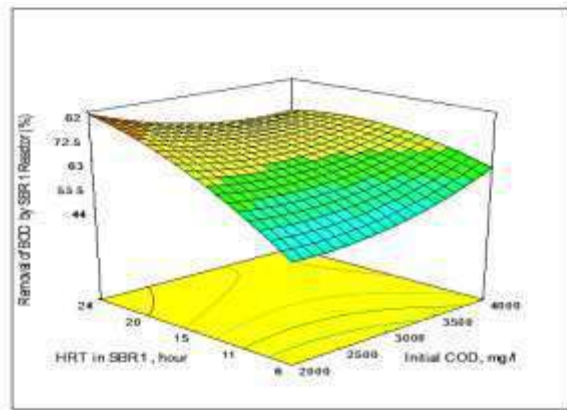
Fig. 1: The schematic diagram of SBR1-O3/GAC-SBR2 was used in this study.



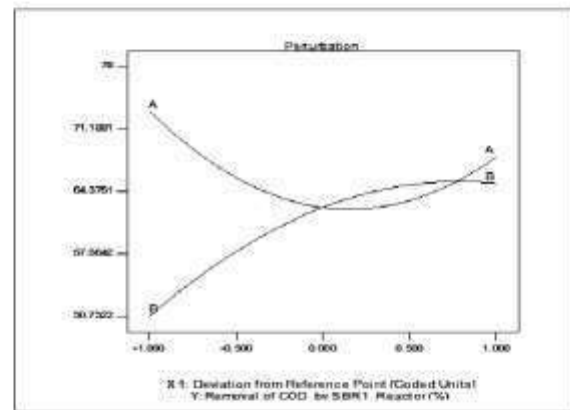
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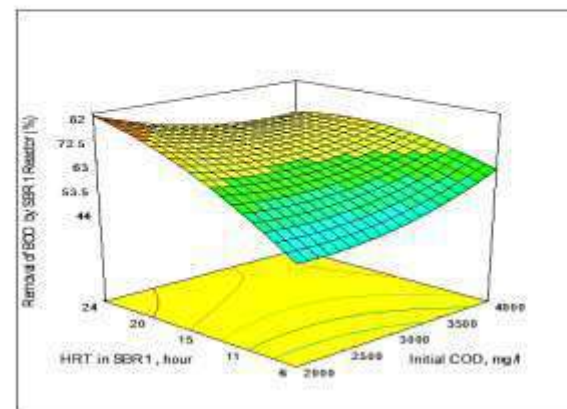
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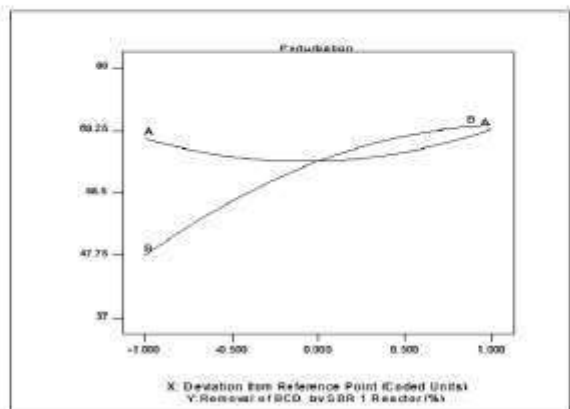
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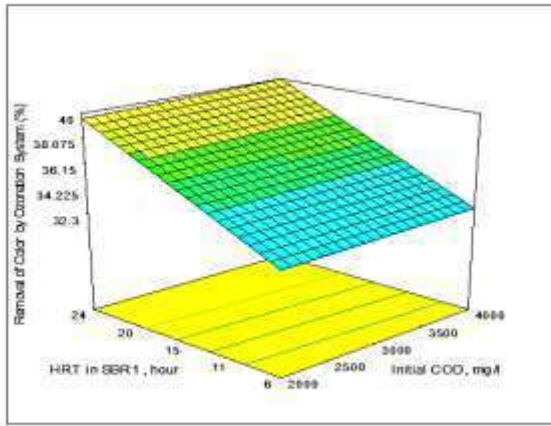
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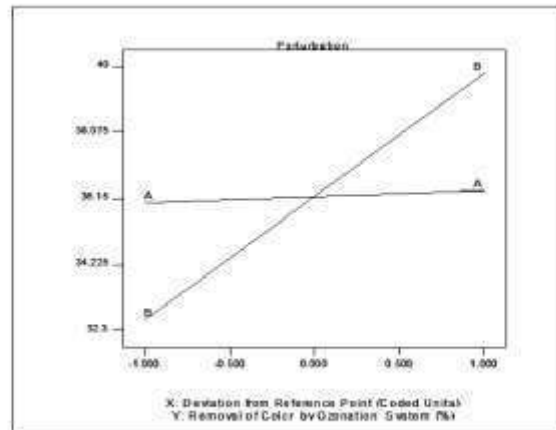
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Fig. 2 (a1): Response surface for color removal in SBR1 with respect to HRT in SBR1 and initial COD. Fig. 2 (a2): Response surface for COD removal. Fig. 2(a3): Response surface for BOD5 removal. Fig. 2 (b1): Perturbation plot for color removal. Fig. 2(b2): Perturbation plot for COD removal. Fig. 2(b3): Point perturbation plot for BOD5 removal.

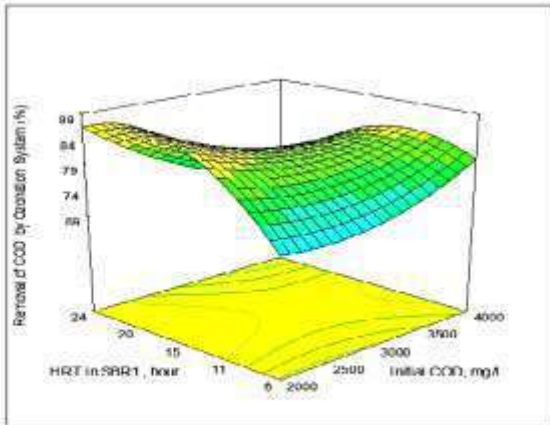
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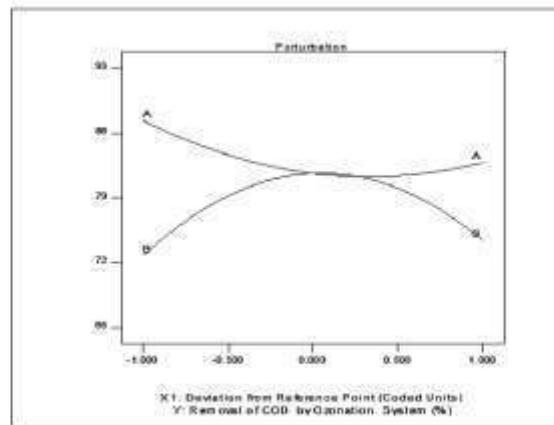
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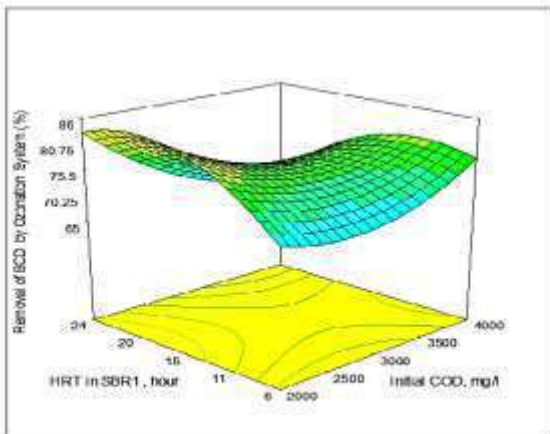
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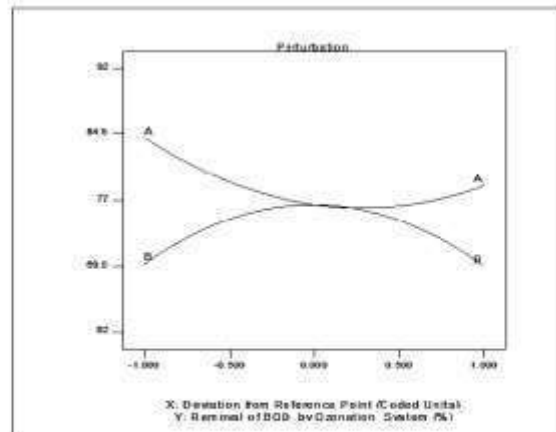
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a (3)



b (3)

Fig. 3 (a1) :Response surface for color removal in O3/GAC system with respect to HRT in SBR1 and initial COD. **Fig. 3 (a2)** :Response surface for COD removal. **Fig. 3 (a3)** :Response surface for BOD5 removal. **Fig. 3 (b1)** :perturbation plot for color removal. **Fig. 3(b2)** : Deviation reference point for COD removal. **Fig. 3(b3)** :Deviation reference point for BOD5 removal.

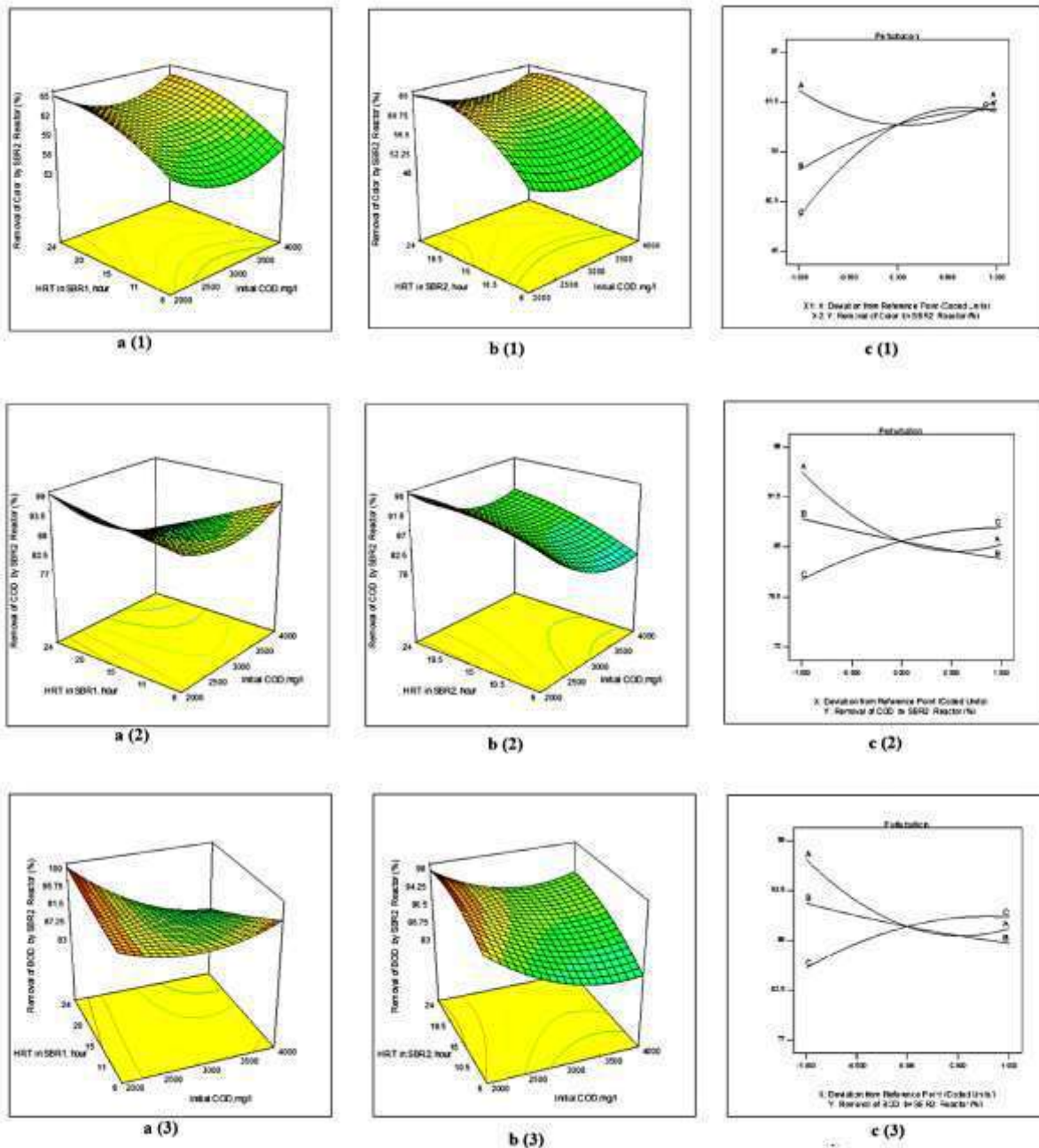


Fig. 4(a1): Response surface for color removal in SBR2 with respect to HRT in SBR1 and initial COD. **Fig. 4 (a2):** Response surface for COD removal. **Fig. 4 (a3):** Response surface for BOD5 removal. **Fig. 4(b1):** Response surface for color removal in SBR2 with respect to HRT in SBR2 and initial COD. **Fig. 4 (b2):** Response surface for COD removal. **Fig. 4 (b3):** Response surface for BOD5 removal. **Fig. 4(c1):** perturbation plot for color removal. **Fig. 4(c2):** Perturbation plot for COD removal. **Fig. 4 (c3):** Perturbation plot for BOD5 removal.

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ARTICLE

CHALLENGES OF EVIDENCE-BASED NURSING AMONG IRANIAN NURSES

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ABSTRACT

Internet and web-based technology have provided new opportunities for the education, research, and professional development of nursing. This study seeks to identify barriers to the use of evidence based information resources by nurses after the introduction of information technology. Participants in this study were the nursing staff of health care institutions of Semnan province in Iran. The mean score of staff attitudes about lack of skill was 2.29 and about environmental factors was 1.81. It seems that regular broad organizational approaches such as organizational culture, information literacy culture, and evidence-based practice can facilitate the use of quality information.

INTRODUCTION

Information technology can affect the health status of communities in two ways, both directly and indirectly. It can directly improve the quality of health services provided to individuals and support disease prevention activities. In addition, it can indirectly affect different items such as the household economic status and social infrastructures. The use of information technology in the health system has significant benefits, for instance it can increase the access to information and up-to-date resources of Medical Sciences for health care professionals [1]. In our country, health care organizations have made some efforts to highlight the impact of Information and Communication Technology on the overall improvement of health related issues. Hence, the health sector has proposed strategies in the form of a national strategic plan for developing the utilization of information and communications technology in health. Moreover, lack of specific objectives for the utilization of new technologies, superficial use of technology, and lack of sufficient awareness of information technology capabilities are considered as some weaknesses in the country [2]. Thus, in order to solve the mentioned problems and to extend the application of information technology in the health sector, it seems necessary to promote the best technology-based practices and select appropriate targets. In the meantime, understanding the potential impact of information technology on health services can be considered as a basis for strategic planning.

In the field of health services, nursing jobs are an important link in the chain of patient care services, because nurses are often considered as coordinators as well as suppliers of patient care [3,4]. Nursing system, like other branches of the health care system, has undergone changes caused by the development of health information and communication technology [5,6]. Internet and web-based technology have provided new opportunities for the education, research, and professional development of nursing [7-9]. However, the findings of several studies conducted at the international level indicate that nurses, compared with other professionals particularly physicians, are less interested to use web-based technologies and information resources available in the internet [10,11]. In today's world, we are observing many innovations and rapid changes in the field of health care [12-14]. Clinical team and especially nurses, that have a critical role in the provision of care for patients, must keep pace with the latest developments made on clinical care and keep their clinical information updated. Research has shown that the nurses who carry out their actions based on scientific evidences are able to make better choices, provide care services with a higher quality, reduce the duration of hospital stays, and decrease the related costs; in other words, they provide better cost-effective services for patients and organization. In addition, such nurses are able to be professionally more responsive to the patients and thus they are more confident and have a stronger professional identity [15,16]. Research has shown that several factors such as lack of time, lack of access to resources, lack of financial support, traditional thoughts, lack of knowledge, as well as lack of management and physicians support hinder the use of updated sources of information by the nurses [15,17]. According to another research, some factors such as lack of applied nursing research, lack of enough time, and lack of organizational support are among the main obstacles to the use of information resources by nurses [18,19].

In recent years significant changes have been made in the field of nursing in our country, among which we may note the followings: holding computer skills training (ICDL) courses for nurses in order to promote and improve the computer literacy skills of nurses and to use electronic resources in the health care environment; holding weekly science seminars in hospitals; increasing nurses access to nursing professors and students which act as information resources available in the clinical environment; reduction of the workload of nurses in teaching hospitals due to the cooperation of students and teachers to treat patients; reduction of working hours of nurses to 8 to 24 hours per week [20-22], and establishing internet sites in hospitals. Taking into consideration the above mentioned items, a series of obstacles that have been reported by nurses in previous studies in Iran are expected to be eliminated. Due to changes in the field of nursing, it is expected to have a raise in nurses' access to the best clinical information so that they could

KEY WORDS

Barriers, Utilization, Evidence-Based Nursing, Nurses

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have the opportunity to utilize the research-based information in their clinical decisions. Therefore, it is necessary to investigate the quality of information resources used by nurses in the clinical setting. The question is that, taking into account the existing facilities in the health care environment, what sources of information can nurses utilize? This study seeks to identify barriers to the use of evidence based information resources by nurses after the introduction of information technology.

METHODS

Sample and setting

Participants in this study were the nursing staff of health care institutions of Semnan province in Iran. The research was conducted from July 2015 to April 2016. Census sampling was used in this study. A total of 485 questionnaires were distributed; 392 were returned, which represented a response rate of 80.8%. A covering letter was prepared for distribution with the survey document, which described the purposes of the study and explained that a response to the survey would indicate the consent of the participant to take part in the research. It also assured participants of the confidentiality of their responses.

Measures

The questionnaire used in this study was developed by the authors, after reviewing related literatures. It was divided into four sections. The first section focused on demographic information (sex, age, work experiences, computer course and education). The second section comprised a scale to measure the attitudes of the participants in relation to environmental barriers in their organization such as access to human resources and care plan, lack of access to scientific literatures in clinical settings and lack of permit to change care plan. The third section measured lack of skill of the study subjects such as inability to understand scientific literatures, lack of skill to search of literatures, lack of skill to use of library, lack of skill to use of databases, lack of skill to use of internet and the four section evaluated the study subjects' believes such as lack of belief to evidence based practice and the impact of scientific results on patient care. The attitudes on each item were measured on a 3-point Likert type scale, where disagree=1, no disagree and no agree=2 and agree=3. The primary questionnaire was reviewed for content validity (through the content validity index (CVI)), and evaluated by 10 experts, who offered feedback in relation to the simplicity and clarity of questions, and the relationship between questions. Then the questionnaire pilot tested on 32 staffs, randomly selected from all the health care institutions. Based on their responses, further revisions were made and some items rephrased. Cronbach's alpha coefficient was used to check the reliability of scores on the individual items that measured attitudes. The coefficient was 0.812.

Procedure

The final version of the questionnaire was distributed among the participants. Those who had been included in the pilot testing of the instrument were excluded from the study. Questionnaires were self-administered, completed anonymously, and returned to the researcher within 72 hours.

Data analysis

Kolmogorov- Smirnov test indicated that data distribution was normal. Means and standard deviations were calculated for individual items on the attitude scale, which measured participants' attitudes towards the barriers. A total attitude score for each of the section was calculated based on the mean scores for each of the items (low score ≤2; high score >2). A low score indicated a negative attitude, while a high score indicated a positive attitude. Correlation test was used to analyze the data.

RESULTS

[Table 1] shows the study subjects' demographic characteristics.

Table 1: Participants' characteristics

Characteristics	Groups	N	%
Age (Year)	*25.5±8.4		
Work experiences (Year)	*9.25± 8.8		
Sex	Female	250	77.2
	Male	73	22.8
Education	Bachelor degree	354	90.4
	Master degree	33	8.4
	PhD	5	1.3
Computer course	Yes	136	34.5
	No	236	65.5

*Mean ±SD

The mean score of staff' attitudes about lack of skill was 2.29 and about environmental factors was 1.81. [Fig. 1]

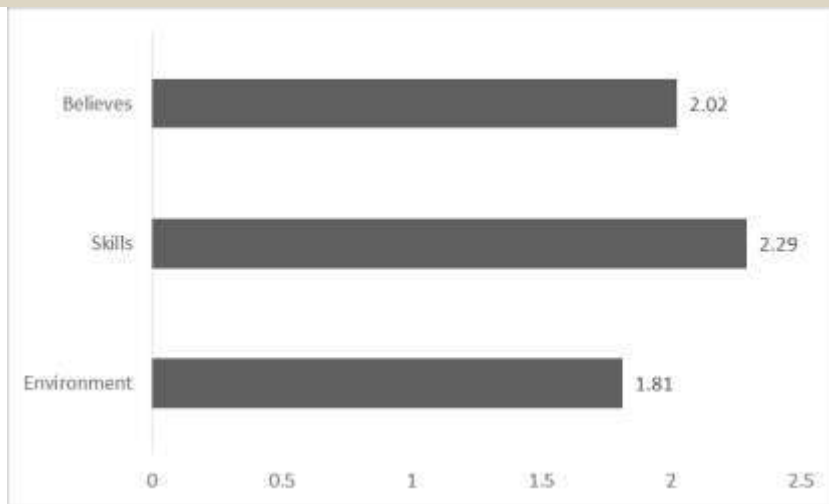


Fig. 1: Mean score of the study subjects' attitudes towards barriers

DISCUSSION

The results of the study showed that more than half of the studied nurses attended training courses on working with computers and searching the databases, however, the nurses and nursing students had little interest in the use of electronic journals and databases such as Pubmed. The results of other studies are consistent with the findings of this study. They found that journal articles and research papers were rarely used as sources of information [23-25]. Moreover, Koivunen, Valimaki & Hatonen found that nurses working in psychiatric hospitals had dramatic defects in the use of the Internet and databases [26]. The findings of the present study are also consistent with results of a study by Dee and Stanely [27]. They found that nursing students, compared with the nurses, were more interested to use electronic databases. Studies have shown that electronic databases have a vital role in the clinical setting and could help decision-makers in public health issues and are also effective in patient survival [28]. The results indicate that the role of clinical librarians in hospitals is neglected. This is widely accepted that evidence-based practices and skills of students can be developed by information specialists and librarians; such practices and skills become significant when the students enter into clinical fields [29]. According to the results, some of the nurses believe that online resources do not contain reliable and credible clinical information. As a result, online resources are not an ideal source of health information for them. However, it seems that these resources can be helpful to identify the information-seeking behaviors of the studied subjects.

The results showed that the problem with understanding the scientific literature was a major hurdle for the subjects. The results of Bertulis' study is consistent with the findings of this study. He found that the structure of research papers and statistical language may also be among the barriers to the use of electronic resources [30]. In general it is believed that improving the critical thinking skills, understanding the language of the research, interpreting research findings, and forming research based working groups and journal clubs can be among the useful strategies. In addition, this approach may motivate nurses and nursing students to utilize high-quality information for making their clinical decisions [20].

The results showed that lack of trust in evidence-based practices and in the impact of scientific findings on patient care in the clinical setting is a major obstacle for students and nurses. The results suggest that poor information literacy of nurses plays a major role in the formation of this manner of thinking. The results of Formoso and et al's study are consistent with the findings of the present study. They indicated that such an attitude is effective in the use of electronic information resources. In addition, they found the culture of information literacy should be promoted among nurses [31]. In other words, organizational plans and commitment to create a good culture of information literacy could affect the successful implementation of evidence-based nursing care [32].

This study indicates nurses have become accustomed to a specific structure. It was a pre-defined framework that was based on the use of partners' comments. It is now widely accepted that the change from the current practice to evidence-based nursing practice is faced with resistance, and nurses are reluctant to use research-based information sources. It seems that regular broad organizational approaches such as organizational culture, information literacy culture, and evidence-based practice can facilitate the use of quality information and affect the behavior of nurses.

CONFLICT OF INTEREST

None

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ARTICLE

THREATS AND SOLUTIONS FOR THE SECURITY OF ELECTRONIC PATIENT RECORD (EPR) IN A DEVELOPING COUNTRY

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ABSTRACT

Introduction: The current policy of the Ministry of Health of Iran is to make an extensive use of information technology in the field of health and establish Electronic Patient Records (EPR). Therefore, addressing the issue of information security is of great importance. This study raised questions such as what threats to and solutions for the security of EPR are proposed and prioritized by the health care staffs. **Methods:** This cross-sectional study was conducted on 400 employees of hospitals affiliated to Semnan University of Medical Sciences of Iran. A valid, reliable and anonymous self-administered questionnaire was used in this study. **Results:** Mean score of human factors was 2.63 and of system defects was 1.96 as EPR threats. 86(36.6%) of the participants selected codified programs, 72(30%) of them chose managerial supports, 51(21.4%) of the study subjects selected continuous monitoring and 41(17.3%) chose the development of standards as the first priorities of the EPR security solutions. Resistance in new technology acceptance and inadequate education had significant and direct relationships with the threat of human factors ($B=0.359$, $P<0.001$) ($B=0.521$, $P<0.001$). Technical factors had significant and direct relationship with the threat of systemic defects ($B=0.464$, $P<0.001$). **Conclusion:** Administrators, developers, and analysts of information systems in health care organizations can use these results not only to establish information systems, but also to pay more attention to the different dimensions of EPR security. In addition, they can train the staffs, to promote the organizational culture.

INTRODUCTION

Along with the development of information technology, it is of great importance to consider the security threats and the methods to deal with them in this field. Nowadays, computer networks are extensively used for the exchange of critical data between different geographic locations; although it has many benefits for mankind, it has created a vast field for abuse. Therefore, one of the most important issues in the field of information technology is the security of information technology [1-3], which aims to keep the health information confidential, while at the same time keep it integrated and highly accessible [4,5]. In addition, authorized access to the information in the field of health care is one of the most important indicators of information security [6,7]. Health care consumers are worried about health care information technology and electronic health records as they may make patients' personal health information more accessible to a wide range of people [7, 8]. Studies suggest that the most of people have concerns about the unauthorized disclosure of their personal information and are worried about the share of information on websites [9, 10]. As a consequence, concerns about the security and confidentiality of data have become the biggest obstacle to the widespread implementation of computerized electronic records and hindered the distribution of data [11]. In small organizations it may be simple to ensure the security of data, as every person has the responsibility to secure his / her own computer and files. However, for larger organizations, such as health care organizations, that store the confidential personal and medical data of patients, there is a more strong need to establish formal security policies and procedures [12-14]. According to the results of many studies, the most of organizations stated that they keep the information secure as they are firstly trying to reduce the related risks. Moreover, some of organization reported that training employees and raising their awareness were the main measures taken to ensure information security. In addition and some of organizations said they were not able to appropriately respond to security events [15-18]. Currently, there is an increasing use of computer networks either via LAN (local area network) or WAN (wide area network) in the public sector and particularly in organizations that digitally register much of their important information; however, the security of information exchange environment is not desirable [19, 20]. While designing and developing clinical information systems, it should be noted that health care workers are key elements in the system, because the employees can understand and evaluate the needs of these systems, and thus develop and implement solutions. In fact, the staffs are the main agents running such systems. Therefore, a successful information system should evaluate and consider the needs of the intended users and the type and scope of their activities [21-23]. Before the design and development of computer information systems, there should be a careful analysis of the needs of organizations and users; it provides an opportunity and lets the designers and developers of such systems and other health care providers to determine their needs for changing or developing an information system. Also, if possible, it can be used to detect the amendable deficiencies in the existing system of health care [24]. The current policy of the Ministry of Health and Medical Education of Iran is to make an extensive use of information technology in the field of health and medical information, implement hospital information systems in the majority of hospitals, make electronic connections between hospitals, and establish electronic patient records. Therefore, addressing the issue of information security is of great importance. Given that few studies have been conducted so far to prioritize the staff's views toward

KEY WORDS

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Electronic Patient Records, the researchers in this study raised the following question: what challenges to and solutions for the security of Electronic Patient Records are proposed and prioritized by the health care staffs. To find the answer to this question we conducted this study aimed to determine the challenges to and solutions for the security of Electronic Patient Records.

METHODS

A cross-sectional survey was performed on employees who were working in hospitals affiliated to Semnan University of Medical Sciences, Iran. The research was performed from December 2014 to October 2015. All clinical and non-clinical staff (n=400) was included in this study. In these hospitals, transition from paper medical records to EPR started in 2007 and was completed in 2010. Before the introduction of this system, all of them had been trained on EPR. An anonymous self-administered questionnaire was developed after reviewing EPR literatures. It was divided into four areas: 1) demographics, such as gender, age, job, education and job experience; 2) Challenges of EPR security such as resistance in the acceptance of new technologies, Insufficient training and awareness, lack of necessary laws and regulations technical factors; 3) Threats of EPR such as Human factors, environmental factors and system defects. In second and third sections, the study subjects' answers were graded as low=1, somewhat =2, high=3 and very high=4 respectively; 4) Solutions such as codified programs, managerial support, development of standards and continuous monitoring. The participants were asked to prioritize their views from 1 to 4 in order to the importance of the solutions. The primary questionnaire was reviewed for content validity (through the content validity index (CVI)), and then evaluated by 10 experts, who offered feedback in relation to the simplicity and clarity of questions, and the relationship between questions. The experts evaluated each question on a 4-point scale (1=low score; 4=high score), and the ratio of their response scores (3 and 4 to the total of 10 responses) were obtained. Items with scores higher than 0.80 were considered suitable; items with scores of less than 0.80 were removed or revised as recommended by the experts, and then reevaluated. Of the original 21 items, 17 were selected to form the questionnaire for this research, which was then pilot tested on 22 employees, randomly selected from the hospitals. Based on their responses, further revisions were made and some items rephrased. Internal consistencies were expressed as Cronbach's alpha 0.866 for the second area, 0.738 for the third area, 0.877 for the fourth area and 0.824 for the entire questionnaire. Next, further revisions were made and some statements were rephrased. Lastly, the final version of the anonymous questionnaire was distributed among the study subjects who were working in the hospitals by the researcher and they were asked to complete the questionnaire. To determine the distributions of responses, SPSS was used to perform descriptive statistics for all demographic variables. A total attitude score was calculated by mean of the scores for some items (low score = mean<3 and high score = mean>=3). Regression was used to investigate effective factors on EPR security. The significance level was set at P<0.05. First, we obtained ethical approval from the Semnan University of Medical Ethics Committee. Then, we prepared a cover letter describing the purposes of the study. The letter explained that responding to the survey indicated the participants' consent to take part in the research. It also assured the participants that all responses would be kept confidential.

RESULTS

A total of 400 questionnaires were distributed; 280 were returned, which represented a response rate of 62.5%. There were 174(69.6%) female, the sample was typically young (55.2% under 30 years of age), 147(63.9%) had bachelor degree, 140 (59.6%) were clinical staffs. [Fig. 1] shows that insufficient training achieved high score (mean=3.11) and technical factor gained low score (mean=2.24) of the study subjects' attitudes towards challenges of EPR security.

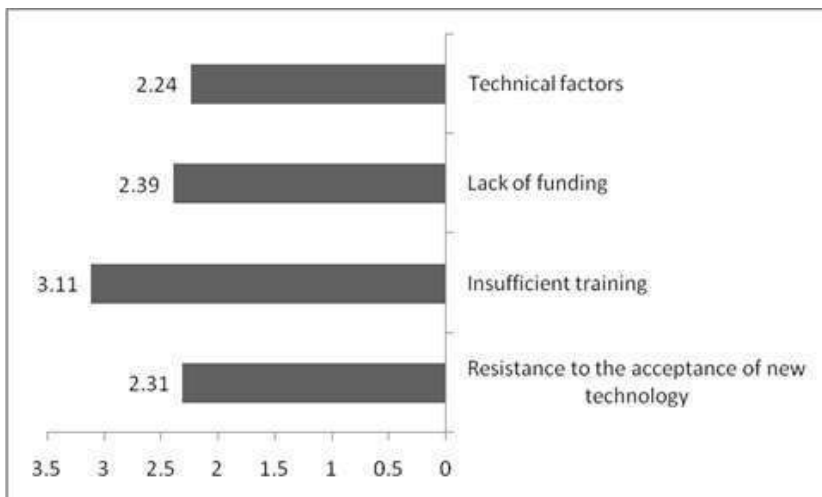


Fig. 1: Mean scores of the study subjects' attitudes towards challenges.

[Fig. 2] shows Mean scores of the study subjects' attitudes towards EPR threats. Mean score of human factors was 2.63 and of system defects was 1.96.

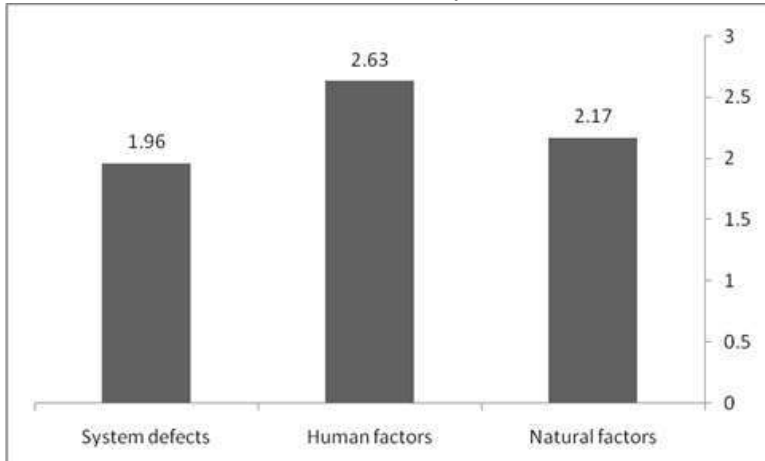


Fig. 2: Mean scores of the study subjects' attitudes towards threats.

[Table 1] has prioritized the participants' attitudes towards the EPR security solutions. 86(36.6%) of the participants selected codified programs, 72(30%) of them chose managerial supports, 51(21.4%) of the study subjects selected continuous monitoring and 41(17.3%) chose the development of standards as the first priorities of the EPR security solutions.

Table 1: The participants' prioritization about effective solutions for EPR security

Priorities Solutions	First	Second	Third	Fourth
	N (%)	N (%)	N (%)	N (%)
Codified programs	86(36.6)	48(20.4)	51(21.7)	50(21.3)
Managerial supports	72(30)	66(27.5)	59(24.6)	43(17.9)
Continuous monitoring	51(21.7)	73(30.6)	73(30.6)	41(17.1)
the development of standards	41(17.1)	46(19.5)	52(21.9)	98(41.5)

Resistance in new technology acceptance and inadequate education had significant and direct relationships with the threat of human factors ($B=0.359, P<0.001$)($B=0.521, P<0.001$). [Table 2]

Table 2: Regression analysis challenges of the resistance in new technology adoption and inadequate training with threaten of human factors

Challenges	R ²	Adjusted R ²	F	B	SD	Beta	t	P-Value
The resistance in new technology adoption	0.492	0.490	226.980	0.359	0.024	0.709	15.066	P<0.001
Inadequate training	0.792	0.791	929.739	0.521	0.170	0.890	30.492	P<0.001

Technical factors had significant and direct relationship with the threat of systemic defects ($B=0.464, P<0.001$). [Table 3]

Table 3: Regression analysis challenges of technical factors with threaten of system defects

Challenges	R ²	Adjusted R ²	F	B	SD	Beta	t	P-Value
Technical factors	0.684	0.983	497.835	0.464	0.21	0.827	22.312	P<0.001

DISCUSSION

The findings of this study showed that resistance to the acceptance of new technologies is somewhat a challenge to EPR security (mean=2.31). The results may indicate that staff's resistance to new technologies might be an important factor which created a sense of distrust in cyberspace. The results of regression analysis showed that the threat of human factors to EPR security is significantly ($P<0.001$) due to staff's resistance to new technologies. In other words, staff's resistance to new technologies can happen when employees are not inclined to learn how to work with the new technologies and thus some of them feel unsecure facing these changes [25, 26]. Such a situation increases the risk of errors when they use EPR systems and consequently reduces the security of EPR. In addition, studies have also shown that one of the challenges of the electronic official systems is the lack of confidence and lack of interest in automation of processes. On the other hand, self-esteem, and personal experiences, and security culture of staff, compared with technical factors, are more effective and put a larger impact on the security of information systems [27, 28].

The results of this study showed that insufficient trainings and low awareness of staff about security issues ($B=0.521$) was among the other factors that could significantly increase the security of EPR ($P<0.001$). In addition, this study showed that inadequate training was among the most important challenges of staffs to secure EPR (mean=3.11). Previous studies have shown that training the staffs is one of the most powerful mechanisms for reducing the security risks [29, 30]. Elahi conducted a research and found that training and informing the users is a basic and fundamental topic for strengthening security programs, and governmental agencies must pay special attention to this gap [31]. The results also show that if organizations fail to notice the effects of trainings on staff awareness and on raising their sense of responsibility to protect the security of information, the staff will not consider themselves as a part of the process of implementation and monitoring information systems. Moreover, according to Ashenden, the human threats to information security are largely ignored. In addition, he found that to solve this problem, it is necessary to change the organizational culture and make effective communication between information security managers, senior managers, and end-users [32].

The results showed that economic factors were among the other security challenges facing EPR security (mean=2.39). It seems that the studied staff paid a special attention to the financial problems facing health centers and the high cost of purchasing equipments (software and hardware), because the limitation in financial resources is one of the common challenges facing all organizations [33]. On the other hand, there are many concerns about hospital costs and it has affected all medical centers in the world [34]. Kiel conducted a research in 2010 and studied the implementation of HIPAA security standards in several health care centers. He found that managers of health care centers at first considered the security standards as very expensive; however, a few years after the implementation of the program, they considered the standards as cost effectiveness [35].

The results showed that the technical factors were among the other EPR security concerns of the staff (mean=2.24). According to the views of the staff, technical factors play an important role in addressing security issues. The results of this study showed that neglecting technical factors can significantly ($P<0.001$) increase the effects of systematic defects in the system and change them into a threat to the security of EPR ($B=0.464$). Kayworth conducted a study and found that most organizations considered technical factors as the immediate answers to their security problems [36]. On the other hand, various studies have shown that although a small amount of security issues were related to technical factors, most organizations reported technical factors as a priority for investment in information security [37].

The results showed that a third of the studied population reported the codified programs as the most effective solution for strengthening health information security. Thus, it seems necessary to make planning to reduce duplicated tasks and prevent the waste of resources and opportunities. In a study by Xiao it was found that the lack of written and compulsory laws to regulate the electronic activities and transactions is one of the major obstacles, particularly in the public structures [4]. As a consequence, if organizations and health care institutions do not have a systematic plan for securing and protecting the data of patients, in case of the loss of sensitive information of patients, they will face much difficulty to retrieve them [14]. More than half of the studied people reported the managers' commitment and support for information security programs as the first and second priorities. Probably, the staff believed that the active involvement and support of the management were essential for achieving the success. It might be due to the fact that, information security has a strong management dimension in which some aspects like policy and management participations are very important [24]. Despite the use of several applied software, such as hospital information systems, in health centers, there is an urgent need to identify various aspects of management and their effects on patients' information security [38].

The results showed that more than half of the studied people reported the continuous and strong monitoring as the first and second priorities to prevent security problems. It is believed that the information security program must be monitored in order to correct deviations and match the activities with the objectives of information security programs. Several studies have emphasized that monitoring is one of the basic processes in the management of any organization; moreover, to correctly carry out activities in any organization it is necessary to implement a monitoring program. Using monitoring systems, organizations can achieve the maximum efficiency and effectiveness required to meet organizational goals. Bulgurcu et al. and Luna-Reyes et al. conducted studies to identify factors influencing the successful implementation of information security system. According to the results of the mentioned studies, monitoring is one of the fundamental parts of information security management. Monitoring helps to identify problems and have effective and timely responses and take more preventive measures [11, 26]. In addition, a study by Mahmoudzadeh and Rad Rajabi showed that 40% of the studied staffs reported continuous monitoring as an important factor in promoting information security [39].

A limited number of the studied staffs reported the standards and regulations as the most important solutions for promoting information security in information systems. Perhaps they considered the standards as a proper control method to prevent errors in the operations performed by the clinical information systems. It is due to the fact that, with the implementation of standards in the health care centers it is expected to observe a reduction in the number and severity of errors in the information security systems [3]. On the other hand, ISO and HIPAA security standards are among the most important security standards used to protect the security of patient information [3,20]. The studies have shown that the implementation of HIPAA standard helped to effectively protect the information and made the information available only to authorized people [29, 40].

The findings of this study should be interpreted with caution because first, it was performed using self-administered questionnaires. Potential problems, such as poor understanding of the questions and possible bias, may compromise the results, but the reliability and the validity of the questionnaire established in its developmental stage may have lowered any possible impact on the results.

The results of this study showed that health care staff reported several challenges which are facing the EPR. Among them, the most important challenges were the human errors and faults and staff's lack of knowledge in the field of EPR security. On the other hand, the health center staff believed that constant monitoring of security protocols and the support of the management were among the most important solutions to strengthen EPR security. These solutions reduce the risk of damage to the information which is the most important asset of every organization. The results of this study can be much valuable for administrators, developers, and analysts of information systems in health care organizations. They may use the results not only to establish information systems, but also to pay more attention to the different dimensions of health information security. In addition, they can train the staffs, to promote the organizational culture.

CONFLICT OF INTEREST

None

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ARTICLE

INVESTIGATING THE CONVERGENCE BETWEEN SPIRITUAL HEALTH AND WORK ETHIC OF NURSES WORKING IN HOSPITALS AFFILIATED TO JAHROM UNIVERSITY OF MEDICAL SCIENCES IN 2015

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ABSTRACT

Introduction: Spiritual health is a unique that coordinates physical, psychological and social dimensions. Work ethic is a factor that creates discipline and sense of duty in the individuals. As a result, the present study aim at investigating the convergence between spiritual health and work ethic of nurses working in hospitals affiliated to Jahrom University of Medical Sciences in 2015. **Materials and methods:** This study was a cross-sectional and analysis study in which 97 nurses working in training hospitals of Jahrom University of Medical Sciences participated. Data tools included Spiritual Health of Academy of Medical Sciences questionnaire and Costa and Mac Kray Work Ethic questionnaire. Data analysis was performed using SPSS version 16 and using descriptive statistics (mean, standard deviation and percent) test, Pearson correlation and regression analysis. **Results:** The results of the Spearman correlation coefficient show that there is a significant convergence between spiritual health and work ethic among nurses ($p < 0.05$, $r = 0.0347$). This means that with work ethic increases in nurses with an increase in spiritual health. The results of the multivariable regression show that, of the dimensions of spiritual health, only behavior and performance of nurses are predictors of their work ethic ($p < 0.05$). **Conclusion:** There was a significant convergence between spiritual health and work ethic in nurses in a way that nurses' work ethic enhances with an increase in spiritual health.

INTRODUCTION

Spiritual health is one of the important aspects of human health that provides a unified relationship between human internal forces and is determined by characteristics such as stability in life, balance and harmony, feeling close relationship with self, God, society and the environment. Spiritual health provides the integrity of an individual [1].

Spiritual health is an important dimension that reinforces the individual's psychological operation and compatibility and will promote other aspects of health. In times of crisis, spirituality is a powerful resource that creates a serious obstacle in the face of psychological stress and depression. Also, by encouraging the individual to sanitary behaviors, it improves the overall health [2]. Spiritual health is a unique that coordinates physical, psychological and social dimensions [3]. When one's spiritual health is seriously compromised, the individual may experience mental disorders such as loss of sense, depression and loneliness in life [6,7]. Work ethic is a factor that creates discipline and sense of duty in the individuals. Paying attention to the concept of work ethic in organizations equals to considering ethics and human relations, because ethics creates commitment and will make individuals to be sensitive to their duties and their job conduct in the best way, without external control. Work ethic in an organization leads to increasing productivity, achieving sustainable development, human cultural metamorphosis, management stability and economic order. Several factors affect work ethic [4]. Work ethic is a cultural norm that gives positive spiritual values to decent and appropriate work in the community and believes that the work itself has an intrinsic value [5]. Work ethic is the internal commitment to comply with requirements that were agreed in connection with work. In other words, work ethic is whole-hearted satisfaction, commitment and practical adherence to tasks that an individual is supposed to do; so that even there are no inspectors and monitors over his activity he will do his task completely. If we can nurture the spirit of spirituality and faith in the hearts of the staff so that they believe that: "God knows the secrets of the heart and the reality of minds" [Surah Mumen, verse 19], then the problem of monitoring is solved by itself. In verses 72-73 of Surah Ahzab, it is noted that all available facilities and opportunities are divine assets and human, as the successor of God, should consider it as a divine asset and take advantage of it in predetermined and legible cases. As the largest and most important human resource for health care organizations, nurses play an important role in enhancing organizational productivity and health. The main goal of any organization is to achieve optimal productivity. The job performance of nurses, as one of the most important human resource hospitals, is affected by several factors including spirituality, work ethic and public health and leads to further commitment, enhancing service quality and productivity. Conscience is the basis of

KEY WORDS

Spiritual health, work ethic, nurses

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being right and wrong that govern a person's thoughts and can act as the viewer and the judge of past actions and as a reference and guidance for future actions [8]. Conscience is the protection of the nurse's individual integrity, beliefs and values. The nurse who refrains from doing certain actions the basis of conscience tries to prevent from damaging his integrity [9].

Conflicts of conscience lead to the loss of personal integrity. Obliging nurses to engage in an activity that is incompatible with their conscience easily makes them to leave the nursing profession. Otherwise, for not following the conscience, they will experience qualm, guilt and shame [10]. Many studies indicate the relationship between spirituality, physical and mental health and enhancing disease compatibility. There are several studies that support the hypothesis that spiritual health can improve psychological functioning and compatibility. In a study entitled "nurses' experiences of the factors leading to commit unconscionable acts", it has been stated that individual, institutional, human, factors and those associated with the context can make nurses do unconscionable actions [12]. In another study entitled "relation between Organizational Health and Spirituality with Organizational Entrepreneurship", it has been stated that spirituality in the workplace can be a powerful positive force in the lives of individuals, because they make their work more enjoyable, more balanced and more meaningful by combining and integrating their spiritual life and work through which they foster their spirits [13]. The results of O'Brien's study showed that when the individual's spiritual health is seriously compromised, he may experience mental disorders such as loneliness, depression and loss of meaning in life [11]. In general, research conducted on the connection between spiritual health and spirituality and factors affecting job performance has concluded that spiritual health can affect better and more effective job performance. Spiritual health is one of the important aspects of human health that provides a unified relationship between human internal forces and is determined by characteristics such as stability in life, balance and harmony, feeling close relationship with self, God, society and the environment. Spiritual health provides the integrity of an individual [1]. Spiritual health is a unique that coordinates physical, psychological and social dimensions. When one's spiritual health is seriously compromised, the individual may experience mental disorders such as loss of sense, depression and loneliness in life [6,7]. Work ethic is a factor that creates discipline and sense of duty in the individuals. Paying attention to the concept of work ethic in organizations equals to considering ethics and human relations, because ethics creates commitment and will make individuals to be sensitive to their duties and their job conduct in the best way, without external control. Work ethic in an organization leads to increasing productivity, achieving sustainable development, human cultural metamorphosis, management stability and economic order. Several factors affect work ethic [4]. As one of the largest and most important human resources in hospitals, nurses are under the influence of several factors such as spirituality, work ethic and public health that lead to further commitment and enhancing service quality and productivity. Given the very valuable and important role of nurses in the area of treatment, paying attention to the factors that increase their commitment to work is very valuable. According to what was said the present study aim at investigating the convergence between spiritual health and work ethic of nurses working in hospitals affiliated to Jahrom University of Medical Sciences in 2015.

MATERIALS AND METHODS

The present study was a cross-sectional and analysis study that investigated the relationship between spiritual health and work ethic of nurses working in hospitals affiliated to Jahrom University of Medical Sciences in 2015. Data gathering tools in this study included two questionnaires. Having received the approval of the Ethics and Research Council of Jahrom University of Medical Sciences, the researcher, after justifying and explaining the objectives of the study, completed the questionnaires used with the help of nurses. The questionnaires were distributed after the presentation of a letter of introduction from Jahrom University of Medical Sciences. Azizi spiritual health questionnaire had 48 questions. Questions number 1 to 28 in the questionnaire assessed the individuals' insights and trends over the past year with questions about the purpose of creation, life after death, reward and punishment in the hereafter, purpose of life, faith and relationship with God. And questions number 29 to 48 explored the individual's performance over the past year with questions about evaluating one's life, doing "enjoining good and forbidding wrong" etc. This questionnaire will be a five-item Likert scale [strongly agree = 4, almost agree = 3, no comment = 2, almost disagree = 1, strongly disagree = 0]. The designed tools are in the form of three scales of insight, attitude and behavior including questions that are indicative of Muslims' spiritual health in cognitive / emotional and behavior fields. If the scores of five-item Likert scale are standardized and converted into 0 to 100, then the score of the spiritual health status variable and its dimensions are divided [insight, attitude and behavior] to four levels of very low [25-0], low [50-25], medium [75-50] and high [100-75].

Score out of 100	Score	Statements	Component
100-0	4-0	Questions 1-12	Insight
100-0	4-0	Questions 13-28	Trend
100-0	4-0	Questions 29-48	Behavior

"The reliability and convergence" and reliability of this questionnaire was proved by Azizi and colleagues with Cronbach's alpha of 79%. Costa and Mac Kray Work Ethic questionnaire, 1992, contains 16 questions from Costa and McCrae five-factor personality questionnaire; 8 questions from this questionnaire (questions 8-1) are about the reliability sub-scale (for example, I am a very competent and efficient person) and other eight questions (questions 16-9) measure the success-oriented sub-scale (for example, I am working hard to achieve my goals). This questionnaire is of a five-scale Likert type in which (score 4) is given to answer "fully agree", (score 3) to "agree", (score 2) to "no comment", (score 1) to "disagree" and (zero) to "strongly disagree". Questions 1 -2- 4 6 9 11-13 are

scored in reverse. The minimum possible score will be 0 and the maximum possible score will be 64. The score between 0 and 21 is weak work ethic. The score between 21 and 32 is moderate work ethic. Any score higher than 32 is a strong work ethic. The questionnaire is standard and it has been used in many studies. In all the research that has been mentioned below, the validity has been approved. Glaty and Irivinl (2001) have reported the validity of the questionnaire 0.76. Ezheii and colleagues (2009) have translated the questionnaire. They have gained Cronbach's alpha for the main character's conscience dimension in the Five-Factor Inventory (BFI) in the Iranian sample 0.72. Alirezaee and colleagues (1392) have also reported 0.7 alpha for this study. Data analysis was performed using SPSS version 16 and descriptive statistics (mean, standard deviation and percent) Pearson correlation test and regression analysis.

RESULTS

In this study, 97 nurses were studied. The mean score of spiritual health variable was 90.91 ± 86.26 . [Fig. 1] shows the mean score of spiritual health variable and its dimensions. The insight dimension of nurses had the highest average and the lowest average was related to behavior.



Fig. 1: Score of spiritual health variable and its dimensions

According to the findings of this study, 85.6 percent of the medical staff (nurses) took advantage of a highly spiritual health. The majority of nurses were at a high level in dimensions like insight, attitude and behavior. The behavior of the nurses was lower than other components [Table 1].

Table 1: Mental health level and its components in nurses

	Low (25-50)	Moderate (50-75)	High (75-100)
	Percent	Percent	Percent
Insight level	0/0	10/3	89/7
Trend level	2/1	15/5	82/5
Behavior level	1/0	32/0	67/0
Spiritual health level	0/0	14/4	85/6
Work ethic level	0/0	6/2	93/8

The average score of work ethic variable was 6.16 ± 41.24 . The work ethic in 93.8 percent of nurses was at a high level and in 2.6% of them was at an average level [Table 2].

Table 2: The level of work ethic in nursing

	Low (0-21)	Moderate (22-32)	High (33-64)
	Percent	Percent	Percent
Work ethic level	0/0%	6/2%	93/8%

The results the Spearman correlation coefficient show that there is a significant convergence between spiritual health and work ethic in nurses [$r = 0.0347$, $p < 0.05$]. This means that nurses' work ethic enhances with an increase in spiritual health. The results of the multivariable regression show that, of the dimensions of spiritual health, only behavior and performance of nurses are predictors of their work ethic [$p < 0.05$]. This means that with an increase of one unit in nurses' behavior and performance, work ethic increases as much as 12.5% [Table 3]. The impact of insight and trend dimensions on nurses' work ethic is not meaningful.

Table 3: Regression coefficients convergence between spiritual health and work ethic in nursing

p-value	T	Beta	S.E	b	R	R ²	independent variable
0/001	3/596	-	5/445	19/581	0/409	0/167	Constant
0/417	0/815	0/109	0/078	0/064			Insight

0/416	0/818	0/122	0/079	0/064			Trend
0/032	2/175	0/253	0/057	0/125			Behavior

DISCUSSION

Nurses' attitude towards and knowledge of spiritual care, and the factors affecting it, can satisfy the spiritual needs of patients. The nurse is able to provide a suitable and compatible environment to facilitate patients' inner healing power. For believers, religious beliefs may help to treat them in harsh conditions. Nurses' spiritual care is beyond the physical needs and is mixed with all human dimensions [physical, emotional, intellectual, social and spiritual] [14]. The results showed that there is a significant convergence between spiritual health and work ethic in the medical staff [nurses]. This means that work ethic enhances in medical staff [nurses] with an increase in spiritual health. Searching the resources, we failed to find any article that had measured the relationship between these two components. In their study, Rahimi and colleagues concluded that spiritual health and attitude to spirituality and spiritual care are at the intermediate level in nursing and midwifery students and that there was a relationship between spiritual health and attitude to spirituality and spiritual care that are consistent with the results of the present study [15]. In a descriptive study in 2011, Ergul and colleagues examined nurses' perception of spirituality and spiritual care and explored its relationship with demographic factors. Results showed that nurses do not have a clear understanding of spirituality and spiritual care and that some factors such as level of education, their religious beliefs and hospitals in which they worked have had a positive impact on their understanding of spirituality and spiritual care that is inconsistent with the results of the present study [16]. This study showed that nurses' spiritual health is high. In their study, Pesut and Hsiao showed that nurses' spiritual health was at moderate to good level. The results of these studies are consistent with those of the present study [18-17]. Obliging nurses to engage in an activity that is incompatible with their conscience easily makes them to leave the nursing profession [19]. Otherwise, for not following the conscience, they will experience qualm, guilt and shame [20]. Moral challenge of nurses and internal medicine in oncology, surgery, elderly and intensive care units has been investigated. [21] Conscience turbulence or qualm, such as guilt in nurses, is experienced when they are not satisfied with the type of care they provide to the patients. The nurse's dissatisfaction can be due to the tasks dictated to him by himself or by others [patients, managers and institutions] or to having been forced to do something contrary to his conscience so that they spend a little time with patients. [22] Lack of time, as well as hard work, has been identified as the most common causes of stress among nurses. Other environmental stresses and those causing conscientious tension include: problems related to management and leadership, professional conflicts, emotional needs of care, work shift and lack of reward [23]. In a study entitled "nurses' experiences of the factors leading to commit unconscionable acts", it has been stated that individual, institutional, human, factors and those associated with the context can make nurses do unconscionable actions, which is inconsistent with the results of the present study [12].

CONCLUSION

There was a significant convergence between spiritual health and work ethic in nurses in a way that nurses' work ethic enhances with an increase in spiritual health. Furthermore, of the dimensions of spiritual health, only behavior and performance of nurses are predictors of their work ethic.

CONFLICT OF INTEREST

There is no conflict of interest.

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ARTICLE

A COMPARISON OF THE EFFECTS OF REMIFENTANIL, ALFENTANIL, SUFENTANIL AND FENTANIL ON THE INCIDENCE RATE OF NAUSEA AND VOMITING AFTER GENERAL ANESTHESIA WITH LARYNGEAL MASK IN CATARACT SURGERY

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ABSTRACT

Introduction: One of the side effects of general anesthesia and anesthetic drugs, especially opioids, is nausea and vomiting. The aim of this study was to examine the effect of fentanyl, alfentanil, sufentanil and remifentanil on the incidence of nausea and vomiting after general anesthesia with laryngeal mask in cataract surgery. **Materials and methods:** In this cross-sectional study, 416 patients in four groups: fentanyl, alfentanil, sufentanil and remifentanil who have got cataract surgery in the Motahari hospital operating room under general anesthesia with a laryngeal mask have been studied. To determine the relationship between the incidence of nausea and vomiting, and opioid, Chi-square test was used. **Findings:** Chi-square test results show that among four remifentanil, alfentanil, sufentanil and fentanyl and the incidence of nausea after anesthesia with laryngeal mask in cataract surgery there is a significant difference (p -value < 0.05). Fentanyl and Sufentanil had the highest and lowest incidence of nausea in patients, respectively. The incidence of nausea in patients using fentanyl was 14.4, alfentanil 13.5, Sufentanil 1.9, remifentanil 9.6%. **Conclusion:** Sufentanil compared with other opioids had the least side effects of nausea and vomiting. Therefore, it is suggested that Sufentanil be used for cataract eye surgery.

INTRODUCTION

KEY WORDS
Nausea and vomiting,
Laryngeal masks,
Cataract surgery

Any opacity in the lens of the eye is called cataracts or cataract. [1] Of the major causes of cataract, age, genetic factors, inflammation, trauma and others can be mentioned. [2] 90 percent of all cataracts are age-related. [3] Many studies have found that prevalence is higher in women than men and more patients are older than 65 years. [4] Sudden movements or attempts to cough, while opening the eyeball can cause protrusion of visual content and permanent damage. That's why when cataract surgery, general anesthesia is chosen, it is necessary that sufficient depth of anesthesia [analgesia] to be maintained. [5] Nausea and vomiting as the second most common complaint of patients after surgery have nearly 20 to 30% prevalence. [6] Nausea and vomiting after surgery is cited as one of the reasons for delay in discharge of patients from anesthesia care unit, so that each time vomiting after surgery caused delays in discharge from the recovery room for at least 20 minutes [6-7]. Among the materials that are used during anesthesia, and it is indicated that they can be effective on nausea and vomiting after surgery, are opioid analgesics [8-9]. Fentanyl with analgesic potency 80 times more than morphine was introduced into medicine as an intravenous anesthetic in the 1960s. Its primary use is as a premedication or sedative before anesthesia in the operating room. Today, fentanils are widely used for anesthesia and pain relief. Its mechanism of action is agonist Mo-Opioid receptor and its side effects are reduced diastolic blood pressure and blood oxygen saturation, nausea and vomiting [10]. Sufentanil due to the power of weakening the central nervous system is used as main or auxiliary anesthetic drug. This drug is seven times more powerful than fentanyl and its recovery from anesthesia is faster than fentanyl [11]. Alfentanil is preservative agent in anesthesia and pain control after surgery. This drug has short-term effect and it is a narcotic analgesic that used as a concomitant drug and to induce anesthesia. The drug also with intrathecal and dura matter injection is used to induce analgesia after surgery [12]. Remifentanil has rapid onset and short duration of action, so that when compared with fentanyl and same drugs it has shorter half-life [about 5 minutes]. This drug also such as alfentanil reaches its peak effect quickly. The power of remifentanil is slightly less than fentanyl. Remifentanil has important role in modern anesthesia and safe therapy for continuous infusion. The most common application of this drug is infusion with propofol in the prescribed intravenous anesthesia [TIVA]. Also for cases where short term analgesia is needed it is useful as single dose [11]. In a study titled [comparison the effects of fentanyl, sufentanil and alfentanil as premedication on the incidence of nausea and vomiting after gynecological laparoscopy surgery], it was found that in the first 24 hours after surgery no differences between the three drugs alfentanil, fentanyl and sufentanil in the incidence of vomiting were observed, while the beneficial effects of alfentanil than two other drugs in reducing the incidence of nausea and vomiting during periods after surgery could be considered as premedication [13]. In a study that compared the effect of fentanyl and alfentanil on waking, nausea and vomiting

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in the elderly cataract surgery, it was found that the incidence of nausea and vomiting in the fentanyl group was more than alfentanil [14]. Nausea and vomiting is a common problem in patients after general anesthesia that can cause delay in unforeseen and unplanned discharge and admission. Since each drug in addition to the benefits can provide side effects, opioids are no exception. The use of opioids (alfentanil and remifentanil and fentanyl and sufentanil) as analgesic drug before, during and after surgery usually increases nausea and vomiting that this nausea and vomiting in patients undergoing many significant problems in recovery, especially in the elderly patients with pharyngeal and laryngeal reflexes is weak and it has caused complications such as pulmonary aspiration. A major goal in the care of patients undergoing cataract surgery is to prevent increased pressure inside the eye. In order to achieve that, the patient should refrain from actions that led to its elevation like the coughing, sneezing, nausea, vomiting and sudden movements. Therefore, any attempt to reduce or minimize its occurrence is important. This study aimed to determine the best drug to reduce nausea and vomiting in cataract surgery with general anesthesia.

METHOD

The present study was cross-sectional. Sampling was gradual random. Calculations and sample size. In this study, 104 patients in each group of fentanyl, alfentanil, sufentanil and remifentanil have been studied. A total of 416 patients were studied. Inclusion criteria: All patients were in the 18 to 70 age group and in ASA I Group classification (American Society of Anesthesiologists) (without sick and healthy) and ASA II (with mild systemic disease), undergone general anesthesia with a laryngeal mask. Exclusion criteria: record of chronic abdominal pain, gastroesophageal reflux, lung aspiration, gastrectomy, diabetes, record of extensive abdominal surgery, gastric ulcer and duodenal, and any changes in the hemodynamic status of patients that need to be injected other drugs. Before the implementation of project, the research after the adoption of project and licensing of research and permission from the ethics committee and after coordination with the authorities of operation room and Motahari hospital administration will be done. Patients undergoing eye surgery (cataract) that laryngeal mask is used for their anesthesia after recovery and gain full consciousness are going to be examined and questioned about the presence or absence of nausea and vomiting (no, low, medium, high). The minimum period that the patient will stay in the recovery room if hemodynamic status is good is 30 minutes. Generally three groups of drugs are used in this study in order to induce patients' anesthesia: 1- Opioids, 2- Sleep aids, 3- Muscle relaxants. Drug dose used in this study will be (fentanyl, sufenta and alfenta=cc1), (remifentanil 1-2 microgram/kg stat) that we use one of the drug for each patient. Of the hypnotic drugs 1/5 mg / kg propofol was used for induction. Propofol maintenance dose will be (dose maintenance = 50-150 micrograms per kilogram per minute). Then of neuromuscular muscle relaxant drugs 0/6mg/kg of Atracurium will be injected to keep the muscle relaxation. After that, the lungs of patients will ventilated with N2O, and oxygen with the ratio of 50% and during anesthesia all the patients will be undergone monitoring and pulse oximetry, heart rate, blood pressure and ECG. The results of the information obtained by the questionnaire were analyzed statistically by SPSS version 22 software and Pearson Chi-Square test was used for analysis.

Findings

In this study, 416 patients who had cataract surgery were enrolled. 53.1 percent were male and 46.9% were female. 23.6% were between 50-55, 19.0% 56-60, 18.8% 61-65, 16.1% 66-70 and 22.6% 71-75. 9.9% of patients had nausea. 46.9% have a diameter of laryngeal mask 3 and 51.1% have a diameter of laryngeal mask 4. 98.3% of patients had duration of 30-39 minutes mask usage and 1.7% of the patients had duration of 40-50 minutes mask usage. 18.5 percent were in the range of 60-69 Kg, 54.3% 70-79 Kg, 21.9% 80-89 Kg and 5.3% 90-100 Kg. The patients were divided into four 104-member groups of remifentanil, alfentanil, sufentanil and fentanyl. Chi-square test results show that among the four drugs remifentanil, alfentanil, sufentanil and fentanyl on the incidence of nausea after anesthesia with laryngeal mask exist significant differences in cataract surgery (p -value < 0.05), [Table1].

Fentanyl and Sufentanil respectively had the highest and lowest incidence of nausea in patients. It is worth noting that nausea of remifentanil and alfentanil were not in extreme levels.

The incidence of nausea in patients using fentanyl was 14.4 percent. Nausea of 4.8% of patients was in the mild level, 5.8% moderate and 3.8% were severe.

The incidence of nausea in patients using alfentanil was 13.5 percent. The level of nausea of 10.6% of patients was in the mild level, 2.9% were intermediate.

The incidence of nausea in patients using Sufentanil was 2 percent. The level of nausea of 1 percent of patients was in mild level, and 1% was severe.

The incidence of nausea in patients using the drug remifentanil was 9.6 percent. Only 9.6% of the patients' nausea was mild.

Table 1: Comparison the effects of four drugs remifentanyl, alfentanil, sufentanil and fentanyl on the incidence of nausea by using Chi-square test

		Nausea				Pearson Chi-Square	p-value
		no	mild	moderate	severe		
		n (%)	n (%)	n (%)	n (%)		
opioid	fentanyl(N=104)	89(85.6)	5(4.8)	6(5.8)	4(3.8)	30.31	0.00
	alfentanil(N=104)	90(86.5)	11(10.6)	3(2.9)	0(0.0)		
	sufentanil(N=104)	102(98.1)	1(1.0)	0(0.0)	1(1.0)		

Chi-square test results show that there is a significant difference among four remifentanyl, alfentanil, sufentanil, fentanyl and the duration of the mask use, weight and age of the patient after anesthesia with laryngeal mask in cataract surgery (p-value <0.05), [Table 2]. But there is no significant difference among the four drugs and diameter of the laryngeal mask and gender (p-value <0.05), [Table 2].

Table 2: Comparison the effects of four drugs remifentanyl, alfentanil, sufentanil and fentanyl based on micro factors by using Chi-square test

		opioid			
		fentanyl	alfentanil	sufentanil	remifentanyl
		n (%)	n (%)	n (%)	n (%)
laryngealdiameter	3	58(55.8)	44(42.3)	50(48.1)	43(41.3)
	4	46(44.2)	60(57.7)	54(51.9)	61(58.7)
	p-value	0.138			
time	30-39	97(93.3)	104(100)	104(100)	104(100)
	40-50	7(6.7)	0(0.0)	0(0.0)	0(0.0)
	p-value	0.00			
gender	male	46(44.2)	61(58.7)	54(51.9)	60(57.7)
	female	58(55.8)	43(41.3)	50(48.1)	44(42.3)
	p-value	0.138			
weight	60-69	31(29.8)	19(18.3)	19(18.3)	8(7.7)
	70-79	54(51.9)	37(35.6)	49(47.1)	86(82.7)
	80-89	15(14.4)	36(34.6)	30(28.8)	10(9.6)
	90-100	4(3.8)	12(11.5)	6(5.8)	0(0.0)
	p-value	0.00			
age	50-55	27(26.0)	12(11.5)	19(18.3)	40(38.5)
	56-60	38(36.5)	14(13.5)	12(11.5)	15(14.4)
	61-65	9(8.7)	16(15.4)	27(26.0)	26(25.0)
	66-70	12(11.5)	21(20.2)	20(19.2)	14(13.5)
	71-75	18(17.3)	41(39.4)	26(25.0)	9(8.7)
	p-value	0.00			

DISCUSSION

The incidence of nausea in patients using fentanyl was 14.4 percent. The incidence of nausea in patients using alfentanil was 13.5 percent. The incidence of nausea in patients using Sufentanil was 2 percent.

The incidence of nausea in patients using remifentanyl was 9.6 percent. In this study, fentanyl and sufentanil have the highest and lowest incidence of nausea in patients. All studies that used opioids do not show the increased incidence of nausea with opioids but PONV is a dose-dependent characteristic that is related to opioids, so that even short-acting opioids also in order to maintain PONV must maintain concentrations high enough to bind to receptor [15]. Today, with ever increasing outpatient surgery, there is a tendency to earlier discharge of patients from recovery. Reduction in the incidence of PONV promotes discharge of patients, costs related to antiemetic drugs, duration of stay of patients in hospitals or reduce readmission and leads to patients' satisfaction, because PONY is recommended by patients as an unpleasant feeling that is even worse than pain [16-17]. And still is a major problem after surgery under general anesthesia.

In a study comparing the incidence of nausea and vomiting associated with fentanyl and propofol with remifentanyl and propofol infusion it was shown that the incidence of nausea and need to anti-nausea drugs during the period 2-12 hours after surgery in patients receiving Fentanyl and Propofol was more [18]. However, in this study we did not examine the plasma concentrations of these drugs during and after operation, but it does not seem that it is the plasma concentrations of these drugs that the determining factor is postoperative nausea after taking opioids, because other studies have shown that the sufentanil in two equal doses of alfentanil required for analgesia after surgery has had less plasma concentration but caused a greater increase in the incidence of nausea, this results are against the results of this study. In this study sufentanil group has the lowest nausea and vomiting. In a study Langevinis and colleagues used alfentanil, fentanyl and fentanyl as a part of

balanced anesthesia technique and anesthesia protocols were planned in such a way that the at the start of the post-anesthesia care concentrations of each drug were nearly identical plasma. After a recovery period, incidence of PONV in the fentanyl and sufentanil three times more than alfentanil group, these results were contrary to the present study [19]. In some studies contrary to this study, no difference in the incidence of PONV has been seen between equivalent doses of morphine, hydromorphone, meperidine, fentanyl, sufentanil and remifentanyl. These studies were contrary to this study [20].

CONCLUSION

The results showed that compared to other opioids sufentanil had the least side effects of nausea and vomiting. Therefore, it is suggested that the Sufentanil be used for cataract eye surgery.

CONFLICT OF INTEREST

None

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FINANCIAL DISCLOSURE

None

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ARTICLE

THE EFFECT OF SOUND AND MUSIC ON SOME PHYSIOLOGICAL AND BIOCHEMICAL TRAITS, LEAF NUTRIENT CONCENTRATION AND GRAIN YIELD OF COWPEA

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ABSTRACT

The present study was conducted to examine the effect of music on the growth and yield of Kamran cultivar of in the summer of 2013 in District 7 of Tehran. This study was conducted in pot in a completely randomized design with six music treatments (Nature, classic, traditional, techno, noise, and control) in four replications. The results of this study showed that playing different types of music has significant impact on all studied traits. As a result of playing classical music compared to control treatment (non-music), traits such as grain yield in single plant (33%), stomatal conductance (21%), relative water content of leaf (21 percent), chlorophyll (47 percent), leaf area of single plant (30%), plant height (38%), sub-branch (52 percent), gibberellin hormone (81 percent), nitrogen (44%), and calcium (21%) increased. However, some traits reduced by playing classical music compared to control (non-music), that rate of their reduction for these traits was respectively: proline (13%), abscisic acid hormone (8%), and auxin hormone (2%). Generally, it can be said that as result of playing classical music, plant found better growth conditions, but playing traditional and techno music, and noise had negative impact on growth of cowpea plant, indicating that the plant as human reacts negatively to sad, unquiet, and stress creating music. It should be noted that the objective observations showed that plants against playing techno music found greater distance from sources of noise and even the arrangement of leaves (the angle of the leaves on the petiole and main stem was more open) was different than other treatments. The results of this study showed that classical music treatment improved cowpea yield and its growth through increased stomatal conductance, chlorophyll content, relative water content, and content of gibberellin hormone. Thus, according to the results of the current study, classical music treatment could be used in order to improve the growth and yield of cowpea.

INTRODUCTION

KEY WORDS

sound, chlorophyll,
stomatal conductance,
plant hormones

The use of music and sound in improving health is not dream or fiction. Beneficial and harmful effects of music have been recognized by ancient Greeks and Romans and scholars such as Pythagoras, Democritus, and Aristotle [1]. In addition to entertainment, music play very useful role in healing and harmonizing the mind, body and spirit of man. One characteristic of living creatures is giving response to stimuli. Plants are complex multicellular organisms that as human are sensitive to assess various effects and testing new treatments and give response to it [2, 3, 4]. Initially, it was believed that there is no perception and memory in plants, but it has been determined that sound has impact on growth of plants and plants as human react to music. Results of various studies indicate that music is effective in various phenomena of germination, growth and development of plants and physiological phenomena such as photosynthesis and flowering time and plant yield [5, 6]. Melodious sounds compared to untreated samples have higher impact on number of germination of seeds, and sound vibrations directly affect the biological living systems [7].

Some studies have been recently conducted in which music is used for growth, yield and quality in plants like tomatoes [8, 9], vegetables [10], and barley [11] that this branch of science is called " biological and phonological " science in which plants are exposed to sound waves or music so that high quality product to be produced, while this science is in its infancy. Some researchers have played different styles of music like rock and roll, jazz, classical or light music for plants and they have achieved to different results. However, a number of other researchers have used different sound frequencies and sound pressure level to treat plants [12].

Cowpea is a plant belonging to fabaceae species, leguminous family, and it is considered annual plant [13]. This plant is regarded often as plant with high adaptability to high temperatures and drought in comparison with other species [14]. Cowpea grains are an important source of dietary protein in developing countries of Asia and Africa, and its foliage has high nutritional values than hay. Its green pods are used and its grains are sold canned .

This plant has nutritional value that applying useful and effective methods in its planting increases its quality and its optimal production. It is clear that many factors contribute to the improvement and control of plant growth and yield. According to what was said, music could be considered one of these enumerated factors. Therefore, in this study, we are trying to determine the effects of sound and music on some traits, including biochemical and physiological traits, leaf nutrient concentration and cowpea grain yield.

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Literature Review of study

The effect of music on pants growth

Great number of studies conducted within the area of agricultural science refer to the role and vital impact of music on the growth of yield of plants. For example, Measures & Weinberger (1969) at the University of Ottawa conducted study on spring and winter wheat and placed these plants at the exposure of various frequencies in germination periods or growth period and both periods sometimes. They observed significant increase in stimulation of plant growth under 5 kHz sound compared to controls (no sound). In 1973, the book titled as "Sound of Music and Plants" was written by Dorosi. Retallack based on experiments on the effects of the plants and music. He obtained the best results from classical music (songs of J.S.Bech, Haydn, Beethoven, Abrahams, Schubert and other composers of the 18th and 19th century in Europe) and traditional music North Indian by Sitar and Tabla. He also found that inharmonious music of the twentieth century composers including Arnold, Shenberg, and Anten.Van. Vebren caused plants to dry, but not as much as rock music [15].

The effect of music on plant height

A number of researchers conducted a study on the effect of music on bean plant height and recorded plant height in the period of 32 days. First, difference in height of plants that violin music was played and then plants that traffic sound was played for them was maximum. Difference in height of control group was minimum. This means that music definitely played a role in better growth of plant. Therefore, the growth of plants received no external sound was slower. Results for traffic sound and violin music compared to control group were slightly better. Thus, it can be concluded that plants may be unable to distinguish different types of sounds, harmonious or inharmonious, but sound definitely affects the plants [16].

The effect of music on growth and germination in grains

Researchers have found that high-frequency sounds increases grain germination rate of Alyssum plant, while it seems that random sounds have opposite effect [17]. Research has shown steady and loud music sound (classical) with frequencies 200 and 2000 Hz on red bean grains and green beans increased their germination by 60% to 100% compared to control group. However, the effect of music on the germination of corn was reverse and germination rate in corn dropped by 40% compared to control group. This difference can indicate that the effect of music on plants depends of species [18]. Plants are sensitive to sounds and radio waves. Sound wave can accelerate plant growth and the effect of sound wave stimulating on the growth and development of plants is clear. Music, sound and healing energy have a significant impact on germination of grains [19].

The effect of sound waves on plant physiological activities

Each plant type requires a particular sequence of musical notes to stimulate growth. Playing real music sound stimulates the protein structure of the plant [20]. Optimal growth occurs when plant is exposed to special waves that their wavelengths are at the size of moderate sizes of plant large leaves [21]. It has been found that playing appropriate music stimulates construction of suitable proteins in plant [22]. Sound waves can alter the cell cycle [23]. Sound waves vibrate the plant leaves and accelerate the movement of protoplasm in the cells [24]. According to reports, leaf transpiration rate and exit of water from leaves are affected by sound waves affect, influencing plant growth [6]. Using laser Doppler vibrometer system, Martens & Michelsen (1981) examined vibration of four plant species in the sound field. All leaves operated in the form of linear mechanical systems when they are sound production was directed at SPL 100 dB at the reference pressure of 20 μ Pa. Leave vibration rate varied at frequencies between 0.5-5 KHz and 3×10^{-4} m s⁻¹, while vibration rate of air particles at 100 dB was 0.005 m s⁻¹ SPL. As a result, vibration rate of leaf was 3-1 times smaller than the air particles. This means that only one part of sound waves energy reaching to leaf cause vibration in leaf and other part of it releases to leaf surrounding as if leaf has not moved. Sound waves might be absorbed by leaf tissue and converted into heat [25].

MATERIALS AND METHODS

Characteristics of the experimental project

To examine the effect of music on the growth and yield of cowpea, Kamran cultivar, an experiment was conducted in the summer of 2013 in District 7 of Tehran. This study was conducted in pot in a completely randomized design with six music treatments (Nature, classic, traditional, techno, noise, and control) in four replications. Music was considered as a factor in this experiment. Twenty and four pots (at the size of 40 cm in height and 50 cm in diameter) were placed in six groups (each containing 4 pots) and they were named under tags of nature, classic, traditional, techno, noise, and control. Four pots in each group were integrated and sticking together, and all groups were same in terms of environmental conditions and they were exposed to external sound (music). Each group of pods had a source of music playing and a sound player.

Planting operation

In early June 2013, they were cultured with high density (30 grains per pot) at depth of 3 to 4 cm. Then, the grains were covered with a mixture of sand and gravel. The first irrigation was performed immediately after planting to provide favorable conditions for seedling growth and increase the germination rate. Music treatment was looped on music playing source in the form of 8 hours of continuous music. Then, it was

replicated for 8 hours in the form of playing music for one hour and silence for one hour by music playing device for 8 hours.

Six treatments included: a) the nature group received nature sounds like the sound of birds, waterfalls, etc. b) classical music group received songs of musicians including Beethoven, Mozart c) traditional group received songs of traditional Iranian music devices such as saline, Knoll, etc. d) techno group e) noise g) control (no music). Since the planting of grains, music was played every day from 9 am to 5 pm for 8 hours, intermittently.

Plant maintenance operation

The first irrigation was performed immediately after planting to provide favorable conditions for seedling and increase the rate of germination. To regulate density, at the time of thinning (2-3 weeks after planting or 2 to 4 leaf stage), the number of seedlings in each plot reduced to 6 by removing the poor seedlings. In this stage, combating with weeds, pests and diseases took place.

Measuring traits at the time of flowering

In the mid-flowering, traits such as chlorophyll (SPAD value), stomatal conductance, and relative water content (RWC), and leaf area were measured.

Measurement of chlorophyll

In order to measured chlorophyll value, hand chlorophyll meter device of SPAD (CM 200 model) was used. Chlorophyll meter shows the relative concentration of leaf chlorophyll based on amount of light absorbed. This measurement was conducted on each pot included 6 plants that three of them were non-destructive and three of them were destructive. Among destructive plants in each pot during the 9-11 hours, the highest leaves of these three plants were determined by chlorophyll meter devices through three readings.

Relative water content

Relative water content of leaf (RWC) is calculated using Turner formula as follows:

$$100 \times (\text{dry weight saturated weight}) / (\text{dry weight of leaf} - \text{fresh weight of leaf}) = \text{RWC}$$

3.4.3. Stomatal conductance

To measure Stomatal conductance, LEAF PROMETER - SC-1, Decagon device was used. This measurement was conducted from upper leaves of three plants determined in each pot during 9-11 hours. [26]

Leaf area (LA)

To measure leaf area index, LAI LEAF AREA METER scanning device ci202 model was used. We conducted this measurement by scanning all leaves of three destructive plants in each pot.

Measurement of physiological and biochemical traits

Nitrogen measurement

Nitrogen of plant was measured through Kjeldahl device. After obtaining plant sample, total amount of nitrogen of plant was calculated by the following formula:

$$\text{Plant nitrogen content} = (\text{read number of blank titration} - \text{read number of plant sample}) \times 0.491$$

Calcium measurement by atomic absorption spectrophotometry

After clouding in the acetylene-air flame, plant extract is evaporated and calcium compounds are converted to atoms. These atoms in based state absorb radiation from hallow cathode related to itself. The beam of calcium atoms in 422.77 nm wavelength was measured by atomic absorption spectrometry.

Measurement of leaves Proline

To measure Proline, [27] method was used. Proline concentration is determined in milligrams per gram of fresh leaf tissue. Unit is determined in milligram per gram of fresh weight according to the following formula:

$$\text{micromole proline in gram of leaf fresh weight} = \left[\frac{\mu\text{gproline}}{\text{ml}} \times \frac{\text{mlToloen}}{5} \times \frac{115}{5} (\mu\text{g}/\mu\text{mol}) \right] \div \frac{\text{grsample}}{5}$$

Measurement of hormones

Measurement of plant hormones such as gibberellins, auxin and ABA was conducted after solutions preparation and plant samples, using HPLC analysis by observing its analysis conditions.

Harvesting operation

After physiological maturity and drying of pods, the crop was harvested in the first week of November 2013.

Measurement of traits in the final harvesting time

Traits at the time of the final harvest

At the end of the growing season, 3 non-destructive plants were harvested in each pot and their height, number of sub-branches, number of pods per plant, number of grains per pod and grain weight were

calculated. The plant height was firstly measured. Then, number of pods was counted. Then, grains were separated from pods and counted. Grains were placed in sun so that sun to dry them. After, two days, their weight was measured that this weight is fact grain yield of three plants in each pot that through dividing it to number of grains, mean weight of grain was calculated.

Data analysis

Data analysis was performed using MSTAT-C software, comparison of means was performed using Duncan method, and graphs were outlined using Excel software.

RESULTS

Grain yield in single plant of cowpea

Investigations conducted in this regard showed that the effect of playing different types music on yield of cowpea grain was significant at the 1% level (Table 4-1).

Comparing means showed that the highest grain yield (with mean of 47.5 g) was obtained in the plant treated by playing classic music, and the lowest yield (with mean of 28.25 g) was obtained in the plant treated by traditional music. Techno music, nature sound, and noise showed no significant difference compared to control group (Table 4-2).

In the present study, the classic music treatment increased all components of grain yield (number of pods, number of grains per pod and grain weight) in cowpea. Ultimately, this treatment resulted in a 33% increase in grain yield.

Table 4.1- Variance analysis results of cowpea yield and its components under the effect of music treatments

Source of changes	df	Number of pods in plant	Number of grains in pod	Grain weight percentage	Grain yield
Treatment	5	18/67*	1/62ns	24/64**	152/47**
error	18	5/79	0/92	3/80	14/79
Coefficient of changes (%)	-	12/72	11/88	8/01	10/35

Ns, *, **are respectively non-significant, significant at the level of 5 and 1 percent probability level

Table 4-2- Results of comparing the mean yield and components of cowpea yield under music treatments

Treatment	Number of pod in plant	Number of grain in pod	Weight of grain (g)	Grain yield in single plant (g)
Control	20/00ab	7/70a	23/07bc	35/50b
nature	20/25ab	7/25a	24/94b	37/25b
Classic	21/75a	7/75a	28/83a	47/50a
Traditional	15/72c	8/24a	21/64c	28/25c
Techno	18/00abc	8/77a	24/46bc	38/00b
Noise	17/75bc	8/84a	23/16bc	36/25b

In each column, the means with at least one shared letter had no statistically significant difference at the 5% level based on Duncan test

Stomatal conductance of cowpea

The investigations showed that the effect of treatment (playing various music) on cowpea leaf stomatal conductance was significant at the 5% level (Table 4.3). According to the results of comparing the means, the highest stomatal conductance (with an mean of 155.58 micromoles per second) was obtained from treatment of playing classical music and lowest value (with mean of 108.45 micromoles per second) was obtained from treatment of playing nature (Table 4-4). It is noteworthy that plant stomatal conductance increased by 21 percent after playing classic music.

Relative water content

Analysis of variance showed that the effect of music on the distribution of cowpea relative water content was significant at the 1% level (Table 4.3). The results of comparing the means presented in Table 4-4 showed that the highest relative water content with mean of 92.17% was obtained from treatment of playing classical music that showed no significant difference with treatment of nature, noise, and techno music. Additionally, the lowest relative water content with mean of 75.68% was obtained from treatment of playing

traditional music that this treatment had no significant difference with non-playing the music (table 4-4). However, in general, playing classical music compared to control treatment (non-music) increased relative water content by 21 percent.

Chlorophyll of cowpea leaf

The effect of treatment (playing various music) on chlorophyll value of cowpea leaf was significant at the probability level of 1% (Table 4-3). As result of playing classic music, chlorophyll content of leaf increased significantly so that it showed significant difference with control group with mean of 36.27 milligram per gram of fresh weight and the lowest content of chlorophyll was obtained from treatment of playing traditional music (Table 4-4).

Leaf area of cowpea

Based on the results variance analysis reported in Table 4.3, the effect of playing different types of music on cowpea leaf area was significant at the probability level of 1%. The highest leaf area with mean of 837.31 cm was obtained from plant treated by playing classic music, while the lowest value with mean of 553.38 cm was obtained from plant treated by playing traditional music (Table 4-4).

Cowpea plant height

Investigations conducted on the effect of playing all types of music on cowpea plant height showed its significance at 1% probability level (Table 4-3) so that by playing music height of plant increased. Results of mean comparisons showed that the highest plant height with the mean of 48.75 cm was obtained by playing classic music, and the lowest height was obtained from control treatment with mean of 35.14 cm (Table 4-4), reflecting the positive impact of music on plant growth.

Number of sub-branches in cowpea

As shown in Table 3-4, the effect of different types of music on number of cowpea sub-branches was significant at the probability level of 1%. As result of playing music, the number of sub-branch increased. Results of comparing means showed that the highest number of sub-branches was obtained by playing classic music that was different significantly from treatment of playing techno music and the lowest number of branch with mean of 5.5 branches was obtained from treatment of lack of playing music (Table 4-4-).

Table 4-3- variance analysis results of some cowpea traits under music treatments

Source of changes	df	Stomatal conductance	Relative water content	Chlorophyll	Leaf area	Plant height	Sub-branch
Treatment	5	938/39*	237/94**	164/48**	42690/88**	94/32**	4/63**
error	18	314/65	27/73	12/75	7246/51	13/02	0/33
Coefficient of changes (%)	-	13/38	6/16	12/48	12/10	8/47	7/96

Table 4-4- Results of comparing the mean of some cowpea traits under music treatments

Treatment	Stomatal conductance (Micromole per second)	Relative water content (percent)	Chlorophyll (device number)	Leaf area (cm)	Plant height (cm)	Sub-branch
Control	127/88ab	76/00b	24/62c	642/66cd	35/15d	5/50c
Nature	108/45b	90/13a	31/85ab	714/35abc	46/20ab	6/67b
Classic	155/58a	92/17a	36/27a	837/31a	48/75a	8/40a
Traditional	135/33ab	75/68b	17/95d	553/38d	39/30cd	7/17b
Techno	130/28ab	91/45a	30/72ab	676/01bcd	43/45abc	8/25a
Noise	137/78a	86/16a	29/15b	794/86ab	42/70bc	7/52ab

Cowpea leaf proline

The results reported on the impact of the effect of playing various types of music on content of proline indicate its significance at 1% probability level (Table 4-5) so that playing music that was stressful increased proline. As shown in Table 6-4, the highest value of proline content with mean of 10.11 milligrams per gram of fresh weight was obtained from treatment of playing techno music, while the lowest content with mean of 5.95 milligrams per gram of fresh weight was obtained from nature music. This suggests the stressing effect of techno music inducing the plant for synthesis of osmolytes such as proline.

The amount of the gibberellin hormone in cowpea plant

The results of this study indicated the effect playing different types of music on amount of gibberellin hormone is significant at probability level of 1% (Table 4-5) so that as result of playing classic music, compared to other treatments, gibberellin acid hormone increased. The results of the means comparisons state that the highest rate of gibberellin with mean of 2.22 milligram per gram of fresh weight was obtained from treatment of playing classic music. In addition, the lowest rate of gibberellin with mean of 1.07 milligram per gram of fresh weight was obtained from treatment of playing noise sound that it has no significant difference with treatment of lack of playing music (control) (Table 4-6).

Auxin hormone of cowpea plant

Investigations (Table 4.5) showed that the effect of music on the auxin hormone in cowpea plants parts was significant at the 1% level of probability. Results of the comparison of the means presented in Table 4.5 indicates it, since the highest rate of auxin hormone with mean of 1.8 milligram per gram of the fresh weight was obtained from treatment of playing techno music that had significant difference with control group. The lowest rate of it with mean of 0.98 milligram per gram of fresh weight was obtained from treatment of playing classic music that had no significant difference with control group and playing noise sound group.

Abscisic acid hormone in cowpea plant

The results of this study showed that the effects of playing different types of music on abscisic acid hormone level was significant in cowpea leaves at probability level of 1% (Table 4-5) .According to results reported in Table 4-6, the highest abscisic acid hormone content with mean of 1.56 milligram per gram of fresh weight was obtained from techno music that had significant difference with control group. In addition, the lowest rate of it with mean of 0.83 milligram per gram of fresh weight was obtained from treatment of non-music that had no significant difference with playing music.

Table 4-5- Results of variance analysis of bio-chemical traits of cowpea under the effect of music treatments

Source of changes	Df	Proline	Gibberellin	Auxin	Abscisic acid
Treatment	5	8/53**	0/67**	0/37**	0/31**
error	18	0/27	0/030	0/0028	0/0023
Coefficient of changes (%)	-	6/82	11/64	4/43	4/26

Table 4-6- Results of mean comparison of bio-chemical traits of cowpea under the effect of music treatments

treatment	Proline (milligram per fresh weight gram)	Gibberellin (milligram per fresh weight gram)	Auxin (milligram per fresh weight gram)	Abscisic acid (milligram per fresh weight gram)
Control	7/48c	1/22d	1/00d	0/83d
Nature	5/95e	1/64b	1/25b	1/06c
Classic	6/60de	2/22a	0/98d	0/90d
Traditional	7/28cd	1/31cd	1/15c	1/37b
techno	10/11a	1/57bc	1/80a	1/56a
Noise	8/33b	1/07d	1/06d	1/06c

Nitrogen content in cowpea leaf

The results of the analysis of variance of the data related to this trait indicated that the effect of the playing different types of music on nitrogen element in cowpea leaves beans was significant at 1% level of probability (Table 4-7). Based on the investigations conducted, considering the results of comparison of mean shown in Table 4-8 the highest nitrogen content in the cowpea leaves with the mean of 3.28% of the dry weight was obtained from treatment of playing classic music that had significant difference with control treatment. In addition, the lowest nitrogen content in the cowpea leaves with the mean of 2.27% of the dry weight was

obtained from treatment of non-music that had no significant difference with treatment of playing techno music.

Calcium content in cowpea leaf

Based on the results reported in Table 4-7, the effect of the playing different types of music on calcium element in cowpea leaves beans was significant at 1% level of probability. In addition, results represented in Table 4-8 suggested that the highest calcium content in the cowpea leaves with the mean of 23.42 milligrams per dry weight gram was obtained from treatment of playing nature music that had no significant difference with treatment of playing classic music. In addition, the lowest nitrogen content in the cowpea leaves with the mean of 15.97 milligrams per dry weight gram was obtained from treatment of noise sound that had no significant difference with treatment of playing techno music.

Table 4-7- Results of variance analysis of concentration of nutrients of cowpea leaves under the effect of music treatments

Source of changes	Df	Nitrogen	Calcium
Treatment	5	0/74**	35/62**
Treatment	18	0/17	7/69
Coefficient of changes (%)	-	15/55	14/42

Table 4-8- Results of comparing the mean of concentration of nutrients of cowpea leaves under the effect of music treatments

Treatment	Nitrogen (dry weight percentage)	Calcium (milligram per dry weight gram)
Control	2/27c	18/11bc
Nature	2/71abc	23/42a
Classic	3/28a	21/92ab
Traditional	3/07ab	19/49abc
techno	2/20c	16/43c
Noise	2/51bc	15/97c

CONCLUSION

The results revealed that the effect of playing different types of music on all traits was significant. The results of means comparing suggested that among all types of music, playing classical music had significant impact on some traits. In general, it can be said that as result of playing classical music and even sounds of nature in some cases plant had better growth conditions, while treatment of playing traditional and techno music, and noise had a negative impact on cowpea plant growth. This result suggests that the plant, as human, reacts negatively to insecure, unquiet, or stress-causing sounds. It should be noted that the objective observations indicated that plant found greater distance from sound production source in playing the techno music and even the arrangement of leaves (leaves angle on the petiole and the stem was more open) was different compared to other treatments and results of other similar studies have been mentioned in this regard.

Grain yield

In this study, as result of playing classical music compared to control treatment (non-music), grain yield in single plant (33 percent) increased.

Investigating the effect of music on cluster bean growth, Vanol & Vaidya (2014) reported that instrumental classic music compared to the melodious sounds of rhythmic rock music had positive effect on the growth of plants. Both instrumental classic music and rhythmic rock music showed better results compared to control. This was also true on negative effects of traffic noise. Higher frequency (2000-1500) showed better results than lower frequency (100-50) and in the case of plant growth plants that were close (25cm) to sound source showed more positive effect than the plants that were distant from the sound source (55 cm).

Stomatal conductance

In this study, as result of playing classical music compared to control treatment (non-music), stomatal conductance in plant studied in this research (21 percent) increased.

At the same token, India University professors played obscure parts of the violin for plants at certain times and sometimes they used its setting clutches as sound source. After several years of experience in the area of sound effects, these results were obtained: Music causes that plant release its oxygen 60% to 100% more

than its conventional level and as the value of oxygen released is exactly consistent with amount of carbon absorbed from carbonic gas in the air, it indicates the increased stomatal conductance as result of playing the music.

Relative water content of leaf

As result of playing classical music compared to control treatment (non-music), Relative water content of cowpea leaf (21 percent) increased.

Sound waves vibrated the plant leaves and accelerated the protoplasm movement in the cell [24]. According to reports, the rate of transpiration and water loss from the leaves are affected by the sound waves, which in turn affects plant growth [6].

Additionally, water absorption is also improved leading to an increase in the relative water content. Kai Xun et al showed that 400 Hz and 106 dB sound stimulation has the best effect on the rate of grain germination, seedling height, the relative increase in fresh weight, ability to split the root, root activity, and plasma membrane permeability [28]

Chlorophyll

The results show that the amount of chlorophyll in plants exposed to classical music compared with control group has been increased by 47%. In this regard, many studies show that plants exposed to louder music, plant height, leaf area, and plant weight had higher chlorophyll content. Additionally, these traits were higher in plants that classical music compared to plants heavy metal music and control groups [18]. Various elements of music had positive effects on the mitotic divisions and growth in leaf cells of onion that this positive impact of music on chlorophyll content in the leaves of onions has been reported in the current study [29].

Single plant leaf area

Due to playing classical music, leaf area of single plant studied in the research increased by 30 percent compared to control (non-music). The results of some studies have shown that the plants exposed to the louder music, plant height, leaf area, plant weight, and chlorophyll content were higher. In addition, these traits in plants that played classical music was played for them were greater than plants heavy metal music and the control groups [18].

Plant height

Due to playing classical music, height of cowpea pant studied in the research increased by 38 percent compared to control (non-music).

In investigating the effect of six types of music with different frequencies on cowpea growth reported that the best treatment to improve the effects of growth and plant height included 400 Hz sound waves, cuckoo singing and the sound of crickets, followed by other treatments . Acoustic sound with cuckoo and cricket sound could increase the height and dry weight of this plant at the stage of seedling. They stated that various sound waves with different frequencies has significant improving effects on seedling stage growth of the cowpea, but their effects varied.

Number of sub-branches

The results showed that sub-branches of plants exposed to classical music playing compared with treatments of control group increased by 52%. It noteworthy that in one study the growth and type of plant species, bean and henna, under sounds of different frequencies were studied. The results of the studies showed that the optimal growth of these plants occurs when the wavelength of the sound was in accordance with the size of the leaves. It should be noted that in the case of bean, growth with random noise was less than the growth of pure sound. This significant difference between the growth in henna plant when exposed to random noise and pure sound was not seen, but the general result showed that as result of playing the music, the number of sub-branches and vegetative organ increased in both plants [22].

Proline

Some plant traits, such as proline decreased by 13% through playing classical music compared to control (non-music) group, but stressful music such as techno music has reverse effect, so that considering the current study, playing stressful music photos increased proline.

Evidence suggests that some genes may be stimulated by sound to move, so the amount of duplication might be increased that increased proline content could be justified by it [30].

Gibberellin

As result of playing classical music compared to control treatment (non-music), stomatal conductance in plant studied in this research increased by 81%.

India University professors played obscure parts of the violin for plants at certain times and sometimes they used its setting clutches as sound source. After several years of experience in the area of sound effects, it was found that music causes that plant to release its oxygen 60% to 100% more than its conventional level and as the value of oxygen released is exactly consistent with amount of carbon absorbed from carbonic gas

in the air. As a result, plant growth greatly and gives more flowers or fruits, controlled as result of gibberellin synthesis in plant.

Auxin

Auxin hormone was increased by 2% compared to control group (non-music) by playing classical music. On the other hand, the highest content of auxin with mean of 8.1 mg per gram of fresh weight was obtained from treatment of playing techno music that had significant difference with control group.

In order to study the effects of sound on callus *Chrysanthemum* growth by measuring the activity of SOD, soluble proteins content, oxidase activity of indole-3-acetic acid (IAA), and calcium absorption, Liu et al., (2002) used a sound stimulation generator (SSG). In their results, they stated that auxin hormone content reduced as result of sound frequency increase.

Abscisic acid

Abscisic acid hormone was also reduced by 8% compared to control group (non-music) by playing classic music, while the highest content of abscisic acid with mean of 1.56 milligram per gram of fresh weight was obtained by playing techno music that had significant difference with control group. Abscisic acid known as stressful hormone and its concentration increases at the stressful conditions. Therefore, its concentration is low when conditions are favorable for plant growth.

Inducing effect of sound wave on dynamical change of Indole-3-acetic acid (IAA) and abscisic acid (ABA) in the laboratory during the differentiation of mature callus of *chrysanthemum* showed that in the group treated with sound frequency (SF) 1.4 dB and SPL 95 kHz, IAA content was significantly higher ($p < 0.05$) and ABA content was lower than the control group. As a result, activation of IAA and ABA inhibition for development and differentiation of mature callus are desirable. Sound waves increased capacity of IAA metabolism and prevented ABA metabolism in mature callus. Thus, higher content of IAA / ABA in treated callus showed that specific gene expression system is associated with internal hormone, which is regulated by certain signals generated by sound waves stimulation [31]

Nitrogen

Nitrogen content was increased by 44% compared to control group (non-music) by playing classical music. Sound waves stimulation increased root activity, total length, and number of roots [32]. Dan Carlson invented sonic bloom that contains a unique blend of sound and spray spraying seaweed and he indicated that the frequency of 3 to 5 kHz makes the opening of the orifice and increasing absorption of nutrients contained in the atmosphere, including nitrogen and moisture in the morning dew [33].

Calcium

The results of this study showed that playing classical music enhances the calcium content of the plant by 21 percent compared to control (non-music) group. In this regard, Liu et al., (2002) used a sound stimulation generator in order to investigate the effects of sound field effects on callus *Chrysanthemum* growth by measuring the activity of SOD, soluble protein, acid oxidase activity, indole-3-acetic (IAA), and absorption of calcium. They reported that as result of increasing sound frequency, activity of superoxide dismutase (SOD), soluble proteins and calcium absorption increased in callus.

As seen, the present study investigated the effect of sound and music on some physiological and biological traits, leaf nutrient concentration, and grain yield of cowpea. We hope that findings of the current study to have significant impact in the adoption and application of innovative solutions in farming practices, especially acquiring the necessary knowledge on breeding the plants and increasing the quality of their growth stages.

CONFLICT OF INTEREST

None

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None

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ARTICLE

STUDYING THE ROLE OF CLIMATIC PHENOMENA IN ROAD ACCIDENTS IN YAZD PROVINCE

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ABSTRACT

This study has been conducted aimed to investigate the role of climate phenomena in road accidents in Yazd in 2015-2016. This study is a descriptive-quantitative one conducted in documents or descriptive-analytic method. Research population consisted of all statistics and documents related to road accident of Yazd. In this research, the statistics of road accidents of Yazd due to dust from 2010 to 2014 were considered as the study sample. The data was obtained from records and statistics provided by the meteorological organization, traffic police, Department of Transportation and Terminals, and Urban Development Department of Yazd. Inferential statistics indices chi-square test, Friedman test, Pearson correlation and regression were used to analyze data. The results showed that the increase in the frequency of dust is correlated with an increase of accidents in Yazd (correlation coefficient 0.75). In the study period, 55.6 percent of accidents have been due to dust and 44.4 percent have been due to other climatic factors. Moreover, the results showed that the most accidents caused by dust have been in the spring and then in winter. Finally, road accidents caused by dust from 2010 to 2014 have had an increasing trend in a varying form. As a result, the climatic factor dust has a greater role in road accidents compared to other climatic factors, and this phenomenon increases with the annual increase in the number of vehicles present in roads of this province and increase in intercity trips in the intended seasons.

INTRODUCTION

One of the study cores of human and environment relations is addressing the environmental hazards. Environmental hazards may be man-induced or natural and no matter whatever the results, they return to man or the environment. Human hazards include excessive levels of crime, war, economic depression, weakness, a variety of illnesses, and pollution, and natural hazards refer to incidents such as earthquakes, volcanoes, droughts, floods and storms. With different level of strength, in all places and at all times, natural hazards threaten human existence, always lead to destruction, and create huge damages to human life and property.

In general, four main factors are involved in accidents: natural factors or environmental factors, human factors, management factors, and vehicles .[1] In addition to incidents in which human is involved, natural disasters such as floods, earthquakes, hurricanes, cyclones, and dust have had a significant role in the escalation of events, especially car accidents over the past decades. Road accidents and their fatalities are one of the current challenges of human societies that impose enormous costs on the economy of countries and pose a big problem to general health. [2]

Several factors may contribute to the occurrence of road accidents, among which the geometric design problems, environmental conditions, and human factor could be noted. Among natural factors (that affect safety and sustainability of transportation) climatic factors can be pointed out, whose effects on road accidents are identified in a documented and logical way. It can be stated that, although very few studies have been done in this area, abundant evidence of the effects of climatic factors such as dust, rain, snow, and frost as important and influential factors in road accidents is found.

Among the important consequences of dust are cutting off roads, limiting visibility for drivers, and trapping them that in some cases besides causing significant economic damage, cause much human injury . In substantial parts of Iran, including deserts and arid and semi-arid regions, such as East and Southeast of the country, part of the Central Plateau and East Esfahan (Nain, Ardestaan, Kashan), Yazd, Kerman, Sistan and Baluchestan, Fars, some parts of Khuzestan and southern parts of Khorasan, Markazi, and Hormozgan, climatic conditions is favorable for dust. In these areas, on the one hand, due to dry land, there is not enough vegetation, and on the other hand, the hot weather of spring and summer has dried the soil and turned it into powder. [3]

Every year, dust imposes great damage to the residential areas and roads, we always witness the decline of many cities and villages of the country, especially in desert areas, and the residents of these areas flee from their homes and turn to larger cities, which threatens normal life in urban and rural communities. Health can also be affected by dust. Dust particles can cause respiratory problems, especially asthma. In addition, viruses and germs in the dust can cause various diseases .[4]

In a comparison between countries in terms of development, the most victims of this crisis are in developing countries, so that road traffic accidents are known as one of the major causes of death in these countries. Dust imposes irreparable damage to the earth every year, and not only in Iran but also in other Asian, African, and American countries, it causes frequent physical and financial damages. Each year, dust destroys human life, challenges sustainable urban and rural life, and has a devastating impact

KEY WORDS

climatic factors, the role of dust, road accidents

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on road transport, agriculture, crops and livestock, trade, and public health and welfare of the people in the affected areas and nature .

Studies concerning the impact of climatic factors on the occurrence of road accidents and controlling strategies in developed countries have had significant progress hence; these countries have become a good role model in minimizing damage from road accidents incurred by climatic factors. However, unfortunately, due to the lack of studies on the role of climatic factors (especially dust) in road accidents in Iran, insufficient information of toll officials of these factors, lack of preventive measures in this regard, and poor performance of officials, every year we witness tragic events that can be minimized with some management and research .

Doaguyan et al. conducted a study titled "Analysis of the role of dust storms in occurrence of road accidents (Case Study of Minab-Jask road). The aim of this study was to evaluate the effects of dust storms on the number of road accidents of Minab-Jask road. The results showed that the highest number of road accidents in Minab has happened in spring in April, when dust storms have often occurred due to dry air. By identifying the characteristics and predicting this type of climatic disaster one day before, while traffic management, road safety, and informing roadside assistance databases, EMS, police, and warning drivers, one can reduce the damage of this climatic disaster. Exploring and identifying the role of climatic factors of road accidents are important in terms of offering management solution. Management of accidents and or accident scene management is one of the effective strategies that can reduce the consequences, including reducing mortality, and preventing new accidents by controlling climatic factors. This study is conducted aimed to investigate the role of dust in the road accidents in Yazd. [5]

Moreover, as road-accidents caused by dust are not fully covered by financial and life insurance in Yazd, most perpetrators escape from the scene, and this has created a kind crime and has exacerbated insecurity in the province. Thus, in addition to loss of life and property that road accidents incur in Yazd, they have numerous cultural problems ranging from failure to comply with traffic laws, civil rights, culture, traffic, lack of cooperation and partnership in crisis management, etc. [6]

Accordingly, main research question or problem will: what role does the climatic factor dust have in the occurrence of road accidents in Yazd? These questions in detail are:

- How much is the role of dust compared to other climatic factors in road accidents in Yazd?
- In which season of the year has dust caused the most road accidents in Yazd?
- How are the process and developments of road accidents due to dust in Yazd?

MATERIALS AND METHODS

In general, the dominant approach of this paper is applied-developmental and its analysis method is descriptive-analytic. The population is the number of traffic accidents of Yazd and the required information is collected from statistical yearbooks, Meteorological Organization in Yazd, traffic police of Yazd, Department of Urban Planning, Department of Transportation and Terminals of Yazd, and Governor of Yazd. The changes and development of road accidents are studied with developing questionnaires and their completion to obtain field information with respect to documents available with the use of data and statistics related to accidents in the past 5 years. Therefore, methods of accidents mean, accidents type, and causes of accidents were used for analyzing accidents, because the technique of assessing and analyzing the past years can provide good information about the causes and contributing factors in the accidents. Moreover, it may be used to manage accidents and changes that will befall in the future. All data and documents related to road accidents in Yazd from 2010 to 2014 formed the study population. [7]

In this method, the researcher has collected the needed data and information from authoritative sources. The researchers has received data from the records and statistics provided by the Meteorological Agency, the traffic police, and the Roads and Urban Development of Yazd, and by developing a questionnaire and completing it and by turning data into usable data, he has analyzed the statistics.

In order to analyze the data from the study, the indices of descriptive and inferential statistics are used. SPSS software is used whenever necessary. The indices of frequency, percentage, and so on are used to describe data (drawing tables was used for data classification). In order to test research hypotheses, nonparametric chi-square test (significance test) through spss is used. For inferential analysis of the data, chi-square test, Friedman test, Pearson correlation coefficient, and regression are used. [8]

RESULTS

In order to show the frequency of occurrence of storms in Yazd, the statistics of synoptic stations of this province during 2010-2014 are used. The results show that the highest frequency of storms in the study period is related to 2014 with 47 times. Moreover, in terms of frequency in month, May with 53 times has the highest frequency during the statistical period. Displaying the influence of each climatic factor on the accidents in this province indicates that during the entire statistical period studied, the phenomenon of dust has caused accidents more than any other phenomenon. In this period, the phenomenon of dust has caused 1948 accidents and storm has caused 913 accidents.

Examining the relationship between dust and accidents in Yazd

In [Table 1]n order to evaluate the extent and the nature of the relationship between the independent variable (the phenomenon of dust) and the dependent variable (accidents), Pearson correlation coefficient is used. The results of this coefficient at 99% confidence level show a significant relationship between the variables: according to this output, the increase in the frequency of dust has increased the total accidents in Yazd. This coefficient is obtained as 0.745 indicating the strength of the relationship between variables.

Table 1: Analysis of the relationship between the phenomenon of dust and accidents in Yazd

Pearson coefficient		Dust	Accidents
Dust	Pearson coefficient	1	0.745**
	Significance level		0.005
	Frequency (per month)	12	12
Accidents	Pearson coefficient	0.745**	1
	Significance level	0.005	
	Frequency (per month)	12	12
** Significance level 99% (0.01)			

Moreover, to determine the effect of dust on accidents, the coefficient of determination (beta) in regression test is used. The results of coefficient of determination of regression analysis show that in the studied period, due to the intercorrelation of variables, 55.6% of the accidents are due to dust and 44.4% are due to the other factors. Moreover, regression analysis shows that the dependence of the dependent variable accidents is equal to 0.745 [Table 2].

Table 2: Regression coefficients of accidents and dust

Variable		Correlation coefficient	The coefficient of determination	Adjusted coefficient of determination	Estimation error	Significance
1	Value	0.745	0.556	0.511	13.40308	0.005

Resource: research findings, 2015

The impact of dust on accidents compared to other climate factors

In Table 3 order to investigate the role of dust in road accidents in Yazd compared to other climatic factors, chi-square test was used. The results are presented in the following. As indicated in Table 3, the observed chi-square value is 816.137, and its significance level is smaller than 0.01. Accordingly, it can be argued that that there is a significant difference between the accidents occurred due to different climatic factors. According to the results, it is observed that amongst climatic factors, dust has the most important role in road accidents.

In addition, in order to determine the impact of each factor on the accidents, the coefficient of determination (beta) regression test is used. According to coefficient of determination regression test, dust is the cause of 55.6% of the accidents, storms, rain, and snow and ice are the cause of 0.167 of the accidents in Yazd.

Table 3: Results of chi-square test to compare the role of dust and other climatic factors in accidents

	Climatic variables				Chi-square test	Degree of freedom	Level of significance
	Storm	Dust	Rain	Snow and ice			
The number of accidents	913	1948	541	409	816.137**	3	0.000

** Significance level 99% (0.01)

Seasonal relationship of dust and accidents in Yazd

In [Table 4] In order to assess, in what season of the year the accidents and dust have happened more and the fact that whether the frequency of dust and accidents in a particular season is consistent or not, while using chi-square test, Friedman test is used. Chi-square values observed is equal to 1137.492 and its significance level is smaller than 0.05. Accordingly, we can argue that there is a significant difference in different between the accident occurred due to the dust in different seasons. Thus, most accidents caused by dust are in the spring and then winter.

Table 4: Freedman statistics of the dependent and independent variables separately for seasons in the investigation period

	Freedman statistics dust	Freedman statistics accidents
Spring	3.67	3.33
Summer	2.33	3
Fall	1.17	1
Winter	2.83	2.67

The process of road accidents in Yazd during the period

In Table 5: order to show the process of road accidents of Yazd due to dust during the period, while using chi-square test, Friedman test was used to show the frequency. Chi-square value is equal to 124.627 and its significance level is smaller than 0.05. Accordingly, it can be argued that there are significant differences between the road accidents caused by dust in different years. According to information obtained, it is understood that the road accidents caused by dust in Yazd have increased from 2010 to 2014, so that in 2010, the number of accidents caused by dust was 1432, which has reached 1542 in 2014. It should be noted that the variability of this increase for this period is because in some years due to a higher frequency of dust phenomenon, for example, in 2013 more accident have occurred than a year after.

Freedman's test results at 99% confidence level also show that the highest frequency of accidents is for the year 2013. Friedman statistics for accidents are 2.25 for 2010, equal to 1.42 for 2011, equal to 2.88 for 2012, equal to 4.83 for 2013, and 3.63 for 2014.

Table 5: Friedman test values for accidents caused by dust in Yazd

	Statistical Profile	Friedman statistic	Friedman statistic
Frequency	12	2.25	2.25
Chi-square statistic	32.954	1.42	1.42
Degrees of freedom	4	2.88	2.88
Significance level	0.000	4.83	4.83
		2014	3.63

Resource: research findings, 2015

Ordinal assessment of the impact of climate conditions on road accidents

In [Table 6] order to assess the fact that from among the studied climatic conditions which one has a greater impact on road accidents, W. Kendall ordinal test is used. The results of this test at 95% confidence level show that from among the climatic conditions, dust has the most effect on road accidents of the studied route. W. Kendall statistic was obtained as 4.08 for this phenomenon. The results of this

test show that, like descriptive findings, cloudy sky has minimal impact on road accidents among the different climatic conditions with 2.23.

Table 6: Ordinal assessment of the impact of climatic conditions on road accidents

Rank	W. Kendall statistics	Climatic condition
6	2.23	Cloudy
3	3.90	rainy
4	3.55	Snowy
2	4.00	Misty (of moisture)
5	3.25	Clear (direct sunlight)
1	408	Dust (Storm)

Resource: research findings, 2016

Inferential assessment of the impact of dust on road accidents

In order to assess whether or not dust has a role in road accidents, univariate t-test is used. The results of the test at 95% confidence level, taking into account the spectral range of Likert, and utility of the number three show that dust has affected road accidents. This is because all the items are at significant level, the mean observed is larger than expected, and the statistics have positively been assessed. As the test results show, the highest test statistic with a value of 3.684 is for the overall impact of dust on road accidents.

In [Table 7] according to test results, three variables of the impact of dust on reducing visibility, the impact of dust on the main route deviation of drivers, and its overall impact on road accidents have been assessed as strong, and only the item of the impact of dust on the road facilities and consequently accidents is estimated at an average level. This shows the high relationship between dust and road accidents, especially in the studied route.

Table 7: Inferential assessment of the impact of dust on road accidents

Components	Number utility test 3					
	Test statistics	Degree of freedom	significance	Mean difference	99 level of confidence	
					Minimum	Maximum
Loss of vision	2.904	19	0.009	0.85000	0.2347	1.4626
Deviation from	3.387	19	0.003	0.80000	0.3056	1.2944
Destruction of	1.756	19	0.04	0.45000	-0.0863	0.9863
The overall impact	3.684	19	0.002	1.00000	-.4319	1.5681

Resource: research findings, 2016

Assessing the factors affecting the reduction of road accidents caused by dust

In order to identify and assess the factors affecting the reduction of the role of dust in road accidents, five variables were selected. The results show that from among the studied variables, facilities with an average of 3.86 is at the highest level of effectiveness in reducing road accidents due to dust and the performance of other organizations with an average of 3.48 is at the lowest level of effectiveness. Among the items examined, quantitative and qualitative improvement of crisis information-equipment with an average of

4.15 has the highest impact and interaction and consultation with other relevant bodies before and after the crisis with an average of 3.20 is at the lowest level of effect. [Fig. 1]

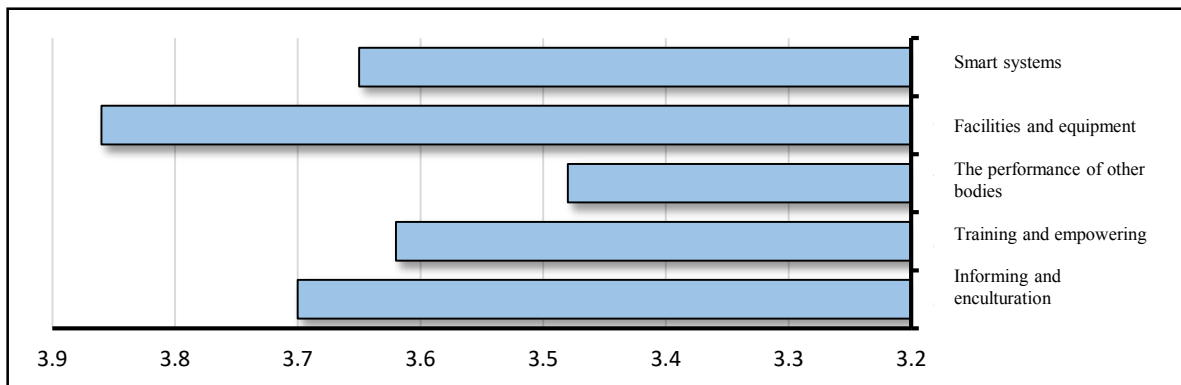


Fig. 1: Assessing factors affecting reduction of road accidents caused by dust.

CONCLUSION

1. The role of dust compared to other climatic factors is more in road accidents in Yazd.

Data analysis in Chapter 4 showed that there is a significant positive relationship between the climatic variable dust and road accidents in Yazd with 99% level of confidence (with a correlation coefficient of 0.74), so that the increased incidence of dust has increased road accidents in Yazd. This correlation between the two variables is maintained from 2010 to 2014. Thus, 55.6 percent of accidents have been due to dust, and 44.4 percent have been due to other climatic factors. Thus, dust has had a greater role in the occurrence of road accidents in Yazd compared to other climatic factors.

These findings are consistent with the results of some research done in this area. The results of the study Omidvar (2006) and Doaguyan et al. (2014) showed that most of dusty storms have occurred because of the dryness of the air, in the event of road accidents. This means that in hot and dry areas of Yazd, climatic phenomena rainfall, snow and ice, sand storms, and foggy air occur less than dust and on the other hand, there is a strong positive correlation between road accidents and dust in this province.

2. Dust has caused the most road accidents in the early spring and autumn in Yazd.

Analysis of the results in Chapter 4 indicate that from 2010 to 2014, in addition to the fact that by reduction and increase in the occurrence of dust, road accidents have decreased and increased, respectively, in different seasons, this phenomenon has existed. Frequency of the phenomena dust and road accidents, respectively, in the winter and spring has the most consistency. Thus, one part of the hypothesis that most road accidents due to dust occur in the early autumn is rejected. According to the researchers, although dust and dust storm in warm and dry the area where autumn is associated with different winds have led to the reduction in the visibility of drivers and road accidents, the majority of road accidents in the winter and spring attributed to dust may be due to other factors. These factors are such as an increase in road travel before and after the Nowrouz. However, most road accidents in Yazd have happened in spring and winter simultaneous to the increase in the occurrence of dust.

3. Trends and developments in road accidents due to dust in Yazd are increasing.

The results showed that there are significant differences between frequencies of accidents due to dust in different years. The road accidents caused by dust in Yazd have increased from 2010 to 2014, so that in 2010, the number of accidents caused by dust was 1432, which has reached 1542 in 2014.

The variability of this increase in road accidents for this period is because in some years due to a higher frequency of dust phenomenon, for example, in 2013 more accident have occurred than a year after, as the occurrence of dust storms and dust also shows a relative increase during the studied years.

However, despite this other phenomena are also associated with the frequency of road accidents in the winter and spring. The number of cars in 2010 and 2013 is not the same. This is because car production and conditions for the people buying are facilitated, and thus it is likely that in 2013, the number of cars on the road is more than in 2010 in Yazd, and this has increased the number of road accidents.

According to the findings, the following recommendations are offered.

1. The use of sand-dune movement-control methods such as mechanical methods of creating natural windbreakers (hills, planting trees) and artificial ones (concrete walls)

2. Equipping and installation of safety signs, lighting equipment along the path, especially is the path of Yazd to Ardakan.
3. Identifying, prioritizing, and the reduction of black spots for optimum services of road rescue
4. The creation of roads management centers and equipping them with electronic and communication services
5. Increasing road cleaning speed in natural incidents and road accidents, especially in areas subject to sand storms
6. Installing online GPS and satellite to show how the driver is like Isfahan
7. The participation of private sector in investment in the development of road transport
8. Establishing road shoulders in some parts of Yazd to Ardakan route
9. The creation of roadside parking in the studied road and observing standard distance between the parking lots available, and creating numerous car parks, especially in high-risk pathways
10. Organizing black spots of Yazd, including Yazd-Ardakan, Yazd-Tabas, Khatam, and Ali Abbado Neck
11. The traffic culture training, this is suggested to be offered as a course in schools
12. Acceleration in the completion of two between-road complexes named Oghda and Oghda 2 complexes given that most accidents occur between these two complexes
13. The development of public transportation, so that the most cars with the least possible rate are in the roads of Iran
14. The selection of expert consultants and contractors in the field of design and construction of roads and highways
15. Increasing traffic pathways in high traffic paths

CONFLICT OF INTEREST

None

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ARTICLE

A COMPARISON OF MOBILE -BASED LEARNING AND LECTURE-BASED LEARNING IN AN ADULT HEALTH CARE WORKERS COURSE

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ABSTRACT

Background: Development of science and technology has necessitated the development in the process of educational activities. One of these communication practices is learning via mobile electronic devices like mobile phones or tablets that are mentioned for mobile learning. The aim of this study is to compare the effect of mobile learning-based education and lecture on the knowledge of health workers in Shiraz University of Medical Sciences in the field of backache. **Materials and Methods:** The research was semi-experimentally carried out on 142 Healthcare workers in Shiraz University of Medical Sciences, who were selected via census in 2014. The samples of the study were randomly divided into control (70 subjects) and the experimental group (72 subjects). After the pre-test, the experimental group and the control group were educated by mobile learning and lecture, respectively. After 4 to 6 weeks, the students' knowledge in the field of backache was determined. Data collection tool was a questionnaire designed by the country's professional health board and approved by 5 experts. The reliability of the questionnaire was confirmed by Cronbach's alpha coefficient $\alpha = 0.92$. Data were analyzed employing SPSS version 18 and independent and paired t-test. The level of statistical significance was set at $P < 0.05$. **Results:** The results demonstrated that there is a significant difference between the scores of pre-test and post-test, and post-test scores in the mobile learning group was significantly higher than the lecture group ($p = 0.02$). The results also demonstrated that there is a positive and significant relationship between age and satisfaction in e-learning group ($p < 0.001$). **Conclusion:** Due to the effectiveness of mobile learning, such method can be employed as one of the modern teaching methods.

INTRODUCTION

Man of the third millennium is trying to avoid the traditional model by accelerating the process of development and IT application in different parts of his life and create a new paradigm based on the requirements of the information age [1]. With the development of e-learning system, the concept of mobile learning in education systems is considered more seriously. Mobile learning involves the application of information technologies and wireless electronic devices such as mobile and laptop to create a learning process and experience independent of time and place [3 2]. This type of learning lays the ground for learning in a living, and dynamic process and decreases the cost of traditional education. Today, with the increasing number of users of mobile and portable computers and technical advances in the equipment and network expansion internet infrastructure, public reception of the electronic equipment has significantly increased [4]. A study was carried out by Kumar et al. in 2007 on the Mobile-based learning (mobile learning) in India. Their study suggests that 69% of people believe that mobile phone is an effective and instant tool in their learning. Seventy two percent (72%) of them believe that mobile learning is a new opportunity and that it has a quick feedback. Kummer et al. believed that learning method with the help of mobile has temporal and spatial flexibility and is more learner centered. Therefore, we can say that the learning path is expanding from distance learning to e-learning and from e-learning to mobile learning [5]. The changing needs of the healthcare sector and medical advances, attention to the education and continuous education of graduates has made Medical Sciences more serious. On the contrary, the issue of enhancing the quality of learning in medical science has always been considered, and is becoming more important day by day. Regarding the fact that medical education around the world today strongly need to employ ICT to provide learning conditions for learners [6], in the meantime, the importance, position, and use of mobile phone has become one of the new areas of theory and research in medical education due to the accessibility and ease of its use. On the contrary, providing in-service education for staff of healthcare systems in the current era is an essential issue that needs careful planning and precision in doing so. The utilization of such education can in addition to using up administrative and personnel power, impose high costs into the system [7]. Advantages of mobile learning-based education like mobility and easy handling, flexibility, accessibility, ease of use, distance accessibility and usefulness are the things that has raised this method of education as one of the suitable solutions for in-service education. So, the use of this method in continuous education and in-service education, especially in health issues can be very effective, due to the fact that such educations play the role of health forefront in the field of health for prevention of diseases, and therefore the use of this method can be very effective in health [8-9]. Despite all the benefits mentioned-learning and mobile learning have their own limitations. According to critics, these educational methods may not be substituted with the teacher, human and emotional interactions and face-to-face relations created in the classroom, [10]. Moreover, in some studies, its efficacy has been reported less than lecture, and its application is disapproved by the

KEY WORDS

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critics, who believe that teaching by professors are among affective factors on the quality of academic teaching [11-13].

Regarding the need to empower employees concerning the problems of the spine and backache that occur nowadays because of lack of awareness on how to correctly walk and sit at the table, and work with computers and carried out routine affairs, it's known as a global problem and many people have been affected [14]. Moreover, regarding the need to update teaching methods and achieve simpler but more effective techniques in relation to the technologies in the world as well as the limitations and challenges of traditional teaching methods and also taking into consideration the novelty of mobile learning and existence of unknown dimensions and features and factors affecting its quality and performance and lack of evidence suggesting the conduction of a similar study to the present project, we decided to carry out this study to evaluate the effect of mobile learning education and lecture in Shiraz University of Medical Sciences on the rate of knowledge of healthcare workers in the field of backache and spinal disorders.

MATERIALS AND METHODS

This study is applied in terms of purpose and it is a quasi-experimental research with two experimental and control groups with non-equivalent group pretest posttest design (NEGD) in terms of methodology and data collection method. The present study is carried out so as to compare the mobile learning-based education and lecture on the knowledge level of healthcare workers in Shiraz University of Medical Sciences in the field of backache in the year 2015.

The study sample included all healthcare workers in Shiraz University of Medical Sciences in Year 2015 (n = 114) who were selected by census method. All samples were divided based on age, gender, work experience and education into two similar groups. Thereafter, they were randomly selected as the experimental group (n = 72) and the control (n = 71).

Inclusion criteria included all those who during the research, have been working for one year as employees in Health Deputy Headquarters in the Shiraz University of Medical Sciences, and were willing to participate in the study and haven't participated in the backache curriculum during the past year. Exclusion criteria were those who didn't want to cooperate and had participated in similar educational program.

In this study, for comparison of mobile learning-based and lecture education, subjects in the sample were divided under the same conditions into experimental and control groups. Thereafter, the knowledge level of both groups in the field of backache was evaluated before education. Regarding the list of employee names, each person was given a number, and by employing the table of random numbers, subjects were divided into two groups. One group was taught through lecture and the other was taught with mobile learning. Educational content was the same in both groups and it was prepared based on the book written by a group of the professional health board and finally a post test was administered to both groups after 4 to 6 weeks of education.

The experimental group was trained with mobile content. Learning content was designed based the standards of mobile learning. The educational content was first segmented; thereafter it was designed as multimedia (voice, images and related animations, clinical samples). All the steps were carried out with the cooperation of educational design experts and e-learning in e-learning pole. After the evaluation steps, amendments and approval of the related responsible, the mobile content were provided to the research samples. In the control group, lessons were taught with lectures and PowerPoint presentation, in addition to questions and answers in a 4-hour course.

The tool for data collection was a questionnaire comprising two parts. The first part included demographic characteristics (sex, age, work experience and job), the second part contains the content taught about the backache discomfort (27 items) which was prepared according to the five-point Likert scale (strongly agree, agree, neutral, disagree, strongly disagree). The above questionnaire was designed by the professional board of Health in the country, while the content validity was employed to confirm the reliability and validity of the questionnaire. For this reason, comments of 5 members of faculty and professionals were received and applied. The reliability of the questionnaire was approved via Cronbach's alpha of $\alpha = 0.92$

For data analysis and to infer the existence of significant relationships between independent and dependent variables, independent t-test and paired t-test was employed. Statistical analysis of the research data were analyzed using SPSS version 18.

The following ethical issues were considered in the research: After obtaining permission from the authorities, the educational program began at the Department of Shiraz University of Medical Sciences. At the start of the educational program, after introduction, the researcher explained the research purposes and the need for its implementation to participants and obtained informed written consent from them. The participants were assured that all information collected will remain confidential. Moreover, considering ethical issues and security, the samples were asked to refrain from writing their name and surname in the questionnaire. They were also assured that the information will only be investigated by the researcher, and only the coding method was utilized for questionnaires to track questionnaires before and after education. Also, the participants were assured that their mobile phone numbers (in some cases it was necessary) will

remain strictly confidential, and the software employed would not cause any damage to the machine and it does not cause security problems.

RESULTS

The aim of this study is to compare the effect of mobile learning and lecture-based education on knowledge rate of healthcare workers in Shiraz University of Medical Sciences in the field of backache. Among the total of 142 health department employees participating in the study, 86 subjects (60.6%) were female while 56 (39.4%) were male. Demographic features of the study samples were presented in [Table 1].

Table 1: Demographic features of the study sample

Variable		Experimental group		Control group	
		Number	percent	Number	percent
Sex	Woman	42	60%	44	61.1%
	Man (number percent)	28	40%	28	38.9%
Age	20 to 30 years	8	11.4%	7	9.7%
	31 to 40 years	35	50%	31	43.1%
	41 to 50 years	22	31.4%	30	41.7%
	More than 50 years	5	7.1%	4	5.6%
Education	Diploma	6	8.6%	5	6.9%
	Associate Degree	8	11.4%	22	30.6%
	Bachelors	28	40%	31	43.1%
	MA	22	31.4%	11	15.3%
	Ph.D.	6	8.6%	3	4.2%
Work experience	1 to 5 years	9	12.9%	5	6.9%
	6 to 10 years	20	28.6%	25	34.7%
	11 to 20 years	36	51.4%	29	40.3%
	21 to 30 years	5	7.1%	13	18.1%

Statistical analysis did not demonstrate any significant difference between the two groups in terms of age, gender, education level and work experience. Therefore, it can be argued that both departments were homogenous with each other and the effect of other variables in the intervention is minimized. The first specific objective of the research was to compare the mean and standard deviation of knowledge in the field of backache of subjects in the control and the experimental group before and after the intervention [Table 1].

Table 1: Comparison between the mean and standard deviation of knowledge in the field of backache of the research samples before and after intervention in experimental and control groups

Score of Knowledge	Mean and SD		t	Degrees of freedom	The level of significance
	Before intervention	After intervention			
The control group	96.69 ± 3.47	111.54 ± 3.15	206.0	38	0.001
The experimental group	97.37 ± 2.56	116.18 ± 3.27	206.0	36.08	

As shown in [Table 1], the mean scores of knowledge of the study subjects in the field of backache in the lecture group and mobile learning were significantly increased after intervention (P <0.001).

In order to determine the exact effect of the intervention, the mean and standard deviation of the pre-test and post-test were compared in both groups [Tables 2 and 3].

Table 2: The mean and standard deviation, effect of education in the experimental group and control group on the knowledge

Score	Mean	Standard deviation	T-test	Degrees of freedom	Significance Level
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Pre-test and post-test score in lecture (The control group)	84.14	12.8	42.15	70	0.001
Pre-test and post-test scores in mobile learning (The experimental group)	45.18	65.14	61.10	70	0.001

Table 3: Comparison of the mean and standard deviation of the learning level between the two teaching methods after intervention

Score	Mean	Standard deviation	T-test	Degrees of freedom	Significance Level
post-test in the lecture and post-test in mobile learning	64.4	18.8	63.2	70	0.000

As shown in [Tables 2 and 3], there was a significant relationship between education and the learning level of the research samples ($P < 0.001$). In addition, the mean score of knowledge in the experimental group (mobile learning) after intervention was more than control group (lecture), and this difference is statistically significant ($P < 0.001$).

The relationship between demographic variables and level of learning of samples were also examined [Table 4].

Table 4: The relationship between demographic variables and level of learning of research samples in groups of mobile learning and lecture

Effect	The significance level of experimental group (Mobile learning)	The significance level of control group (lecture)	Test
Age	0.602	0.023	Pearson's correlation coefficient
Sex	0.632	0.157	Pearson's correlation coefficient
Level of Education	0.065	0.001	Kendall's correlation coefficient
Work experience	0.128	0.004	Kendall's correlation coefficient

As can be seen, there was no significant relationship between demographic variables and learning level of the subjects in the experimental group (mobile learning), however, there was a significant positive relationship between the level of education ($p = 0.001$) and work experience ($p = 0.004$) and age ($p = 0.023$) with their learning rate in the control group (lecture education methods).

DISCUSSION

The results of this study revealed that the level of knowledge of healthcare workers in the field of backache in mobile learning was more than the lecture group ($P < 0.001$). In other words, this educational method fully improves the learning level of the study samples. Based on the present results, the learning level of the two groups had an upward trend after the intervention but no significant difference was observed between the two groups, which demonstrates that mobile learning was more effective. This finding is in line with the results of Papzan and Soleimani [15] and McConatha et al. [16], Wang [17] which state that education via mobile learning is more effective than lecture. Chojecki [18] believes that the utilization of mobile learning in health is important. He mentioned the reduction of potential errors in the process of transferring teachings as the result of his research. Learning method with the help of mobile phone has more flexibility in terms of time and space when compared to other teaching methods such as lecture and is more learner-centered. Experts believe that learning is not just acquiring an experience of knowledge, but rather a continuous process [19-20]. Using the mobile phone, which is now available to all students has provided opportunities for educational planners, teachers and students to continue, expand and deepen the teaching-learning processes, share information, create equal educational opportunities. Mobile technology has provided opportunities for educational planners and students within the university to prepare a summary or detailed clinical content and laboratory instruction in combination with images, animations, audio, and educational clips in an interactive manner and in the form of a book as educational resources to the students [21]. This educational device could cause widespread satisfaction for features such as audio and video capabilities for more attraction and its suitability with the talents and abilities of learners, and that it can be effective in their retention. Zamani et al. believe that technical capabilities in the mobile phone are an effective factor in encouraging students to employ these tools for learning. Mobile

learning is very flexible and it's appropriate for teaching adults [22-24]. The results of this research demonstrated that there was no significant relationship between demographic variables such as age, sex, education level, and work experience with learning level in mobile learning group. These results may to some extent indicate the properness of mobile learning with the characteristics of adults. Mobile learning can readily provide the learner with flexibility in time, place, quick learning and independent learning, which is in harmony with the autonomous characteristics of adults and people with any demographic characteristics can easily use it and carry out learning activities.

CONCLUSION

Education via mobile phone can enhance students' learning. The utilization of mobile technology (mobile learning) allowed its users to learn in any environment, and experience mobility, flexibility, and transportation and access learning in non-constant environments.

CONFLICT OF INTEREST

There is no conflict of interest.

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ARTICLE

E-LEARNING OR IN-PERSON APPROACHES IN CONTINUOUS MEDICAL EDUCATION: A COMPARATIVE STUDY

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ABSTRACT

Introduction: Technological advancement and new discoveries in science has made it practically impossible to deny the need for revolutions in the process of conducting training activities. E-learning is a method of facilitating and promoting learning through the use of information and communication technology tools. The aim of this study is to compare the knowledge of general practitioners participating in addiction detoxification continuous training program employing electronic (offline) and in-person training. **Method:** This quasi-experimental study was conducted in 2013 in Fars Province, Iran by psychiatrists who participated in the addiction detoxification continuous training program. A total of 118 samples were randomly divided into two equal groups of 59 subjects after completion of the pre-test questionnaire. The in-person retraining method was employed in one group while the electronic learning method was employed in the other group. A posttest was administered after the training. Data was collected with the aid of a written test; the validity and reliability of the questions were determined by 5 members of the medical faculty and Cronbach's alpha of 85%, respectively. Statistical analysis of data was carried out using SPSS (ver.16), t-test and Levene's test. **Results:** The results revealed that there was a significant difference between the pretest and posttest scores, and the posttest scores obtained in the e-learning group were significantly higher than the pretest scores ($p < 0.01$). **Conclusion:** E-learning method can be employed as an alternative or complement to traditional training in the retraining of practitioners. This method makes it possible for instructors to benefit from several training strategies and foster active learning in students.

INTRODUCTION

In the present era, training, which is considered as a basic human right is known to be a factor of change and social progress. Many psychologists undergoing training believe that learning conditions must be organized in a way that will enable each learner to achieve optimal learning capacity. E-learning technology has paved the way for many training aspirations, such as independent learning, self-directed learning, learning in any place, special time-independent learning, collaborative training and learning and rapid feedback and evaluation of learning to appear more attainable [2]. Continuous training is one of the areas in which e-learning has been hugely applied. The term "continuous training" refers to postgraduate activities designed to promote knowledge, skills and professional competence. Continuous training of the health team is a key element in bolstering the quality and efficacy of the healthcare system. Taking into cognizance the fact that subjects of continuous medical training have access to experimental teaching methods, they are considered the best group to benefit from remote learning through the use of information technology and network utilization. Based on the foregoing, practitioners need to adopt methods that will enable them to utilize their knowledge and enhance their performance without time and place constraints [3, 4]. Although, conventional continuous medical training courses increase participants' knowledge, it has little effect on the behavior of practitioners and capable of improving the patients' confidence on the practitioner [6, 5]. In a study titled "Comparison of the Effectiveness of Web-based and In-person Class Methods", Schrader (2006) showed that e-learning is 6% more effective than in-person training method in providing knowledge; although, students' learning was reported to be identical in both methods and students were satisfied with both methods. However, in longitudinal studies conducted in comparison with the control group, web-based training, which was accompanied with feedback from the instructors, was 19% more efficacious than the in-person training method [7]. Moazemi (2014) conducted a research on dental students to compare the traditional and electronic methods and concluded that the e-learning method significantly increased knowledge and skills of participants [8]. Overall, the research results indicated that e-learning is an effective method of learning. Taking into cognizance the fact that subjects of continuous medical training have access to experimental teaching methods, they are considered the best group to benefit from remote learning using information technology and network utilization. Addiction detoxification training is a priority for the Ministry of Health and healthcare workers. Addiction to drugs and psychotropic after road traffic accidents, injuries and accidents, cardiovascular diseases and depression is in the 4th place of the diseases' burden classification. Among the 18-30 year old male population, addiction was classified in the second place of disease burden. Iran's Forensic Medicine report in 2013 revealed that 8 people lose their lives every day owing to drug addiction. In addition to being associated with mortality and morbidity in the field of health, addiction induces serious family, social and legal consequences for the country [9]. Considering the fact that continuous training centers are responsible for training and updating practitioners' with scientific information such as addiction treatment centers and training of practitioners through in-person and electronic "addiction" detoxification programs, we attempted to evaluate and compare the effects of two training methods.

KEY WORDS

E-learning, In-person training, Continuous medical training

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MATERIALS AND METHODS

This research is an applied and quasi-experimental research that examines the level of knowledge and training of general practitioners who participated in the addiction seminar held in 2013 using both in-person and electronic methods. The study population included all practitioners who participated in the addiction detoxification seminar and the total number was 170. The samples were made up of 118 subjects that were identified using Morgan Table (with a population of 170 subjects) and were randomly divided into two equal groups of 59. Inclusion criteria included all practitioners who participated in the addiction detoxification seminar; desire to participate in the research and apathy in participating in addiction retraining courses. Exclusion criteria included unwillingness to continue to cooperate. All samples were randomly divided into two groups after completing the pre-test questionnaire. The in-person retraining method (12h) was used in one group while the electronic learning method was used in the other group. Training content was akin in both groups and was prepared by one of the professors in a related discipline. Given that, most samples were stationed in Fars province, Iran and were engaged in different occupations, offline method was employed in the e-learning group to present the content in such a way that flexibility of time, place and speed of learning will be accommodated. The designing stage of the offline content got underway after receiving related training contents relative to the standards of e-learning.

The training content was initially segmented and thereafter, it was designed in the interactive multimedia form (a professor's voice, related images and animations, clinical specimens) with self-assessment training at the end of each segment. All steps were designed in collaboration with instructional design experts and e-learning specialists in the e-learning hub. After the evaluation process, amendment and approval of the person in charge, the content was made available on compact disc to the research subjects. The subjects after studying the interactive content and passing all sections of the course proceeded to the posttest section of the compact disc. After answering the questions, the learners received a code that specified the number and score of their medical system and their score was determined in the continuous training by furnishing this code to the concerned authorities (researcher). In the in-person training, the professor taught lessons using lectures and PowerPoint presentations along with questions and answers. Thereafter, the participants completed the posttest questionnaire. The data collection tool was a written exam, in which test questions on the continuous addiction detoxification training program was designed and developed based on the content of the lessons taught by the professor and consisted of 24 multiple choice questions (closed and regular questions). Face and content validity of the test questions were evaluated by five faculty specialists at Shiraz University of Medical Sciences and their comments were applied. The reliability of the questionnaires was 85%, which was determined by distributing the questionnaires among 15 physicians using Cronbach's alpha. Participants in both groups (in-person and electronic training) answered questions by stating their area of specializations on two occasions before and after training. In order to confirm laws and ethical standards, the objectives of the study was explained to the participants and they were assured that all information will be kept confidential. Statistical analysis of data was carried out using SPSS software (ver.16), t-test and Levene's test. A 0.05 significance level was considered in this study.

RESULTS

The study was conducted to compare the effects of continuous training addiction detoxification programs using both in-person and e-learning methods on general practitioners' knowledge in Fars Province. Male and female participants accounted for 89.4% and 10.6% of the subjects. In addition, managers of private and government research addiction detoxification centers accounted for 89.8% and 10.2% of the subjects, respectively. In order to test the first hypothesis of the research (general practitioners' knowledge level before in-person and electronic training on addiction detoxification reeducation was different), the independent samples t-test was employed [Table 1].

Table 1: Comparison of general practitioner's knowledge level before in-person and electronic training on addiction detoxification reeducation

Learning Method	Number	Average	Standard Deviation	t value	Degree of Freedom	Significance Level
Pre-test	In-person training	59	13.25	1.87	116	0.31
	E-learning	59	13.15	1.62		

The results in [Table 1] show that the average pre-test score in the in-person training (13.25%) is more than that of the average pre-test score in the electronic training (13.15%). The independent t-test was used to compare the average in-person and electronic teaching methods as well as investigation of the first hypothesis. As can be seen, the calculated t value was 0.31, which was not significant at 0.05. In other words, there was no statistically significant difference between the pre-test in the in-person and

electronic training groups. To investigate the second hypothesis of the research (general practitioners' knowledge level before and after in-person and electronic training on addiction detoxification reeducation was different), t-test was used and the results are presented in [Table 2].

Table 2: Comparison of general practitioner's knowledge level before in-person training on addiction detoxification reeducation

Learning Method	Number	Average	Standard Deviation	t value	Degrees of Freedom	Significance Level
Pre-test	59	13.25	1.87	11.16	116	0.001
In-person training						
Post-test	59	17.06	1.83			

The results of the above [Table 2] show that the average pre-test score in the in-person training (13.25%) is less than that of the average posttest score in the in-person training (17.06%). In order to compare the average pre-test and posttest score, the dependent t-test was used. As can be seen, the calculated t value was 11.62%, which was significant at 0.001; i.e. the level of knowledge of general practitioners who were trained using in-person method increased. To investigate third hypothesis of the research (general practitioners' knowledge level before and after electronic training on addiction detoxification reeducation was different), t-test was used and the results are presented in [Table 3].

Table 3: Comparison of general practitioner's knowledge level before electronic training on addiction detoxification reeducation

Learning Method	Number	Average	Standard Deviation	t value	Degrees of Freedom	Significance Level
Pre-test	59	13.15	1.62	19.06	116	0.001
E-learning						
Post-test	59	18.84	1.61			

The results of the above [Table 3] show that the average pre-test score in the electronic training method (13.15%) is less than that of the average posttest score in electronic training method (18.84%). In order to compare the average pre-test and posttest score, the t-test was used. As can be seen, the calculated t value was 19.06%, which was significant at 0.001; i.e. the level of knowledge of general practitioners trained using electronic training method increased. To investigate the main hypothesis of the research (general practitioners' knowledge level after in-person and electronic training on addiction detoxification reeducation was different), the independent t-test was used and the results are presented in [Table 4].

Table 4: Comparison of general practitioner's knowledge level after in-person and electronic training on addiction detoxification reeducation

Learning Method	Number	Average	Standard Deviation	t value	Degrees of Freedom	Significance Level
In-person training	59	17.06	1.83	5.58	116	0.001
Post-test						
E-learning	59	18.84	1.61			

The results of the above [Table 4] show that the average posttest score in the in-person training method (17.06%) is less than that of the average posttest score in electronic training method (18.84%). In order to compare the average posttest score of both groups, the independent t-test was used. The results show that the calculated t value was 5.58%, which was significant at 0.001; i.e. electronic training method increased the level of knowledge of general practitioners the more compared to the in-person training method.

DISCUSSION AND CONCLUSION

The aim of this study was to compare the level of knowledge of practitioners participating in addiction detoxification reeducation courses using electronic and in-person training methods. Overall, the results showed that e-learning method as compared to the in-person learning method significantly increased general practitioners' level of knowledge ($p < 0.001$). The results of this study are in consonance with the results of other researchers. For example, Khatooni's study showed that the internet like the traditional training methods could be used effectively to provide continuous training programs [10], [11]. Yasin et al. showed that web-based training, which is accompanied with a positive feedback from the instructor, is far more efficacious than the in-person training method. Other studies have also shown the positive effect of electronic training on anatomy and oral health training [12, 13]. Moreover, the results

indicated an increase in knowledge of general practitioners who were trained using the in-person training method ($p < 0.001$). The results of the present research are in consonance with the results of researches carried out by Student, Samad and Fani [14,15, 16], but was not in consonance with the results of Basra on, Mohammad Jafari, Moatari and Moradi [17,18,19]. These researchers believed that continuous in-person training programs failed to increase the knowledge of participants in the acceptable range. Overall, the results of this study indicated that in-person training methods are relatively effective, but achieved little success in attaining the objectives of the program as well as the expected return. It seems that programs that incorporate active learning and problem-oriented methods are interactional by nature and involves more people than other methods such as electronically designed methods, which are significantly more effective than the lecturing method and has increased the efficacy of many programs. The results of previous researches and the results of the current e-learning research programs could be used as a replacement for in-person training programs. In most cases, the e-learning programs were more effective and successful than the in-person training programs and helped researchers to achieve the desired goals. E-learning provides a lot of information from a variety of sources and increase access to knowledge on a continuous basis. It also enhances the quality of services and adapts quickly to new programs and information. The interactive feature of electronic continuous medical training courses along with its flexibility in time and space, improves the efficiency and functionality of addiction detoxification courses more than the traditional methods. One of the constraints of traditional continuous medical training courses is place and time restriction, which has been eliminated in the electronic courses. On the other hand, electronic medical continuous training courses are more attractive not only because they are accessible at any time and place, but because interaction and engagement have also been given special consideration in e-learning. Finally, considering the results obtained in the present study, it is recommended that new training approaches should be considered using information and communication technology in order to enhance continuous medical training.

CONFLICT OF INTEREST

There is no conflict of interest.

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None

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ARTICLE

THE RELATIONSHIP BETWEEN OWNERSHIP STRUCTURE, FINANCIAL CONSTRAINTS AND RATIO OF COSTS OF RESEARCH AND DEVELOPMENT COMPANY LISTED ON THE TEHRAN STOCK EXCHANGE

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ABSTRACT

The aim of this study was to investigate the relationship between ownership structure, financial constraints and the ratio of R & D spending companies listed in the Tehran Stock Exchange. This research is study, library, scientific analytical and based on panel data analysis (panel data). The data of 102 financial companies listed on the Tehran Stock Exchange during the period 1389 to 1393 (512 firm - years). To analyze the results of the study is used Eviews 7 software. The results showed that the three hypotheses regarding the approval of the financial constraints and the ratio of R & D spending is reversed, also between Institutional ownership structure and the ratio R & D spending and Finally, the ownership structure of management than R & D spending significant inverse relationship exists. Also according to the analysis made in connection with the fourth research hypothesis to the conclusion that between Shareholder ownership structure split and the ratio of R & D spending, there is no significant relationship.

INTRODUCTION

Research and development (R & D) are any consistent and creative activities done to increase knowledge of man, culture, society and use this knowledge for new applications (Black et al., 2014). The role of research and development on economic growth, is to the extent that it is referred to as an important variable in the economy, also companies are divided into the developed or underdeveloped on the basis of research funds of GDP. Research and development expenditure in addition to stimulating economic growth and development are enhancing the firm's profits as well. Operating cash flows arising from cash and cash equivalents of companies can be decreased or increased by factors such as investment in research and development. As well as additional cash investment in R & D could increase or reduced agency costs. Institutional investors considering their influence and force in the company to control the company always want to symbolize the intrinsic value of their own assets.

Allocation of a portion of cash flows from operating activities in new companies to research and development expenditure on research and development from the premise of the thoughts of management of institutional investors.

Companies have different motives to their cash holdings. If for any reason the company fails to timely access to the needed cash, the company is having "financial constraints" (Almdya et al., 2013). Existence of financial constraints in the long run may harm the ability of profitability, growth and thus the company's financial situation and cause falling behind the competition and even provide elimination from the market for the company. Therefore access to cash in companies with financial constraints is a crucial issue. So it is expected that in case of fluctuations in operating cash flows, cash reserves at companies with financial constraints get affected [11].

For division of the company in terms of financing constraints, financial constraints, must be defined. The fullest and clearest definition in this case, is that companies are in range of financing that are facing a gap between internal costs and external costs allocated. Determining the amount of cash reserves for many companies is of special importance. It should be noted that the higher the strength the liquidity of an asset is, its efficiency is reduced. With regard to the fact that the company can finance its operations and investment projects through the capital market, a company that has convenient access to the capital markets should not attempt to preserve cash (Olson and Asvad, 2013).

The aim of our research in this study is to answer the main question that Whether there is a significant relationship between the control level of financial constraints and the ratio of R & D spending in companies listed in Tehran Stock Exchange?

Cash and financial constraints derived from it may be the beginning and end of the activity cycle. Cash is the main element of current assets in the balance sheet. The decision of manager depends on the amount of cash available to fund cash management that are expected to be available in the future. In fact, considering that the lack of liquidity in a company can have wide consequences for the system, liquidity is important for any institution beyond any other issue [7].

KEY WORDS

Financial constraints, the ratio of research and development expenditure, the level of institutional ownership control

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In the knowledge-based management, the management of company should have sufficient knowledge of the conditions to predict company's future cash flows. And according to these forecasts should make investment and financing so that with a glimpse to the future of the company, the management could guarantee the company's growth. Also additional cash investment in R & D spending can help to enhance the qualitative and quantitative development of companies.

Therefore considering how to handle cash management, along with issues related to ownership percentage of institutional ownership and management structure to increase investment, in spending of research and development, are of the importance and necessity of this research.

Liquidity management or the ability to raise funds and timely fulfillment of commitment is necessary for the survival of companies. Therefore, liquidity management, considering financial constraints governing the companies is among the issues that are being performed by managers [9].

Attracting investors in the capital market of our country is very important according to the managers considering the novelty of our capital markets compared to developed countries. And in order to achieve these we need to identify the relation of factors such as: Financial constraints, level of institutional ownership control

The level of managerial ownership control, and the company's controlling of minor shareholder and its impact on the ratio of research and development expenditure can help achieve the company's ultimate goal [3]

MATERIALS AND METHODS

Review of literature

[12] in a study examined the relationship between earnings and cash flows and stock returns with attention to specific characteristics of companies.

The results showed that profit provided more relevant information to predict stock returns for large corporations, companies with high debt levels and firms with no growth. And changes in profit provide more relevant information for small companies with low debt levels and firms with no growth.

Spritzer and Jones (2015), in study examined the relationship between accounting profit and operating cash flow with systemic risk. The results show that accounting earnings information during the period of investigation compared to information on operating cash flow in the process of predicting systematic risk involve increasing information content.

Aghaei et al (2014) in a study examined the effect in operating cash flow shocks on asset and capital structure of listed companies in Tehran Stock Exchange. Sample findings suggest that there is a significant relationship between changes in cash flow from operations and asset restructuring and corporate capital.

[1], in a study examined the relationship between abnormal operating cash flow with stock returns of companies listed in Tehran Stock Exchange began. The results of the hypothesis test showed that there is a significant and negative relation between abnormal operating cash flows with future stock returns.

[8] in a study examined the impact of financial constraint on the relationship between institutional investors and their investment cash flow sensitivity.

Research hypotheses

First hypothesis: There's a significant relationship between R & D expenditure and financial constraints of companies.

The second hypothesis: There's a significant relationship between the structure of institutional ownership and financial constraints of companies.

The third hypothesis: There's a significant relationship between managerial ownership structure and financial constraints of companies.

The fourth hypothesis: There's a significant relationship between ownership structure of minor shareholder and financial constraints of companies.

Research methodology

The research is correlational in nature and content, and to discover correlations between variables ex post facto method will be used. The study population consisted of all companies listed on the Stock Exchange

of Tehran. According to the official website of Tehran Stock Exchange all the companies in time of study were 520 companies in 37 industrial groups.

Therefore in this study, all companies listed in Tehran Stock Exchange in a period of six years, from 2010 to 2014, are population of the study. In this study, the sample is an appropriate representative of the target population, screening method is used for sample selection. For this purpose, the following criteria were considered and if a company has met all criteria it was selected as one of the sample companies.

1. Considering the information required since 2010, companies which up to March 2007 have been listed in Tehran Stock Exchange and by the end of 2014 their name is not removed from the list.
2. During the period in question, their shares should be actively traded on the exchange.
3. To enhance the comparability of companies that are surveyed, financial period should have ended 29 of March and during the financial period it should not be changed.
4. The company must not be a part of financial inters mediation because disclosure of information in these companies is different.
5. The information required is available.

Research variables

- The research includes a dependent variable that refers to the ratio of research and development expenditure ($\Delta \ln(R \& D)_{i,t}$):

How it is calculated is as follows:

$$R \& D_{i,t} = (\text{Sales}) / (\text{research and development expenditure})$$

- Institutional ownership structure ($CI_{i,t}$): how it is calculated is as follows:

Institutional ownership structure = (total number of issued stock) / (total shares held by institutional owners)

- Managerial ownership structure ($CM_{i,t}$): how it is calculated is as follows:

(Total number of issued stock) / (total shares held by directors) = managerial ownership structure

Structure of ownership of minor Shareholders ($CSZ_{i,t}$) which is calculated as follows:

(Total number of issued stock) / (number of shares in the hands of micro Shareholders) = level of micro stakeholders

- Financial constraints ($Cons_{i,t}$):

In this study, to estimate the level of financial constraints, Whited Wu index (2006) is used. This index measures financial constraint through a group of variables reflects the characteristics of companies and its calculation method is as follows:

$$wwindex = -0.091CF_{i,t} - 0.062DIVPOS_{i,t} + 0.021TLTD_{i,t} - 0.044LNTA + 0.102ISG_{i,t} + 0.035SG_{i,t}$$

DIVPOS: is a dummy variable and for the companies that did not have any divided shares during the period is equal to 1 and otherwise will be equal to 0.

CF: is operating cash flow to total assets.

$$CF_{i,t} = \frac{\text{Operating Cash Flow}_{i,t}}{\text{Total Assets}_{i,t}}$$

T LTD: leverage (the ratio of total long-term debt to total assets)

$$TLTD_{i,t} = \frac{\text{Total Long-Term Debt}_{i,t}}{\text{Total Assets}_{i,t}}$$

LNTA: company size

$$LNTA_{i,t} = \ln(\text{Total Assets}_{i,t})$$

ISG: Industrial sales growth industry in which the company is located in.

SG: Sales growth

$$SG_{i,t} = \frac{\text{Sales}_{i,t} - \text{Sales}_{i,t-1}}{\text{Sales}_{i,t-1}}$$

Therefore, according to the study of Chang (2004), if a company does not pay the stock dividend of the year t, the company will be classified as a company with financial constraints. Because when their ability to access external financing is reduced they can stop paying dividends, to compensate part of the lack of financial resources. However, these criteria should be used with caution, because the payment of a dividend cut in order to maintain the liquidity of the shares on the market can have a negative effect.

Therefore variable of financial constraints is a dummy variable that if the company did not pay dividends in the considered year is equal to 1, otherwise it will be zero. In this research by using Whited Wu index, each participant is calculated with a number. Then calculate the median for all companies and firms that are higher than the median of the total Companies; have financial limitations and companies that are lower than the median of the total companies are companies without financial constraints.

The study included two control variables that include:

- **Corporate Governance Index ($\Delta CG_{i,t}$):** that is measured as follows:
The percentage of outside director's board to all board members
Member of the outside directors is a member in the company that is not an executive (Shahzad et al., 2010).
- **Cash flow ratio ($CF_{i,t}$):**

Cash flows are calculated as follows:

$$CF_{it} = (INC_{it} - TAX_{it} - INTEP_{it} - PSDIV_{it} - CSDIV_{it}) / A_{i,t-1}$$

In which:

- CF : Cash Flow firm i in year t
- INC_{it} : Operating profit before amortization of company i in year t
- TAX_{it} : The total tax paid by the company i in year t
- $INTEP_{it}$: Interest expense paid by the company i in year t
- $PSDIV_{it}$: The interest paid by shareholders of the company i in year t
- $CSDIV_{it}$: Ordinary shareholders profit of company i in year t
- $A_{i,t-1}$: The total book value of assets of the company i in year t

Model of the study is as follows:

(Equation (1))

$$\Delta \ln(R \& D)_{i,t} = \alpha_0 + \beta_1 Cons_{i,t} + \beta_2 CIns_{i,t} + \beta_3 CM_{i,t} + \beta_4 C(SZ)_{i,t} + \beta_5 \Delta CG_{i,t} + \beta_6 CF_{i,t} + \varepsilon_{i,t}$$

In these models we have:

i, represent the Company (cross-sectional units) and t represents the year.

$$\varepsilon_{i,t} = \text{Random error of company i in year t.}$$

RESULTS

Hypothesis testing

Table 1: illustrates the descriptive statistics of Research variables

Variable	The number of observations	Mean	Standard deviation	Lowest	Highest	Skewness	kurtosis
The ratio of R & D spending	512	0/3270	0/3672	0/0000	2/7159	3/123	14/890
Financial constraints	6412	0/4526	0/4981	0/0000	1/0000	0/191	-1/970
Institutional ownership structure	512	0/7079	2/8419	0/0116	70/7600	24/593	607/177
Managerial ownership structure	512	0/2842	0/1252	0/0000	0/6919	-0/003	-0/212
micro shareholder structure	512	0/1218	0/0536	0/0000	0/2965	-0/002	-0/211
Corporate governance index	512	0/6654	0/5411	0/8955	2/8780	1/223	1/666
Cash flow ratio	512	0/1549	0/1304	0/0009	1/3310	2/337	12/172

According to the [Table 1] average ratio of research and development expenditure of companies is respectively 0/3270 and the minimum is 0/0000 and maximum amount is equal to 2/7159. The rate of skewness and kurtosis should be 0 and 3 for the variable to have a normal distribution that shows that the variable does not have a normal distribution. According to the description given in [Table 1], average of financial constraints, level of institutional ownership control, the level of managerial ownership control and the controlling micro, shareholder corporate governance index and the ratio of cash flow sample of companies during the period of study, all have positive averages.

The test of the normal distribution of the dependent variable

In this study to estimate the parameters of the model, ordinary least squares method is used. Therefore, it is necessary to test the normal distribution of this variable.

So it is necessary that the normal distribution of the dependent variable is controlled before obtaining the parameters and to find a proper method to normalize them if they are not.

$$\begin{cases} H_0 : \text{Normal Distribution} \\ H_1 : \text{Not Normal Distribution} \end{cases}$$

Table 2: Results of normal distribution of the dependent variable before and after normalization

	Variable	(N)	(K-S)	(Sig)
Before normalization	The ratio of R & D	512	4/616	0/000
After normalization	The ratio of R & D	512	670	0/761

Given that in [Table 2] for the variable of ratio of R and D the importance level of K-S is less than 0/05, so the H_0 hypothesis for normal distribution of these variables is rejected at 95% confidence level. Which means ratio of R and D do not have a normal distribution. So before the test this variable must be normalized. In this study Johnson Transformation is used to normalize the data and analyzed by Minitab 16 software. Results of the K-S test after normalization are according to the Table.

According to [Table 2], since after normalization the importance level (sig.) of Kolmogorov-Smirnov test for the dependent variable is higher than 0/05, (0/761), so the H_0 hypothesis is accepted at 95% confidence level, which means ratio of R and D has a normal distribution after the normalization.

The correlation between the variables of the research

In this part by using Pearson correlation test we examine the relation of variables and their correlation. According to Pearson test, institutional ownership structure had a significant negative correlation with ownership structure management and micro shareholder structure.

Table 3: Matrix of Pearson correlation coefficients between variables

	The ratio of R & D spending	Financial constraints	Institutional ownership structure	managerial ownership structure	micro shareholder structure	Corporate governance index	Cash flow ratio
The ratio of R & D spending (<i>P-Value</i>)	1						
Financial constraints (<i>P-Value</i>)	0/005 (0/899)	1					
Institutional ownership structure (<i>P-Value</i>)	0/033 (0/411)	-0/039 (0/341)	1				
Managerial ownership structure (<i>P-Value</i>)	-0/032 (0/311)	0/033 (0/376)	-0/154 (0/000)	1			
micro shareholder structure (<i>P-Value</i>)	-0/032 (0/433)	0/033 (0/416)	-0/154 (0/000)	-0/283 (0/000)	1		
Corporate governance index (<i>P-Value</i>)	-0/011 (0/795)	-0/047 (0/248)	-0/042 (0/297)	-0/042 (0/304)	-0/042 (0/219)	1	
Cash flow ratio (<i>P-Value</i>)	-0/009 (0/826)	-0/034 (0/398)	-0/016 (0/688)	0/000 (0/991)	0/000 (0/187)	-0/063 (0/118)	1

Managerial ownership structure also is positively correlated with micro shareholder ownership structure.

Examining the co-linearity between variables

Co-linearity means there is a linear relationship between the explanatory and independent variables. In this study the co-linearity relationship between independent variables is examined using Pearson's correlation coefficient. As seen in the Table, financial constraints, institutional ownership structure, ownership structure management and micro shareholder structure have a direct correlation and this correlation is very strong. Therefore due to the problem of co-linearity between these variables, enabling simultaneous arrival of these variables in a model is not possible and we need to check and test them in separate models. Other variables do not have problem of co-linearity and simultaneous arrival of them in the model will not cause co-linearity problem.

Testing research hypotheses

The aim of this study was to investigate the relationship between financial constraints and the company's research and development expenditure and statistical hypothesis is defined as follows: This hypothesis is estimated using model (1) with panel data and if the coefficient is significant at a confidence level of 95% it was approved.

$$\begin{cases} H_0 : \beta_1 = 0 \\ H_1 : \beta_1 \neq 0 \end{cases}$$

To be able to determine whether using panel data in estimating the model will be efficient or not, the Chow test or F test is used and in order to determine which method (fixed effects or random effects) is to better estimate (fixed or random detection of differences in cross-sectional units) the Hausman test is used. The results of these tests are presented in the Table.

Table 4: Chow and Hausman test results for the model (1)

Test	N	T	T value	df	P-Value
Chow	512	F	3/0932	(503·101)	0/0284
Hausman	512	χ^2	3/0705	6	0/0394

According to [Table 4] Chow test results and P-Value of (0/0284), testing the hypothesis is rejected at 95% and indicates that the panel data method can be used. Also according to Hausman test, and P-Value of (0/0394), which is less than 0/05, the test of hypotheses is rejected at 95% and hypotheses is confirmed. Therefore, the model is estimated using fixed effects.

To test the validity of the model and the assumptions of the classical regression it is required in addition to the lack of co-linearity between the independent variables in the model, some tests be done regarding the normality of the residuals of variance, independence of residuals and absence of clear error model (Linear model) will also be performed. To Testing normality of error terms, various tests can be used. One of the tests is Jarque bera test, which is used in this study.

Results of Jarque bera test indicate that the residue of the model at 95% have a normal distribution, the probability of this test (0/3412) is larger than 0/05. Another statistical assumption of the classical regression is residual variance consistency. If the variances are non-linear is not unbiased estimator and will not have the least variance. In this study we test the homogeneity of variances with Breusch–Pagan test. Considering the importance level of this test, which is smaller than 0/05 (0/0302), null hypothesis that there is a variance consistency is rejected and can be said is there is a problem of unequal variants. In this study, to address this problem in estimating, we used generalized least squares (GLS). Also in this study to test that the residuals are not correlated, which is one of the assumptions of regression analysis and is called correlation analysis, the Durbin-Watson (D-W) is used .According to preliminary results of model estimation of Durbin-Watson statistic amount were equal to 2/42 and between 1/5 and 2/5 we can conclude that the residuals are independent.

In addition, to test whether the model has a linear relationship and whether linear or non-linear relationship and is being properly explained, Ramsey test has been used. Given that the importance level of Ramsey test is (0/6238) and larger than 0/05, the null hypotheses of linearity of the model is accepted and model does not have a specification error. Summary of results of these tests are presented in Table 4-6.

Table 5: Test results of the modeling assumptions (1)

	Jarque bera	Breusch–Pagan		Durbin-Watson	Ramsy	
χ^2	P-Value	F	P-Value	D	F	P-Value
1/3435	0/3412	1/0845	0/0302	2/42	3/4722	0/6238

According to [Table 5] Chow and Hausman test results as well as results of the statistical assumptions of classical regression model (1) research is estimated using panel data and fixed effects. The results are presented in table. The model is estimated using the software Eviews 7:

$$\Delta \ln(R \& D)_{i,t} = 1187.678 - 0.0042Cons_{i,t} + 1187.380Ins_{i,t} - 1077.067CM_{i,t} - 1444.443C(SZ)_{i,t} + 0.0211\Delta CG_{i,t} + 0.1102CF_{i,t} + \varepsilon_{i,t}$$

Table 6: first hypothesis test results using fixed effects

The dependent variable is the ratio of R & D spending - Views: 512, Year- Company					
Variable	Coefficient	T statistic	P-Value	Relation	
Fixed part	1187/678	2/6090	0/0093	Positive	
Financial constraints	-0/0042	-1/2199	0/0260	Negative	
Institutional ownership structure	1187/380	1/6084	0/0094	Positive	
managerial ownership structure	-1077/067	-1/0704	0/0389	Negative	
micro shareholder structure	-1444/443	-3/0354	0/1525	meaningless	
Corporate governance index	0/0211	1/0888	0/2767	meaningless	
Cash flow ratio	0/1102	1/1788	0/0390	Positive	

Determining model score	0/2024
<i>F</i> (<i>P-Value</i>)	0/1933 (0/1098)

In considering the significance of the model according to [Table 6], the values of the F-statistic is smaller than 0/05 (0/1098) so with 95% confidence level, significance of the model is confirmed.

The coefficient of determination of the model suggests that 20/24 percent of ratio of R & D expenses is explained by variables in the model.

In examining the significant coefficients based on the results presented in [Table 4-7], since the probability of t-statistic for variable rate of financial constraints is smaller than 0/05 (0/0260), a significant relationship between financial constraints and the cost of R & development is confirmed at the level of 95%. The first hypothesis is accepted and we can say with 95% confidence there is a significant relationship between financial constraints and the ratio between R & D spending. A negative coefficient for this variable (-0/0042) implies the existence of an inverse relationship between financial constraints and the company's research and development expenditure, so that with 1 unit rise of financial constraints, the ratio of R&D expenses are also reduced 0/0042 units. Thus, according to the analysis made in connection with the first hypothesis it can be concluded that a significant inverse relationship exists between R & D expenditure and financial constraints.

In examining the significant coefficients based on the results presented in the Table, Since the probability of t-statistic for variable coefficient of institutional ownership structure is smaller than 0/05 (0/0094), as a result, a significant relationship between institutional ownership structure and research and development expenditure at the level of 95% is confirmed. The second hypothesis is accepted and we can say with 95% confidence there is a significant relationship between institutional ownership structure and the ratio of R & D spending. The positive coefficient for this variable (1.187/380) suggests the existence of a direct link between institutional ownership structure and research and development expenditures.

In examining the significant coefficients based on the results presented in the Table, Since the probability of t-statistic for variable coefficient of managerial ownership structure is smaller than 0/05 (0/0389), as a result, a significant relationship between managerial ownership structure and research and development expenditure at the level of 95% is confirmed. The second hypothesis is accepted and we can say with 95% confidence there is a significant relationship between managerial ownership structures and the ratio of R & D spending. A negative coefficient for this variable (-1.077/067) implies the existence of an inverse relationship between managerial ownership structures and the company's research and development expenditure.

In examining the significant coefficients based on the results presented in the Table, Since the probability of t-statistic for variable coefficient of micro shareholder structure is larger than 0/05 (0/1525), as a result, a significant relationship between micro shareholder structure and research and development expenditure at the level of 95% is confirmed. The second hypothesis is rejected and we can say with 95% confidence there is a no significant relationship between micro shareholder structure and the ratio of R & D spending.

CONCLUSION

The results of the study regarding the three accepted hypothesis showed that there was inverse correlation between financial constraints and the ratio of R & D spending, also there is a significant inverse relationship between institutional ownership structure and the ratio of R & D spending and finally between managerial ownership structure and R & D spending.

Also according to the analysis made in connection with the fourth research hypothesis we come to the conclusion that there is no significant relationship between micro shareholders structures the ratio of R & D spending.

The results of the first hypothesis, the presence of a significant relationship between dependent and independent variables are consistent with the study of Aguilera and Jackson (2010), Block (2012) and Chrynk and Aschalr (2009), but in terms of the type of relation it is consistent with the results of Lazvnyk (2008) and is in conflict with Paris and colleagues (2009) and Gosh and colleagues (2007).

The results of the second hypothesis of our research are consistent with the research findings of Driver et al (2008), Aghione et al (2005) and Aghion et al (2009) and are in conflict with research findings Bruner (2010) and Driver et al (2012).

The results of our research findings in third hypothesis are consistent with Mankada-Patrnv and et al (2010) and New et al (2010) and in conflict with Block (2012) and Aguilera and Jackson (2010). The fourth hypothesis results of our research are consistent with the research findings of Lazvnyk (2008), Aghione (2005) and Paris (2009) and in conflict with research findings of Lerner and Wolf (2006) Vloylry (2011).

According to the research result the following recommendations can be mentioned

1. According to the results of the first hypothesis it is proposed research be conducted regarding the relationship between financial constraints and standardized cash flows and affecting the credibility of the company's business.
2. According to the results of the second research hypothesis it is proposed a research be conducted regarding the relationship between the level of institutional ownership and control of credit ratings and its impact on the intrinsic value of companies.
3. According to the results of the third research hypothesis it is proposed a research be conducted regarding the relation between the ratio of R & D spending and financial leverage and impact on adjusted profit of companies.
4. According to the results of the fourth research hypothesis it is proposed a research be conducted regarding the relationship between micro shareholder structure and the market value of equity and its impact on discretionary accruals of companies.
5. Since the increased level of financial constraints, the level of institutional ownership control, managerial ownership structure micro shareholder structure can have important effects on investment decisions; recommendations of Accounting Standards references to voluntary disclosure of the items mentioned above by management will be very helpful.
6. It is best that the financial analysts active in the capital market, and investment advisers in Stock Exchange, along with analysis and conventional techniques that they perform, to perform also specific analyzes based on the state of research and development expenditure and its influencing factors, and financial constraints, the level of institutional ownership control, managerial ownership structure micro shareholder structure, according to the accounting standards.

CONFLICT OF INTEREST
There is no conflict of interest.

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ARTICLE

IDENTIFICATION AND PRIORITIZATION OF EFFECTIVE FACTORS ON DEVELOPMENT OF RURAL BUSINESSES WITH AHP ATTITUDE (CASE STUDY: DEHKAHAN VILLAGE, CITY OF KAHNUJ)

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ABSTRACT

With the entry of private banks into banking system and the conversion of some state-owned banks into private banks as well as the transition from traditional banking atmosphere to competitive environment, customers have more choice to use bank services and products. Due to environmental changes and the need for flexibility and responsiveness in banks, this study aimed to assess the impact of privatization of Mellat Bank on the customer's perception of service quality in Sistan-Baluchistan province. This cross-sectional and descriptive study was carried out among 380 customers of Mellat bank branches based on random sampling in Sistan-Baluchistan province in 2016. For data collection, service quality scale (SERVQUAL) by Parasuraman et al., [8,9] was employed. Data were analyzed using descriptive, inferential statistics and chi-square test, Wilcoxon pairwise comparisons, respectively. Based on the results of the questionnaires, the overall average expectations of respondents exceeded the overall average of their understanding and the mentioned gap is seen more or less in all five dimensions of SERVQUAL model. In other words, customers' expectations about the quality of banking services are not met in any of the dimensions. Increasing the quality of services in competing banks, developing e-banking services and increasing public knowledge about banking services increased customer expectations regarding service quality bank.

INTRODUCTION

Experience has shown that direct government intervention in the economy in the form of economic tenure not only failed to solve the economic problems but also created a barrier to growth, development and social welfare. As a result, during the past four decades, tendency towards privatization has been the main agenda of economic policies in many countries in the world. Privatization is considered as an important issue and the current needs of all communities. In a general and extensive sense, privatization has been defined as "The state of declined economic or eliminated all economic activities ". In certain limited sense, privatization means "transfer of ownership of state-owned industries to the private sector ". Generally two reasons or goals are presented for the assignment of state-owned industries to private sector:

- 1) Reduced responsibilities of the state and privatization of industries in areas controlled by the government.
- 2) Reduced financial problems from state-owned industries (by authors, 1993).

Therefore the government and many organizations and companies, including banks call for privatization in the country. Banks are also required for privatization in order to develop and gain more profitability. There are different reasons for privatization. The most prominent reason is the poor performance of state-owned companies compared with the private sector. As can be seen, due to low productivity, state-owned enterprises impose heavy costs on the state budget and increase financial load. Although this may result from a state of weakness and disability, or lack of monitoring by governments, one of the ways to reduce the budget deficit is reducing these costs by privatizing of state-owned companies. It can increase possible and optimal application of those state assets to the public sector (Prokopenko, 2002). In Iran, the privatization of the banks is considered in accordance with Article 44; so that the privatization of banks was began by selling shares of three banks of Saderat, Mellat and Refah in the Stock Exchange and Social Security. In recent years, the tendency to emphasize the increasing role of the private sector in Iranian's banking for development of the banking system is justifiable by increasing competition and efficiency [10]. Increased activities of private banks created stronger and more efficient competitors to the state banks and show that how the entry of private banks in the Iranian's banking market leads to positive change in the entire banking system. In light of the competitive market caused by private banks, interest rates in informal money market were declined in Iran so that interest rates in 2001 were reached from 30% percent to 17% in 2009. It is predicted that by joining two banks of Tejarat and Mellat among private banks and the continuity of it in an open and competitive market, the performance of Iran's banking system to be improved (Omidinejad, 2009). Also in recent years, advertisements have been attracted attention as an essential element of the national economy among banks, financial and credit institutions and loan institutions. The main reason is increased competition in the new space and the presence of private banks on the one hand and privatization of some state-run banks on the other hand. By the year 2012, three state-owned commercial banks, 5 state-owned specialized banks, 18 private banks, 2 bank loans and a credit institution (total of 27 banks and one credit institution) are operating. In terms of marketing expenses, increased volume of advertising marketing is the most important indicator in Iranian banks (Aziz et al., 2012). The main objective of slogans was facilitation of storing information in the minds of customers. Bank Mellat' slogan is "Feeling change ". Given the importance of customer satisfaction

KEY WORDS

Quality of services, privatization, SERVQUAL, Mellat Bank

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from banking services, the focus of this study is on the role of privatization in customer perception of the service and satisfaction and customer loyalty. Therefore, this study was conducted to investigate whether customers of Mellat Bank have felt changes that were made after the bank's privatization and also its impact on the relationship between the customer and the bank investigated. In other words, this study was sought to answer this question: to what extent, privatization of Mellat Bank led to the customer satisfaction and efficiency of the banks and how many bank customers have felt these changes? With regard to this, this study investigated the impact of privatization of Mellat bank on the customer's perception of changing service and customer satisfaction and loyalty.

Research hypothesis

Main hypothesis

There is a difference between perception and expectations of quality services after privatization.

Sub hypothesis

1. There is a difference between perception and expectations of Physical tangibles after privatization.
2. There is a difference between perception and expectations of Reliability after privatization.
3. There is a difference between perception and expectations of Customer Responsiveness after privatization.
4. There is a difference between perception and expectations of Assurance after privatization.
5. There is a difference between perception and expectations of Sympathy after privatization.

Conceptual model

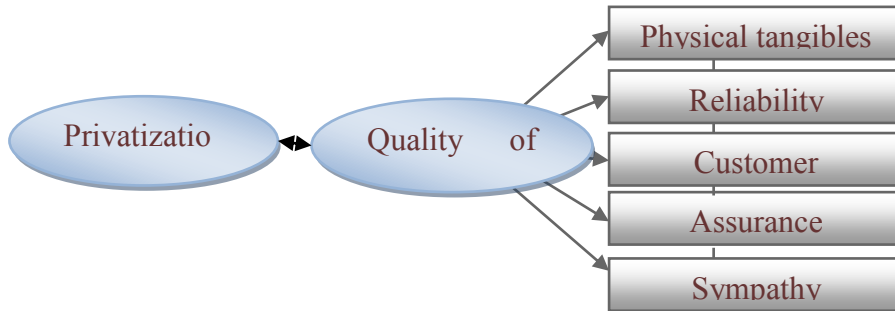


Fig. 1: The conceptual model (Source: Chang Li et al., 2012).

METHODS

The present study is an applied research and the method of data collection is descriptive. The research method was a survey because it describes the state of relations between variables. The study population consisted of those customers in branches of Mellat bank with 5-year history of receiving the bank's services. The study sample consisted of 380 bank customers who were selected as sample using Cochran formula. A questionnaire was used to collect data. In this study, the validity was approved with the consultation of several professors and reliability was assessed by Cronbach's alpha coefficient which was computed 0.87 for 44 items. The questionnaire showed high reliability. In this study, the dependent variable is the service quality of the bank and its relationship with the independent variables is investigated. In this study, descriptive method was used to obtain demographic information and the quality of service and t-test and ANOVA were used to examine the hypotheses. And SPSS statistical software was employed for statistical analysis.

RESULT

Hypothesis 1: There is a difference between perception and expectations of Physical tangibles after privatization

Table 1: Wilcoxon test for paired comparison in the field of physical tangibles

Variable		Std. Deviation	Mean	N
Physical tangibles	Perceptions	1.25478	3.2579	380
	Expectations	0.95621	4.1737	380

Variable	Wilcoxon test	Sum of Ranks	Mean Rank	N	Sig. (2-tailed)	Z
Physical tangibles	Negative Ranks	6128.5	122.57	50 ^a	0.000	-10.851 ^b
	Positive Ranks	36942.5	152.03	243 ^b		
	Ties			87 ^c		

Measuring the difference between expectations and perceptions of customers in physical tangibility dimension with paired comparison test and using the Wilcoxon test showed that since the obtained value of z is 1% at a significance level, thus it shows the difference between expectations and perceptions of customers in physical tangibility dimension. Here the first sub-hypothesis proved that: there is a difference between perception and customer expectations after privatization.

Hypothesis 2: There is a difference between perception and expectations of Reliability after privatization

Table 2: Wilcoxon test for paired comparison in the field of Reliability

Variable		Std. Deviation	Mean	N
Reliability	Perceptions	1.19231	3.3947	380
	Expectations	0.80873	4.3632	380

Variable	Wilcoxon test	Sum of Ranks	Mean Rank	N	Sig. (2-tailed)	Z
Reliability	Negative Ranks	4814	114.62	42 ^d	0.000	-11.553 ^b
	Positive Ranks	36802	149.6	246 ^e		
	Ties			92 ^f		

Measuring the difference between expectations and perceptions of customers in Reliability dimension with paired comparison test and using the Wilcoxon test showed that since the obtained value of z is 1% at a significance level, thus it shows the difference between expectations and perceptions of customers in Reliability dimension. Here the Second sub-hypothesis proved that: there is a difference between perception and customer expectations after privatization.

Hypothesis 3: There is a difference between perception and expectations of Customer Responsiveness after privatization

Table 3: Wilcoxon test for paired comparison in the field of Responsiveness

Variable		Std. Deviation	Mean	N
Responsiveness	Perceptions	0.97914	3.9342	380
	Expectations	0.85773	4.3211	380

Variable	Wilcoxon test	Sum of Ranks	Mean Rank	N	Sig. (2-tailed)	Z
Responsiveness	Negative Ranks	12318	107.11	115 ^g	0.000	-5.467 ^b
	Positive Ranks	26463	162.35	163 ^h		
	Ties			102 ⁱ		

Measuring the difference between expectations and perceptions of customers in physical tangibility dimension with paired comparison test and using the Wilcoxon test showed that since the obtained value of z is 1% at a significance level, thus it shows the difference between expectations and perceptions of customers in Responsiveness dimension. Here the Third sub-hypothesis proved that: there is a difference between perception and customer expectations after privatization.

Hypothesis 4: There is a difference between perception and expectations of Assurance after privatization

Table 4: Wilcoxon test for paired comparison in the field of Assurance

Variable		Std. Deviation	Mean	N
Assurance	Perceptions	1.26777	3.1526	380
	Expectations	0.97986	4.1632	380

Variable	Wilcoxon test	Sum of Ranks	Mean Rank	N	Sig. (2-tailed)	Z
Assurance	Negative Ranks	5626.5	119.71	47 ^j	0.000	-11.598 ^o
	Positive Ranks	40126.5	157.36	255 ^k		
	Ties			78 ^l		

Measuring the difference between expectations and perceptions of customers in physical tangibility dimension with paired comparison test and using the Wilcoxon test showed that since the obtained value of z is 1% at a significance level, thus it shows the difference between expectations and perceptions of customers in Assurance dimension. Here the fourth sub-hypothesis proved that: there is a difference between perception and customer expectations after privatization.

Hypothesis 5: There is a difference between perception and expectations of Sympathy after privatization

Table 5: Wilcoxon test for paired comparison in the field of Sympathy

Variable		Std. Deviation	Mean	N
Sympathy	Perceptions	1.25478	3.2579	380
	Expectations	0.95621	4.1737	380

Variable	Wilcoxon test	Sum of Ranks	Mean Rank	N	Sig. (2-tailed)	Z
Sympathy	Negative Ranks	2980	82.78	36 ^m	0.000	-13.347 ^o
	Positive Ranks	43380	161.87	268 ⁿ		
	Ties			76 ^o		

Measuring the difference between expectations and perceptions of customers in physical tangibility dimension with paired comparison test and using the Wilcoxon test showed that since the obtained value of z is 1% at a significance level, thus it shows the difference between expectations and perceptions of customers in Sympathy dimension. Here the fifth sub-hypothesis proved that: there is a difference between perception and customer expectations after privatization.

CONCLUSION

Based on the results of the questionnaires, the overall average expectations of respondents are beyond the overall average of their understanding and there is a gap between the customers' expectations with their perception of the quality of services after the privatization of Mellat Bank. The gap is seen more or less in all five dimensions of SERVQUAL model. In other words, customers' expectations about the quality of banking services are not met in any of the mentioned aspects. At the same time, based on the results of the analysis of the questionnaires, the smallest gap belonged to the responsiveness and the largest gap is devoted to empathy. Perhaps the external and internal factors influencing the gap between the expectations of the customers' perception of quality of services after the privatization of Mellat Bank can be found in the following:

The entry of private banks to the banking network as competitors: for various reasons, including agility in processes and services, customer satisfaction, increased attention to the development of electronic banking services, recruiting specialist in public banks, private banks were attracted by public and an appropriate share of the market was accounted for the bank customers, particularly retail customers. Increasing the quality of services in competing banks: rival banks (including public, private and private) need to constantly improve the quality of their services and, for this reason, the expectations of society with respect to banking services were increased.

Increasingly development of electronic banking services: Although the bank focused to move towards the centralized banking and development of channels providing electronic banking services (including internet banking, telephone banking, mobile banking, commercial terminals, ATM, etc.) as well as wide efforts in order to provide high quality services to customers have started, it seems that customers' expectations in this regard are beyond their perception.

Increasing public knowledge of international banking services: With increasing knowledge of society towards to the modern banking services, it seems that their expectations of internal banking services have also increased, therefore, it may be claimed that customer expectations of banking network are beyond functioning of the country's bank and Mellat Bank is not exceptional.

It seems that organizational factors leading to consolidation of these factors can be outlined as follows: No change in the prevailing mentality of employees and branches to the private sector and permanent domination of a state bank perspective.

Lack of proper advertising and information about the Bank services: It seems as agents of a firm particularly in the front-line services for customer (employees of bank branches) don't access to sufficient knowledge about the quality of their services so they cannot use it correctly and efficiently deliver services to their recipients. The main causes of this problem may be summarized as follows:

Lack of proper communication between public relations departments and service provider units in the bank.

Lack of staff training in accordance with the change and quality of banking services.

Lack of optimal use of propaganda services (including brochures, TV spots, etc.)

Advertise beyond existing realities: advertisement should be done based on the capacity in the provision of services, so it not only result in positive business income for the service provider, but also decreases expectations of service recipients and the mismatch of expectations with their perceptions.

CONFLICT OF INTEREST

There is no conflict of interest.

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None

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ARTICLE

NUMERICAL SIMULATION OF VELOCITY DISTRIBUTION IN THE RIVER LATERAL INTAKE USING THE SSIIM₂ SOFTWARE

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ABSTRACT

In this study, flow numerical simulation has been performed in the direct path of rectangular channel using SSIIM₂ software, that solves Navier-Stokes equations by Finite-Volume Method (FVM). The flow calculations were performed in the three dimensional model using K-ε-RNG and K-ε-Standard turbulence models. In the second section, using this turbulence model, the flow velocity profiles at different sections of the main channel and intake were compared with the experimental and numerical results of other researchers; and a good agreement has been found between them. The comparison of the obtained results with experimental and numerical results of other researchers indicates that this numerical model can well predict the flow velocity profile in the different sections of the main channel and intake.

INTRODUCTION

From the distant past so far, diverting water from its original path has been done for many purposes such as agriculture, urban water supply and etc. Flow diverted into the intake has complex properties and leads to the flow separation zones in the main channel and the intake. That flow enters into the intake, has strong momentum in the direction of main channel and therefore, flow separation occurs through the intake [1]. In this area of the flow, fluid particles in the vicinity of the left wall of the intake channel have rotation mode and in fact, this area of the lateral channel will have no effect on the amount of discharge. In other words, the flow separation zone reduces the discharge of the intake and increase the velocity in other parts of the flow. Also, due to the changes which occur in the velocity distribution in the intake, deposition usually happens in the intake inlet that leads to the reduction in intake efficiency, the entrance of coarse-grained sediments into the network and the increase in executive costs for descaling operations. Any action that reduces the secondary flows and whirlpools at the intake inlet, reduces the accumulation of sediments at the intake inlet and also the sediments enters into the intake. Many studies had been done on diverting the flow in the direct path by previous researchers. Shafaeii Bajestan et al did the experimental and numerical investigation of flow pattern in the intake with 30-degree diversion angle from trapezoidal channel. In this study, firstly, different tests were performed on lateral intake with 30-degree diversion angle from the wall of trapezoidal channel in the laboratory flume and 3D components were measured. Then, this data was used to calibrate and validate the mathematical model SSIIM₂. The results showed that there is a direct relationship between the width of separated flow on the bed and the surface and discharge. Also, they indicated that in compared to discharge from direct channel, the width of flow pipe increases on the surface and decreases on the bed in the discharge from trapezoidal channel and since the concentration of sediment on the bed is more than one in surface layers, obliquity of the wall of main channel will lead to the reduction of input sediment. [2]

Mohammadion et al examined the effect of the curvature of the bottom edge of the 90-degree intersection of direct and arc-shaped channels on the flow pattern. In this research, modification of the flow pattern and reduction of erosion and deposition were examined by replacing the bottom vertical edge of intersection with an arc. The results showed that using an arc with mentioned radius will have significant effect on the reduction of the deposition potential of flow and erosion. [3] Seyyedian and Shafaeii Bajestan determined the dimensions of flow tube and a spiral vortex power in the lateral intakes. In this study, firstly, different tests were performed on lateral intake with 90-degree diversion angle in the laboratory flume and 3D components of velocity were measured. Then, this data was used to calibrate and validate the mathematical model SSIIM₂ and this model was implemented for other hydraulic conditions so that the acceptable range of the data was obtained. The results indicated that the width of flow tube on the bed and the surface is directly related to discharge. Also, the power of secondary flow created in the beginning of the intake was calculated that affects the transfer of bed load to intake and it was found that there is an

KEY WORDS

Ateral intake, flow velocity profile, shear stress, SSIIM₂ numerical model

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inverse relationship between it and Froude number and there is a direct relationship between it and discharge. [4] Shakibaeinia et al discussed the application of 3D numerical modeling in simulating the complex phenomena in river engineering by using model SSIIM₂. This study aimed to evaluate the efficiency of three-dimensional numerical models in solving the issues raised in river engineering and validate them in some complex cases. The results of numerical predictions were compared with available experimental or field data. The results indicated the accuracy of mentioned numerical models that can be used in solving the many problems raised in river engineering.[5] .Karami Moghaddam et al. evaluated the effect of the radius of curvature of the intersection zone on the dimensions of separation zone by using 3D model SSIIM₂ and the results were verified by using physical methods.[6] Montaseri et al. [7], in their study, using the flow pattern of the front of the intake, showed that in a 180-degree arc, the flow tube on the front of the intake, which is more in upper layers of flow than lower layers, reduces. Also, the maximum secondary flow power is in the 45-degree cross-section of arc and there is a relative maximum power in the 130-degree cross-section. Law and Reynolds conducted an analytical and experimental study on main and diverted channels with the same width and provided a relationship between the discharge ratio and different Froude number for before and after intersection and the width ratio of two channels. [8,13]. Chen and Lian simulated the t-shaped intersection, which has been studied experimentally by Pop and Salet in two-dimensional form with high Reynolds number by the use of K-ε-Standard model. [9]

The results obtained for small discharge ratio were consistent with the previous experimental measurements but for the larger discharge ratio, their results were fundamentally different from the previous measurements. Issa and oliveira conducted 3D simulation of turbulent flow for T-shaped geometries.[11] Kasthuri and Pundarikanthan performed an experimental study on measuring the length and width of flow separation zone in the intake with 90-degree diversion angle from a rectangular channel and concluded that the dimensions of flow separation zone depend on discharge ratio and the width and length of vortex zone decrease at the inlet of intake channel by increasing the discharge ratio. [12]

MATERIALS AND METHODS

In order to simulate the deposition and investigate the intakes and rivers hydraulically the SSIIM₂ software was designed. This software solves the Navier-Stokes equations by the use of finite-volume method. Finite-volume method is based on direct discretization of the integral form of conservation laws in physical space. Flow analysis is done in steady state and the algorithm SIMPLE is used for coupling the velocity and the pressure. Discretization method of the momentum equations, drop and turbulence kinetic energy and Reynolds stress is the second order forward difference method and discretization method of the equation of pressure is a standard method. Turbulence models used in this software are K-ε-Standard turbulence model, K-ε-RNG turbulence model, local K-ε turbulence model based on the water velocity, K-ω turbulence model with Wilcox's wall law and K-ω turbulence model with k-epsilon wall law. Given differential form of

$$\text{conservation law } \frac{\partial U}{\partial t} + \bar{\nabla} \cdot \bar{F} = Q,$$

RESULTS

the important step in finite volume method is integrating governing equations on control volume:

$$\int_{\Omega_J} \frac{\partial U}{\partial t} d\Omega + \int_{\Omega_J} \bar{\nabla} \cdot \bar{F} d\Omega = \int_{\Omega_J} Q d\Omega$$

$$\int_{\Omega_J} \bar{\nabla} \cdot \bar{F} d\Omega = \int_S \bar{F} \cdot d\bar{S}$$

Using Gauss divergence theory, :

Integral form of conservation law for each control volume, Ω_J , related to the point J is as following:

$$\frac{\partial}{\partial t} \int_{\Omega_J} U d\Omega + \int_{S_J} \bar{F} \cdot d\bar{S} = \int_{\Omega_J} Q d\Omega$$

The above equation is replaced by its discrete form where the integral of volume is expressed as the averaged values of the cell and the integral of surface is expressed as a total of volume package.

$$\frac{\partial}{\partial t} (U_J \Omega_J) + \sum_{faces} \bar{F} \cdot \Delta \bar{S} = Q_J \Omega_J$$

Governing equations of the movement of fluid are the equation of continuity and momentum that are as equations (5) and (6) for turbulent flow in incompressible fluid in a 3D geometry, respectively. In different turbulence models, the turbulence kinetic energy is defined as equation (7). (15)

$$\frac{\partial \bar{U}_i}{\partial x_i} = 0 \quad K = \frac{1}{2} \overline{U_i U_i} \quad \frac{\partial \bar{U}_i}{\partial t} + (\overline{U_j}) \frac{\partial \bar{U}_i}{\partial x_j} = -\frac{1}{\rho} \frac{\partial \bar{p}}{\partial x_i} + g_{xi} + \frac{\partial}{\partial x_j} [v \frac{\partial \bar{U}_i}{\partial x_j} - \overline{U'_i U'_j}]$$

Where $\rho \bar{u}_i \bar{u}_j$ is Reynolds stress, U_i and U_j are the flow velocities in the directions of x and y , t is time, ν is a molecular viscosity, p is pressure, k is turbulence kinetic energy, ρ is fluid density and g_{xi} is gravity in the direction of x_i .

$$\frac{\partial k}{\partial t} + U_j \frac{\partial k}{\partial x_j} = \frac{\partial}{\partial x_j} \left(\frac{\nu_T \partial k}{\sigma_k \partial x_j} \right) + p_k - \varepsilon \quad \nu_T = c_\mu \frac{K}{\varepsilon^2} P_k = \nu_T \frac{\partial U_j}{\partial x_i} \left(\frac{\partial U_j}{\partial x_i} + \frac{\partial U_i}{\partial x_j} \right)$$

$$\frac{\partial \varepsilon}{\partial t} + U_j \frac{\partial \varepsilon}{\partial x_j} = \frac{\partial}{\partial x_j} \left(\frac{\nu_T \partial \varepsilon}{\sigma_\varepsilon \partial x_j} \right) + C_{\varepsilon 1} \frac{\varepsilon}{k} P_k + C_{\varepsilon 2} \frac{\varepsilon^2}{k}$$

P_k is defined as follows,

K is marked as ε and becomes as follows,

In above equation, P_k is a term of producing turbulence and empirical constant values used in this study are as follows (15)

$$C_\mu = 0.09, \quad C_{1\varepsilon} = 1.43, \quad C_{2\varepsilon} = 1.92, \quad \sigma_\varepsilon = 1.3, \quad \sigma_k = 1$$

Experimental model performed by Barkdoll et al.

In the experimental study by Barkdoll et al. (8), the lengths of main and secondary channels are 2.74 m and 1.68 m, respectively and the diversion angle is considered 90 degrees. The cross sections of both channels are rectangle. Input discharge of main channel (Q_1) is 0.011 m³/s, the depth of flow (d) is 0.31 m and the Reynolds number (Re) is 49600 and the width of both channels (b) is 0.152 m. [Fig. 1] shows a schematic design of the channel. The hydraulic characteristics of water flow are listed in [Table1]

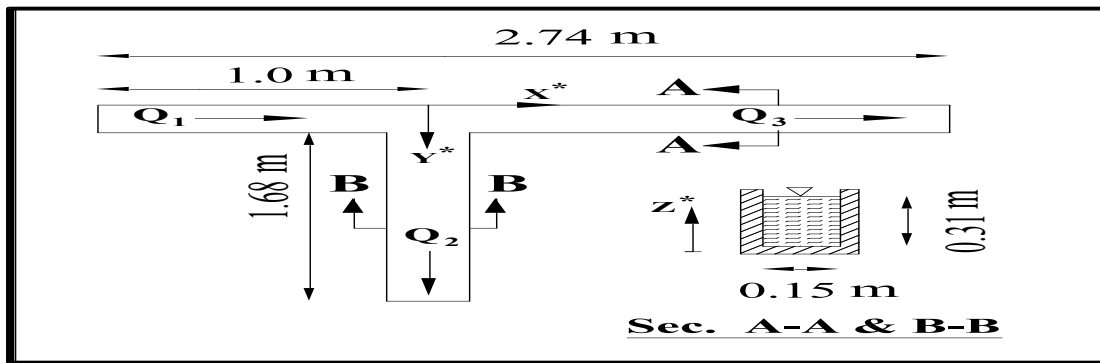


Fig.1: Geometric characteristics of laboratory flume.

Table1. Hydraulic characteristics of flow

d (m)	Q_1 (Lit/s)	R	Q_3 (Lit/s)	Q_2 (Lit/s)	Re	Fr
0.31	11	0.31	7.59	3.41	49600	0.13

Networking and boundary conditions of computing field to simulate experiments done by Barkdoll et al. In this study, the inlet of main channel uses the boundary condition of specified velocity with the average velocity equal to 0.236 m/s. according to the value considered in experimental model, intake discharge ratio (R) is equal to 0.31. Given the inconsiderable changes at the water surface, the symmetry boundary condition is applied to the surface. Wall boundary conditions are applied to rigid boundaries and the walls are considered smooth hydraulically. Also, one of the important factor affecting the speed of the implementation of the model is an appropriate regional networking in which there is flow. Figure-2 shows the plan and perspective of the networking of computing field in 90-degree intake. Table2 lists the number and dimensions of its different zones in the directions of x , y and z .

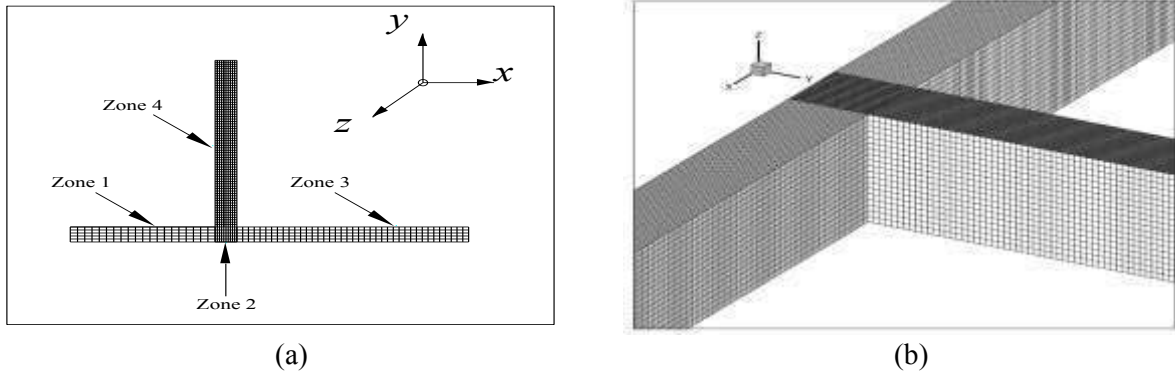
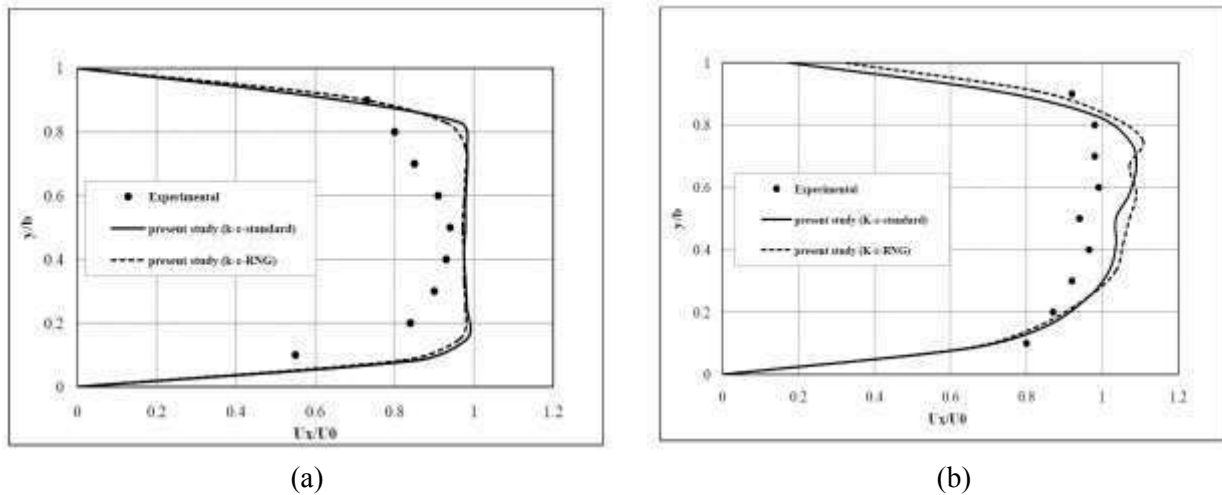


Fig. 2: Networking of computing field within the intake in two modes (a) and (b) perspective.

Table 2. The number and dimensions of the zones of computing field in different directions

Zone	number of cells in direction of x	number of cells in direction of y	number of cells in direction of z	Dimensions of cells in direction of x (mm)	Dimensions of cells in direction of y (mm)	Dimensions of cells in direction of z (mm)
Zone1	25	120	19	7.70	6	16.31
Zone2	25	50	19	6	3	16.31
Zone3	25	240	19	6.93	6	16.31
Zone4	25	50	19	3	11.20	16.31

According to experimental study, indicates the dimensionless speed profiles (U_x/U_0) near the water surface for the different cross-sections of main channel with constant input discharge of $0.011\text{m}^3/\text{s}$, intake discharge ratio (R) of 0.31 and Froude number of input flow (Fr) of 0.13. Y^* and X^* are the distances in the axes of y and x that made dimensionless with the width of intake channel. U_x is a maximum velocity at the cross-section $X^*=-4.65$ which is equal to 0.28 m/s. [Fig. 3]. Profiles of computing velocity in different cross sections of main channel (a) $X^*=-4.65$, (b) $X^*=-0.5$, (c) $X^*=0.5$ and (d) $X^*=2$



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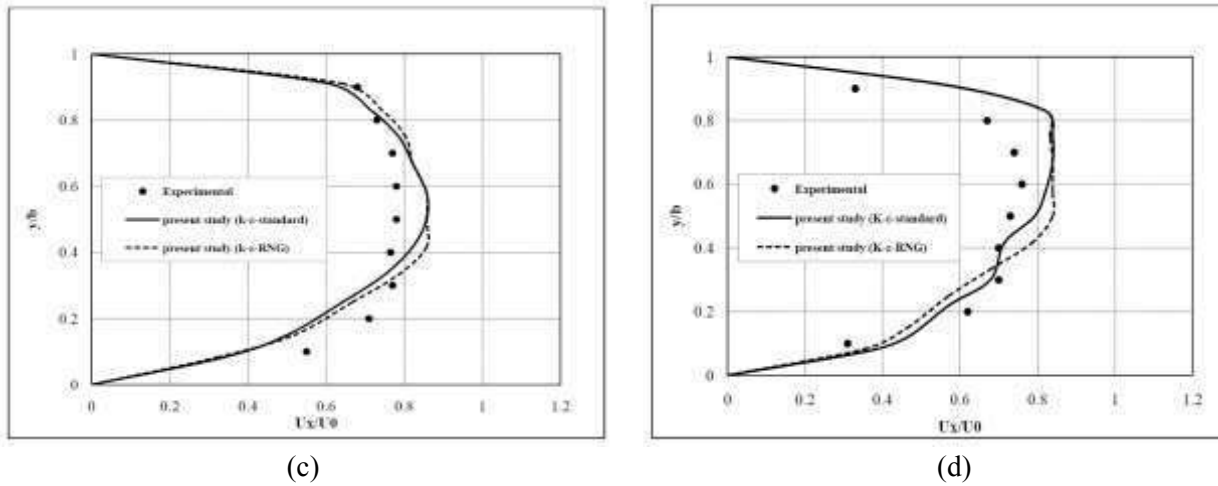
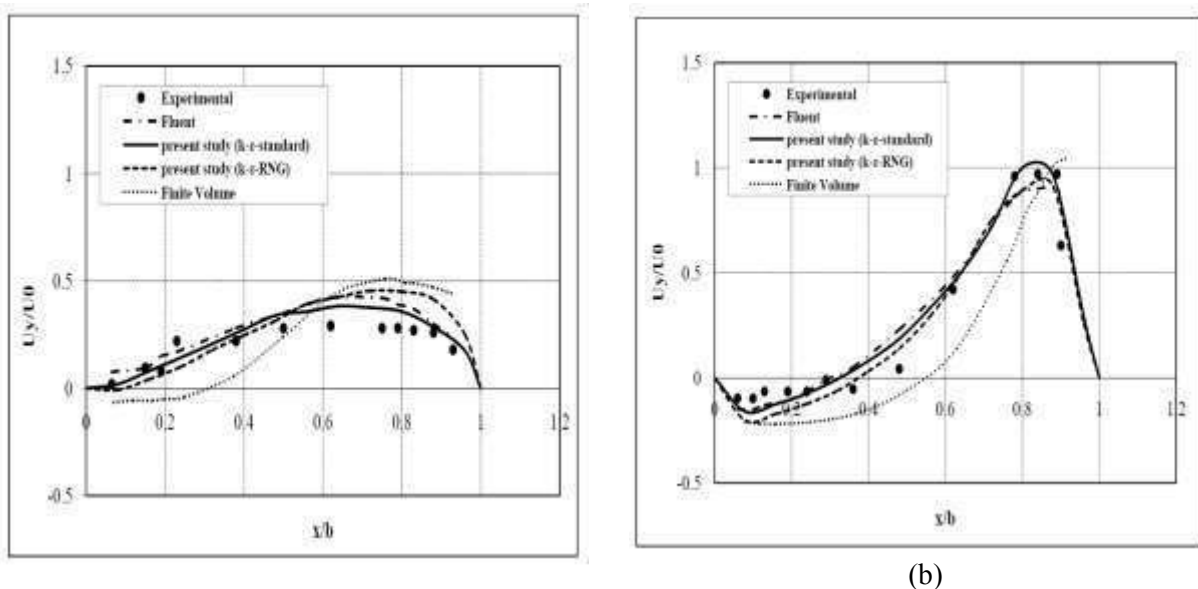


Fig. 3: Examination of flow velocity profiles.

Given to [Fig.(3-a)], in the distances before the inlet of the intake, the profile of velocity keeps its expanded mode and by approaching the inlet, due to the sucking flow applied by the intake, the profiles of velocity are diverted towards the diverted channel and the maximum velocity is moved towards the intake inlet ($X^*=-0.5$) [Fig. 3-b].

The results of this study showed that when the flow enters into the intake, the velocity decreased along the intake inlet and in the bottom wall of inlet ($X^*=-0.5$), the maximum speed receded from the inner wall of the main channel. Residual flow expands along the main channel after passing the intake inlet but, due to the effects caused by the curvature of flow lines in the intake inlet, the maximum velocity deviates towards the inner wall again. Amount of predicted velocity is greater than the amount of experimental velocity, because air tension is neglected in numerical modeling. Figure 4 shows the profile of dimensionless velocity (U_y/U_0) near the water surface for different cross sections. The numerical results obtained from the Fluent software are derived from the numerical study by Safarzadeh and Salehi Neishabori (1) in which K- ϵ -Standard turbulence model was used to examine the distribution of the flow velocity profiles. Also, the numerical results of Finite-Volume are derived from numerical study by Godarzirzadeh et al.in which K- ϵ -RNG turbulence model was used(10).

[Fig. 4]. Profiles of computing velocity in different cross sections of the intake (a) $Y^*=1$, (b) $Y^*=2.5$, (c) $Y^*=4$ and (d) $Y^*=10$ According to [Fig. 3 and 4], K- ϵ -Standard turbulence model is better than K- ϵ -RNG turbulence model for estimating the velocity and the results show that the positive and negative amounts of velocity obtained by it are consistent with the results of experimental study. Amount of predicted velocity is greater than the amount of experimental velocity, because the effects caused by secondary flow leads to the transfer of maximum velocity to the bottom of the water surface. [Table 3] shows the average percentage error obtained from comparing the numerical amounts of the software of SSIIM₂ and Fluent with experimental amounts for different sections of main channel and intake.



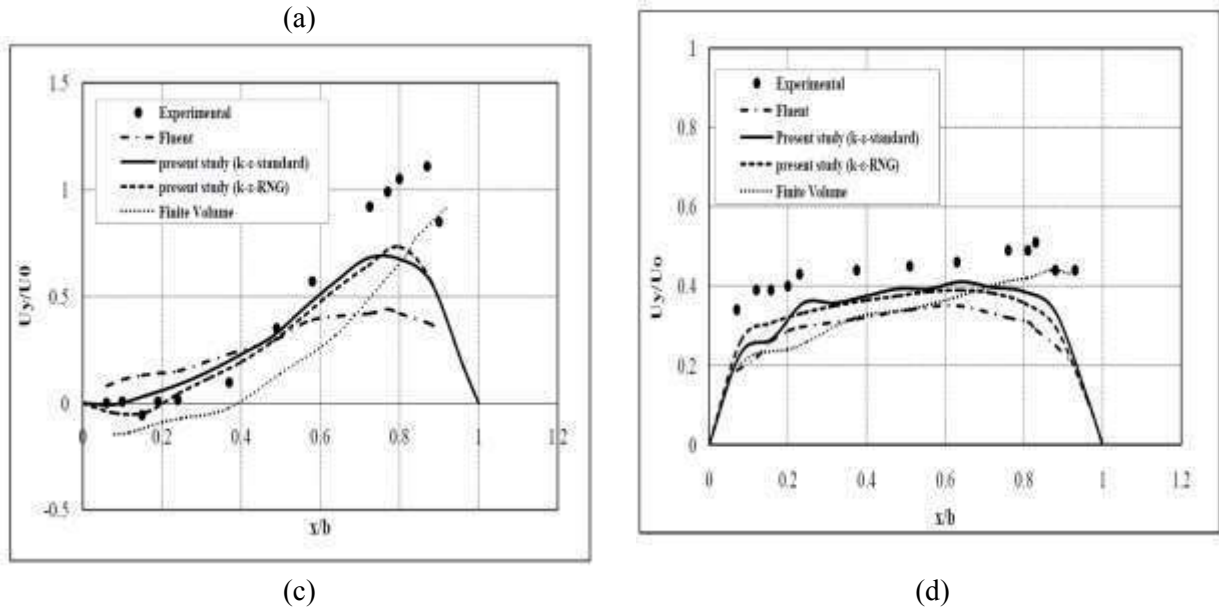


Table3: Average of percentage error obtained from comparing the numerical results of velocity profile in different cross sections of two channels with experimental results

Section	X*				Y*			
	-4.65	-0.5	1	2	1	2.5	4	10
SSIIM2 (K-ε-Standard)	13.28	9.67	12.30	10.71	5.73	15.25	20.60	9.14
SSIIM2 (K-ε-RNG)	13.59	10.72	13.47	11.42	11.20	20.76	22.02	10.05
Fluent					6.41	11.98	41.33	14.67

In the second part of the study, according to the good results obtained from the first part, the profiles of velocities averaged in the depth in different sections of main channel and intake of experimental model provided by Shettar and Murthyare examined by K-ε-standard turbulence model.[17]

CONCLUSION

Totally, the results obtained for the flows with applied conditions are as follows:

In the distances before the intake inlet, the profile of velocity keeps its expanded mode and by approaching the inlet, due to the sucking flow applied by the intake, the profiles of velocity are diverted towards the diverted channel and the maximum velocity is moved towards the intake inlet ($X^*=-0.5$) [Figure 3b]. When the flow enters into the intake, the velocity decreased along the intake inlet and in the bottom wall of inlet ($X^*=-0.5$), the maximum speed receded from the inner wall of the main channel. Residual flow expands along the main channel after passing the intake inlet but, due to the effects caused by the curvature of flow lines in the intake inlet, the maximum velocity deviates towards the inner wall again.

K-ε-Standard turbulence model is better than K-ε-RNG turbulence model for estimating the velocity and the results show that the positive and negative amounts of velocity obtained by it are consistent with the results of experimental study.

In both modellings, given the percentage error obtained from comparing the numerical amounts with experimental amounts, the numerical amounts obtained from the numerical model of SSIIM₂ software in most cross sections are more consistent with experimental results than the numerical results obtained from the numerical model of Fluent software, it shows the high ability of this numerical model in determining the velocity profile in different cross sections of main channel and intake.

The maximum shear stress occurs in the right wall of the beginning of intake channel and its value is equal to 2.6 N. Since the erosion and corrosion of walls increase with the increase in shear stress, it can be concluded that the probability of the erosion and corrosion in this zone is more than other zones.

CONFLICT OF INTEREST
None

ACKNOWLEDGEMENTS

None

FINANCIAL DISCLOSURE

None

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ARTICLE

BUSINESS COMPETITION ANALYSIS OF IRAN'S AIRLINE INDUSTRY USING FUZZY TOPSIS METHOD

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ABSTRACT

This paper adopts a fuzzy TOPSIS multi-method approach for studying Iran's airline industry. First, the highly complex nature of competition in this sector is described. Then, the components of the methodology and its eclectic approach are examined. Application of fuzzy TOPSIS technique to Iran's airline industry will make it possible to rank its airlines in the light of key success variables of this sector. This paper also evaluates the empirical findings of fuzzy TOPSIS method from a managerial perspective. Data analysis reveals that the competitive price has the greatest weight among performance criteria of airlines. The results of this research indicate the superiority of private airlines over public ones in obtaining competitive advantages due to their stable management, paying attention to advertising, improving quality of services and reducing variable costs.

INTRODUCTION

This paper is aimed at using fuzzy TOPSIS technique for Iran's airline sector in order to rank the air carriers based on relative closeness coefficient and the main criteria of success in this industry. This analysis provides useful information for Iranian airlines to assess their goals and strategies. For this purpose, in the first section of the paper, increasing competition in Iran's airline industry will be elaborated, which poses a serious threat to the survival of companies in the period of economic sanctions. Furthermore, in this section a brief review will be provided regarding the main features of domestic airlines of Iran. In the next section that deals with the background of the research methodology, building blocks of fuzzy TOPSIS approach, i.e. linguistic variables and fuzzy sets as well as conventional TOPSIS method will be explained, and then the proposed fuzzy TOPSIS method will be elaborated. Fuzzy TOPSIS technique can be used for various problems ranging from choosing a location for facilities, robot selection [1- 2], selecting an analytical system for a software company, selection of the optimum initial training aircraft in the Taiwan Air Force Academy [3], quality of service in the hospitality industry [19], plant layout design [3], transshipment site selection [4], evaluation of the competitive advantages of shopping websites [6], as well as machine tool selection [5]. We assume that this fuzzy TOPSIS multi-method approach with its extensive applications, compared to its sub-components, can be a unique and more useful tool, and can accommodate the rules and requirements of survival in a chaotic and uncertain environment like the airline industry, where the competitors are struggling for survival and success. The next section deals with the application of fuzzy TOPSIS approach to Iran's airline industry, which, from a comparative perspective, provides valuable information for airlines to review their judges, objectives, strategies, programs, projects and actions. The final section is an analysis of the results of the fuzzy TOPSIS approach from a managerial perspective, where a managerial assessment is given regarding the meaning of quantitative values derived from the fuzzy TOPSIS method. Our goal is to justify our analysis by demonstrating the operations of airlines in accordance with the main success factors in the industry. The final section provides conclusion.

The nature of Iran's airline industry

"Iranian Airways" was established in 1944 and provided its first air travel services for Tehran-Mashhad route and after the Second World War. The geographical conditions of Iran, its vastness, remoteness of relatively crowded areas from each other, road and rail vehicle shortages, the need for fast and reliable connections among academic and government organizations, and above all the absence of a regular network with high functionality in order to revive mutual aviation rights with other countries, as well as the need for ensuring the welfare of the nation, led the board of ministers to ratify the proposal suggested by the road and transportation minister for establishing a national airline in 1961. Subsequently, Iran National Airlines Corporation was established by the merger of two airlines, i.e. "Iranians Airways" and "Persian Air Services", and a new airline was established named "Iran Air", using the "HOMA" bird as its symbol in the same year and began its operations in 1962. Now, after seven decades of establishment of aviation industry in Iran, more than 15 public and private airlines are active in the country, which indicates the potentials of its passenger and cargo market. United States sanctions against Iran have had many adverse impacts on the aviation and aerospace industry, and have caused its passenger and cargo fleet, which was one of the largest air fleets in Asia and the Middle East in the 1960s, become unable to rebuild and modernize itself.

Sanctions imposed by the United States against aviation and aerospace industry of Iran have impacted the

KEY WORDS

Iran's airlines, Multi-criteria decision-making, Fuzzy TOPSIS, Multi-method approach, Competitive advantage.

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aviation operations in the country from various aspects. Most importantly, Iranian airlines mainly use the older aircrafts, and are not able to refurbish their fleets due to such sanctions. The use of older aircrafts, in its turn, undermines civil aviation safety, since one of the factors affecting safety is the use of new equipment and original spare parts for aircrafts. Due to the lack of free access to the global market for upgrading the aviation fleet and the necessity of meeting such demands, speculative and rent-seeking behaviors have become dominant in this context.

Iran's aging aviation fleet has led it to lose a large share of transportation of passengers and cargo in international airways to the competitors, i.e. foreign companies. This has not only a negative impact on fair market competition among airlines, but also has caused significant economic loss for Iran. It should be noted that foreign airlines continuously increase the number of their aircrafts and flight lines, and have won at least half of the Iranian passengers on international flights. Given that Iran is a vast country and there are long distances between destinations in the country, people are forced to use flights, so probably, if airlines can develop more, there will be more potential customers that will use airplanes.

Iran Air - On February 23, 1961 a national commercial airline company was established in Iran for the first time. The company was named "Iran National Airlines Corporation" and is internationally known as Iran Air, abbreviated as "HOMA" in Persian, which is the name of a legendary bird too. It acquired the facilities of other private companies already working in Iran and became a full member of IATA in 1964. Its official name was changed to "The Airline of the Islamic Republic of Iran", again abbreviated as "HOMA", in 1981. The number of active airplanes of Iran Air fleet (aircrafts on the flight lines) rose to 51 aircrafts.

Mahan Air - Iran's first private airline was registered under the name of Mahan Air in 1992. The company started its national operations with flights of Tehran - Kerman - Tehran route. Mahan Air, then, acquired two Airbus A300B4 passenger aircrafts and added them to its fleet in 1999 in order for achieving the objective of development, security and safety. In the following years, it has also acquired and operated other types of airplanes such as Airbus A300-600, A310, A320, A340 as well as Boeing 747-300/400 as the most modern aircrafts available for long-range flights to Europe and the Far East destinations. For short-range routes within the country, 16 aircrafts of BAe-146-300 type have been added to its fleet. The increased number of aircrafts in the fleet (54 aircrafts) and flight network development to different parts of the country and the world stimulated a strong growth in the number of passengers, in such a way that according to the Iranian Civil Aviation Organization, Mahan Air has transported the largest number of passengers, both within the domestic network as well as international network, among Iranian airlines in 2012. In 2009, Mahan launched its Frequent Traveler Club, named Mahan & Miles.

Aseman Airlines - It was established in the year 1980 from the merger of four airlines, i.e. Air Taxi, Pars Air, Air Service and Hour Aseman. Aseman Airlines has now the largest flight network to domestic destinations and particularly to the deprived areas. It has established three flight centers in Tehran, Shiraz and Mashhad for better coverage of its flight network. Each of these three centers benefit from independent flight crew and maintenance hangars for recruiting and training local experts and performing daily flights with an adequate independence. The latest prestigious certificate issued in this regard is IOSA that have been issued by IATA for Aseman Airlines. Now, it has 33 aircrafts and performs regular flights to 40 domestic and 13 foreign destinations.

Kish Air - With the aim of developing the operations of Kish Island by connecting it to the centers of the provinces as well as to the countries around the Persian Gulf, Kish Air was established in 1991. After the first stage of establishment and by the end of 1992, the development stage of Kish Air began with appointment of a new management team. Currently, Kish Air is in the fifth stage of its history and the company management has successfully realized its new strategies, resulting in the increased number of owned aircrafts rather than leased ones, as well as replacement of Eastern aircraft with Western ones in its fleet. At present, the company owns seven Boeing MD as well as 3 Fokker 100 aircrafts. The company has meet all required international specifications and standards, is a member for IATA, and is the Iran's first airline with IATA Operational Safety Audit (IOSA) certificate.

Zagros Airlines - It was established in Arvand Free Zone and started its operations in 2005. Zagros Airlines currently has a fleet of 19 aircrafts, including 11 Airbus A320 and eight Boeing MD series airplanes. The company has managed to grow by 30% in terms of domestic and international destinations and by 70% in terms of number of passengers, and has transported more than 3 million passengers in the past year.

Qeshm Air - It was established in 2009, and became affiliated with Sorinet Development Holding of Qeshm; and its official name changed from Faraz Qeshm to Qeshm Air in 2012. Finally, the company was transferred to the Ministry of Petroleum of the Islamic Republic of Iran in 2014. The company is in possession of 21 aircrafts and provides services on different routes and to different destinations.

Table 1: Number of passengers of flights in 2015

Row	Company name	No. of passengers
1	Iran Air	4,000,000
2	Mahan Air	6,500,000
3	Aseman Airlines	2,489,682
4	Kish Air	1,700,000
5	Zagros Airlines	3,500,000
6	Qeshm Air	1,600,000

METHODS

This section briefly outlines linguistic variables, fuzzy sets, TOPSIS technique and the proposed fuzzy TOPSIS method.

Linguistic Variables and Fuzzy Sets

A linguistic variable is a variable whose values are words or sentences in a natural or artificial language [7]. For example, age is a linguistic variable if its values are linguistic rather than numerical, i.e., "old", "young", "very young" [20]. The concept of a linguistic variable indicates approximate characterization of phenomena which are either too complex or too ill-defined to be describable quantitatively. The main applications of the linguistic approach lies in the realm of humanistic systems - especially in the fields of artificial intelligence, linguistics, human decision processes, pattern recognition, psychology, law, medical diagnosis, information retrieval, economics and related areas [7-8].

Fuzzy sets and fuzzy logic are considered as powerful mathematical tools for modeling of uncertain systems in industry. Fuzzy set theory is the expansion of classical set theory. While classical set theory only embraces full membership or non-membership, fuzzy set theory also accepts partial membership. A fuzzy number like R [9-10-11]:

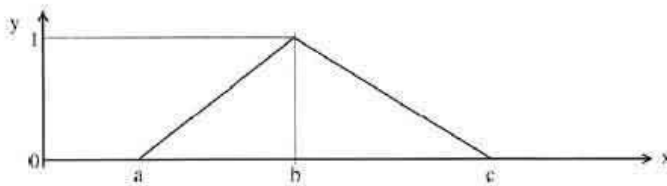


Fig. 1: An example of a triangular membership function.

Different fuzzy numbers can be used depending on circumstance. However, triangular fuzzy numbers are more common, since they have simple arithmetic characterization and can be used in a fuzzy environment to promote the process of providing information in an efficient manner. In this research, we have used triangular fuzzy numbers for fuzzy TOPSIS approach. Triangular fuzzy numbers can be described as a, b, c, where these parameters represent the lowest possible value, most likely value and the highest possible value respectively that will describe a fuzzy event. Triangular fuzzy number is shown in [Fig. 1]. While triangular fuzzy numbers have various functions, we have only noted the most important of them in this research. If we define two positive triangular fuzzy numbers (a₁, b₁, c₁) and (a₂, b₂, c₂), then:

$$(a_1, b_1, c_1) + (a_2, b_2, c_2) = (a_1 + a_2, b_1 + b_2, c_1 + c_2) \tag{1}$$

$$(a_1, b_1, c_1) \times (a_2, b_2, c_2) = (a_1 \times a_2, b_1 \times b_2, c_1 \times c_2) \tag{2}$$

$$(a_1, b_1, c_1) \times k = (a_1 \times k, b_1 \times k, c_1 \times k) \text{ where } k > 0 \tag{3}$$

TOPSIS Method

TOPSIS stands for the "Technique for Order of Preference by Similarity to Ideal Solution" [3]. The ideal solution (which is also known as positive solution), is a solution to maximize the benefit criteria and minimize the cost criteria, whereas the negative solution (non-ideal solution) maximizes the cost criteria and minimizes the benefit criteria [9].

The benefit criterion is to be maximized, while the cost criterion is to be minimized. The best alternative is the alternative that will be close to the ideal solution and distant from the negative solution as much as possible. We assume that our multi-criteria decision problem has *m* alternatives (A₁, A₂, ..., A_m) and *n* criterion or characteristic of decision-making (C₁, C₂, ..., C_n). Each alternative is evaluated with regard to *n* criteria or characteristic. All values or ranks given to alternatives with regard to each criterion will be

marked in the decision matrix as $X = (x_{ij})_{m \times n}$. If $W = (w_1, w_2, \dots, w_n)$ will be the vector for relative weight of criterion, j^{th} w_j will be obtained. The TOPSIS method can be summarized as follows:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^m x_{ij}^2}} \quad i = 1, 2, \dots, m \quad j = 1, 2, \dots, n \quad (4)$$

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{j=1}^n x_{ij}^2}} \quad i = 1, 2, \dots, m \quad j = 1, 2, \dots, n \quad (5)$$

By calculating r_{ij} which represent the value/ranking of normalized criterion/characteristic, the decision matrix $X = (x_{ij})_{m \times n}$ can be normalized, where w_j is the relative weight of j^{th} criterion or characteristic. The calculations of the Euclidean distances of each alternative from positive and negative ideal solutions are as follows:

$$v_{ij} = r_{ij} \cdot w_j \quad \text{where } i = 1, 2, \dots, m \text{ and } j = 1, 2, \dots, n \quad (6)$$

$$d_i^+ = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^+)^2} \quad i = 1, 2, \dots, m \quad (9)$$

$$d_i^- = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^-)^2} \quad i = 1, 2, \dots, m \quad (10)$$

The approximate closeness of each criterion to the ideal solution will be calculated. Approximate closeness of alternative A_i in relation to A^* , i.e. CC_i ranking, changes based on the approximate closeness to the ideal solution. The larger the value of CC_i , the better the alternative A_i . The most suitable alternative is the closest to the ideal solution.

$$CC_i = \frac{d_i^-}{d_i^+ + d_i^-} \quad i = 1, 2, \dots, m \quad (11)$$

The Proposed Fuzzy TOPSIS Method

The main steps of fuzzy TOPSIS method include:

First step: In the first step, a panel will be formed consisted of some decision-makers who are fully informed with regard to airline selection and the adopted assessment process. In a group that K decision-makers (D_1, D_2, \dots, D_k) are responsible for the ranking (y_{jk}) of each criterion (C_1, C_2, \dots, C_n), with an increasing trend:

$$a_j = \min_k \{y_{jk}\}, \quad b_j = \frac{1}{K} \sum_{k=1}^K y_{jk}, \quad c_j = \max_k \{y_{jk}\} \quad (12)$$

$$w_j = (w_{j1}, w_{j2}, w_{j3})$$

$$w_{j1} = \frac{\frac{1}{a_j}}{\sum_{j=1}^n \frac{1}{a_j}}, \quad w_{j2} = \frac{\frac{1}{b_j}}{\sum_{j=1}^n \frac{1}{b_j}}, \quad w_{j3} = \frac{\frac{1}{c_j}}{\sum_{j=1}^n \frac{1}{c_j}} \quad (13)$$

Second step: The normalized decision matrix is obtained as follows:

$$X = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \dots & \dots & \dots & \dots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} \quad (14)$$

Third step: After forming the decision matrix, normalization is performed. This calculation is done by formulas 4 and 5.

$$R = \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1n} \\ r_{21} & r_{22} & \dots & r_{2n} \\ \dots & \dots & \dots & \dots \\ r_{m1} & r_{m2} & \dots & r_{mn} \end{bmatrix} \quad (15)$$

Fourth step: Due to the different weights of each criterion, weighted normalized decision matrix is calculated by significant weight of evaluation criterion weight.

$$\bar{V} = [v_{ij}]_{\max} \text{ for } i = 1, 2, \dots, m \text{ and } j = 1, 2, \dots, n \quad (16)$$

Fifth step: The positive and negative fuzzy solutions are determined as follows:

$$\begin{aligned} \bar{A}^+ &= (\bar{v}_1^+, \bar{v}_2^+, \dots, \bar{v}_n^+) \\ \bar{v}_j^+ &= (\max_i(v_{ij1}), \max_i(v_{ij2}), \dots, \max_i(v_{ijn})) \\ \bar{A}^- &= (\bar{v}_1^-, \bar{v}_2^-, \dots, \bar{v}_n^-) \\ \bar{v}_j^- &= (\min_i(v_{ij1}), \min_i(v_{ij2}), \dots, \min_i(v_{ijn})) \\ & i = 1, 2, \dots, m \text{ and } j = 1, 2, \dots, n \end{aligned} \quad (17)$$

Sixth step: Then, the fuzzy distance of each alternative from positive and negative fuzzy ideal solutions is calculated as follows:

$$\begin{aligned} \bar{d}_i^+ &= \sqrt{\sum_{j=1}^n (\bar{v}_j^+ - \bar{v}_{ij}^+)^2} \text{ and} \\ \bar{d}_i^- &= \sqrt{\sum_{j=1}^n (\bar{v}_j^- - \bar{v}_{ij}^-)^2} \quad i = 1, 2, \dots, m \end{aligned} \quad (18)$$

Seventh step: Fuzzy approximation represents the distances of positive and negative fuzzy solutions at the same time.

$$\bar{CC}_i = \frac{\bar{d}_i^-}{\bar{d}_i^+ + \bar{d}_i^-} \quad i = 1, 2, \dots, m \quad (19)$$

Eighth step: Defuzzification of fuzzy closeness coefficient is performed as follows:

$$CC_i = \sqrt[3]{\bar{CC}_{i1} \cdot \bar{CC}_{i2} \cdot \bar{CC}_{i3}} \quad (20)$$

This formula can be considered as defuzzification process. Closeness coefficient (CC_i) is defined for all possible alternatives. Ranking of alternatives can be determined by means of this closeness coefficient. The steps of fuzzy TOPSIS approach are summarized in [Fig. 2].

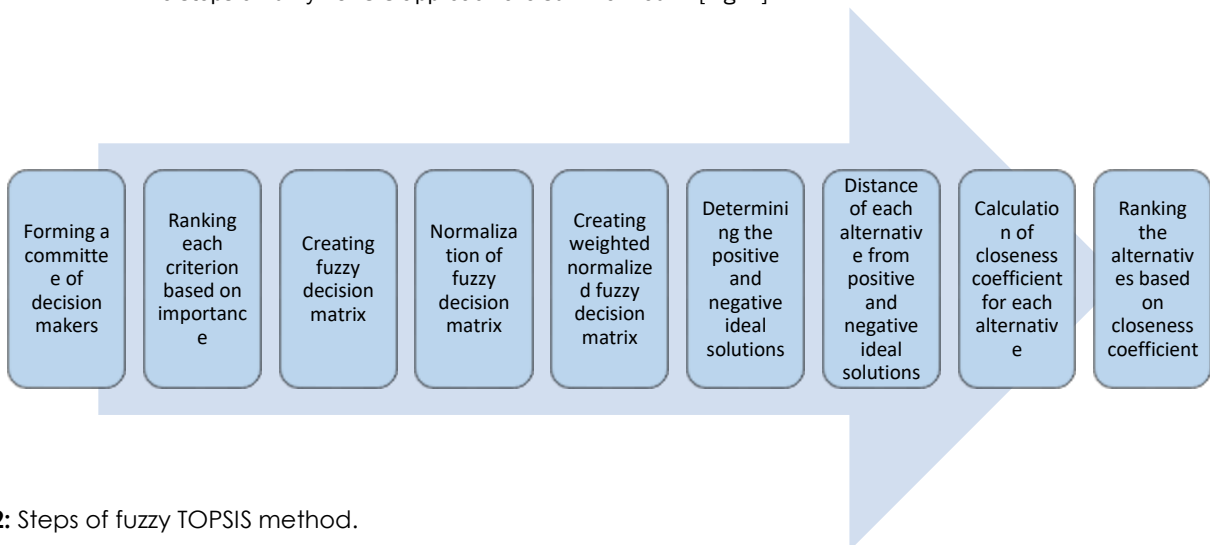


Fig. 2: Steps of fuzzy TOPSIS method.

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Application of Fuzzy TOPSIS technique to Iran's airline industry

The proposed algorithm for application of fuzzy TOPSIS method to Iran's airline industry can be explained in the following steps.

In the first step, a panel was formed consisted of 24 experts of selected companies from different departments such as procurement, quality, production and planning involved in devising strategy. Using semi-structured interviews with these individuals, a list of nine criteria for the process of devising strategy was prepared. These criteria concern the various aspects of the strategy, including advertising, product quality, cost competitiveness, customer loyalty, market share, customer services, e-commerce, management experience and brand. The characteristics of such criteria in the aviation sector of Iran are as follows.

Advertising

Advertising in the airline business is a means to stimulate customers to buy and use the products and services of the airline or become assured of the continued efforts of the marketing mix. Existence of different airline companies with different ticket prices in airline industry suggests that advertising programs have become an important and necessary issue for air carriers. Overall, they guarantee the advertising programs of airlines as well as increase the sales and market share. In airline business, advertising is a way for creating an image of the company, selling products and offering services as well as motivating the crew [12].

Product Quality

Product quality in the airline business is composed of a process that begins with purchasing a ticket and includes the behaviors and characteristics of the cabin crew and executives. The quality of services offered in airline business may include: the expected time for ticket purchase, ticket fares, waiting time for check-in and boarding the airplane, the delay before the flight, the distances between the seats inside the airplane, the number of services provided by stewardesses, quality of services, emergency materials and equipment, on-time landing, waiting time for collecting baggage and the number of damaged or lost baggage [12].

Cost Competitiveness

Proper calculating of costs of services in aviation business plays a vital role in determining the costs of tickets. Airline companies need to minimize their costs and omit those operations that do not provide added value to their final product. Fixed and variable costs that have a direct impact on the costs in the aviation sector include: (1) fixed costs: amortization, depreciation, insurance costs, engineering costs, operating costs and infrastructure costs, and (2) variable costs: costs of fuel, maintenance and repair costs, personnel expenses and the costs of passengers and meals.

Customer Loyalty

Airline companies are continually developing and improving their products and services to satisfy customers' needs. The companies use loyalty programs to ensure the integrity of the customers. In such programs, the client's data is stored in some databases, and thereby some promotions can be offered directly to the groups of clients. The result of such a clear strategy and planning is low costs and high profits for airlines [13].

Domestic airlines that are in a fierce competition in terms of quality and services offer similar or identical products and services. Customers cannot distinguish between the products or services of these companies. That is why customer loyalty to a particular brand cannot be felt in airline industry. Customers can easily change their brands to obtain the desired products or services [14].

Market Share

Market share is a percentage of the total market that a company has secured for certain categories of products or a specific product. Market share is usually classified based on geographic region (state, country, etc.), gender, ethnicity and other demographic factors. Companies try to increase their market share to be able to achieve economies of scale for production, distribution, advertising and other fields of application of categories, and to increase their profit margins and earnings [15].

Customer Services

Airlines must be aware of the needs of their customers at the time of planning for products and services. The services offered in airline business include: cabin orders, aircraft type, flight frequency, flight network, ticket booking points, punctuality and services offered at the travel time [16].

E-commerce

Although air travel is one of the fastest types of travel, however, it is too costly for many people. Thus, airline companies must invest in e-commerce infrastructure and expand their operations in this field to make the most of e-commerce applications, and to meet their customers' demands as well as to increase their profit margins. E-commerce provides a suitable environment for airlines to communicate with their customers in a reliable and timely manner [17]. Due to benefitting from advanced technology, speed, quality of services, security and convenience as well as from continuous and low-cost e-commerce applications, air travels have become one of the building blocks of civic and contemporary life. Airlines can alleviate their problem of high costs or completely resolve it by means of their e-commerce measures [17]. According to IATA, typical ticket cost is about \$10, while online ticket cost is nearly \$1. That is why e-commerce provides the airline companies with many advantages such as savings in distribution costs, growing competition, a dynamic and market-oriented pricing as well as availability and provision of direct services to customers [18].

Management experience

The airline's management is crucial for keeping the costs down. Management should inspire the employees to use effective strategies for reducing costs. Motivation of employees is one of the major keys is performing more efficient work and lowering the costs.

Brand

With regard to branding in the airline industry, some factors play vital roles such as promotional and advertising measures, logo and colors of the company, aircraft interior design, ticket sales points, waiting halls at the airports and the variety and quality of provided services during flight. Booking and purchasing tickets are the early interactions during customers' contact with the airline. Hence, the design of ticket reservation points is an important milestone for the airlines. If the first encounter will not be pleasing, there will be a direct negative impact on the brand. Employees working in these positions should be skilled, trained and qualified. Interactions for booking and purchasing tickets via telephone should be understandable, simple and clear. After a brief introduction of the criteria from a managerial viewpoint, the managers are asked to rank the criteria in accordance with their relative importance. Then, using AHP technique and Expert Choice software program, the values (weights) of those criteria will be obtained that are to be used in fuzzy TOPSIS method. The values are presented in [Table 2].

Table 2: The final weight of criteria

Criterion	Final weight
Competitive price	0.244
Quality of services	0.195
Customer loyalty	0.193
Customer services	0.091
Market share	0.084
Brand	0.064
Management experience	0.049
E-commerce	0.045
Advertising	0.035

Solving the Fuzzy TOPSIS algorithm

(Step 1) Creating a decision matrix for ranking consisted of m alternatives and n criteria.

The decision matrix is given in the following table. As you can see, the relative importance of alternatives with respect to each criterion has been represented by triangular fuzzy numbers. Given that every criterion has several sub-criteria, the mean of the sub-criteria for each dimension will be calculated.

Table 3: Data for fuzzy decision matrix

Alternatives Criteria	Weights of criteria (AHP)	Mahan	Zagros	Kish Air	Aseman	Qeshm Air	Iran Air
Advertising	0.035	(0.4,0.5,0.6)	(0.4,0.5,0.6)	(0.33,0.43,0.53)	(0,0.1,0.2)	(0.53,0.63,0.73)	(0.37,0.47,0.57)
Quality of services	0.196	(0.67,0.77,0.87)	(0.43,0.53,0.63)	(0.4,0.5,0.6)	(0.37,0.47,0.57)	(0.5,0.6,0.7)	(0.4,0.5,0.6)
Competitive price	0.244	(0.47,0.57,0.67)	(0.3,0.4,0.5)	(0.5,0.6,0.7)	(0.53,0.63,0.73)	(0.57,0.67,0.77)	(0.57,0.67,0.77)
Customer loyalty	0.193	(0.45,0.55,0.65)	(0.25,0.35,0.45)	(0.3,0.4,0.5)	(0,0.1,0.2)	(0.6,0.7,0.8)	(0.4,0.5,0.6)

Customer services	0.084	(0.55,0.65,0.75)	(0.55,0.65,0.75)	(0.2,0.3,0.4)	(0.3,0.4,0.5)	(0.8,0.9,1)	(0.5,0.6,0.7)
Market share	0.091	(0.7,0.8,0.9)	(0.35,0.45,0.55)	(0.35,0.45,0.55)	(0.3,0.4,0.5)	(0.5,0.6,0.7)	(0.35,0.45,0.55)
E-commerce	0.045	(0.6,0.7,0.8)	(0.57,0.67,0.77)	(0.03,0.13,0.23)	(0.27,0.37,0.47)	(0.4,0.5,0.6)	(0.43,0.53,0.63)
Management experience	0.049	(0.43,0.53,0.63)	(0.57,0.67,0.77)	(0.33,0.43,0.53)	(0.3,0.4,0.5)	(0.6,0.7,0.8)	(0.43,0.53,0.63)
Brand	0.064	(0.65,0.75,0.85)	(0.45,0.55,0.65)	(0.4,0.5,0.6)	(0.35,0.45,0.55)	(0.7,0.8,0.9)	(0.5,0.6,0.7)

(Step 2) Normalizing the decision matrix

Table 4: Data for normalized fuzzy decision matrix

Alternatives Criteria	Weight criteria	Mahan	Zagros	Kish Air	Aseman	Qeshm Air	Iran Air
Advertising	0.035	(0.55,0.68,0.82)	(0.55,0.68,0.82)	(0.45,0.59,0.73)	(0,0.14,0.27)	(0.73,0.86,1)	(0.5,0.64,0.77)
Quality of services	0.196	(0.77,0.88,1)	(0.5,0.62,0.73)	(0.46,0.58,0.69)	(0.42,0.54,0.65)	(0.58,0.69,0.81)	(0.46,0.58,0.69)
Competitive price	0.244	(0.45,0.53,0.64)	(0.6,0.75,1)	(0.43,0.5,0.6)	(0.41,0.47,0.56)	(0.39,0.45,0.53)	(0.39,0.45,0.53)
Customer loyalty	0.193	(0.56,0.69,0.81)	(0.31,0.44,0.56)	(0.38,0.5,0.63)	(0,0.13,0.25)	(0.75,0.88,1)	(0.5,0.63,0.75)
Customer services	0.084	(0.55,0.65,0.75)	(0.55,0.65,0.75)	(0.2,0.3,0.4)	(0.3,0.4,0.5)	(0.8,0.9,1)	(0.5,0.6,0.7)
Market share	0.091	(0.78,0.89,1)	(0.39,0.5,0.61)	(0.39,0.5,0.61)	(0.33,0.44,0.56)	(0.56,0.67,0.78)	(0.39,0.5,0.61)
E-commerce	0.045	(0.75,0.88,1)	(0.71,0.83,0.96)	(0.04,0.17,0.29)	(0.33,0.46,0.58)	(0.5,0.63,0.75)	(0.54,0.67,0.79)
Management experience	0.049	(0.54,0.67,0.79)	(0.71,0.83,0.96)	(0.42,0.54,0.67)	(0.38,0.5,0.63)	(0.75,0.88,1)	(0.54,0.67,0.79)
Brand	0.064	(0.72,0.83,0.94)	(0.5,0.61,0.72)	(0.44,0.56,0.67)	(0.39,0.5,0.61)	(0.78,0.89,1)	(0.56,0.67,0.78)

(Step 3) Creating the weighted normalized fuzzy decision matrix

Multiplying the normalized decision matrix (\tilde{r}_{ij}) by the weights of criteria (w) gives the weighted normalized fuzzy matrix (\tilde{V}).

Table 5: Creating the weighted normalized fuzzy decision matrix

Alternative s Criteria	Mahan	Zagros	Kish Air	Aseman	Qeshm Air	Iran Air
Advertising	(0.019,0.024,0.029)	(0.019,0.024,0.029)	(0.016,0.021,0.025)	(0,0.005,0.01)	(0.025,0.03,0.035)	(0.018,0.022,0.027)
Quality of services	(0.151,0.173,0.196)	(0.098,0.121,0.143)	(0.09,0.113,0.136)	(0.083,0.106,0.128)	(0.113,0.136,0.158)	(0.09,0.113,0.136)
Competitive price	(0.11,0.129,0.157)	(0.146,0.183,0.244)	(0.105,0.122,0.146)	(0.1,0.116,0.137)	(0.095,0.11,0.129)	(0.095,0.11,0.129)
Customer loyalty	(0.109,0.133,0.157)	(0.06,0.084,0.109)	(0.072,0.097,0.121)	(0,0.024,0.048)	(0.145,0.169,0.193)	(0.097,0.121,0.145)
Customer services	(0.046,0.055,0.063)	(0.046,0.055,0.063)	(0.017,0.025,0.034)	(0.025,0.034,0.042)	(0.067,0.076,0.084)	(0.042,0.05,0.059)
Market share	(0.071,0.081,0.091)	(0.035,0.046,0.056)	(0.035,0.046,0.056)	(0.03,0.04,0.051)	(0.051,0.061,0.071)	(0.035,0.046,0.056)

E-commerce	(0.034,0.039,0.045)	(0.032,0.038,0.043)	(0.002,0.008,0.013)	(0.015,0.021,0.026)	(0.023,0.028,0.034)	(0.024,0.03,0.036)
Management experience	(0.027,0.033,0.039)	(0.035,0.041,0.047)	(0.02,0.027,0.033)	(0.018,0.025,0.031)	(0.037,0.043,0.049)	(0.027,0.033,0.039)
Brand	(0.046,0.053,0.06)	(0.032,0.039,0.046)	(0.028,0.036,0.043)	(0.025,0.032,0.039)	(0.05,0.057,0.064)	(0.036,0.043,0.05)

(Step 4) Determining the positive ideal solution (\tilde{V}_j^*) and the negative ideal solution (\tilde{V}_j^-)

Given that in the process of normalization all parameters become positive, at this step, the largest number of each criterion is considered as the positive ideal solution of that criterion, whereas, the smallest number is considered as the negative ideal solution of that criterion.

Table 6: Positive and negative ideal solutions

Criterion	Positive ideal solution (\tilde{V}_j^*)	Negative ideal solution (\tilde{V}_j^-)
Advertising	(0.025,0.03,0.035)	(0,0.005,0.01)
Quality of services	(0.151,0.173,0.196)	(0.083,0.106,0.128)
Competitive price	(0.146,0.183,0.244)	(0.095,0.11,0.129)
Customer loyalty	(0.145,0.169,0.193)	(0,0.024,0.048)
Customer services	(0.067,0.076,0.084)	(0.017,0.025,0.034)
Market share	(0.071,0.081,0.091)	(0.03,0.04,0.051)
E-commerce	(0.034,0.039,0.045)	(0.002,0.008,0.013)
Management experience	(0.037,0.043,0.049)	(0.018,0.025,0.031)
Brand	(0.05,0.057,0.064)	(0.025,0.032,0.039)

Step 5) Determining the distance of each alternative from positive ideal solution (d_i^*) and negative ideal solution (d_i^-)

Table 7: The distance of each alternative from positive ideal solution

Alternative	(d_i^*)
Iran Air	0.2948
Qeshm Air	0.1531
Aseman	0.4602
Kish Air	0.3683
Zagros	0.2217
Mahan	0.1401

Table 8: The distance of each alternative from negative ideal solution

Alternative	(d_i^-)
Iran Air	0.1931
Qeshm Air	0.3349
Aseman	0.0278
Kish Air	0.1197
Zagros	0.2663
Mahan	0.3479

(Step 6) Determining the closeness coefficient (CC_i) for each alternative

Once the positive distance (d_i^+) and negative distance (d_i^-) is calculated for each alternative A_i , the closeness coefficient (CC_i) of each alternative will also be computed:

Table 9: Calculation of closeness coefficient for each alternative

Alternative	(d_i^-)	(d_i^+)	$()$	Rank
Iran Air	0.1931	0.2948	0.3958	4
Qeshm Air	0.3349	0.1531	0.6863	2
Aseman	0.0278	0.4602	0.0569	6
Kish Air	0.1197	0.3683	0.2454	5
Zagros	0.2663	0.2217	0.5458	3
Mahan	0.3479	0.1401	0.7129	1

The closeness coefficients are calculated in the above table for each alternative. The alternatives (airlines) with a larger closeness coefficient will also have a higher priority.

(Step 7) Ranking the alternatives based on closeness coefficient

The graph of the rankings of the airlines is presented below. As it is clear from the [Fig. 3], Mahan with the closeness coefficient of 0.712 is ranked first, Qeshm Air has the closeness coefficient of 0.686 and is ranked second, while Zagros with the closeness coefficient of 0.545 is in the third rank. Aseman Airlines has the lowest coefficient closeness, i.e. 0.056, and is ranked last. Iran Air and Kish Air are ranked fourth and fifth, respectively.

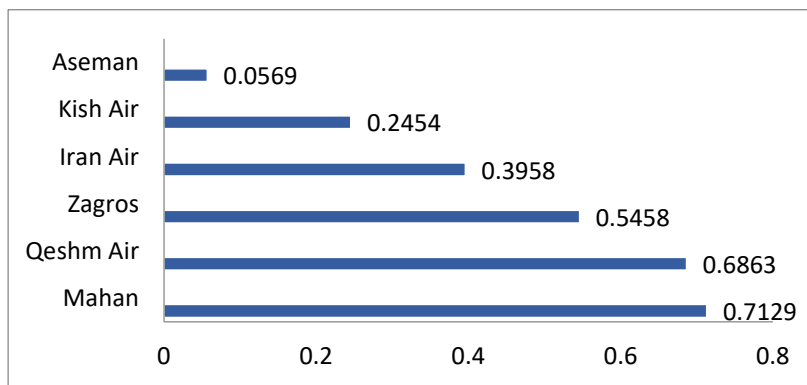


Fig. 3: Airline rankings based on the closeness coefficient

DISCUSSION AND ANALYSIS OF RESULTS

After implementing the fuzzy TOPSIS method, rankings of airlines were determined in the light of the success variables of this sector. These findings can be discussed from a managerial viewpoint and in terms of the following operations and key success factors in Iran's airline industry.

Iran's first private airline, Mahan Air was established in 1992 and its mission is "safe, efficient and high-yield transportation of passengers, cargo and mail, and providing services of superior quality in accordance with the international standards". The airline currently is operating 51 aircrafts, flying to more than 49 domestic and 51 international destinations from the Middle East to the Far East and European continent. The number of passengers of the airlines was about 6.5 million people in 2015.

Mahan Air mainly uses outdoor advertising in order to attract customers and improve its brand. Such advertising are mostly the advertisements at airports, in-flight magazines and the company's websites.

In order to provide the highest and best services in addition to compliance with international standards for flights, Mahan Air has committed itself to fulfill all the expectations of the passengers. Mahan Air's meals follow the special processing guidelines and techniques of cooking and seasoning. For in-flight meals, the local taste and dishes of the destination countries have been taken into account. In some flights, western cuisine and cooking methods as well as some dishes for people who favor certain taste have been included in the menu.

Flight crew and attendants are trained periodically and continuously to provide passengers with the best services, and to achieve customer satisfaction in order for gaining competitive advantage.

Aimed at lowering the prices of services and tickets, Mahan has collaborated with and created partnerships, and also has established some service companies in recent years, including Saman Airport Services Company for airport handling, Mahan Safir Transportation Company, Mahan Air Cargo Services, Arman Catering Company in the field of catering and also providing services to other companies, Botia training center for in-service training of its staff, and Mahan Technique to perform technical repairs. Mahan Air Maintenance Center has already issued technical certificates for other airlines.

Mahan Company has offered special facilities for the purpose of attracting and retaining customers; it

launched its Frequent Traveler Club, named Mahan & Miles in 2009. Creating a dedicated lounge in flight terminals, special free pre-flight amenities for business class travelers and the members of Frequent Traveler Club including a variety of drinks, snacks, warm breakfast, and various sweets as self-service, use of wireless internet, Persian and English-language press and the children's play and entertainment area are among other services of the company.

The company has reduced its delays to less than 8% of the total delays of domestic airlines, has established new passenger services offices in Europe (Milan, Rome, Turin etc.), and has lower ticket prices comparing foreign airlines to be able to maintain its market share and improve it.

Stable management can be considered as one of the most important factors for the success of the company. Hamid Arabnejad has been the CEO and Chairman of the Board from the beginning of its establishment and has created an integrated management team to implement a strategic plan in order to improve and expand the operations of Mahan Air.

In 2013, Mahan Air's brand was considered as one of the "100 most valuable brands of Iran" at the "10th Iranian Industries Champions Festival". Lalim Touristic and Recreational Complex in Sari, Mazandaran is under construction in collaboration with Mahan Air at a distance of 7 kilometers away from Sari International Airport including a five-star hotel and residential units on a land with an area of 15 hectares and with a building area of 60 thousand square meters.

Qeshm Air is one of the Iranian public airlines. The company started its operations in 1993 and was transferred to the Ministry of Petroleum of the Islamic Republic of Iran in 2014. The company has 13 active airplanes of Fokker 100, Airbus and BAE types. It provides nearly 3,000 seats and offers flights and cargo services to more than 22 domestic and international destinations.

Advertising is one of the strengths of the company, and its widespread advertising on television, at airports and at international destinations has distinguished the company in attracting more passengers and gaining competitive advantage over other airlines.

The main station of the airlines is Qeshm Island Airport and its other hubs include Imam Khomeini International Airport and Mehrabad International Airport.

Providing high quality flight and ticket sales services are among the strengths of Qeshm Air, which had led this company to be ranked second among domestic airlines. Qeshm Air transfers those travelers who directly purchase their tickets from the company's website from their home to the airport for free. The establishment of new sales systems as well as different in-flight services with the highest standards of quality and safety has led to the considerable growth of customer loyalty for the company. The company's data center was established in 2016, yet another growing trend of the company towards e-commerce. Qeshm Air is the only airline brand among top 10 top luxury brands of Iran.

Zagros Airlines began its operations in 2005. The company has been able to increase the number of aircrafts in its fleet, to become among the leading and growing companies of Iran, and to make significant contributions to Iran's airline industry in a short period of time. Zagros Airlines currently has a fleet of 19 aircrafts, including 11 Airbus A320 and eight Boeing MD series airplanes, provides more than 3,000 seats and offers flight services to more than 20 domestic and international destinations. The company has managed to grow by 30% in terms of domestic and international destinations and by 70% in terms of number of passengers, and has transported more than 3 million passengers in the past year (2015). The main station of this airline is Mehrabad airport in Tehran and it has established a repair and maintenance hangar in Mashhad in order to lower its costs.

Advertising of the company is mainly done as in-flight promotions and the passengers of this airline will enjoy some facilities such as a discount on hotel rates and use of leisure facilities on some routes. The major competitive advantage of the company is its reasonable and lower ticket prices comparing other airlines. The airline has managed to bring down its variable costs, to organize e-commerce and to purchase Airbus passenger aircrafts as some steps towards greater customer satisfaction and increased market share of the company for passenger transportation. The weaknesses of the company include flight delays, which are around 11% of the total delays of all airlines, and flight services of lower quality than other airlines.

Consecutive United States' sanctions against Iran's aviation industry and Iranian airlines in the last 30 years have led to complete decline of Iran Air from its golden days. The extent of these pressures increased up to the point that the International Association of Air Transport (IATA) suspended the settlement of accounts of all airlines with the Airline of the Islamic Republic of Iran. The impact of such sanctions for Iran Air is prohibition of selling tickets for Iran Air planes by air travel agencies. Refraining from selling fuel to aging, worn-out Iranian planes has turned Iran's Homa, which was known as the Caviar Airline long time ago, into one of the largest Iranian loser companies. Over the last 30 years, business sanctions prevented Iran Air from purchasing new airplanes from western companies. This has forced Iran Air to use aging airplanes and jumbo jets procured before the Islamic Revolution in 1979 for transportation of passengers. According to Airfleets.net, Iran Air's air transportation fleet consists of 46 jets with average fleet age of 27 years, and there are even 40-year-old Boeing aircrafts still flying. Increased number of incidents of Iran Air's aircrafts due to technical problems caused the Europe Union to ban the flight of most of the company's airplanes in 2010.

Currently, 60% of the shares and management of the company are controlled by the government, and 40% of the shares are transferred to the public via Edalat Shares Cooperatives. Iran Airtour Airline and Homa Hotels Group were previously the subsidiaries of Iran Air; Homa Hotels Group was sold to the Social

Security Administration and Iran Airtour Airline to the private sector.

Obviously, the company has failed to obtain a good market share due to loss of its foreign advertising outlets, lack of access to e-commerce and crippled airplanes with regard to lack of access to maintenance and repair resources and spare parts suppliers. The flight delay of 16% out of the total delays of the country's airline industry is another complicating issue. The company's strengths include old loyal customers as well as its brand as the flight carrier.

Kish Air was established in 1991 with the aim of developing the operations of Kish Island by connecting it to the centers of the provinces as well as to the countries around the Persian Gulf. After registration and receiving legal permits, Kish Air became a joint stock company as one of the subsidiaries of Kish Free Zone Organization. The main station of the company is Kish airport and Mehrabad Airport in Tehran is its second flight hub. The company owns 10 active aircrafts of Boeing MD and Fokker 100 types.

Like other Iranian public airlines, economic sanctions have adversely affected the performance and expansion of the company. However, data analysis indicates that lack of management stability is the main problem of the company for planning and business operations, to the extent that the company's rank was lower than other airlines' ranks for all the examined aspects. Replacement of CEOs for seven times in the past ten years and exerting influence over decision-making and policy-making processes of Kish Air by Kish Free Zone Organization as its parent organization have caused the company to face with some great challenges in competition with other domestic competitors. Lack of advertising and e-commerce platforms, increased variable costs and deteriorated quality of services have led to a sharp decline of Kish Air's market share, and subsequently the brand of this airline have lost its former popularity.

Aseman Airlines was established in the year 1980 from the merger of four airlines, i.e. Air Taxi, Pars Air, Air Service and Hour Aseman. Aseman Airlines has established three flight centers in Tehran, Shiraz and Mashhad for better coverage of its flight network. Each of these three centers benefit from independent flight crew and maintenance hangars for recruiting and training local experts and performing daily flights with an adequate independence. Aseman Airlines was transferred to the National Pension Fund in 2002. It has now 33 aircrafts, 20 of which are active and perform regular flights to 40 domestic and 13 foreign destinations.

In recent years, Aseman Airlines has tried to lower its costs in order to raise capital and purchase new airplanes, and for this purpose, it has jointly established Arman Catering Company in collaboration with Mahan Air, and 50% of its shares belong to Aseman Airlines; it has also developed its technical-engineering department namely "Aseman Technique" to attract customers for its services. However, Aseman Airlines was ranked last in our rankings, mainly due to weakness in advertising, underdevelopment of e-commerce and management instability. The economic sanctions have also crippled a major part of the company's fleet, and its passenger transportation market share has dropped sharply comparing with other domestic competitors. Flight delays of the company, which are around 19% of the total delays in Iran, have led Aseman Airlines to lose much of its loyal customers.

CONCLUSION

In this study, fuzzy TOPSIS method was employed instead of conventional TOPSIS technique. In the light of the key success factors in Iran's airline sector, a comparative assessment was performed in this regard. Mahan Air and Qeshm Air showed outperformance comparing with other airlines in terms of advertising and product quality, and thus achieved competitive advantage in these fields. The performance of Zagros Airlines was relatively good, whereas other airlines had poor performance in this regard, so it is necessary for them to address this issue. In terms of cost competitiveness, Zagros Airlines and Mahan Air were at the top, while other airlines were underperforming. Mahan Air and Qeshm Air were the most competitive airlines in terms of customer loyalty and market share. Whereas Zagros Airlines had a good market share compared to other competitors, Iran Air, Kish Air, and Aseman Airlines had underperformance in this regard and must handle the issue in their strategic planning process. In terms of customer services, Qeshm Air showed a remarkable performance, Iran Air and Zagros Airlines had a modest performance, and Mahan Air's performance was relatively good, however, Kish Air and Aseman Airlines were considered as poor performers. Mahan Air also was an excellent performer in terms of e-commerce and management experience, Zagros Airlines was a modest one, and other airlines were not good at all in these fields, and thus, they should carefully consider these issues. With regard to the branding, Mahan Air and Qeshm Air were the best companies; Iran Air was modest, but other airlines underperformed, so they shall revise the relevant issues in their long-term planning. By considering all of these key success factors, we can see that Mahan Air is a fully competitive company, Air Qeshm is in the second, and Zagros Airlines in the third place; other airlines are in the following ranks.

The findings show that private airlines have been able to maintain their dominant role. It should be noted that despite the fact that Zagros Airlines is a newly established airline compared with other competitors, it has intensified competition in the sector and has become a main competitor for other airlines in recent years. Iran Air, Aseman Airlines and Kish Air must pay special attention to the key success factors of the industry if they want to survive in it, and they must consider the long-term planning into account.

CONFLICT OF INTEREST

There is no conflict of interest.

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ARTICLE

INITIAL DILUTION OF EFFLUENT DISPOSAL OF SOLAR DISTILLATION SITE TO SEA FOR MARINE ENVIRONMENT

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ABSTRACT

Initial dilution and its characteristics play important roles in designing of effluent disposal into the sea. Using of the mixing models is very common for estimating of initial dilution. In this study, the performance of the jet system has been studied for waste disposal of Kish port solar desalination site by using empirical equations. Initial dilution is related to water depth, diameter, flow rate, distance between openings, water velocity environment. After considering different environmental conditions and the most critical conditions the best initial dilution is determined. In the scenarios, the final scenario is best and the first scenario is worst case. By using of jet system as an effluent disposal system for Kish Port Solar Distillation, we have obtained with increasing effluent discharge from $0.463 \text{ m}^3/\text{s}$ in the Khamir port to $1.2 \text{ m}^3/\text{s}$ in Kish port, the length of main duct must be increased. The performance of the T-shaped diffuser for waste disposal is cheaper than the jet system because in it is consumed the length of duct from beach to sea.

INTRODUCTION

There are many areas in which they need access to fresh water and healthier facility is not possible, Therefore need for investment in research and study of different methods of desalination of saltwater feels. At first glance the use of fresh water now seems very good but when the water supply is low. However, when the volume of water extracted is high, there are financial costs of implementation issues for the supply of land, building construction, supply and installation of facilities and structures (such as intakes, pipelines and water disposal system). Another aspect of this type of desalination is destructive environmental effects of around the disposal of wastewater. Some of these effects such as increasing of salinity could be dangerous for fish and other animals in the ocean environment and that can cause the loss of them or away from the area. Another risk is damage of the plant tissue by disruption of chemical properties, salinity and temperature of seawater. Another threat to human life or living in areas near the sea is increasing of ground water resources salinity due to sea water. With regard to the above destructive effects of desalination on the marine environment and coastal areas, the designing of desalination disposal system must be carefully. In this paper we describe the marine depletions and plume jet by mixing mechanism. Then the governing equations and the expression characteristics of Kish and Khamir desalination site are paid and initial dilution by diffusers and jet system are defined.

Governing equations

When sewage is discharged into the sea then immediately mixed to environment. Initial mixing zone is done through diffusers in a radius about 100 meters and few minutes after discharging wastewater to the environment that is defined near field. The incorporation of this region is determined by intensity of mixing due to turbulence that generated by buoyancy force and momentum of the discharged jet. Processes that occur in this area include a mix of free plume, plume hitting to water surface, the horizontal distribution and additional mixing beyond of final height of plume. Near field when ends that the turbulence due to discharge is less than the effect of turbulence due to buoyancy force. For a layer that is distributed below the surface, the loss of momentum is due to stable distribution of the density profile inside the layer. Beyond the Near field, the plume of contamination moves with the acceptor environment flow and that is distributed by turbulence of this area that is defined Far field. Mixing in a Far field is quieter than near field. Finally input waste water with initial concentration is mixed in near field and far field then average pollutant concentrations will reduce to acceptable standards in coastal water. Although the concentrations of pollutants in near field may damage to marine ecosystems, But because of given the small size of the area to the sea in this area, the adverse effects of waste water discharging is not regarded. Discharging a fluid with the initial momentum from a hole or groove into a large volume of fluid is called jet. The initial velocity is caused movement of the jet and the amount of discharge from the jet is important for form of jet movement. Discharge of water from a tube into a pool is a clear example for a jet. The plume stream is similar the jet with the difference that the initial velocity is not reason of plume flow movement but reason of fluid motion is difference in the density with the recipient environment. For example, air flow caused by the fire plume is a clear example. The plume was created without any initial velocity and as a result of the density difference due to the air warming. The discharge of pollutants into the sea usually caused by a combination of jet and plume and that is rarely due to only jet or simple plume. Primarily discharge of pollutants into the sea act as jet due to the initial velocity and momentum flux and then that act the same as plume because of energy dissipation of velocity operation due to taking the distance into sea. As the motion of the tube, the behavior of pollutants can also take a layer or turbulent condition that in this state turbulence criterion is Reynolds numbers above 4000. The pollutants in the tube have density more than the sea water, and it may those sat there on the bed. Discharge of pollutants must be same as jet mode at the beginning to move to the water environment. Discharge of pollutants caused dilution by creating more

KEY WORDS

desalination unit,
Saltwater, Mixing zone,
Initial dilution, T form
Diffuser, jet system for
waste disposal.

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turbulence with the water environment. It is mentioned standards proposed by the U.S. Environmental Agency that discharge of pollutants process must be located in maximum radius of 200 meters from beginning of the tube [5].

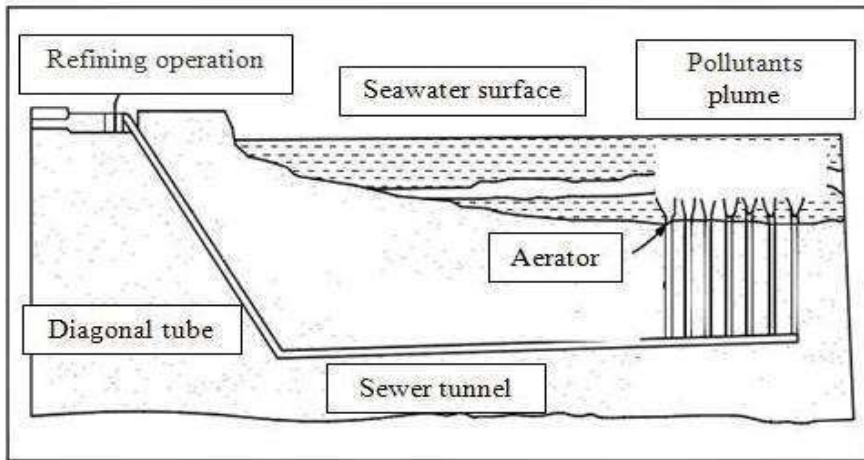


Fig. 1: A typical sewer tunnel to discharge sewage into the sea [3].

Sewage outflow from single- diffuser or multiport diffuser can be removed. Multiport diffuser in the thermal discharge shows greater rates than single-diffuser in initial dilution. A Multiport diffuser has linear structure form that includes a few branches with large ducts with spaced from each that goes out heat sewers from these ducts. In this paper sewage outflow from a T-shaped diffuser in multiport diffusers is parallel to the stream environment [1]. Gained initial dilution equation in T-shaped diffuser by using the Bernoulli equation and the momentum equation for the pressure continuity along the axis of multiport diffuser. In T shaped diffuser, the momentum loss is considered due to the surrounding environment flow in the momentum equation between the front and rear sections of the T-shaped diffuser. Then by combining the energy equation and the momentum equations, the amount of dilution in the near-depletion of T-shaped diffuser be calculated as follows:

$$\frac{S_t}{S_0} = 1 - C_d M_r \tag{1}$$

The S_t is T-shaped diffuser minimum dilution level and C_d is effective coefficient of the inertia of the flow and M_r is proportion between momentum of depletion discharge by T-shaped diffuser and the momentum of discharge by surrounding environment flow that is calculated as follows:

$$M_r = \frac{(U_d)^2 H}{(U_0)^2 D} \tag{2}$$

In this formula H is depletion depth and D is the diameter of the discharge tube, U_0 is the depletion discharge rate and U_d is surrounding environment flow rate. S_0 is initial dilution of the surrounding flow in inertia state that follows by [1]:

$$S_0 = \sqrt{\frac{H \cos \theta_0}{2B}} \tag{3}$$

θ_0 is Angle between the urethra and the sea floor, usually less than 45 degrees is chosen. [6] obtained constant coefficients of Equation with experimental data in the following way:

$$\frac{S_t}{S_0} = \frac{1}{1 - [60 \exp(-5M_r^{0.2})] M_r} \tag{4}$$

By substituting equation (3) in equation (4) we get:

$$S_t = [1 - [60 \exp(-5M_r^{0.2})] M_r] \sqrt{\frac{H \cos \theta_0}{2B}} \tag{5}$$

It is first necessary to define B parameter for T-shaped diffuser. This parameter, which is denoted by the letter B is the area of each hole of T-shaped diffuser to the distance between holes in the T-shaped diffuser:

$$B = \frac{A_0}{l} \tag{6}$$

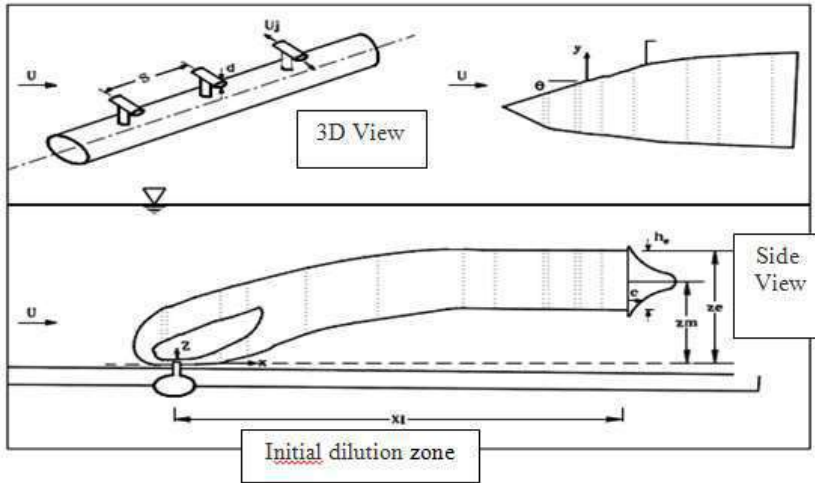


Fig. 2: Exit of effluent plume from diffuser into the sea with marine parameters [4].

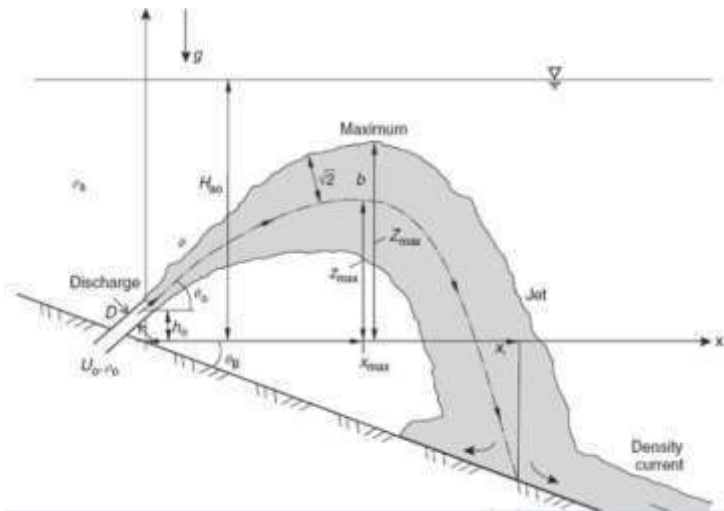


Fig. 3: Exit of effluent jet from tube into the sea with marine parameters [4]

Kish Port Solar Distillation and surrounding area

RO technology is used in Kish port solar distillation in Hormozgan province. For reasons mentioned in the introduction, one of the most important sections of the solar distillation site is effluent disposal system. Importance of this issue is the environmental impact and economic costs. According to information received from the desalination system and the efficiency of the system the effluent characteristics are considered in [Table 1].

Calculation of the minimum dilution level of the jet system

For comparison of the effluent disposal systems in this section is investigated application of jet system in Kish Port Solar Distillation. 8 tubes are used with diameter of 20 cm at the end of one main duct. End of main duct is 2500 meters from the beach and the location of the slope fracture from 4% to 1% is 500 meters from the beach. By using of Cormix software we have obtained result of dilution and cormix by jet system in effluent disposal systems of Kish Port Solar Distillation as table 4.

Table: Characteristics of effluent of Kish Port Solar Distillation

Effluent discharge	1.2 m ³ /s
Effluent density	90000 mg/lit
Effluent temperature	45°C

Table 2: Characteristics of effluent of surrounding areas of Kish Port Solar Distillation

Velocity of flow	3 m/s
Wind velocity	2 m/s
environment temprature	40°C
coefficient of Darcy Veysbakh in near the sea	0.04
coefficient of Darcy Veysbakh in depletion area near the sea	0.13
Slope in near depletion area	%4
Environment density	%1.2

Table 4: Result of dilution and density concentration (mg/lit) by jet system in effluent disposal systems of Kish Port Solar Distillation

Concentration mg/lit (cormix)	S(dilution)	X(distance)	Concentration mg/lit (cormix)	S(dilution)	X(distance)
6360	14.1	17.43	88000	1	0
5960	15.1	18.38	49400	1.8	0.73
5960	15.2	18.62	39600	2.3	1.67
5930	15.2	18.99	37000	2.4	2.62
5900	15.2	19.36	34000	2.6	3.58
5880	15.3	19.73	29700	3	4.53
5860	15.3	20.11	25900	3.5	5.38
5860	15.4	20.45	22300	4	6.32
5684	15.4	20.85	19200	4.7	7.26
3490	25.8	45.35	16700	5.4	8.2
2540	35.5	69.15	14700	6.1	9.13
2210	40.7	93.31	13000	6.9	10.07
2070	43.5	117.11	11700	7.7	10.93
1990	45.3	140.91	10500	8.5	11.87
1930	46.6	165.07	9540	9.4	12.81
1890	47.7	188.87	8700	10.3	13.75
1850	48.5	213.02	7970	11.3	14.96
1810	49.8	236.82	7400	12.2	15.55
1790	50.3	260.63	6850	13.1	16.49

CONCLUSION

The use of saline water resources by solar distillation is available in many areas that are an affordable way to provide drinkable water. But the site desalination plant produces a much higher salt concentration of sea water. Using of the mixing models is very common for estimating of initial dilution. In this study, the performance of the jet system has been studied for waste disposal of Kish port solar desalination site by using empirical equations. Initial dilution is related to water depth, diameter, flow rate, distance between openings, water velocity environment. After considering different environmental conditions and the most critical conditions the best initial dilution is determined. In the above scenarios the final scenario is best and the first scenario is worst case. By using of jet system as an effluent disposal system for Kish Port Solar Distillation, we have obtained that with increasing of effluent discharge from 0.463 m³/s in the Khamir port to 1.2 m³/s in Kish port, the length of main duct must be increased. The performance of the T-shaped diffuser for waste disposal is cheaper than the jet system because in it is consumed the length of duct from beach to sea.

CONFLICT OF INTEREST

There is no conflict of interest.

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ARTICLE

THE ROLE OF TOURISM AND IMPROVING OF RURAL VALUES TISSUE ON THE SUSTAINABILITY OF RURAL SYSTEMS

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ABSTRACT

Most villages have are old and valuable, which remained open during different historical periods, and lack of organization and the destruction of their fields to provide them, on the other hand this Such places high capacity, to develop tourism, as one of the regional and local development strategies, in the villages and the country that need to evaluate the potential of tourism and its role in the development of the rural areas, especially in rural of Holi villages, the field of rural development and sustainability of the system provided. The present study is an applied. The research method is analytical type. The study sample consisted of professionals, tourists and county officials Holi, is in 2016. The number of population, the equivalent of 1,500 people has been considered. The sample size of 305 people, according to Cochran formula was determined. For statistical data analysis, and to describe the results of the questionnaire, one-sample t-test was used. The results indicate that, with the role of tourism and improvement of rural areas, the sustainability of rural systems, at 95 percent (sig = 0.000), the sustainability of the rural social systems, at 95 percent (sig = 0.000), the sustainability of economic systems rural 95% confidence level (sig = 0.000), and the sustainability of rural physical systems, at 95 percent, (sig = 0.000) are confirmed. Among the indices, physical parameters in the first place, the economic situation in the second position, social status is in third place, and this showed that the tissue conditioners valuable tourism and rural social sustainability of rural systems, is less impact in the Holi district.

INTRODUCTION

Of course, part of the identity of people today, lies in the architecture of their predecessors, so genuine identity of each community, delves into the old architecture is achieved. Perspective and physical structure of the villages of Iran, the influential and the influx of technology, culture and urban landscape, and along with it the decline of native cultural values and rural residents, increasing and too skewed. Obviously, the longer this goes on village is, in its wake towns; away from their original identity will Broadcasting. But part of the places to the empowerment and architectural values, continues to live on. Hence the tissues valuable physical development plans require proper attitude, and rural areas in terms of precious few studies that require particular attention. The main purpose of Prized context of rural development projects is laying the groundwork for authentication, and enables the preservation of such places, and valuable works of rural architecture with the revival texture, and with new ideas and solutions, to meet the increased demand, new ideas and practices livelihoods in the village. In the villages, for the implementation of development projects worth tissue, further consideration is that of culture and history, these villages as a "relic of the past, a legacy for the future" are raised. Rural areas in Iran, due to climatic diversity, a variety of materials and indigenous technology, harmony of man and nature, species unique and unmatched qualities of space, over an extended period and in certain places offer. Villages during the course of your life, because of extensive links with the natural and historical contexts, created many of the values of historical, cultural, natural, tourism, and architecture. Which were part of the national capital and cultural identity and history of the land, are considered? Rehabilitation of Rural valuable monuments and sites, in direct contact with areas of social and economic life of the inhabitants of the village, which, together with the hierarchical chain, and each grain directly connected to the whole set of values to emphasize the place, from all aspects and attributes [1]. Citizens (regional indigenous tourism) that concern urban life and the car, and the problems it brings to the village, or tourists who wish to visit the historical sites of value which, in the village where he spent a few days there, in any case, the economic burden is positive for the village. That's why upgrading projects, open Reviving that with regard to body and texture village, the village is in the range of valuable town, a place for better communication between residents and tourism development, and is necessary.

The study come as necessity, most villages have a two-bit old and which, during different historical periods remain open, and the destruction of their lack of organization and provides them the other hand, the Such places high capacity, for the development of tourism as one of the most important regional and local development strategies, in the villages and country which must assess the role of tourism and its potential in the context of rehabilitation rural values, rural development and it provides system stability a.

History research

Several studies on the theme of study, margins, and it is done, it will be brief: Mojtabayi and Arghan [2] in an article on the feasibility of tissue conditioners with rural value, which is paid to the development of tourism, the results suggest that tissue villages, in addition to the influence of natural factors, human factors also affected. Pari Pishbr *et al* [3] a study to evaluate the role of tourism, and improving tissue with rural values, the sustainability of rural systems using the SWOT model studied, the results show that, the village Citadel, according to historical background and texture it valuable and historic castle, and natural features has many comparative advantages, is in the field of tourism. Arbab Saljugh *et al* [4], in an article restoring the rural areas contain valuable historical monuments of culture, the tourism industry's perspective, the results demonstrate that, historical contexts towns, including the historic values - cultural and rich heritage for future generations are considered. Abbas-Zadeh *et al* [5],

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study, evaluation methods values in historical contexts, aimed at developing cultural tourism began; the results indicate that, there is a clear relationship between values and goals of the development of cultural tourism, the need to study the methods of assessment unavoidable. Hayati Rad [6], in an article on the structure of the value is paid in sustainable tourism development, the results indicate that improved textures, rural values, systematic process of identifying, analyzing, planning and decision-making and implementation is designed, whereby spatial and physical development of the village. Haji Zadeh *et al* [7], a study on the sustainable development of tourism in rural areas with rural value that results indicate that perspective and physical structure of Kandovan, with the influence and the influx of technology, culture and urban landscape, and at the same time degradation and cultural values of the indigenous inhabitants of the village, day after day, is increasingly blurred. Hasani *et al* [8], a study on tourism-based economy, that's a step to restoring and enhancing tissue with rural values, the results suggest that tissue rural context, has brought architectural values and quality materials canvas is significant that, in comfort climate and environment to attract tourists an effective role plays. Khodadadi and Mohammad Nejad [9], in an article on the role of valuable tissue rural tourism development that results indicate that the tourism implications in economic, social and physical environment, in the context of looking for valuable rural Javaherdeh had.

MATERIALS AND METHODS

The present study is an applied. The research method is analytical type. The study sample included professionals, tourists and county officials Holi, is in 2016. Total population of 1,500, have been considered. The sample size of 305 people, according to Cochran formula was determined. To evaluate the role of tourism, and improving rural valuable tissue in three different sections (social, economic and physical), from a questionnaire of 42 questions prepared. For statistical data analysis, and to describe the results of the questionnaire, one-sample t-test was used. Also, various statistical data, corporate brochures and statistical offices of the organization were enjoying.

Research hypothesis

1. Improvement textures, tourism and rural values, the sustainability of rural systems, are effective.
3. Tourism and valuable tissues rural development, the rural economic system stability, is effective.
2. Improvement textures tourism and rural values, rural social stability systems, is effective.
4. Tourism and valuable tissues rural development, rural stability of physical systems, is effective.

RESULTS

Using t-test, the indices sustain effective rural systems

1-The Role of tourism and improvement of tissues with rural values, the sustainability of rural systems of fistula was placed on outer skin opening of fistula and knot was secured on the outer hard leather piece [Fig. 3].

Table 1: One-sample t-test to evaluate the role of tourism and improvement of the rural areas, the rural system stability

In the Confidence level 95 percent		Significance level	The t-statistic	Degrees of freedom	Average	In the Confidence level 95percent
maximum	minimum					
3/62	3/43	0/000	74/866	58	3/53	Sustainability of Rural Systems

According to [Table 1], the value t obtained from the study of the test is 74/866, and the role of tourism and improvement of tissues with rural values, the sustainability of rural systems, at 95 percent (sig = 0.000), is confirmed. So valuable tourism and improvement of rural areas, could affect the sustainability of rural systems that, due to the significant amount of good it can get that from the perspective of those questions, rural tourism and rural development have valuable tissue, and can affect system stability rural effective.

2. Examine the valuable role of tourism and improvement of rural areas, the rural social system stability

Table 2: one-sample t-test to evaluate the role of tourism and improvement of the rural areas, the rural social system stability

In the Confidence level 95 percent		Significance level	The t-statistic	Degrees of freedom	Average	In the Confidence level 95 percent
maximum	minimum					
3/76	3/45	0/000	45/98	58	3/60	rural social system stability

According to [Table 2], the value of t obtained from the 45/98 test is evaluated, and the sustainability of rural social systems, at 95 percent (sig = 0.000), is confirmed. So the role of tourism, and the development of rural areas has been valuable, have an impact on rural sustainability of social systems, due to the significant amount of good, and also trace amounts of it can't get that, from the perspective of those who question the sustainability of the rural social systems, attention has been focused on a limited basis.

3. The Role of Tourism and valuable tissues rural development, the rural financial system stability

Table 3: One sample t-test to evaluate the role of tourism and development of the rural areas, the rural financial system stability

In the Confidence level 95 percent		Significance level	The t-statistic	Degrees of freedom	Average	In the Confidence level 95 percent
maximum	minimum					
3/59	3/32	0/000	50/31	58	3/45	rural financial system stability

According to [Table 3], the value of t obtained from the 50/31 test is evaluated, and the sustainability of rural economies, at 95 percent, (sig = 0.000) is confirmed. Tourism and rural development has been so valuable tissue, affect the stability of rural economies, given the significant amount of good, as well as the average amount it can't get that from the perspective of those who question the sustainability of rural economic systems, to considering the average.

4. The Role of Tourism and valuable tissues rural development, rural stability of physical systems

Table 4: one-sample t-test to evaluate the role of tourism and development of the rural areas, the rural physical system stability

In the Confidence level 95 percent		Significance level	The t-statistic	Degrees of freedom	Average	In the Confidence level 95 percent
maximum	minimum					
3/28	3/07	0/000	58/04	58	3/18	rural physical system stability

According to [Table 4], the value of t obtained from the 58/04 test is evaluated, and the sustainability of rural physical systems, at 95 percent (sig = 0.000), is confirmed. So the role of tourism and rural development has been valuable tissue, affect the sustainability of rural physical systems, due to the significant amount of good, and the average value of t where we can see that, from the perspective of those who question the sustainability of rural physical systems, to considering the average.

CONCLUSION

Tourism and Rural valuable role in tissue development, the sustainability of rural systems, at 95 percent (sig = 0.000), the sustainability of the rural social systems, at 95 percent (sig = 0.000), sustainable rural economic systems, at 95 percent (sig = 0.000), and the sustainability of rural physical systems, at 95 percent (sig = 0.000), are approved. Among the indices, physical parameters in the first place, the economic situation in the second position, social status is in third place, and this showed that the tissue conditioners valuable tourism and rural social sustainability of rural systems, is less impact in the Holi district.

CONFLICT OF INTEREST

There is no conflict of interest.

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ARTICLE

AMOUNT OF BAKING SODA AND SALT IN THE BREAD BAKED IN CITY OF ZABOL

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ABSTRACT

Large amounts of proteins, calories and minerals are supplied from bread. In the meanwhile, baking soda prevents their absorption and much salt causes various diseases. The aim of this case study was to determine the amount of baking soda and the salt in bakeries of Zabol. For this purpose, 95 bakeries were chose from Zabol through census method and pH and salt and baking soda used in them were determined. In addition, information such as employment history and education level of dough-preparer was also collected and their relationship was evaluated using baking soda through statistical tests. The results showed that 67.36% of the samples had pH greater than 6. The highest pH was observed in Taftoon bread as 73.97%. 30.52% of samples had salt more than the standard level. The present study also showed a significant relationship between the type of bread and the use of baking soda in it (P- Value: 0.039). No significant relationship was observed between the type of bread and the use of salt. Accordingly, the most bread types baked in the city of Zabol are in about standard level in terms of the salt amount and the baking soda.

INTRODUCTION

Bread as the most important product of wheat is the staple food of many countries of the world and supplies a major part of daily energy, protein, minerals and vitamins required by body [1-3]. Based on the results of the consumption pattern of households, average per capita bread consumption in Iranian households is 320 grams a day [286 grams in urban areas and 382 grams in rural areas] [4, 5] which is five times greater than per capita consumption in Europe which is 60 g per day [2, 6] In addition, bread is a necessity in Iranians' food basket and is considered as a valuable and sacred foodstuff. Low cost and wide acceptability of it has caused this foodstuff to play an important role in satiating the hungry and a producing a major part of the energy demands of the country's households [5]. Bread is one of the sources of micronutrients such as iron to body [1,7] and has been able to meet 10% of the iron needed for the body [1,8] In the case of using leaven or yeast, it can cause degradation of phytate available in dough and therefore can play an important role in increasing the bioavailability to some minerals including iron, zinc and calcium [9] In order to produce a stuffed bread, the dough should have a uniform porosity and be strong and flexible when touching [10] the bread crust should be in golden brown colour, crispy and chewable [7] The bread produced by a dough which is not bulky and porous by yeast or sourdough is kept at a very low level in terms of taste, digestibility and thereby is not suitable for consumption [7, 11]. In our country for various reasons including saving time and providing quick dough, workers' impatience and low skill, unfortunately bakeries sometimes use harmful chemical additives such as baking soda and salt that expose consumers' health at risk [3,7,12] The mentioned substances are illegally used to puff or leaven bread in the bakery because this chemical substance is decomposed on heating and carbon dioxide gas is produced and a part of sodium bicarbonate is converted to sodium carbonate during this process which is resistant to heat [12,13] Baking soda not only affects the bread colour and makes it yellow or darken, but also gives unfavourable and alkaline taste and flavour to bread due to sodium carbonate and also causes anaemia, increases uptake of heavy metals including lead, cadmium, mercury, enhances absorption of iron, zinc, calcium, osteoporosis, cardiovascular diseases especially in children and women, causing or

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Baking Soda, Dough, Salt, Bread, Bakeries, Zabol, hygiene

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aggravating convulsions in children, intellectual weakness, fatigue, hands-trembling, vitamins inactivation, preventing the fermentation process, impaired digestive enzyme activities and thus indigestion that causes stomach cramps and bloating leading to stomach and intestines diseases and reduces the flavour and taste of the bread and un-leavening the bread and increasing bread wastes [3,7, 14, 15] And in addition, consuming baking soda reduces the growth and yeast activity and thereby reduces phytate enzyme activity in bread with increasing ambient pH [16]. Besides, consumption of salt can cause blood pressure due to increasing the sodium in the bread [9]. Reports have shown that one reason for high bread wastes in Iran is the use of baking soda in bread-baking process so that there is a bread waste as 15%-20% of in our country; while the bread waste is 1%-2% in developed countries [9, 16] Although, the Ministry of Health has banned the use of baking soda in bread from 2002/03/11 [18], scattered observations indicate the continuity of using baking soda in bread. Accordingly, this study aims at investigating the use of baking soda and salt and the factors affecting baking soda in the bakeries of Zabol in 2014 and recommending some strategies for reducing the use of baking soda and salt in bread for transmitting health care infections to the patients and the common areas where contamination occurs.

MATERIALS AND METHODS

This is a cross-sectional study conducted in 2012 on 95 bakeries of Zabol. Data collection was performed through census. The number of cases for each type of bakery included 19 Lavash bakeries, 73 Taftoon bakeries and 3 Sangak bakeries. Prior to sampling, a special form was designed to record information including bakery characteristics [operator's name, age, work experience, the type of bread, the education level of bakery owners and daily baking rate). After referring to the bakeries while sampling the bread, the mentioned forms were also completed. To determine the performance of bakeries about the use of baking soda and salt, 3 loaves of middle-baked bread were chose from each bakery and were considered as a mixed sample. The samples were placed inside a nylon bag, and the characteristics of the sample including the place and date of sampling were written on it and sent for carrying out experiments. In the laboratory, samples were tested for the presence of baking soda based on the standard method of Institute of Standard for traditional breads, Standard. No. 2628. Based on the above-mentioned standard, bread pH is a maximum of 6 and thereby the pH greater than 6 in bread was considered as an indicator for the use of baking soda in the produced bread. [19] Measuring the salt was carried out according to Standard Method No. 2577 issued by Institute of Standards and Industrial Research of Iran, and the salt content of less than 2% was considered as authorized level and the higher amount was considered as unauthorized level. pH and salt were measured according to the standard method of Institute of Standard for traditional breads of Iran [20]. To determine pH, the bread sample is first fully dried and pulverized in the laboratory atmosphere and a 10 g pulverized sample is carefully weighed in flask 250 cc and 90cc distilled water is added to it and is capped. Then it was alternately shaken for 10-15 min and then the pH of sample was measured using pre-calibrated pH meter. The experiments were performed with pH meter and a scale with accuracy of 0.010. To measure the salt, one gram of the dried and milled sample was precisely weighed and placed in a flask 250 ml and 10 ml of silver nitrate solution (0.1 N) and 10 ml of concentrated nitric acid were added to it and then the mixture was boiled. When boiling, 5 ml saturated permanganate was added until the solution is colourless and 100 ml of water and 5 drops of Ferric Ammonium Sulphates solution were added to it after cooling. Then it was titred with a potassium thiocyanate solution(0.1 N) up to emergence of brown red colour and stability in this colour for 15 seconds [6] To analyze the results, the SPSS 18.0 software and chi-square test were used. For quantitative variables, mean and Standard Deviation [SD] were used as central tendency and dispersion measures and tables and chart-drawing were used for displaying data about the qualitative variables.

RESULTS

In this study, 95 bakeries were assessed in Zabol. The results showed that the amount of baking soda consumed in bread varies. 64 [76.36%] bakeries have used baking soda and this amount in Taftoon bread was more than other bread types [73.97%]. According to [Table 1], the difference between the frequencies of using baking soda in different bread types was statistically significant [P- Value 0.039]

Table 1: Frequency of different types of Iranian flat bread prepared by the bakeries of Zabol in terms of using baking soda

Type of Bread	With/Without baking soda		Total
	Without baking soda pH<6	With baking soda pH > 6	
Taftoon	[26.02]19	[73.97]54	100 [73]
Lavash	[52.63]10	[47.36]9	[100]19
Sangak	[66.66]2	[33.33]1	[100]3

Dough-preparers at the bakeries under study are divided into three groups of less than 5 years, 6-9 years and more than 10 years of work experience. Those with more than 10 years of work experience had the highest percentage in the groups with the frequency of 44 cases(46.31%) [Table 2]

Table 2: Distribution of work experience in different groups of dough-preparers

Work Experience [year]	Frequency [Percentage]
<5	[20] 19
6-9	[33.68] 32
>10	[46.31] 44
Total	[100] 95

The relationship between the use of baking soda and the work history of dough-preparers was assessed according to which (34.09%) of dough-preparers of this group with more than 10 years of work experience have not used baking soda and (65.90%) of members of this group have not used baking soda [Table 3]. Therefore we can say that there was no relationship between the dough preparers' work experience at bakeries and the use of baking soda (P-Value> 0.05).

Table 3: Frequency distribution of [use of baking soda] according to dough-preparers' work experience

Consumption of Baking Soda	Work Experience		p
	Yes	No	
	Number[percentage]	Number[percentage]	
<5	[31.57]6	[68.42] 13	P-Value > 0.05
6-9	[31.25] 10	[68.75] 22	
>10	[34.09] 15	[65.90] 29	
Total	[32.63] 31	[67.36] 64	

[Table 4] shows the frequency of dough-preparer workers in bakeries under study in city of Zabol according to educational level. The education level of bakeries staff can be categorized to 4 different groups: ["illiterate/elementary school", "guidance school", "diploma degrees)

The group with guidance school education level was the most frequent one with 49 cases (51.57%) in comparison with other education levels. It is also observed that those educated at guidance school grade use baking soda more than others (73.46%). And workers with high school education [57.69%] had used baking soda less than others. And no significant relationship was observed between the education level of workers involved in preparing dough in bakeries and the use of baking soda(P-value> 0.05).

Table 4: Frequency distribution of (use of baking soda) based on the level of education among dough-preparer workers in bakeries of Zabol

Consumption of Baking Soda	Yes Percentage	No Number [Percentage]
Level of Education		
Illiterate	0	0
Elementary School	[35]7	[65]13
Guidance School	[73.46]36	[26.54]11
Diploma	[42.30]11	[57.69] 15
Total	[32.63]31	[67.36] 64

The amount of salt used in different bread types varies. 29 (30.52%) bakeries have used salt in their produced bread. This rate was more than other types in Sangak bread [one case (33.33%)]. According to [Table 5], the difference between the frequencies of using salt in different bread types was not statistically significant (P-Value> 0.05).

Table 5: Frequency distribution of salt consumption in different bakeries of Zabol

Type of Bread	Number	Those higher than the standard level. Number [Percentage]
Taftoon	73	(32.87) 24
Lavash	19	(21.05) 4
Sangak	3	(33.33)1

Although the bread had been considered and studied from various aspects as a staple food and an important foodstuff in the food basket of Iranian households in the scientific communities [8], paying attention to the supply and consumption of bread is very important in terms of health and nutrition as well as the national economy [21]. Baking soda has been detected in 64 out of 95 bakeries of Zabol [Table 1] In the case of Taftoon bread, bakery staff [73.97]. were using baking soda to make Taftoon bread. The best practice about lack of using baking soda was associated with Sangak bakery staff. However, according to the Ministry of Health reports, baking soda is used more in baking Lavash bread [22], in a

study conducted by Heidar Mah (2007) on sanitation and bread quality of bakeries in Isfahan, 9.8% of the Taftoon bread produced in machine bakeries and 4.76% of Taftoon bread baked in oven bakeries had used baking soda [23]. In a study by Pasdar Khoshknab et al in 1999 on the status of baking soda in bread baked in Kermanshah town, it was reported that 8% of bakeries under study had used baking soda and this is less than that of obtained in Zabol [24]. In another study, Asemi et al reported in 2004 about the non-consumibility of Lavash and Barbari breads in Kashan in terms of the use of baking soda according to standard method of Institute of Standard for traditional breads, Standard. No. 2628. based on the measurement of bread pH as 9.82% and 14.39% respectively [25]. The results of Malakoutian's study about the quality of baked bread and health status of bakeries in Kerman city show that the salt amount of 32.8% of bakeries that bake machine Taftoon bread and 9.4% of the oven Taftoon bakeries were above the standard level [26] which is inconsistent with the results of this study. Baking soda is mostly used when the dough-preparer worker is delayed at work and uses yeast instead of baking soda for early fermentation and preparation of bread. This leads to early fermentation and preparation of dough for baking bread [27]. The results obtained by Malakootian et al research about the quality of baked bread and the hygienic conditions shows that "Half of the bakeries added soda as a leavening agent to breads. The amount of salt used per production of each loaf of local bread: Sangak, indirect heat, machinery Taftoon and oven Taftoon bakeries was 48.72%, 33.33%, 31.13% and 8.97%, respectively, which was more than the approved standards" and 24.2% of Kerman's bakeries enjoyed suitable hygienic conditions [28]. Although the usual salt amount is useful for the body, but the daily salt requirement is in a range which is provided more than the needed level under normal circumstances of human diet. Accordingly, excessive salt in bread is not justifiable from this perspective [6]. Adding salt makes more dough stickiness and dough sticks to the walls of the oven. To reduce fluidity, dough resistance is increased and due to the poor quality of flour and lack of awareness of owners and workers of the bakery about the dangers of salt, more salt may be added to the dough according to habit. In the meanwhile, training and upgrading these subjects' knowledge can overcome this bad habit and planning is highly recommended in this regard [6, 26]. Much salt has reduced the yeasts activities of dough and consuming it for a long time can increase blood pressure. This is also harmful for people who suffer from kidney diseases and heart failure [29- 33]. Although various studies show that the amount of baking soda in bread has decreased compared to the past decade.

CONCLUSION

The results of this study and other studies indicate that the use of baking soda and salt in bread still illegally continues despite the disadvantages of using baking soda and banning its use in bread by Ministry of Health and the irreparable damages of salt to the body system especially in patients with kidney disease and those with high blood pressure. Accordingly, health authorities and other organs in charge with this issue can act for producing high quality bread and full elimination of baking soda and other illegal additives from the bread with granting supervision ID with the presence of technical officer, and continuously monitoring and controlling bakeries, the continued implementation of applied research to enhance the quality of bread, and intensifying the implementation of legal regulations. Fortunately, in the amendment to Article 13 of the law on foodstuffs, beverage, and cosmetics, training the operators and workers in food preparation and distribution centers such as bakeries have been considered. And has required the bakeries to attend the public health education classes before the start of the work. it seems it is possible to increase the knowledge level of the bakery staff if topics such as losses from the use of baking soda in bread-baking and the benefits of fermentation to be raised in addition to the topics included in the curriculum of public health for bakery staff.

CONFLICT OF INTEREST

There is no conflict of interest.

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ARTICLE

EVALUATION OF CORROSION AND SCALING TENDENCY INDICES IN ZAHEDAN GROUNDWATER RESOURCES

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ABSTRACT

Corrosion in water distribution systems is the primary reason for occurrence of damages in pipes, faucets, and metal joints in water supplying systems, and results in decreasing the useful life of concrete reservoirs at least down to half, 40 % decrease of water transmission in the pipes, as well as damaging the pipes and building materials. In addition, the entry of the material resulted from the destruction of the pipes to water imposes serious risks for consumers. In this study, the corrosion indices of drinking water sources of Zahedan were investigated in 33 water samples of this city in 2015, and values of parameters such as pH, TDS, total alkalinity, hardness, sodium, calcium, water temperature and other chemical parameters were determined as well. Langelier, Ryzner, and Puckorius indices were formulated in "Microsoft 2016" software to determine the qualitative parameters of the water samples, and the results were reported. The obtained results demonstrate 67.26%, 78.72%, and 100% of corrosion tendency for Langelier, Ryzner, and Puckorius indices of the samples, respectively. According to these results, the steel or concrete facilities of water transferring and distribution network of Zahedan have either already been damaged or will be. Considering the high degree of corrosion, the drinking water sources of Zahedan benefit damping their corrosively.

INTRODUCTION

Corrosion is one of the qualitative indices of water which is effective in the preservation of its health and quality. Determination of the corrosion potential is important in maintaining the useful life of facilities and pipes of water distribution network [1]. Corrosion in transmission and distribution networks is a complicated phenomenon which include physical and chemical reactions between the surface of metal and corrosive water [2, 3]. The water causing corrosion is called corrosive water and is different from erosion [4]. The corrosiveness of water depends on numerous environmental factors including alkalinity, buffer power, sodium, calcium, dissolved oxygen, TDS, sulfates, chlorides, polyphosphates, presence of microorganisms and residual chlorine, as well as physical factors such as temperature, velocity, flow rate, and nature of the metal [5- 8]. In water treatment processes, it is possible to prevent interior corrosion of metallic and concrete instrument by adjustment of pH, alkalinity, and calcium hardness of water [9, 10]. Corrosion in water transmission lines and water treatment facilities leads to serious damages such as decrease of water transmission and distribution capacity, increase of pumping costs due to shrinkage of the pipes as a result of increase of calcium precipitation, shortening the useful life of the pipes and destruction of all parts of the water distribution system and water transmission lines, water pumping instruments, main lines of distribution network and home plumbing as well as blocking the pipes and ill-timed and unexpected damages, perforation of the pipes, increase of water turbidity and resulting in decrease of water quality in terms of aesthetics [11-13]. Corrosive waters dissolve the materials used in pipes, joints, and faucets of water distribution network and cause serious health, aesthetic, and material and energy consumption problems and result is economic losses in aqueous systems [14, 15]. Application of corrosion indices for investigation of the tendency of water for leaving precipitates behind, is one of indirect evaluation and simple detection of water corrosion methods. The accuracy of indices are evaluated on the basis of their ability in determination of under-saturation, saturation, and super-saturation states of water in terms of calcium carbonate and prediction of the capacity of waters in

KEY WORDS

Corrosion, Scaling
Tendency, Zahedan,
Groundwater, Ryzner,
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keeping or leaving and or degradation and dissolving calcium carbonate (CaCO₃) precipitates. Some of these indices include; Langelier, Ryzner, and Puckorius [16- 20]. According to the regulations of many drinking water standards of accredited organizations worldwide such as EPA and WHO standards, drinking water must not be corrosive [21-23]. Since the corrosion and precipitation indices must be evaluated at least once every two-years for distribution networks of surface water sources and once a year for distribution networks of underground sources, this study was performed to investigate the corrosion status of underground water sources of Zahedan in 2015.

MATERIALS AND METHODS

To determine the corrosion potential of drinking water (underground water sources) of Zahedan in 2015, first, the water samples were prepared according to standard methods of census, from 33 water wells which were being used for supplying drinking water. Then, the residual chlorine and parameters like concentration of calcium, total alkalinity, bicarbonate, hardness, sodium, chlorides, sulfates, total dissolved solids (TDS), and pH of samples were determined after two times repeating, on the basis of the methods presented in reference books [24]. Following this, the value and interpretation of the indices of Ryzner stability, Langelier saturation, and Puckorius took place using Microsoft Excel 2016 according to the methods of previous studies of the authors of the present article and were determined based on table 1 [1]. The conductivity, turbidity, temperature, and pH parameters were determined by in situ sampling using a pH-Ion meter of METROHM Company. The distribution of the values of the indices in Zahedan was plotted and reported using Geographic Information System (GIS v10) by applying IDW (Inverse Distance Weighted) method.

Indexes	Equation	Index value	Water condition
Langelier saturation index (LSI)	$LSI = pH - pHs$ $pHs = A + B - \log (Ca^{2+}) - \log (Alk)$ $pH \leq 9.3$ $pHs = (9.3 + A + B) - (C + D)$ $(3) pH > 9.3$	LSI < 0	Super saturated, tend to precipitate CaCO ₃
		LSI = 0	Saturated, CaCO ₃ is in equilibrium
		LSI > 0	Under saturated, tend to dissolve solid CaCO ₃
Ryzner stability index (RSI)	RSI = 2pHs – pH	RSI < 6	Super saturated, tend to precipitate CaCO ₃
		6 < RSI < 7	Saturated, CaCO ₃ is in equilibrium
		RSI > 7	Under saturated, tend to dissolve solidCaCO ₃
Puckorius scaling index (PSI)	$PSI = 2 (pHeq) - pHs$ $pH = 1.465 + \log (T.ALK) + 4.54$ $pHeq = 1.465 \times \log (T.ALK) + 4.54$	PSI < 6	Scaling is unlikely to occur
		PSI > 6	Likely to dissolve scale

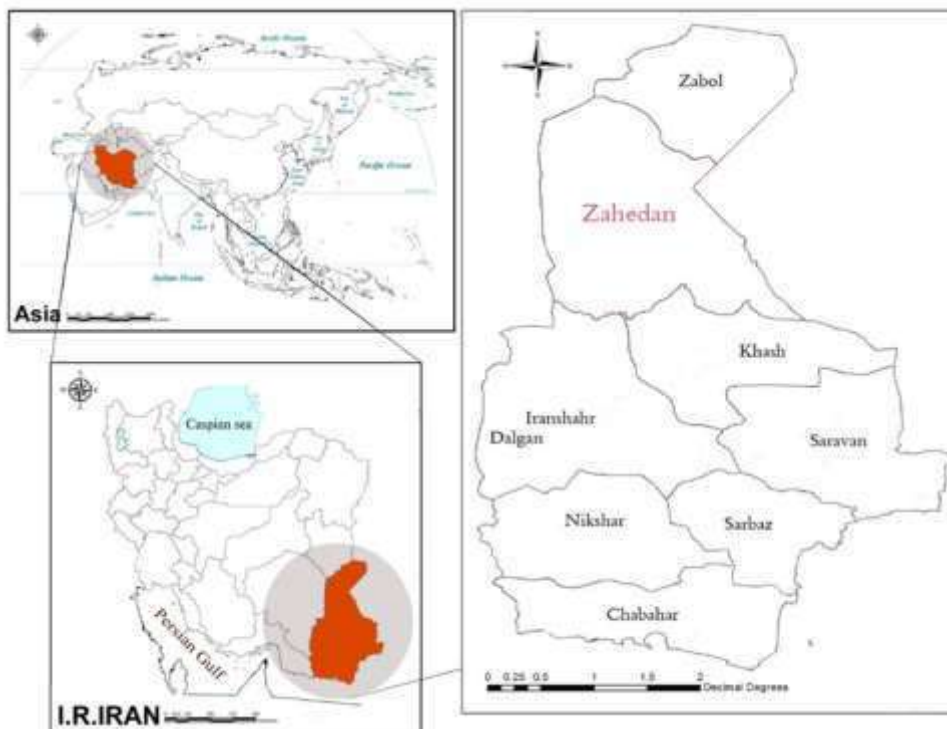


Fig. 1: Zahedan Location.

RESULT AND DISCUSSION

The primary reason for occurrence of corrosion or precipitation inside the interior walls of the pipes of water distribution networks is variation of physical and chemical parameters of water, in particular pH, temperature, total alkalinity, calcium, chlorine, sulphates, and etc. The mean values of maximum, minimum, average, and standard deviation of parameters corresponding to calculation of corrosion indices of the samples are provided in [Table 2]. The high mean values of the concentration of sulphates and chlorine in the samples indicate the delicacy in the indices, however, considering the fact that the equilibrium of the concentration of all parameters are in the same level, obtaining similar results for values of corrosion indices is not surprising. According to [Table 1], the obtained results show that the qualities of these sources of drinking water are unpleasant.

Table 2: Water quality characteristics associated with corrosion and scaling tendency

Parameters	Minimum	Maximum	Mean	Std. Deviation
pH	6.83	8.28	7.68	0.43
TDS(mg/l)	184.6	6210.4	279.61	456
CL(mg/l)	6	1315	417.70	324.62
Ca(mg/l)	28	458	118.18	122.57
Na(mg/l)	37	1610	272	174
Mg(mg/l)	3.28	154	35.2	18
Temperature(c.)	17	27	22	2.76
Total Alkalinity(mg/l CaCO ₃)	35.6	548.40	318.01	118.59
F(mg/l)	0.06	0.97	0.287	0.12
Turbidity	0.01	35.4	2.57	4.68
NO ₃ (mg/l)	1.61	90.8	17.8	10.56
SO ₄ (mg/l)	22	1550	536.62	387.15
HCO ₃ (mg/l)	76.6	542	252	62

Table 3: The National standards and Zahedan groundwater quality [17, 21]

Parameters	Desirable level	Limited level	Over Standards
pH	6.5-8.5	6.5-9	0.0
TDS	1000	1500	9.5
Cl ⁻	250	400	13.2
SO ₄ ²⁻	250	400	11.32
Ca	300	-	-
NO ₃	-	50	1.01
Mg	30	-	21
Na	200	200	45.3

The interpretation of the corrosion indices of the drinking water of Zahedan is provided in table 4 as percentages. On the basis of interpretation of all three indices, the findings in table 4 demonstrate the tendency of more than 60% of all samples for corrosion. As observed, according to Langelier index, 67% of the sources tend to dissolve calcium carbonate and 33% of them tend to precipitate it. 79% and 73% of the sources showed tendency for corrosion according to Ryzner and Puckorius indices, respectively.

Table 4: Drinking water stability of Zahedan drinking water

No	Index	Water condition	%
1	Langelier	Under saturated, tend to dissolve solid CaCO ₃	67
		Saturated, CaCO ₃ is in equilibrium	33
		Super saturated, tend to precipitate CaCO ₃	0.0
2	Ryzner	Under saturated, tend to dissolve solid CaCO ₃	79
		Saturated, CaCO ₃ is in equilibrium	21
		Super saturated, tend to precipitate CaCO ₃	0.0
3	Puckorius	Likely to dissolve scale	73
		Scaling is unlikely to occur	23

The Langelier, Ryzner, and Puckorius indices for drinking water samples of Zahedan are illustrated in [Fig. 1]. [Fig. 1] shows that, majority of the samples provided from the wells have similar qualities and statuses,

and values of SI, PSI, and RSI indices all sit within a certain range. The acquired results showed that only the water sources in upper Lar, downer Lar, and Ladiz villages tend to precipitate calcium carbonate, whereas rest of the sources all tend to dissolve it. Among these sources, those belonging to upper Tamin, Kalak, Karimabad, demonstrated higher corrosiveness compared to other sources. The mean values of Puckorius and Ryzner indices in water samples of the villages were obtained as 6.45 and 7.16, respectively. These values being higher than 6, confirms their corrosiveness. The mean value of Langelier index was obtained as 0.57 which emphasizes on the corrosiveness of these water sources even more. The Ryzner index which unlike Langelier index doesn't have a theoretical base and is established based on a series of experiments, shows that, a great section of the under study sources have corrosion potential.

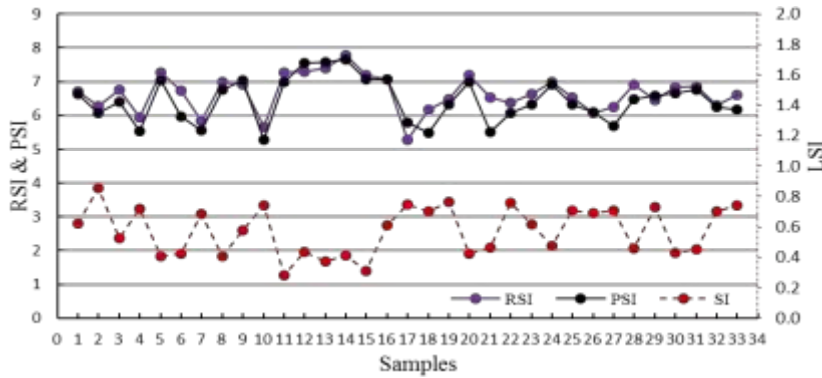


Fig. 1: The score of Langelier, Ryzner, and Puckorius indices in samples.

[Fig. 1] illustrates that, majority of the underground water sources of Zahedan are corrosive except for those in Rahmatabad, Golchah, upper Tamin, Kalak, and Karimabad villages. The values of corrosion indices of Dizook, Gavdaran, Bepi, and Garaghe villages demonstrated the highest corrosion potentials among the under study sources.

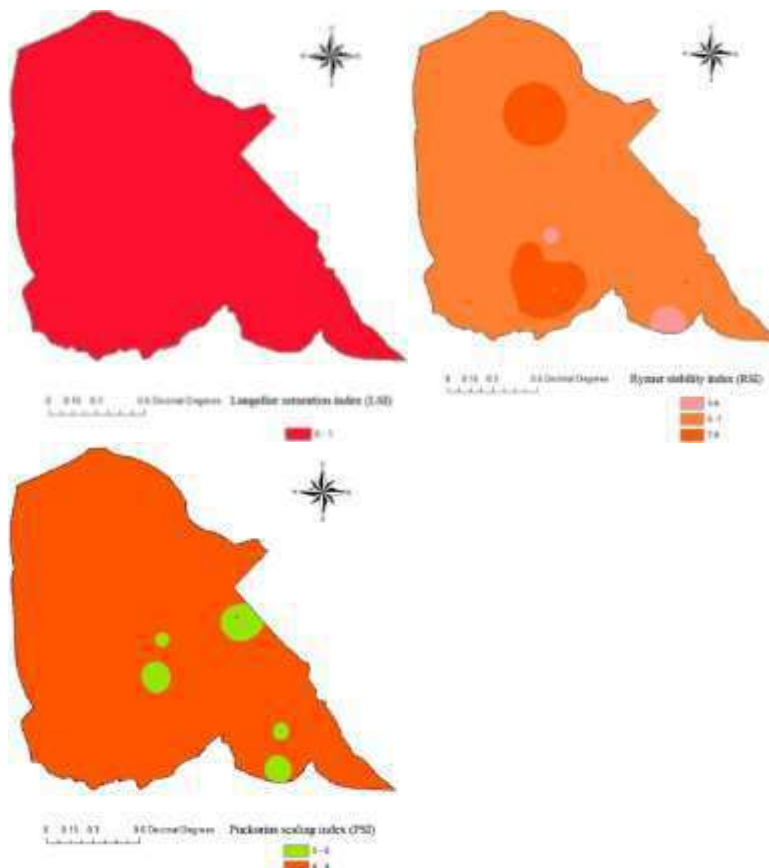


Fig. 2: The distribution of Langelier, Ryzner, and Puckorius indices in Zahedan city.

The mean value of the alkalinity of the water of the villages was determined as 318 mg/L CaCO₃ which is way higher than the standard limit in Iran (120 mg/L CaCO₃). The mean value of the total dissolved solids was determined as 280 mg/L which is also higher than the standard limit in Iran. In case, the water supplying situation is described as critical, this could be considered within the allowed range (the

maximum allowed limit is 1500 mg/L and in case of lack of water in the area it is 2000 mg/L). The mean value of pH was determined as 7.91 which is an acceptable value according to the standard limit in Iran (7-7.5) [27]. The pH values of the waters of Pede Shahi, Tavakkolabad, Dizook, Rigmalek, Bepi, Garaghe, Tahlab, upper Tamin, Chahbook, Choonabad, and downer Lar were higher than 8 and need changes in disinfection methods of these water. Azari *et al*, investigated the stability indices of the drinking water of villages in Qom province using Langelier, Ryzner, Puckorius, and corrosion indices in 2012 and their results indicated the corrosiveness of the water sources under study[14]. In the investigation of Tagipoor *et al*, the corrosion and precipitation potentials were studied in drinking water distribution system of Tabriz by Langelier, Ryzner, Puckorius, and corrosion indices in 2012 [28]. In the study of Shams *et al* the corrosion and precipitation potentials of the water supplying network of Tabas villages were investigated using Langelier, Ryzner, and Puckorius indices and corrosiveness of the water of Tabas region was confirmed by these indices [29].

CONCLUSION

In this study, corrosiveness of the drinking water sources of Zahedan was investigated by Langelier, Ryzner, and Puckorius indices. The results of this study revealed that majority of the underground drinking water sources of Zahedan show high corrosion potential. Hence, wasting costs and capital must be prevented by stabilization of the water by applying a specific plan such as pH and alkalinity adjustments, addition of chemical inhibitors, control of the amount of dissolved gases, and removal of some minerals, as well as consideration of system design, specially choosing type and material of pipes and adjusting the slope and flow rate of the water.

CONFLICT OF INTEREST

There is no conflict of interest.

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FINANCIAL DISCLOSURE

None

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ARTICLE

REMOVAL OF REMAZOL BLACK B DYE FROM AQUEOUS SOLUTION BY ELECTROCOAGULATION EQUIPPED WITH IRON AND ALUMINIUM ELECTRODES

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ABSTRACT

Releasing wastewater of textile industry containing organic dye compounds such as Remazol Black B to the accepting water sources, results in severe damages to the environment and aquatic life. Since majority of the water treatment methods lack sufficient efficiency for removal of textile dye compounds, in this work, the efficiency of electrocoagulation method was investigated in treatment of synthetic water containing Reactive Black 5 dye using iron and aluminum electrodes in a batch reactor. First, a 1-liter reactor was equipped with iron and aluminum electrode by bipolar connection, and then the electricity source was turned on following adjusting the initial concentration to 5000 mg/L, electrical conductivity to 1000-3000 μ Siemens/cm, pH to 2-9, and electrical potential to 30 V. In the next step, the sampling took place at 20-minute intervals and the efficiency of dye removal was determined during the maximum reaction time of 80 minutes, at 597 nm using a spectrophotometer. The results exhibited that, in this process, the maximum Reactive Black 5 dye removal efficiencies were obtained as 96 % and 89.45 % using iron and aluminum electrodes at pH values of 5 and 6, respectively, applying reaction time of 80 minutes, electrical conductivity of 3000 μ Siemens/cm, and initial concentration of 5000 mg/l. Over time, the energy consumption rate increased as well as electrode mass consumption, pH, ultimate temperature of the wastewater, and the removal efficiency. The electrocoagulation process equipped with iron and aluminum electrodes could be used well as an efficient and cost effective method for treatment of wastewaters containing Remazol Black B dye.

INTRODUCTION

Textile industry is one of the most water consuming industries in the world and releases a remarkable amount of wastewater. These wastewaters contain considerable amounts of organic dye compounds. Approximately, 50% of the dyes utilized in textile industry consists of azo dyes. These dyes are also used widely in industries such as paper and printing, pharmaceutical, and toy industries [1, 2]. It is estimated that, about 15% of the dye compounds used in dyeing processes are released to the environment through wastewater [3]. Releasing dye containing wastewater into the rivers and lakes results in decreasing water quality, oxygen transfers into the water, and gas solubility as well as high toxicity, carcinogenicity, and mutation for livings including humans [4, 5]. Therefore, removal of dye from these wastewaters is of great importance [6]. Following the advances of the science of textile dye production, novel dyes are introduced to the market which demonstrate better dyeing characteristics, however, this improvement of the quality has led to higher stability of dye structure, enhancing their resistance against biological and chemical degradation processes [7]. Majority of the dyes used in textile industry are not biodegradable and since they form strong complexes, common water treatment processes including coagulation, flocculation, and chemical precipitation are not considered effective methods for their degradation [6]. Furthermore,

KEY WORDS

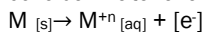
Remazol Black B, Dye, Electrocoagulation, Aluminium Electrode

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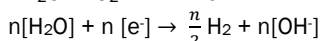
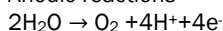
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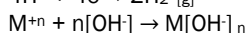
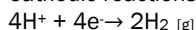
these techniques suffer from other disadvantages such as high costs, production of huge amounts of sludge, and low efficiency [7, 8]. Electrochemical process is a biocompatible method which can compete with other water treatment method due to the low costs [9, 10]. The advantage of this method include low costs of the instruments and application, low sludge production with low water content and high dewatering capability, and little room required for the instrument installation [11]. In electrochemical coagulation processes, electrical current is applied using electrodes of generally iron and aluminum type to destabilize water pollutant agents as well as suspended and colloidal material [12]. In electrocoagulation process, iron and aluminum electrodes are degraded through electrolysis process according to the following equations, forming metallic hydroxides capable of coagulating the clotting agent of the suspended material or other dissolved pollutants in the water, which in turn leads to destabilization of colloidal material and pollutant agents in the water by inducing floatation or precipitation [13].



Anodic reactions



Cathodic reactions



Where, M is the anode metal and n is the number of electrons transferred in redox reaction [14]. To date, some studies have been conducted regarding the efficiency of electrocoagulation in dye removal from aqueous media. Some of them are as follows: Vidal *et al's* study entitled "Removal of Acid Black 194 from water by electrocoagulation using aluminum anode" [15], Shankar *et al's* study entitled "Removal of COD, TOC, and dye from pulp and paper industry wastewater through electrocoagulation" [16], and Mollah *et al's* study entitled "Treatment of orange II azo-dye by electrocoagulation (EC) technique in a continuous flow cell using sacrificial iron electrodes" [17, 18]. Since many reactive dyes are not biodegradable and considering the lack of sufficient efficiency of common wastewater treatment methods in removal of these dyes, in this study, the possibility of application of electrocoagulation water treatment method, using iron and aluminum electrodes was investigated for removal of reactive Black 5 dye in laboratory scale and the optimum operational condition was determined for removal of the dye considering the energy and electrode consumption rates.

MATERIALS AND METHODS

Materials and instruments

All materials used in this study, including Reactive Black 5 dye (CASRN) C26H21Na4N5O19S6 (17095-24-8), sodium hydroxide, and hydrochloric acid were supplied from Merck Company of Germany. HPLC grade distilled water was used in all experiments. First, stock solution of the dye (1000 mg/l) was prepared by dissolving certain amount of RB5 powder with purity of 55% in water. The pH adjustment took place by a Denver Ultra basic-UB10 made in USA using 1 N hydrochloric acid and sodium hydroxide (19). The electrical conductivity was adjusted to 1000, 1500, 2000, 2500 and 3000 $\mu\text{s}/\text{cm}$ using 1 normal KCl by a WTW-Cond 1310 made in Germany.

Performing the process

To start the experiments, electrode planes of iron and aluminum with dimensions of 11×10 cm and distance of 2 cm were connected to a Micro power supply of 30 v potential using bipolar connection method, in a glass container with height, depth, and width of 13×12×10, respectively and volume of 1 liter. The pH values of the samples containing synthetic wastewater with dye concentration of 5000 mg/l, were adjusted to 2, 3, 4, 5, 6, 8, and 9 before applying the electrical current. Furthermore, their conductivities were adjusted to 1000, 1500, 2000, 2500, and 3000 $\mu\text{s}/\text{cm}$. The samples were then added to the reactor which was placed on a magnetic stirrer. A gentle and equal rate of stirring was applied for all samples. The electrocoagulation experiments were performed by applying the electrical current with electrical potential difference of 30 V. The efficiency of dye removal was then determined using a Thermo Scientific Helios Epsilon UV/VIS spectrophotometer at 597nm by taking 20 ml of the samples from the middle of the container in 20-minute intervals and maximum reaction time of 80 minutes. Amounts of the iron and aluminum released in the reactor were calculated by Faraday's law in addition to comparing their weights.

RESULTS

pH effect

[Fig. 1] shows the pH effect on the efficiency of electrocoagulation process within the range of 2-9 as well as pH variations when using iron and aluminum electrodes. The maximum removal efficiency was obtained as 96% following using iron electrode at pH 6. The second best result was achieved as 89.45% removal efficiency by aluminum electrode at pH 5. Figure 1 furthermore demonstrates that, the ratio of ultimate pH increase rate to initial pH increase rate is greater when applying iron electrode than the aluminum. The

average ratio of ultimate pH increase rates to initial pH increase rates are obtained as 3.8 and 3.03 unites for iron and aluminum electrodes, respectively. ;Fig. 2] provides the ultimate temperature variations and initial pH values of 5 and 6 through electro coagulation process over time. [Fig. 2] illustrates that, for both electrodes, the ultimate temperature of the process increases from 25.7 °C to 48.9 °C over time. The ultimate pH values also increase. In 80 minutes, when applying aluminum electrode, the pH value reaches 8.57 from 5 with correlation coefficient of 90%, and when applying iron electrode, it reaches 10.5 from 6 with correlation coefficient of 96%. Figure 2 also shows that the growth rate of pH is greater when the iron electrode is used rather than the aluminum electrode.

The initial pH of the environment induces a significant effect on the performance of all processes, especially electrocoagulation process for removal of organic contaminants from aqueous solutions. Considering the standard regulations and the possibility of releasing the wastewater to environment, the variations of ultimate pH of the wastewater is as much important as the initial pH [20]. Ghalwa Abu *et al* (2016) reported that in their studies about removal of Reactive Red 24 by electrocoagulation process, the removal efficiency was highly pleasant when using iron electrodes at neutral pH or alkaline condition. This happened due to decrease of the dissolution of iron ions and formation of iron hydroxides capable of adsorbing dye molecules. On the other hand, the aluminum electrode demonstrated better efficiency in acidic environment. The decrease of dye removal by aluminum electrode is attributed to decrease of protonated functional groups on the dye molecules[21]. Rastgarfar *et al* (2011), reported a removal efficiency of 98% for Liquor Black dye in their study of removal of phenol and dye from liquor black in pulp and papermaking process by electrocoagulation method using aluminum electrode at pH 7. They depicted the reason as the high surface area of hydrophobic aluminum hydroxide bulks at neutral pH, which leads to fast adsorption of the dissolved organic material and trapping colloidal particles. In addition, due to oxidation of hydroxide ions at the anode and oxidation of Fe²⁺ to Fe³⁺ and formation of Fe(OH)₆³⁻ and Fe(OH)₄⁴⁻, the removal efficiency declines. By application of aluminum electrodes at pH values below 2 and above 10, the removal efficiency of this process decreases since at pH values below 2, aluminum hydroxide particles do not precipitate considering their amphoteric characteristic, and at pH values above 10, the solubility of Al(OH)₃ increases as useless soluble AlO₂. In this study, the maximum efficiency was achieved when pH values were adjusted to 6 and 5 for iron and aluminum electrodes, respectively. This was in good agreement with the above studies. Hence, the optimum pH is determined as 6 and 5 for iron and aluminum electrodes in electrocoagulation process [22].

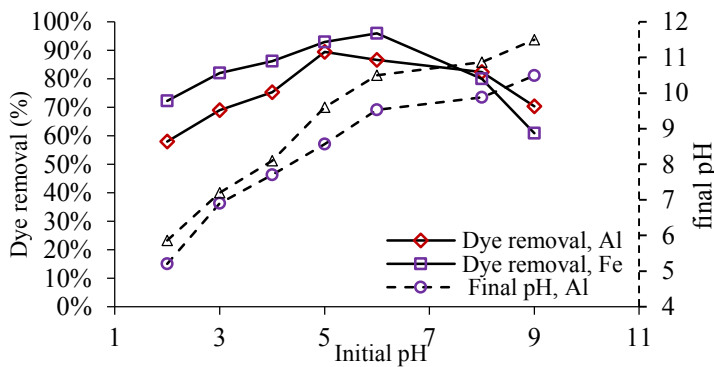


Fig. 1: Effect of pH on removal efficiency (time 80 min, 30 voltages, 5000 mg/l dye, 3000 μs/cm electrical conductivity).

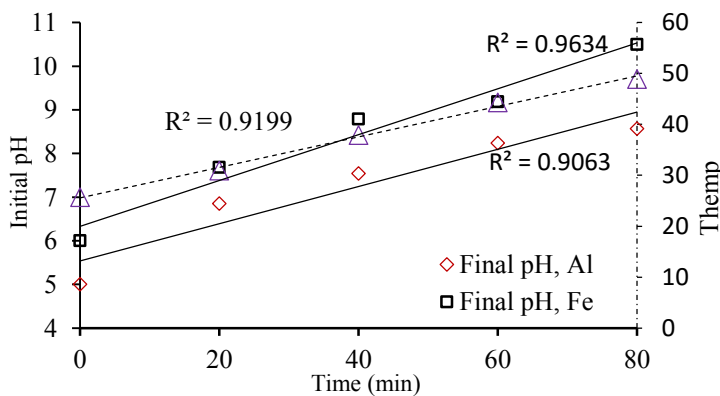


Fig. 2: Temperature and pH change during process (30 voltages, 5000 mg/l dye, 3000 μs/cm electrical conductivity).

Reaction time effect

[Fig. 3] demonstrates the effect of reaction time on energy consumption in dye removal using aluminum and iron electrodes at pH of 5 and 6, respectively. Studying figure 3 shows that, with increasing the contact time, the remaining concentration of the dye decreased, whereas energy consumption increased. Application of aluminum and iron electrodes consume 0.26 and 0.36 kWh energy, respectively for removal of each gram of dye within 80 minutes. It further illustrates that, using aluminum and iron electrodes in electrocoagulation process decreased down the dye concentration from 5000 mg/l to 264 mg/l and 100 mg/l, respectively.

[Fig. 4] provides the effect of reaction time on iron and aluminum electrode weight per gram of dye removed. Studying this figure revealed that, about 1.94 g of aluminum and 2.39 g of iron electrodes were consumed or in other words, were produced in the system as coagulants per each gram of removed dye, after 80 minutes. Figure 4 shows that iron electrode is consumed more compared to aluminum electrode at the same time period and dye removal efficiency was higher by former one.

Almost in majority of the studies, the reaction time parameters is considered a primary and important one in investigation of the process, because it will improve the power and usability of processes in addition to reducing costs, in particular the current costs [23].

Dalvand *et al* (2011) in their study entitled as "treatment of wastewater containing Reactive Red 198 using electrocoagulation process" reported that by increasing the reaction time, energy consumption increases. They achieved 99.1% dye removal efficiency in their study, following voltage of 20 V, reaction time of 75 minutes, energy consumption of 1.516 kWh per cubic meter of treated wastewater. The increased electrical current from electrodes was the reason they explained for this achievement [13]. Salmani *et al* (2016), in their study entitled "Removal of Reactive Red 141 from synthetic wastewater by electrocoagulation process" reported that, the removal efficiency enhances by increasing the reaction time, as by increasing the reaction time from 22.17 minutes to 28.10 minutes, the dye removal efficiency ascended from 89.74% to 95.18%. They presumed the reason for this improvement was higher production of Fe ions and formation of sufficient iron hydroxide clots [24]. In this study, the rate of energy consumption, iron and aluminum consumption, and removal efficiency increased by increasing the reaction time. Thus, in this study, the maximum efficiency is introduced at 80 min reaction time. Economic reasons hindered further continuation of the process.

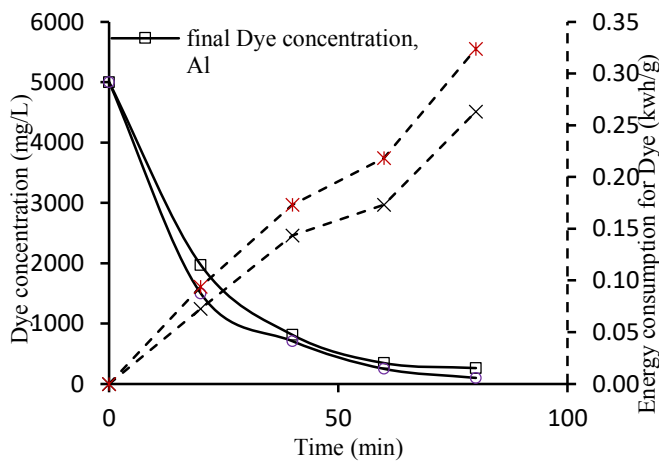


Fig. 3: Effect of time changing on removal efficiency (30 voltages, 5000 mg/l dye, 3000 μ s/cm electrical conductivity, pH 5, 6).

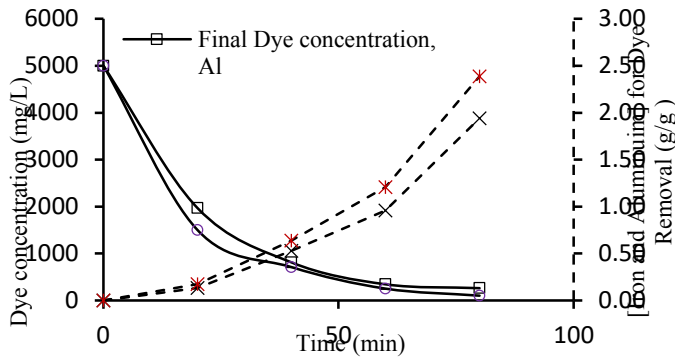


Fig. 4: Effect of time changing on removal efficiency and Wight of metal sacrificial (30 voltages, 5000 mg/l dye, 3000 $\mu\text{s}/\text{cm}$ electrical conductivity, pH 5, 6).

Electrical conductivity effect

[Fig. 5] illustrates the effect of electrical conductivity on dye removal efficiency in electrocoagulation process when using iron and aluminum electrodes. Studying figure 5 shows the improvement of the efficiency by increasing the electrical conductivity. Following increasing the electrical conductivity from 1000 to 3000 $\mu\text{s}/\text{cm}$, the dye removal efficiency increased from 73.7% to 78.7% and from 89.45% to 96% using aluminum and iron electrodes, respectively. Figure 6 shows the impact of variation of initial electrical conductivity on energy and metal consumption rate in dye removal process. [Fig. 6] reveals that, energy consumption rate has increased by enhancing the electrical conductivity, and more metal is released in the solution and or consumed from the electrode planes subsequently resulting in higher dye removal efficiency. By increasing the electrical conductivity from 1000 to 3000 $\mu\text{s}/\text{cm}$, energy consumption rate increased from 0.17 to 0.26 and from 0.2 to 0.32 when using aluminum and iron electrodes, respectively. For per gram of dye removed, the metal weight released to the solution increased from 1.44 to 2.38 and from 1.27 to 1.94 when using iron and aluminum electrodes, respectively. Natural water and all sewages and wastewaters contain various compounds and ions, which cause electrical conductivity between two electrodes, once an electrical pole is established. As the ionic strength grows, electrical conductivity will increase at constant voltage, or in a constant current, the voltage will decline by improving electrical conductivity [23]. Bazrafshan *et al* (2012), in their investigation regarding removal of humic acids from aqueous solutions by electrocoagulation process with iron electrode, reported that, at a constant voltage, enhancing electrical conductivity leads to increase of energy and electrode consumption rate. The rate of electrode consumption increased from 0.11 to 0.19 kg/g and humic acid removal efficiency increased from 76.95% to 92.69% following raising electrical conductivity from 1000 to 3000 $\mu\text{s}/\text{cm}$. They assumed that, increasing the electrical conductivity was the reason for this improvement in the efficiency (9). Bazrafshan *et al* (2012), in their study of removal of humic acid from aqueous media by electric coagulation process with the addition of hydrogen peroxide reported that, humic acid removal efficiency improved remarkably by increasing the electrical conductivity by addition of 1, 1.5, 2, and 3 g/l of potassium chloride. They claimed that, this occurred due to the increase of coagulant as well as increasing the size and growth rate of the produced clots which results in improvement of the efficiency [20]. In this study, the removal efficiency increased with increasing electrical conductivity and correspond with the results of the above studies. In this study, the optimal efficiency of the electrical conductivity was achieved as 3000 $\mu\text{s}/\text{cm}$.

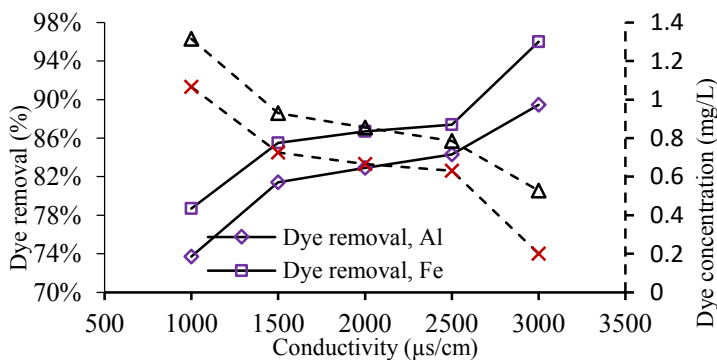


Fig. 5: Effect of electrical conductivity change on removal efficiency (30 voltages, 5000 mg/l dye, time 80 min, pH 5, 6).

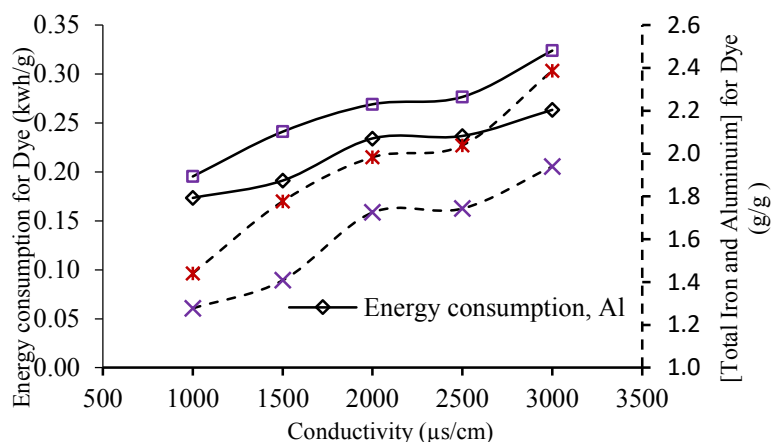


Fig. 4: Effect of electrical conductivity change on Wight of metal sacrificial and energy consumption (30 voltages, 5000 mg/l dye, 3000 μs/cm electrical conductivity, pH 5, 6).

on outer skin opening of fistula and knot was secured on the outer hard leather piece [Table 1].

CONCLUSION

This study was conducted to investigate the Remazol Black B dye removal efficiency by electrocoagulation process using iron and aluminum electrodes. The obtained results indicate that, in removal of Remazol Black B through electrocoagulation process, at a reaction time of 80 minutes, following enhancing electrical conductivity from 1000 to 3000 μs/cm, using iron and aluminum electrodes at pH of 6 and 5, leads to increases of energy and metal consumption rate which in turn increases the removal efficiencies to 96% and 89.45%, respectively. By increasing the contact time and electrical conductivity, the energy consumption rate and consequently the removal efficiency enhances. When using both iron and aluminum electrodes, the output wastewater is alkaline and needs to be concerned about once releasing to the environment. Furthermore, the results indicate higher dye removal efficiency of iron electrode from aqueous solution compared to the aluminum one with slightly more energy consumption and the same electrical conductivity. In general, the results of this research exhibited that, the electrocoagulation method using iron and aluminum electrodes is an appropriate method for removal of reactive dyes from wastewater in laboratory scale.

CONFLICT OF INTEREST

There is no conflict of interest.

ACKNOWLEDGEMENTS

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FINANCIAL DISCLOSURE

None

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ARTICLE

PHENOL ADSORPTIVE BY CUMIN STRAW ASH FROM AQUEOUS ENVIRONMENTS

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ABSTRACT

Due to the increasing use of the adsorption process for the removal of environmental pollutants, selecting a suitable material as an adsorbent has been a major concern of researchers in this field from the technical and economic aspects. This study aims at identifying the possibility of using Cumin Straw Ash (CSA) for removing phenol from aqueous solutions. Cumin Straw Ash was used as an adsorbent at a rate of 2.4, 8.15 and 25 mg/l in laboratory scale in a batch system and changes of phenol concentration, pH and contact time and the adsorption process obeyance from Freundlich and Langmuir equations was investigated. All experiments were performed according to Examination of Water and Wastewater Standard Methods. Besides, Excel software was used to analyze the data and Cumin Straw Ash is highly efficient in removing phenol and the absorbed phenol is reduced by increasing the pH value and removal efficiency is directly related with the increase of adsorbent. The best adsorption efficiency was obtained with adsorbent dosage (dose) of 0.1 g/100 ml, pH 7, phenol concentration 10 mg/l and the contact time of 75 min. Moreover, phenol adsorption process on Cumin Straw Ash obeys from Freundlich isotherm more than Langmuir isotherm. Low cost of cumin straw and the use of Cumin Straw Ash in phenol removal are recommended as an alternative or an option together with other treatment methods.

INTRODUCTION

Phenol (C₆H₆O) is a cyclic hydrocarbon with a molecular weight of 94.11 g/mole and is a bisphenol or white solid in special case. Phenolic compounds are hydrocarbons that hydroxyl group has formed bonds with carbon atoms of benzene ring in their molecular structure [1]. Normally, the phenol is produced from coal tar and gasoline distillation and artificially by heating sodium sulfate benzene with aquatic soda at high pressure [2]. Contamination of water by phenol is considered as one of the most important environmental issues with high toxicity and is found in agricultural wastewaters due to use of some pesticides, industrial wastewater such as pharmaceuticals as well as paint and petrochemical industries and coal-fired power plants. Some of the main pollutants considered as phenol containing sources are chemical industrial wastewater applied in the manufacture of resins, plastics, fibers, adhesives, iron, steel, aluminum, lead and detergents. Moreover, these sources have been found in disinfectants, detergents, cigarettes and vehicles exhaust and are used in the preparation of household products, biocides and dyes [3-7]. In addition to synthetic ways, phenol goes into water resources through the natural ways and also because of the physical structure found in most chemical compounds, it can also be found in municipal wastewaters and is particularly concerning due to environmental stability, solubility in water and health problems. Very high concentrations of phenol, if ingested, inhaled or absorbed through the skin can cause death [8]. In addition to health risks, this material is important due to taste and smell. One consequence of phenolic compounds is the creation of chlorophenol compounds during chlorination of drinking water which leads to objectionable stench by consumers. Moreover, phenol risks and its derivatives can cause several health problems. Therefore, phenol has been classified as a pollutant with particular and hazardous priority [9, 10]. World Health Organization (WHO) Guidelines for the concentration of phenols, chlorophenol and 2,3,4,6-tetrachlorophenol recommends the level of 0.1 µg/l in drinking water (0.1ppb). According to the US Environmental Protection Agency (U.S EPA), the permitted level of phenol in water resources of human communities and the water used for fish breeding are 0.3 and 2.6 mg/l respectively

KEY WORDS

Phenol, Adsorption,
Cumin Straw Ash,
Aqueous Environments

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[9]. Due to these problems, removing these types of organic compounds from chemical and petrochemical industrial wastewater is one of the necessary components in Wastewater Treatment Systems of these industries. Several different physicochemical methods are used in this method to remove phenol and phenolic compounds from aqueous solutions as follows: Distillation with steam, chemical oxidation with hydrogen peroxide, deposition, ion exchange, electrochemical methods, irradiation, activated carbon and volatile ash. However, the adsorption process is one of the efficient and effective techniques [1, 3, 9-11]. but the adsorption process is an efficient and effective technique (2, 8, 11). Since activated carbons have high adsorption capacity, they are widely used as an adsorbent for organic contaminants. Activated carbon adsorption ability is related to the high surface to volume ratio and pores size. In addition, activated carbon adsorption capacity depends on the activation method and the activated carbon source. Silica and activated Alumina are used as adsorbents [12]. The use of activated carbon to remove chlorine, separating the gases and air pollution treatment, recycling heavy metals and food industries and removal of potentially polluting substances such as phenol and phenolic derivatives from aqueous solutions have many applications. But due to high cost, other options have been suggested as an alternative. The use of ash as a low-cost adsorbent is recommended for the removal of phenolic compounds. Ash is a viable alternative to activated carbon due to the low cost of it [13-18]. Ash can be produced from a wide range of carbonous materials such as wood, coal, walnut shell, fruits core, agricultural wastes, etc [14]. Cumin straw is one of cheap and available agricultural wastes in the country and it can be used as a low-cost and even free adsorbent for the removal of phenol and phenolic compounds. It is because Iran is the largest producer and exporter of cumin straw contributed about 40% of world production, and cumin straw is generated in many parts of the country (Khorasan, Semnan, Isfahan, Yazd, Kerman, Tabriz) (19). Due to high production of agricultural wastes, it was decided to test cumin straw as a cheap and available agricultural waste material.

MATERIALS AND METHODS

At first Cumin Straw collected from farms were well washed with distilled water several times. After drying at 700 °C, they were placed inside the furnace for 120 minutes and the generated ash was sifted with the help of standard mesh sieves of 20 and 100 after crushing with porcelain mortar to obtain ash grains with a diameter ranging from 0.15- 0.85 mm. Then it was held in the desiccator to prevent moisture absorption. To provide the stock sample contaminated with phenol, the solid phenol produced by Merck Company of Germany with 99.9% purity and the molecular mass of 94.11 was used [4]. 1000mg of this phenol is weighed and moved into a 1000ml volumetric flask and while mixing with distilled water, it was brought to the desired volume and 2 mL of sulfuric acid (1 N) was added to it. (This solution remains stable at refrigerator temperature of 4 °C for 28 days) (20). In order to determine the pH effect of samples on the adsorption process using H₂SO₄ and NaOH (0.1 N), the pH was set in the range of 2-12 using pH meter (Ultra Basic UB-10). To determine the effect of adsorbent dosage on the adsorption process, the doses of 2.4, 8.15, 25 mg/l were used and to determine the effect of adsorbent contact time, 10, 20, 40, 60, 90, 120, 150 and 180 minutes were applied. To investigate the effect of the phenol concentration in the removal process, the concentrations of 5, 10, 20, 40 and 80 mg/liter were used (To create optimal conditions of contact, a shaker with a speed of 150 rpm was used). After the elapse of contact time in the adsorption process, the sample was passed through the Whatman filter and measured by colorimetric method with the 4- aminoantipirin reagent using spectrophotometer (model PD-303 UV) at the wavelength of 500 nm according to Method 8047 [21]. After obtaining the results using the software Excel 2010, the curves were plotted and the peak and optimal points were determined and reported in accordance with testing conditions.

RESULTS

The results of this study about the effect of pH in aqueous solution in the removal efficiency of phenol by Cumin Straw Ash, the effects of contact time and the adsorbent dosage on the performance of system for the removal of phenol and finally Freundlich and Langmuir adsorption isotherms for the adsorption used in this research, are represented in [fig.1 to 6] in this research.

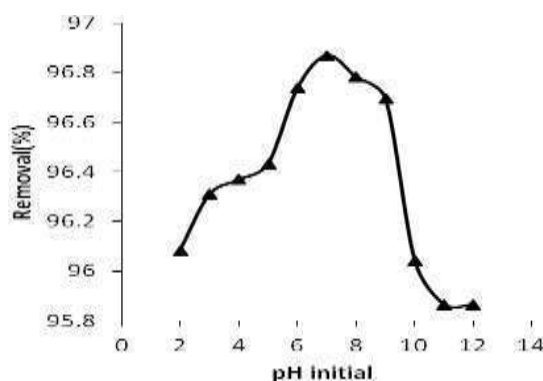


Fig. 1: The effect of pH on the adsorption of phenol on the Cumin Straw Ash (Initial phenol concentration: 50 mg / l, adsorbent dosage: 0.03 gr/100l, contact time: 60 min)

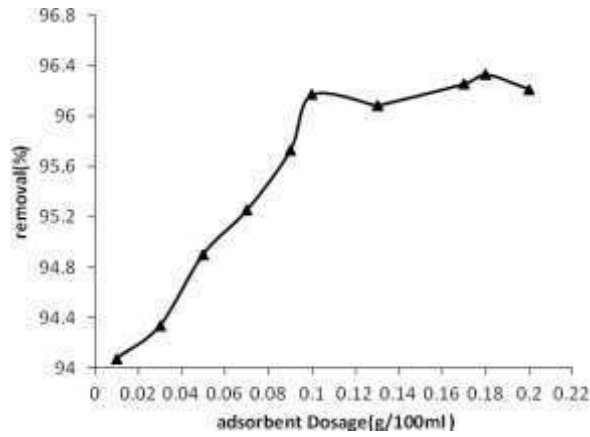


Fig. 2: The effect of adsorbent dosage on the adsorption of phenol on the Cumin Straw Ash (phenol concentration: 50 mg/l, optimum pH: 7 and contact time: 60 min).

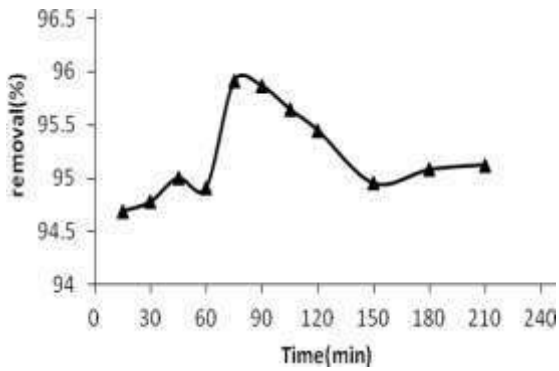


Fig. 3: The effect of contact time on the adsorption of phenol on the Cumin Straw Ash (phenol concentration: 50 mg/l, optimized pH: 7 and the optimized adsorbent dosage: 0.1 g/100 ml).

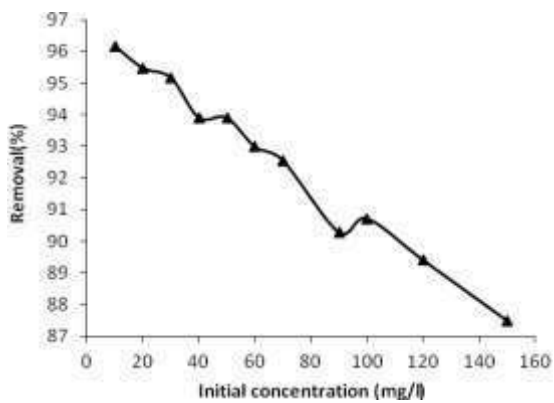


Fig. 4: The effect of phenol concentration on the adsorption of phenol on the Cumin Straw Ash (optimized adsorbent dosage: 0.1 g/100 ml, optimal pH: 7, optimal contact time: 75 min).

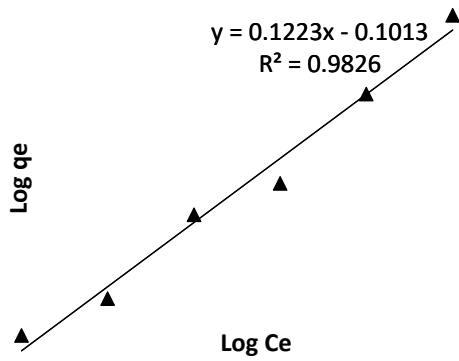


Fig. 5: Linear isotherm of Freundlich adsorption for phenol by CSA at a temperature of 23 °C.

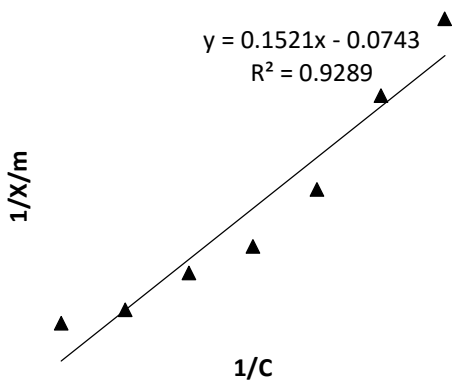


Fig. 6: Langmuir linear isotherm for adsorption of phenol by CSA at 23 °C.

The effect of initial pH

The adsorption of phenol from aqueous solution is completely dependent on the pH of the solution because pH affects the electrical charge quality of adsorbent surface and changes the ionization degree of the phenol (22). The results of pH effect on adsorption process are represented in Figure [1] and, as expected, the amount of adsorbed phenol decreases by increasing the pH. This phenomenon is related to the effect of pH on phenol ionization. Phenol which is a weak acid (PKa 10) will be slightly adsorbed at high pH due to dominant repulsive forces. Phenol is also in the form of salt at high pH and will be easily ionized and creates negative charge in phenolic groups and the OH ionic groups on the adsorbent prevent from phenolate ions absorption at the same time [20]. In this regard, similar results are provided for the adsorption of phenol on palm kernel by Rengaraj and bentonite by Banat [23, 24].

The effect of adsorbent dosage

The effect of adsorbent dosage on the adsorption process efficiency is represented in Figure [2] and the values of 0.01- 0.2 g/100 ml have been considered in this regard. The results show the efficiency of 96% for samples with phenol concentrations of 50 mg/l. This is due to the special features of Cumin Straw Ash in terms of carbon content due to the burning of organic matters in Cumin Straw and increasing the active surface and porosity on the ash surface.

The effect of contact time

To evaluate the effect of contact time on the efficiency of phenol removal process, the samples with initial concentration of 50 mg/l and the adsorbent with concentration of 0.1 g/100 ml were prepared. The results showed that the time required for achieving high efficiency (95.90%) in the adsorption process of phenol on Cumin Straw Ash is 75 minutes.

The effect of initial phenol concentration

Exchange capacities of sorbent adsorption (Cumin Straw Ash) in different concentrations of phenol are provided in Figure 4. According to the results of the initial concentration effect of phenol in Figure 4, it was observed that the efficiency of absorption decreases with increasing concentration of phenol. It seems that with increasing the concentration of phenol, adsorption capacity of the adsorbent rises which may result in

an increase in the mass transfer force and thus increasing the absorption capacity (23, 24). This is consistent with Daraei's study for phenol adsorption on Ostrich Feathers Ash (25).

The phenol adsorption isotherm (Langmuir and Freundlich)

Adsorption Isotherm: Adsorption isotherms are equilibrium data used to explain the interaction between adsorbed and adsorbent materials. Isotherms are also expressing absorptive capacity of an adsorbent. In the present study, to evaluate the empirical data analysis and describing the absorption equilibrium in adsorption between solid and liquid phases, Langmuir and Freundlich models were used. The obedience of each model is determined with plotting the curve of each balance and investigating the Correlation Coefficient of model (R^2) with experimental results (26).

Langmuir isotherm: Langmuir isotherm model is based on scientific assumptions the most important of which is that adsorbed materials (atoms, molecules or ions) are bond to identical spots on the surface of the adsorbent and monolayer adsorption process occurs. These assumptions also express that all places of adsorption have the same consistency to the adsorbed material molecules and no transition happens from the adsorbed material at the adsorbent surface (26, 27), and this is presented by the following equation [1]:

$$q_e = \frac{q_m K_L C_e}{1 + K_L C_e}$$

In this equation, q_e is the amount of adsorbed phenol per a certain amount of consumed adsorbent and C_e (mg/L) is the solution equilibrium concentration and q_m is the maximum phenol required for the formation of two layers (mg/g). At the same time, Langmuir equation can be drawn linearly to determine the Langmuir adsorption constants (K_L) and maximum adsorption capacity of the adsorbent (q_m). The values of q_m and K_L can be achieved by charting $1/q$ vs. $1/C_e$.

$$\frac{1}{q_e} = \frac{1}{q_m} + \frac{1}{q_m K_L} \frac{1}{C_e}$$

Freundlich isotherm is merely an experimental model based on adsorption on heterogeneous adsorbent surface which is described by the following equation [3]:

$q_e = K_f C_e^{1/n}$ In this equation K_f and $1/n$ are Freundlich adsorption constants related to the capacity and absorption rate. Freundlich equilibrium constants are obtained by charting $\ln q_e$ against $\ln C_e$ based on empirical data of intercept as K_f and slope as $1/n$. Freundlich equation can be linearized for determining Freundlich adsorption constants as follows (28-29), equation [4]:

$$\ln q_e = \ln K_f + \frac{1}{n} \ln C_e$$

According to the results observed in the Graph (5, 6), the phenol adsorption on Cumin Straw Ash properly functions from Freundlich isotherm. Freundlich model presents a more reliable description physically for absorbing contaminants on organic materials and this can be due to the presence of different absorption bands on organic materials.

CONCLUSION

Phenol pollution has dangerous special priority with known or carcinogenic-suspected harmful effects, mutagenic effects, and severe damages to the fetus or detoxification. Considering the results of this study, Cumin Straw Ash can be effectively and efficiently being used for the removal of phenol in aqueous solutions. Phenol removal percentage is a function of initial phenol concentration, contact time, pH and adsorbent dosage. This adsorbent is able to remove about 95.99% of phenol from solutions with initial concentration of phenol as 10 mg/L. The adsorption on the Cumin Straw Ash was described by Langmuir and Freundlich adsorption isotherms, which indicates better performance of Freundlich adsorption isotherm with data obtained from this study. The removal of phenol from aqueous solutions at low concentrations of phenol is influenced by adsorption on solid adsorbent surface sites, while This is despite the fact that adsorption occurs at the surface and internal exchange of both of them. Finally, it is concluded based on the results obtained from the present study that Cumin Straw Ash has high capacity in adsorbing phenol from aqueous solutions and thus it can be used as a practical strategy for removal process from wastewater of industries that use phenol.

CONFLICT OF INTEREST

There is no conflict of interest.

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FINANCIAL DISCLOSURE

None

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ARTICLE

HEAVY METAL CONCENTRATIONS IN WATER RESOURCES OF RURAL AREAS OF KERMANSHAH, IRAN

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ABSTRACT

The main cause of many health problem, in the developing countries, still is lack of access to hygienic water resources. Water resources contaminated by heavy metals is one of the serious environmental concerns of the recent decades. The present study is an attempt to survey concentration of heavy metals such as chrome, manganese, and copper in water resources of rural areas of Kermanshah Province. The study was carried out as descriptive and cross-sectional work to determine concentrations of chrome, manganese, and copper in water resources of rural areas of Kermanshah Province. The data was compared with Iran National Standard (1053). The samples were examined by atomic absorption spectrophotometry to determine concentration of the contaminations. The obtained data was analyzed in SPSS-16. The results showed that MEAN concentrations of chrome, copper, and manganese were 0.44, 0.195, and 0.24 respectively, which were in compliance with Iran National Standards. In addition, concentration of copper and manganese in all the samples met the standards. As to chrome, 2.5% of the samples did not meet the standards. Mean concentrations of the metals in the present study was in compliance with Iran National Standard and the samples were safe for drinking. However, given the critical importance of routine survey of water resources in rural areas, the local officials need to examine the resources in routine bases.

INTRODUCTION

According to the definition by World Health Organization [WHO], drinkable water is the water that is suitable for consumption by human and all other household usages [1]. Developing countries are still challenged by the health problems caused by unhygienic water; this is indicated by the statistics of WHO [2]. What is the main concern for human communities is contamination of the environment by heavy metals, which is a serious problem as these metals, even at low concentration levels, are not absorbable, induces physiological effects, and influence living organisms [3-6]. The contamination of water resources by heavy metals is one of the main environmental problem of the recent decades [7-8]. Heavy metals are featured with high chemical stability, low decomposability, and augmentation in the body of living organisms; these make them a serious health problem in today's industrial world [9, 10]. Contamination of water resources by heavy metals happens through natural ways [weathering and erosion of rocks] and human's activities [mining, industrial activities, and farming]. These factors degrade quality of water resources for drinking, farming, and industrial purposes [8, 11]. One of the main issues caused by the water contaminated by heavy metals is failure of metabolism these metals in the body, so that they are augmented in fat, muscles, bone, and joints tissues and cause variety of disease and side-effects [1]. In general, human environment is featured with 35 toxic metals and 23 of them are heavy metals. These metals are naturally found in small quantities in food regimen so that they are needed for good health. However, when concentrations of these metal exceed the natural level, they induce toxic effects on human body [12, 13]. Chrome is one of the main elements needed for carbohydrates and fats metabolism. The element also increases sensitivity to insulin through facilitating insulin attachment to cells and increasing number of insulin receivers. Chrome shortage increases risk factors of different diabetes, cardiovascular diseases, and disorders of immunity system [14]. The side-effects of excessive intake of chrome appears as rash, burning and itching in digestive system mucus membranes, and in serious cases, as the liver

KEY WORDS

Heavy metal, concentrations, chrome, copper, manganese, Kermanshah

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necrosis, the kidney inflammation, internal bleeding, respiratory problems, digestive system cancer, and death [15]. Manganese can have severe toxic effects on different body organs such as liver. It induces respiratory, digestive, and nervous poisoning; and the latter is known as manganism with symptoms similar with Parkinson’s disease [3]. Copper is the third mostly used metal in the world and also one of the critical micronutrients for animals and plants. The elements are needed for hemoglobin production in human, and in plants, it is needed for reproduction, fighting diseases, and regulating water [16]. However, excessive amounts of this metal can cause anemia, liver, renal, digestive, and nervous disorders [17]. Results of a study to survey concentration of manganese in ground water in Scotland showed that 30% of the water resources were contaminated with the elements [based on WHO standards] [18]. Sobhani Ardakani surveyed concentrations of arsenic, zinc, chrome, and manganese in ground water resources in Razan Plain and reported that mean concentrations of the elements met the standards of WHO [3]. Alidadi et al surveyed concentrations of heavy metals [chrome, cadmium, and lead] in drinking water of Mashhad City and showed that concentrations of chrome and cadmium were less than national and international standards and concentration of lead was higher than the standards in some regions. In addition, mean concentrations of the elements in summer and spring were significantly different [4]. Ahmadizadhe Finit studied concentrations of cadmium, lead, and zinc in water resources of villages of Bandar Abbas and showed that mean concentrations of the metals in drinkable water wells was as per the standards. However, concentration of cadmium in 52% of the samples was higher than WHO standards [1]. Pieri measured concentrations of nickel, aluminum, copper, and manganese in water resources of Zabol and reported that except nickel, concentrations of all metals was below the standard levels [3]. Concentrations of heavy metals in drinking water is highly effective on quality of the water and controlling concentrations of these metals in water resources is highly critical; these highlight necessity of periodical studies in this field [1]. Given the importance of the issue, the present study is aimed at measuring concentrations of chrome, manganese, and copper in drinking water resources of rural areas of Kermanshah Province, Iran.

MATERIALS AND METHODS

A descriptive cross-sectional study was carried out to determine concentrations of heavy metals (chrome, manganese, and copper) in drinking water resources in rural areas of Kermanshah Province based on Iran National Standards. Totally, 153 specimens from 51 villages were collected. Having made the arrangements and educated the health personnel in rural clinics, the specimens (water taps, wells, and reservoirs) were collected in special containers. The specimens were transported to the lab following the national guidelines and the standards. The samples were collected in polyethylene containers (0.5L), which were rinsed in the labs beforehand. The specimens were collected according to the sampling instructions (3). In addition, PH of the samples was measured at site using ph-meter. The specimens were examined using atomic absorption spectrophotometry in Kermanshah Medical Science University by experienced personnel. The collected data was analyzed

RESULTS

The results of the study are listed in [Table 2 and 3]. Value of pH in none of the samples under study was higher than the standard levels. In addition, concentrations of copper and manganese in all the samples were at the standard range. As to chrome, although, mean concentration of the metal was within the standard limits, however, in two cases (Mahmoudabad-Jouzi) concentration of the metal was higher than standard levels.

Table 1: Quality Assessment of drinking water in terms of heavy metals

Variable	Preferred level (mg/l)	Permitted level (mg/l)
PH	6.5-8.5	6.5-9
Chrome	-	0.05
Copper	1	2
Manganese	0.1	0.4

Table 2: Mean and SD value of concentrations of heavy metals

Variable	Mean	Std. Deviation	Minimum	Maximum
PH	7.4	0.3	6.7	8
Chrome	0.044	0.023	0.04	0.16
Copper	0.195	0.07	0	0.501
Manganese	0.24	0.11	0	0.72

Table 3: Concentrations of heavy metals in drinking water based on place of sampling

City	Place of sampling	pH	Chrome	Copper	Manganese
Paveh	Satiari	7.4	≤0.04	0.293	0.153
	Nouryab	7.8	≤0.04	0.501	0.185
	Sheler	7.4	≤0.04	0.279	0.191

	Banehvareh	7.5	≤0.04	0.31	0.22
	Chourzi	7.4	≤0.16	0.307	0.143
Harsin	Karmiāng	7.8	0.04	0.178	0.43
	Tamarg	8	0.04	0.181	0.72
	Legz	7.2	0.04	0.155	0.12
Songhor	Ghrianch	8	0.04	0.257	0.172
	Heibatollah	7.2	0.04	0.161	0.303
	Deh Solieman	7.2	0.04	0.155	0.242
Islam Abad	Ghoveh Sorkhak	7.6	0.04	0.149	0.271
	Chahardah Joffeh	7.4	0.04	0.223	0.149
	Dizgaran	7.4	0.04	0.149	0.185
	Chenger	7.4	0.04	0.209	0.326
Sahne	Guilaneh	7.3	0.04	0.147	0.069
	Cheraghabad	7.4	0.04	0.169	0.297
	Ab Barik	7.4	0.04	0.176	0.333
	Chah Moieneh	7.6	0.04	0.138	0.294
Dalahou	Ghale Zanjir Sofla	7.6	0.04	0	0
	Kachal Bel Olia	7.2	0.04	0.243	0.194
	Houkani	7.8	0.04	0.236	0.284
	Rijab	7.3	0.04	0.22	0.227
Ravansar	Routvand	7.8	0.04	0.184	0.345
	Lohrabi	7.8	0.04	0.144	0.384
	Hassan Abad	7.8	0.04	0.231	0.361
Kermanshah	Helshi	7.2	0.04	0.156	0.148
	Mahidasht Shahr	7.6	0.04	0.245	0.233
	Abbass Abad	7.5	0.04	0.212	0.249
	Markaz Ghazanchi	7	0.04	0.198	0.313
	Rahimabad	8	0.04	0.147	0.214
	Kashanbeh	7.6	0.04	0.248	0.191
	Bijteh	8	0.04	0.268	0.221
	Haft Cheshme	7.6	0.04	0.24	0.259
	Cheghablak	7.6	0.04	0.192	0.225
	Mahmoud Abad	7.1	0.16	0.175	0.328
Javanroud	Sarab Bas	6.9	≤0.04	0.147	0.297
	Nahrab	7.8	0.04	0.152	0.162
	Sefid Barg	7.8	0.04	0.148	0.12
Kangavar	Ali Abad	7.6	0.04	0.138	0.373
	Rahman Abad	7.6	0.04	0.172	0.175
	Gharlogh	7	0.04	0.152	0.201
Guilan Gharb	Cheshme Gholami	7.5	0.04	0.158	0.127
	Viznan	6.7	≤0.04	0.248	0.259
Sarpol zahab	Piran	7	≤0.04	0.248	0.179
	Sraileh	7.6	≤0.04	0.147	0.287
	Habivand	7.6	≤0.04	0.161	0.246
	Gharebagh	7.5	≤0.04	0.221	0.24
	Gavchali	7.8	≤0.04	0.141	0.236
Salas Babajani	Miraabad	7.4	0.04	0.152	0.085
Ghasr-e-Shirin	Cheshmeh Imam Hassan	7.1	0.04	0.133	0.316

Heavy metals have become a health issue in the today's industrial world. These metals can enter human body from different paths. They play two key role in the body; i) being part of the ingredients of vital molecules; and ii) being coenzymes so that by attaching to different enzymes they can activate the enzyme and accelerate the reactions. Therefore, some of metals are needed and useful for living organisms. Lack of some of these metals delays natural body reactions and induces negative physical responses in the body [20]. Different factors influence available amounts of these metals in the ecosystem. Heavy metals can enter urban, industrial, and agricultural sewage by natural forces (e.g. soil erosion and flood) or unnatural factors such as human activities [21]. The results showed that mean concentrations of copper and manganese were at the Iran National Standard range. In the case of chrome, while mean concentration of the metal was at the standard range, in two cases (Mahmoud Abad and Jourzi) concentration of the metal was higher than the standards. The results also showed that pH of the samples ranged from 6.7 to 8. This range in Sobhani Ardakani work was 7.1-8.2. This pH range decreases reactivity of the elements and increases their adsorption by soil colloids. In addition, this pH range facilitates solvability of positive metal ions (metal elements such as arsenic, zinc, and chrome), creates alkali specifications in water, and increases pH value above 7 (3). According to Iran National Standard 1053 maximum acceptable concentration of chrome in drinking water is 0.05mg/L and mean concentration of chrome in this study was 0.04. Malakoutian et al. studied ground water resources in Sirjan Plain and showed that mean concentration of chrome was less than 1mg/L [22]. Basma Yaghi (2007) surveyed concentrations of heavy metals in 364 private wells in Batinai region, Oman and showed increase of lead and chrome above the standards in 80% of the wells. The causes of the contaminations were namely industrial activity in the region and erosion of rocks in the region due to the climate [23]. Maximum acceptable concentration of copper in drinking water according to Iran standard (1053) is 2 mg/L and our results showed that this figure was 0.195mg/L, which is far less than the standard requirement. Malakoutian reported that mean concentration of copper in ground water resources was 26.74µg/L, which was acceptable according to the standards [22] Alighadr et al. studied concentrations of heavy metals in

drinking water reservoirs in Ardabil and found that concentration of Iron in all samples was less and within the standard range and concentration of copper was at the top limit of the national standard (24). In addition, Rajaie et al. surveyed concentrations of heavy metals in water wells of Sistan Baluchestan Province and showed that concentrations of copper and iron were within the standard range and safe for drinking [25]. Aker et al. (2006) measured concentrations of copper, cadmium, and lead in running water of Mytilu SP region. Their results indicated that concentrations of these metals vary in time; so that concentration of cadmium was low and concentrations of copper and lead were higher [26]. Hassanzadeh et al. surveyed concentration of heavy metals (lead and copper) in ground water reservoirs of Kerman City and concluded that concentrations of these metals was at the standard range [27]. According to Iran National Standard (1053), maximum allowable concentration of Manganese in drinking water is 0.4mg/l and our results showed that concentration of this metal was 0.24mg/L. Sobhani et al. reported concentration of Manganese was 4.50 parts in one billion part, which is far less than the standard limit [28].

CONCLUSION

The results showed that the concentration of chromium except two points in suburb of Kermanshah and Paveh were higher than national standard (0.16). And according to the carcinogenic characteristic of hexavalent chromium and genetic damage caused by trivalent chromium, some measures must be done in this field. In other cases, the concentration of chromium was in standard range. About the copper and manganese parameters, all the samples were lower than the national standard threshold and allowable to drink. But since the displacement and metals washing by water is inevitable over the time, however, regular monitoring of drinking water for rural areas is really necessary by relevant authorities.

CONFLICT OF INTEREST

There is no conflict of interest.

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ARTICLE

STUDYING THE EFFECT OF ENTREPRENEURIAL CULTURE ON INNOVATION AND CREATIVITY OF THE EMPLOYEES OF SISTAN AND BALUCHESTAN REGIONAL ELECTRICITY COMPANY (SBREC)

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ABSTRACT

Today, organizations should institutionalize entrepreneurial culture to become entrepreneurs. Organization should see human Worthiness of work as a key resource and do their best to maintain and support it. Due to this, the study was conducted to study the effect of organizational entrepreneurial culture on organizational innovation and creativity in SBREC. Research method is descriptive and correlational. The population consists of all employees of SBREC, and Cochran's formula was used to determine sample size methodology. Library and field studies are data collection tools (questionnaire). For this study, entrepreneurial organizational culture of McGuire (1962) and Organizational Commitment Questionnaire by Allen and Meyer (1999) have been used. Cronbach's alpha was used to test reliability, which was higher than the standard rate (0.7) and was confirmed. Descriptive analysis (frequency) and inferential statistics (linear regression) with SPSS software have been used to analyze the data. The findings of this study show that entrepreneurial organizational culture and all its dimensions have a direct and positive effect on the creativity and innovation of the employees in SBREC, so entrepreneurship culture should be institutionalized in the organization to improve employees' creativity and innovation in organizations.

INTRODUCTION

Pace of transformations as well as the emergence of new intellectual, cultural, industrial, and social products has brought about surprising and considerable conditions for countries like ours that are experiencing developmental delay. These countries suffer some kind of historical determinism and have no choice but to walk in the path that others (developed and advanced countries) have identified for them. This is because they have neither the time, capital, and Worthiness of work to finagle innovative and new approaches to develop nor the ability to get out of the vast sea of technological and modern achievements. Economic, industrial, and socio-cultural conditions of our country today is in such a way that solving the problems and bottlenecks calls for different patterns, and new solutions are required. The increasing population of the country, young demographic composition, inability of manufacturing sectors to attract skilled labor, the need to create job opportunities and factors like these are the reasons that cause macro policy makers and planners to seek to solve this problem seriously. This strategy is nothing but entrepreneurship, because entrepreneurship is known as an engine of economic development of the countries in the current era. The establishment and institutionalization of entrepreneurship need resolving mental obstacles at the personal level on the one hand, and overcoming organizational barriers at the level of organization and the company on the other hand. Pursuing highly variable entrepreneurial opportunities is a good way to identify the organizations growth and their strategic restructuring [1]. For organizations with stability, organizational entrepreneurship, expressed through entrepreneurial projects, represents a potential engine of progress through which new products are created, new markets are formed, new technologies are discovered, and new businesses are built [2] Entrepreneurship is a phenomenon that occurs in different environments and collections and leads to economic growth through innovations that people have created in response to economic situations and have created these values both for individuals and for society. Therefore, organizational entrepreneurship includes the application of entrepreneurial behavior in a stable organization [3]. In this organization, all the individuals are committed to the goals of the organization and use all their power and talent for the development and survival of their organization. Among the factors that have created such a context in the organization is the prevailing atmosphere of the organizations. The employees in these organizations work with the highest level of creativity and innovation, and what can have the greatest impact in creating this space is innovation structure, and corporate entrepreneurship that act as the main body of the organization. In this regard, the issue of recognition of the effects that organizational culture and organizational innovation can have in the development of creative space and innovation of the organizations is of the important issues that should be tackled, so that the proper conditions for organizational entrepreneurship in the organizations like SBREC are provided. Since power industry has a considerable status in the development process of our country, the managers of this industry are required to coordinate with the current situation with the creation of strategies and appropriate measures. The necessity to identify and encourage innovative and creative individuals in the power industry is important because this industry has always looked for innovative ways to reduce waste, increase quality, reduce cost, enhance the ability to respond to the diverse needs of our Open communications, and increase creativity and innovation, so that it can give appropriate responses to rapid changes in current markets. In addition to meeting domestic needs, it tries to have a proper share in the export of electricity and exchange for the country under sanctions [9].

KEY WORDS

Entrepreneurial
organizational culture,
organizational creativity,
innovation, employees

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Thus, in this study, we look to an answer to the following question. Does entrepreneurial organizational culture have an effect on organizational innovation and creativity of the employees of SBREC or not?

Conceptual framework

In this study, after reviewing the theoretical basics and studies conducted in assessing the entrepreneurial organizational culture, due to comprehensiveness of the model and its ten dimensions, organizational culture of McGuire (2003) is used. These dimensions include fearlessness, creativity tolerance, domination, worthiness of work, risk-taking, open communication, cooperation, creativity, freedom of expression, and vitality of the workplace [4, 7, and 10].

Moreover, for operational evaluation of the concepts of creativity and innovation, the researcher-developed method has been used.



Fig. 1: The conceptual model [11,12].

Hypotheses

The main hypothesis: the components of entrepreneurial organizational culture affect creativity and innovation of the employees of SBREC.

Sub-hypothesis

- Creativity and innovation affect creativity and innovation of the employees of SBREC.
- Creative deviation tolerance affect creativity and innovation of the employees of SBREC.
- Fruitless invasion affect creativity and innovation of the employees of SBREC.
- Worthiness of work affect creativity and innovation of the employees of SBREC.
- Risk taking affect creativity and innovation of the employees of SBREC.
- Open communications affect creativity and innovation of the employees of SBREC.
- Collaboration affect creativity and innovation of the employees of SBREC.
- Pre-activated innovation affect creativity and innovation of the employees of SBREC.
- Speech affect creativity and innovation of the employees of SBREC.
- Entertainment affect creativity and innovation of the employees of SBREC.

RESEARCH METHOD

The study is applied regarding the purpose and descriptive-survey regarding data collection. In descriptive method, the aim is to describe situations or phenomena under investigation [13]. Survey method is one of the sub-divisions of descriptive research method used to investigate the distribution of the attributes of the population. In this study, the researcher describes and assesses the effects of entrepreneurial organizational culture on creativity and innovation of the employees of SBREC. To describe the characteristics of the sample, the data collected are summarized and classified using descriptive statistics. After that, descriptive statistics such as mean and standard deviation related to the variables of the research are listed, and then using inferential statistics, we confirm or reject the hypotheses. In this study, library studies, articles, and academic journals are used to collect theoretical basics and the literature. Moreover, to collect statistical information, field study and search in the population are resorted to. The population of this research includes all staff working in SBREC, 415 people. Morgan table is used to determine the sample size, and 201 people are selected as the sample. The questionnaires will be distributed randomly between them. In this study, to gather data, first, using the interviews with experts, elites, and elite professors, entrepreneurial organizational culture questionnaire by McGuire and creativity and innovation questionnaire were prepared by the researcher and then distributed among the population and collected data were analyzed using SPSS software.

Research findings

Main hypothesis: the components of entrepreneurial organizational culture affect creativity and innovation of the employees of SBREC.

To determine the effectiveness, goodness-of-fit in regression model was analyzed which was discussed below. To propose the model of the relationship between the components of entrepreneurial organizational culture (Y) and Creativity and innovation (X) after investigating its adequacy indicators in below table, the model is presented.

Table 1: Goodness of fit of regression model between the components of entrepreneurial organizational culture and creativity and innovation

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.844	0.712	0.711	0.179

The relationship between independent variables and the dependent variable equals to .844. R Square is .712 which shows that 71.2 percent of variation in the components of entrepreneurial organizational culture is predicted by creativity and innovation. Because this measure do not consider the degree of freedom, adjusted R Square was used which equals to 71.1 in this study. According to the indices, the model was adequate.

Table 2: Regression equation of creativity and innovation

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig
		B	Std. Error	Beta		
1	Constant	1.64	0.088	0.844	18.82	0.000
	The components of entrepreneurial organizational culture	0.625	0.023		27.46	
Dependent Variable: creativity and innovation						

The inserted variable in regression equation is the core of regression analysis which can be seen in [Table 2] the regression equation is provided by unstandardized coefficients.

Creativity and innovation = 1.64 + (0.625) the components of entrepreneurial organizational culture

It can be said that with increase of one unit of each independent variable depending on the written coefficient, the dependent variable is increased. In other words with increase of one unit in The components of entrepreneurial organizational culture, the standard deviation 0.625 unit of creativity and innovation is increased, so they have positive relationship. T-test relating to regression coefficients are displayed in the table for independent variable as well. The sig. value equals to .000, so the components of entrepreneurial organizational culture has a meaningful effect on creativity and innovation.

Sub-hypothesis1

Creativity affect creativity and innovation of the employees of SBREC.

To determine the effectiveness, goodness-of-fit in regression model was analyzed which was discussed below. To propose the model of the relationship between Creativity (Y) and Creativity and innovation (X) after investigating its adequacy indicators in below table, the model is presented.

Table 3: Goodness of fit of regression model between Creativity and creativity and innovation

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.787	0.619	0.618	0.206

The relationship between independent variables and the dependent variable equals to .787. R Square is .619 which shows that 61.9 percent of variation in Creativity is predicted by creativity and innovation. Because this measure do not consider the degree of freedom, adjusted R Square was used which equals to 61.8 in this study. According to the indices, the model was adequate.

Table 4: Regression equation of creativity and innovation

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig
		B	Std. Error	Beta		
1	Constant	2.317	0.078	0.787	29.623	0.000
	Creativity	0.455	0.020		22.278	
Dependent Variable: creativity and innovation						

The inserted variable in regression equation is the core of regression analysis which can be seen in [Table 4] the regression equation is provided by unstandardized coefficients.

$$\text{Creativity and innovation} = 2.31 + (0.455) \text{ Creativity}$$

It can be said that with increase of one unit of each independent variable depending on the written coefficient, the dependent variable is increased. In other words with increase of one unit in Creativity, the standard deviation 0.455 unit of creativity and innovation is increased, so they have positive relationship. T-test relating to regression coefficients are displayed in the table for independent variable as well. The sig. value equals to .000, so Creativity has a meaningful effect on creativity and innovation.

Sub- hypothesis2

Creative deviation tolerance affect creativity and innovation of the employees of SBREC.

To determine the effectiveness, goodness-of-fit in regression model was analyzed which was discussed below. To propose the model of the relationship between Creative deviation tolerance (Y) and Creativity and innovation (X) after investigating its adequacy indicators in below table, the model is presented.

Table 5: Goodness of fit of regression model between Creative deviation tolerance and Creativity and innovation

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.670	0.450	0.448	0.24839

The relationship between independent variables and the dependent variable equals to .670. R Square is .450 which shows that 45 percent of variation in Creative deviation tolerance is predicted by Creativity and innovation. Because this measure do not consider the degree of freedom, adjusted R Square was used which equals to 44.8 in this study. According to the indices, the model was adequate.

Table 6: Regression equation of Creativity and innovation

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig
		B	Std. Error	Beta		
1	Constant	2.273	0.113	0.670	20.141	0.000
	Creative deviation tolerance	0.465	0.029		15.782	
Dependent Variable: Creativity and innovation						

The inserted variable in regression equation is the core of regression analysis which can be seen in [Table 6] the regression equation is provided by unstandardized coefficients.

$$\text{Creativity and innovation} = 2.27 + (0.465) \text{ Creative deviation tolerance}$$

It can be said that with increase of one unit of each independent variable depending on the written coefficient, the dependent variable is increased. In other words with increase of one unit in Creative deviation tolerance, the standard deviation 0.465 unit of Creativity and innovation is increased, so they have positive relationship. T-test relating to regression coefficients are displayed in the table for independent variable as well. The sig. value equals to .000, so Creative deviation tolerance has a meaningful effect on Creativity and innovation.

Sub- hypothesis3

Fruitless invasion affect creativity and innovation of the employees of SBREC.

To determine the effectiveness, goodness-of-fit in regression model was analyzed which was discussed below. To propose the model of the relationship between Fruitless invasion (Y) and Creativity and innovation (X) after investigating its adequacy indicators in below table, the model is presented.

Table 7: Goodness of fit of regression model between Fruitless invasion and Creativity and innovation

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.756	0.571	0.570	0.21930

The relationship between independent variables and the dependent variable equals to .756 R Square is .571 which shows that 57.1 percent of variation in Fruitless invasion is predicted by Creativity and innovation. Because this measure do not consider the degree of freedom, adjusted R Square was used which equals to 57 in this study. According to the indices, the model was adequate.

Table 8: Regression equation of Creativity and innovation

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig
		B	Std. Error	Beta		
1	Constant	2.004	0.102	0.756	19.672	0.000
	Fruitless invasion	0.524	0.026		20.146	
Dependent Variable: Creativity and innovation						

The inserted variable in regression equation is the core of regression analysis which can be seen in [Table 8] the regression equation is provided by unstandardized coefficients.

$$\text{Creativity and innovation} = 2.00 + (0.524) \text{Fruitless invasion}$$

It can be said that with increase of one unit of each independent variable depending on the written coefficient, the dependent variable is increased. In other words with increase of one unit in Fruitless invasion , the standard deviation 0.524 unit of Creativity and innovation is increased, so they have positive relationship. T-test relating to regression coefficients are displayed in the table for independent variable as well. The sig. value equals to .000, so fruitless invasion has a meaningful effect on Creativity and innovation.

Sub- hypothesis4

Worthiness of work affect creativity and innovation of the employees of SBREC.

To determine the effectiveness, goodness-of-fit in regression model was analyzed which was discussed below. To propose the model of the relationship between Partnerships and Worthiness of work (Y) and Creativity and innovation (X) after investigating its adequacy indicators in below table, the model is presented.

Table 9: Goodness of fit of regression model between Worthiness of work and Creativity and innovation

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.467	0.218	0.215	0.29609

The relationship between independent variables and the dependent variable equals to .467 R Square is .218 which shows that 21.8 percent of variation in Partnerships and Worthiness of work is predicted by Creativity and innovation. Because this measure do not consider the degree of freedom, adjusted R Square was used which equals to 21.5 in this study. According to the indices, the model was adequate.

Table 10: Regression equation of Creativity and innovation

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig
		B	Std. Error	Beta		
1	Constant	2.717	0.145	0.467	18.789	0.000
	Partnerships and Worthiness of work	0.369	0.040		9.217	
Dependent Variable: Creativity and innovation						

The inserted variable in regression equation is the core of regression analysis which can be seen in [Table 10] the regression equation is provided by unstandardized coefficients.

$$\text{Creativity and innovation} = 2.71 + (0.369) \text{ Partnerships and Worthiness of work}$$

It can be said that with increase of one unit of each independent variable depending on the written coefficient, the dependent variable is increased. In other words with increase of one unit in Partnerships and Worthiness of work , the standard deviation 0.369 unit of Creativity and innovation is increased, so they have positive relationship. T-test relating to regression coefficients are displayed in the table for independent variable as well. The sig. value equals to .000, so Partnerships and Worthiness of work has a meaningful effect on Creativity and innovation.

Sub- hypothesis5

Risk taking affect creativity and innovation of the employees of SBREC.

To determine the effectiveness, goodness-of-fit in regression model was analyzed which was discussed below. To propose the model of the relationship between Risk taking (Y) and Creativity and innovation (X) after investigating its adequacy indicators in below table, the model is presented.

Table 11: Goodness of fit of regression model between Risk taking and Creativity and innovation

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.294	0.086	0.083	0.32001

The relationship between independent variables and the dependent variable equals to .294 R Square is .086 which shows that 8.6 percent of variation in Risk taking is predicted by Creativity and innovation. Because this measure do not consider the degree of freedom, adjusted R Square was used which equals to 8.3 in this study. According to the indices, the model was adequate.

Table 12: Regression equation of Creativity and innovation

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig
		B	Std. Error	Beta		
1	Constant	3.421	0.117	0.294	29.310	0.000
	Risk taking	0.183	0.034		5.369	
Dependent Variable: Creativity and innovation						

The inserted variable in regression equation is the core of regression analysis which can be seen in [Table 12] the regression equation is provided by unstandardized coefficients.

$$\text{Creativity and innovation} = 3.42 + (0.183) \text{ Risk taking}$$

It can be said that with increase of one unit of each independent variable depending on the written coefficient, the dependent variable is increased. In other words with increase of one unit in Risk taking , the standard deviation 0.183 unit of Creativity and innovation is increased, so they have positive relationship. T-test relating to regression coefficients are displayed in the table for independent variable as well. The sig. value equals to .000, so Risk taking has a meaningful effect on Creativity and innovation.

Sub- hypothesis 6

Open communications affect creativity and innovation of the employees of SBREC.

To determine the effectiveness, goodness-of-fit in regression model was analyzed which was discussed below. To propose the model of the relationship between Open communications (Y) and Creativity and innovation (X) after investigating its adequacy indicators in below table, the model is presented.

Table 13: Goodness of fit of regression model between Open communications and Creativity and innovation

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.370	0.137	0.134	0.31100

The relationship between independent variables and the dependent variable equals to .370 R Square is .137 which shows that 13.7 percent of variation in Open communications is predicted by Creativity and innovation. Because this measure do not consider the degree of freedom, adjusted R Square was used which equals to 13.4 in this study. According to the indices, the model was adequate.

Table 14: Regression equation of Creativity and innovation

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig
	B	Std. Error	Beta		
1	Constant	3.389	0.095	0.370	0.000
	Open communications	0.185	0.027		
Dependent Variable: Creativity and innovation					

The inserted variable in regression equation is the core of regression analysis which can be seen in [Table 14] the regression equation is provided by unstandardized coefficients.
Creativity and innovation = 3.38 + (0.185) Open communications

It can be said that with increase of one unit of each independent variable depending on the written coefficient, the dependent variable is increased. In other words with increase of one unit in Open communications , the standard deviation 0.185 unit of Creativity and innovation is increased, so they have positive relationship. T-test relating to regression coefficients are displayed in the table for independent variable as well. The sig. value equals to .000, so Open communications has a meaningful effect on Creativity and innovation.

Sub-hypothesis 7

Collaboration affect creativity and innovation of the employees of SBREC.

To determine the effectiveness, goodness-of-fit in regression model was analyzed which was discussed below. To propose the model of the relationship between Collaboration (Y) and Creativity and innovation (X) after investigating its adequacy indicators in below table, the model is presented.

Table 15: Goodness of fit of regression model between Collaboration and Creativity and innovation

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.459	0.211	0.208	0.29747

The relationship between independent variables and the dependent variable equals to .459 R Square is .211 which shows that 21.1 percent of variation in Collaboration is predicted by Creativity and innovation. Because this measure do not consider the degree of freedom, adjusted R Square was used which equals to 20.8 in this study. According to the indices, the model was adequate.

Table 16: Regression equation of Creativity and innovation

Model	Unstandardized Coefficients	Standardized Coefficients	T	Sig
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The inserted variable in regression equation is the core of regression analysis which can be seen in [Table 16] the regression equation is provided by unstandardized coefficients.

		B	Std. Error	Beta		
1	Constant	3.077	0.108	0.459	28.472	0.000
	Collaboration	0.268	0.030		9.018	
Dependent Variable: Creativity and innovation						

Creativity and innovation = 3.07 + (0.268) Collaboration

It can be said that with increase of one unit of each independent variable depending on the written coefficient, the dependent variable is increased. In other words with increase of one unit in Collaboration , the standard deviation 0.268 unit of Creativity and innovation is increased, so they have positive relationship. T-test relating to regression coefficients are displayed in the table for independent variable as well. The sig. value equals to .000, so Collaboration has a meaningful effect on Creativity and innovation.

Sub- hypothesis 8

Pre-activated innovation affect creativity and innovation of the employees of SBREC.

To determine the effectiveness, goodness-of-fit in regression model was analyzed which was discussed below. To propose the model of the relationship between Pre-activated innovation (Y) and Creativity and innovation (X) after investigating its adequacy indicators in below table, the model is presented.

Table 17: Goodness of fit of regression model between Pre-activated innovation and Creativity and innovation

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.210	0.044	0.041	0.32733

The relationship between independent variables and the dependent variable equals to .210 R Square is .044 which shows that 4.4 percent of variation in Pre-activated innovation is predicted by Creativity and innovation. Because this measure do not consider the degree of freedom, adjusted R Square was used which equals to 4.1 in this study. According to the indices, the model was adequate.

Table 18: Regression equation of Creativity and innovation

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig	
	B	Std. Error	Beta			
1	Constant	3.593	0.121	0.210	29.779	0.000
	Pre-activated innovation	0.120	0.032		3.749	
Dependent Variable: Creativity and innovation						

The inserted variable in regression equation is the core of regression analysis which can be seen in [Table 18] the regression equation is provided by unstandardized coefficients.

Creativity and innovation = 3.59 + (0.120) Pre-activated innovation

It can be said that with increase of one unit of each independent variable depending on the written coefficient, the dependent variable is increased. In other words with increase of one unit in Pre-activated innovation , the standard deviation 0.120 unit of Creativity and innovation is increased, so they have positive relationship. T-test relating to regression coefficients are displayed in the table for independent variable as well. The sig. value equals to .000, so Pre-activated innovation has a meaningful effect on Creativity and innovation.

Sub- hypothesis 9

Speech affect creativity and innovation of the employees of SBREC.

To determine the effectiveness, goodness-of-fit in regression model was analyzed which was discussed below. To propose the model of the relationship between Speech (Y) and Creativity and innovation (X) after investigating its adequacy indicators in below table, the model is presented.

Table 19: Goodness of fit of regression model between Speech and Creativity and innovation

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.329	0.108	0.105	0.31612

The relationship between independent variables and the dependent variable equals to .329 R Square is .108 which shows that 10.8 percent of variation in Speech is predicted by Creativity and innovation. Because this measure do not consider the degree of freedom, adjusted R Square was used which equals to 10.5 in this study. According to the indices, the model was adequate.

Table 20: Regression equation of Creativity and innovation

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig
		B	Std. Error	Beta		
1	Constant	3.353	0.114	0.329	29.366	0.000
	Speech	0.185	0.030		6.089	
Dependent Variable: Creativity and innovation						

The inserted variable in regression equation is the core of regression analysis which can be seen in [Table 20] the regression equation is provided by unstandardized coefficients.

$$\text{Creativity and innovation} = 3.35 + (0.185) \text{ Speech}$$

It can be said that with increase of one unit of each independent variable depending on the written coefficient, the dependent variable is increased. In other words with increase of one unit in Speech , the standard deviation 0.185 unit of Creativity and innovation is increased, so they have positive relationship. T-test relating to regression coefficients are displayed in the table for independent variable as well. The sig. value equals to .000, so Speech has a meaningful effect on Creativity and innovation.

Sub- hypothesis 10

Entertainment affect creativity and innovation of the employees of SBREC.

To determine the effectiveness, goodness-of-fit in regression model was analyzed which was discussed below. To propose the model of the relationship between Entertainment (Y) and Creativity and innovation (X) after investigating its adequacy indicators in below table, the model is presented.

Table 21: Goodness of fit of regression model between Entertainment and Creativity and innovation

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.789	0.622	0.621	0.20589

The relationship between independent variables and the dependent variable equals to .789 R Square is .622 which shows that 62.2 percent of variation in Entertainment is predicted by Creativity and innovation. Because this measure do not consider the degree of freedom, adjusted R Square was used which equals to 62.1 in this study. According to the indices, the model was adequate.

Table 22: Regression equation of Creativity and innovation

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig
		B	Std. Error	Beta		
1	Constant	1.912	0.096	0.789	19.958	0.000

	Entertainment	0.511	0.023		22.393	
Dependent Variable: Creativity and innovation						

The inserted variable in regression equation is the core of regression analysis which can be seen in [Table 22] the regression equation is provided by unstandardized coefficients.

$$\text{Creativity and innovation} = 1.91 + (0.511) \text{ Entertainment}$$

It can be said that with increase of one unit of each independent variable depending on the written coefficient, the dependent variable is increased. In other words with increase of one unit in Entertainment, the standard deviation 0.511 unit of Creativity and innovation is increased, so they have positive relationship. T-test relating to regression coefficients are displayed in the table for independent variable as well. The sig. value equals to .000, so Entertainment has a meaningful effect on Creativity and innovation.

DISCUSSION & CONCLUSION

Entrepreneurial organizational culture has a significant effect on innovation and creativity of the employees of SBREC. According to the findings of this study, risk-taking, integrity among managers and employees, tolerating conflict, and its other aspects in the organization have a significant impact on creativity and innovation. Thus, it is necessary that this organization act more innovatively and creatively to increase employee creativity and finally, produce schedules and new ideas, and take steps to improve the process of recruiting staff[5].

In this regard, it is suggested that managers be supportive of new ideas, consider appropriate rewards to encourage creative people, and give importance to establishing good relations with employees regardless of the hierarchical relationships in order to create open critical spaces. Moreover, it is necessary that managers express the objectives and expectations of the organization clearly and take steps to tailor the program objectives in the organization. Culture in an organization is like a character in a human being. Basic assumptions, beliefs, norms, and values, as a basis for an organization's culture, form its foundation and distinguish between good and bad. Culture of any organization is known as a fundamental factor in forming it and has a great effect on organization structure and design, inner and outer environment of the organization, technology, human Worthiness of work, and the most importantly on creativity and innovation and strategy of the organization. Culture determines dos and don'ts and forms organizational behavior. With a strong and cohesive culture, along learning more about the goals and strategies of the organization, people feel a sense of responsibility and commitment towards the values and norms and feel satisfied with the job. This, along with strong management, improves morale, motivation of organizational performance, and creativity and innovation of the staff [13, 14].

Organization and management thinkers argue that human capital is the most important capital of the organization. Attention to this precious capital directly affects the failure or success of the organization, so efforts to develop creativity among staff is something important that managers need to consider. More committed people adhere more to the values and objectives of the organization, play a more active role in the organization, and are less likely to leave the organization and seek new employment opportunities. As noted, the concepts of creativity and innovation imply a positive attitude that comes from the sense of loyalty of employees to the organization and is manifested with participation in organizational decisions, attention to individuals of the organization, and their success and prosperity. Studies in this area show that employees' commitment to the organization will have very valuable results for the organizations.

Practical recommendations for organizations

- Have fun. The fact that you take working weeks seriously is good, but you should keep in mind that the working environment is equally serious fun as well. The employees should have a good idea of the workplace. Make a friendly working environment.
- Keep an open mind and think outside of the mold. If you encourage this among your employees, you will be amazed with the results that can be achieved.
- Put learning and growing as the permanent program of your business. The world and the market are always changing, so you should not expect that increase in knowledge and growth occurs simultaneously. If you are committed to continuous learning, you will find that your business becomes more stable.
- To strengthen the business, have strong communication. Building strong relationships between staff and activities enables you to make your company stronger.

CONFLICT OF INTEREST

None

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COMPARING INHIBITORY EFFECT OF CHLORPROPHAM AND CORIANDER ESSENTIAL OILS ON POTATO SPROUTING DURING THE STORAGE

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ABSTRACT

There are some chemicals like chlorpropham which efficiently control sprouting; however, the application of which has been challenged due to the incidence of quality problems and the growing interest in organic food consumption. In response to this need, application of 0, 0.5, 1, 2 and 4 $\mu\text{l/l}$ Coriander essential oils (CEO) at regular intervals of 2, 4, and 6 weeks on Agria potato sprouting control was tested. All experiments were replicated 3 times. Data was analyzed by a completely randomized design (CRD) with a factorial experiment at a statistical level of 5%. According to the results, by increasing CEO application up to 2 $\mu\text{l/l}$, the sprouting of tubers was significantly controlled for 3 months. Using 4 $\mu\text{l/l}$ CEO did not significantly increase the inhibitory effect. Furthermore, the use of 0.5 $\mu\text{l/l}$ CEO stimulated the sprouting of tubers compared to the control samples. Using 2 $\mu\text{l/l}$ CEO for every 4 weeks showed the best result. Yet, its inhibitory effect was not that much as CIPC's was, especially from the fourth month on. Organoleptic evaluation of the boiled and fried potato samples treated with CEO and chlorpropham did not show significant differences, but both of them received higher scores compared to the control treatment.

INTRODUCTION

At the end of the dormancy period, the potato (*Solanum tuberosum* L.) tubers begin to sprouting, resulting in weight and nutritional value loss, wilting and toxic alkaloid production. The sprouted tubers are neither desirable for processing nor suitable for the next year's planting as tuber seed. Although the cold storage (2 - 4 °C) inhibits potato tuber sprouting for a long time, it is not always possible due to the technical or practical reasons. Using sprout inhibitors, a reliable alternative to cold storage, has made the availability of high-quality potatoes possible during almost the whole year [1][2]. Chlorpropham (CIPC) is one of the most effective sprout inhibitors having an irreversible constant effect and extensively used in potato tuber storage but not seed tuber ones [3][4]. The interest in producing and using organic or at least healthy food has doubled the attempt to limit the use of artificial preservatives and find the safe alternatives [3][5]. Using chemical compounds such as ethylene, ozone, aromatic aldehydes, naphthalene acetic acid, hydrogen peroxide, and alcohol as well as methods like storage at high levels of carbon dioxide in order to control sprouting either encounters technical and practical problems or is not very effective [6][7][1][8][9]. Using the leaves of Muna plants containing monoterpenic volatile essentials, the Inca (the most important civilization in South America) was the first tribe managing to store potatoes in an acceptable manner [10]. Vaughn and Spencer [1993], conducted a study on using environmentally friendly natural compounds including net monoterpenes 'Terpineol', 'Citronellol', 'Citral', 'Geraniol', and 'Cineole' so as to control potato tuber sprouting during storage; it was concluded that none of them can be as effective as chlorpropham [9]. De Vries [1999] invented a compound base on caraway extracts with the brand 'TM-Talent' in Netherlands and claimed that the aerosol form of this compound delays potato sprouting for 3 months [11]. Using 8 mmol/l of a compound made of clove extracts for 6 consecutive weeks, Slinger et al [2000] managed to control potato sprouting by 56% for 4 months [12]. Biox-A is another clove-based compound controlling potato sprouting by 73% for 3 months. There was not a significant difference between the inhibitory effect of this compound and 60ppm chlorpropham [13]. Coriander is extensively cultivated in Iran, the seed of which contains 0.6 to 2.2 percent volatile oil (CEO). The most important terpenic and terpenoid compounds of coriander include 'alpha-Linalool' (60-85%), 'Geraniol' (4-7%), and 'Geranyl acetate' (2-6%) [14]. In this study, a comparison was made between chlorpropham and coriander essential oils (*Moriandrum sativum* L.) as available resources of monoterpenic compounds to examine their inhibitory effect on potato sprouting.

MATERIALS AND METHODS

Healthy fresh Agria tubers with 3.5-5.5 cm in diameter were selected in late October 2015. After a 15-day curing, selected potato pile was divided to 4-kg groups and each one was put in a 10-liter container. Then, all of them were placed in a dark storage with a temperature of $12 \pm 1^\circ\text{C}$ and relative humidity of $92 \pm 3\%$. Storage in this temperature helps to the dormancy breaking of the tubers and better evaluation of solutions in controlling tuber sprouting. Using a Clevenger apparatus (Wertheim, Germany), the essential oils used in the experiment was extracted from fresh coriander seeds in 2 hours, at 97-98°C distilled water, and with the normal air pressure [15]. The CEO was transferred to a dark glass bottle by means of petroleum ether (as solvent) after being dried by anhydrous sodium sulfate and was kept at 2°C until

KEY WORDS

storage, sprouting, potato, Coriander (*Coriandrum sativum* L.)

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being used [16]. In middle December 2015, the tubers of each container were exposed to the emitted vapors of 5, 10, 20, or 40µl CEO. For this purpose, a Whatman filter paper (Whatman #1; 23mm diam; Whatman, Maidstone, Kent, UK) was placed in each container, on which the above mentioned amounts of CEO solutions were dripped, and the aperture containers were immediately closed. Direct contact between tubers and the CEO was not let . To provide the needed oxygen for the tubers respiration, the containers aperture were opened for 15 minutes every four weeks and sealed again. This was repeated at regular intervals of every 2, 4, or 6 weeks during the experiment. A group of tubers was only treated by 37g chlorpropham (5% purity), produced by Aldrich Corporation. To do this, the powder was poured into the container, completely sealed and slowly shaken for 10 minutes. The sealed container was kept at room temperature for 48 hours [4] [2]. During the storage, the parameters of percentage weight loss as well as the percentage of sprouted tubers were measured monthly, using direct observation method [17]. At the end of the storage term, the total weight of the tuber sprouts in each treatment was measured. All experiments were repeated 3 times. At the end of the experiment, the results were statistically analyzed by a completely randomized design (CRD) with a factorial experiment at a statistical level of 5%, by means of SPSS 16 software. Finally, the treatment showing the best inhibitory effect on potato tuber sprouting while using the minimum essential oil in the storage period was compared with the chlorpropham-used treatment. Furthermore, using Hedonic Scaling Test, a 12-person group of evaluators did an organoleptic evaluation of the selected coriander essential oils, the chlorpropham and control treatment cooked in two ways: boiled potatoes (cooking at 95±2°C water for 30 minutes) and fried potato strips (deep frying in sunflower oil for 1.2 minutes at 180 °C). Then, the scores of treatments were analysed using ANOVA test and then was compared with each other by Least Significant Difference Test [18].

RESULTS

Storage Period

By increasing the storage period, there was a significant increase in the tubers' being dehydration. Such that the moisture content of tuber in the four-time monthly sampling compared to the harvesting time, was decreased by 4, 11.5, 16.3, and 18.7 percent, respectively. along with these changes, the percentage of sprouted tubers and the total weight of sprouts were significantly increased [Table 1]. There were more changes in the last month of storage. Just in the fourth month of storage, the percentage of sprouted tubers and the total weight of sprouts were increased by 166 and 335 percent, respectively.

CEO Concentration

By increasing the amount of CEO application from 5 to 20µl, the tuber moisture content was significantly increased and the percentage of sprouting as well as the total weight of sprouts were significantly decreased. There was no significant change in any of the studied variables when the amount of CEO applied was increased from 20 to 40µl. As such, the amounts of 20 and 40µl CEO were more significantly effective than control and other treatments in inhibitory of potato sprouting as well as preserving the moisture content of the tubers. On average, the moisture content of the tubers treated with 20µl CEO in the storage period was more than the control treatment by 12.2 percent. In the same period, the percentage of sprouting and the total weight of the tuber sprouts under control treatment were as 5.5 and 3.2 times larger than the ones in tubers treated by 20µl-CEO. The increase in the percentage of sprouted tubers treated by 5µl CEO, compared to the control treatment, was an important point in the present study [Table 2].

Number of CEO Application

By increasing the application of CEO from every 6 weeks to every 4 weeks, the sprouting percentage and the total weight of the sprouts were decreased by 24 and 27 percent, respectively. More increase in the application of CEO from every 4 weeks to every 2 weeks (5-time more application in the storage period) had a slight effect but insignificant difference on the study components [Table 3].

Table1: Comparison of studied variables changes of the Potato Tubers Treated with CEO during the storage

Studied parameters			Storage duration after Treatment (month)
Total sprout weight of tubers (g/kg)	Sprouting (%)	Moisture content (%)	
0.00±0.00 ^d	0.00±0.00 ^d	82.50±1.12 ^a	0
0.00±0.00 ^d	0.00±0.00 ^d	79.00±1.31 ^b	1
1.78±0.84 ^c	3.40±2.40 ^c	73.01±0.85 ^c	2
8.95±2.45 ^b	21.00±1.50 ^b	69.05±1.22 ^d	3

39.00±2.71 ^a	56.00±1.83 ^a	67.00±0.74 ^d	4
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Means ± SD of three replicates

Means within each column followed by different letter are significantly different ($p \geq 0.05$).

Study of the sprouted tuber at the end of the storage period indicated that the 4-week interval of 20µl CEO application was the best treatment to control sprouting in potato samples. This treatment was able to control tuber sprouting for more than 3 months. It was significantly more effective than the treatments with the same or even more amounts of CEO application (treatment with 10 times of 10µl CEO application and 3 times of 40µl CEO application); moreover, there was not a significant difference between this treatment and the treatment with 5 times of 40g/l CEO application. Therefore, the monthly 20µl-CEO application was selected as the best treatment to be compared with chlorpropham treatment.

Table 2: Comparison of different amounts application effects of CEO on studied variables in treated potato tubers

Studied parameters			CEO application
Sprout weight Of tubers (g/kg)	Sprouting (%)	Moisture content (%)	µl(
15.25±2.21 ^b	28.09±1.65 ^b	69.03±1.52 ^d	0 (control)
16.70±0.98 ^a	30.50±1.80 ^a	70.20±0.88 ^c	5
8.90±1.11 ^c	11.33±0.95 ^c	76.51±1.63 ^b	10
4.67±1.15 ^d	5.06±0.5 ^d	77.40±1.33 ^a	20
4.15±0.77 ^d	4.53±0.70 ^d	77.43±1.42 ^a	40

Means ± SD of three replicates

Means within each column followed by different letter are significantly different ($p \geq 0.05$).

Table 3: The effects of The interval between two consecutive applications of CEO on studied variables changes in treated potato tubers

Studied parameters			The interval between two consecutive applications of CEO (week)
Sprout weight Of tubers (g/kg)	Sprouting (%)	Moisture content (%)	
9.24±0.62 ^b	14.84±0.88 ^b	77.41±2.13 ^b	2
9.38±0.83 ^b	15.08±1.11 ^b	77.28±2.74 ^b	4
11.21±1.89 ^b	18.44±1.49 ^b	67.65±1.48 ^a	6

Means ± SD of three replicates

Means within each column followed by different letter are significantly different ($p \geq 0.05$).

Comparison of the inhibitory effect of Selected CEO and CIPC Treatments

The efficiency comparative results of the chlorpropham powder treatment and the 20µl-CEO treatment on the sprouting of tubers indicated that the first is able to Decisively control tuber sprouting. Such that at the end of the storage period, only 1 percent of the CIPC treated tubers started initial sprouting. The other tubers under this treatment did not sprout. The tubers of the selected CEO treatment started sprouting from the second week of February. So, this treatment was almost completely effective in controlling tuber sprouting until late February (the fourth month of storage after the first treatment). At the end of the fourth month, its inhibitory ability decreased and was significantly less effective than the chlorpropham; however, it was still stronger compared to the the inhibitory effect of control treatment [Table 4].

Table 4: Effect of selected CEO and CIPC powder treatments on the sprouting (%) and total sprout mass (g/kg) of the potatoes tubers at the end of 3rd and 4th months of storage

Studied Parameters		Comparison Time	Sprout Control Method
Total sprout mass (g/kg)	Sprouting (%)		
00.75±0.11 d	3.00±0.62 d	End of month 3	Monthly Application of 20 µl CEO
2.75±0.44 c	15.00±1.67 c	End of month 4	
00.00±0.00 d	00.00±0.00 e	End of month 3	CIPC
00.08±0.02 d	1.00±0.66 e	End of month 4	
15.33±1.71 b	43.00±2.50 b	End of month 3	No Control
57.08±2.03 a	99.00±2.13 a	End of month 4	

Means ± SD of three replicates

Means within each column followed by different letter are significantly different ($p \geq 0.05$).

Organoleptic Evaluation

The organoleptic evaluation indicated that there is not a significantly distinguishable difference between the potatoes treated with CEO and chlorpropham regarding the organoleptic features of the products. The control samples, compared to CEO and CIPC treatments, received a significantly lower score in both cooking and frying tests from the panelists [Table 5]. Shrinkage, increasing of the reducing sugar followed by texture softness, sweetening, and darkening the fried potato due to tuber sprouting are among the major reasons the panelist group was dissatisfied with control sample.

Table 5: Organoleptic score comparing of the cooked Potato Samples Treated with CEO, CIPC and Control Sample

CIPC	Sprout Control Method		Cooking method
	Monthly application of 20 µl CEO	control	
18.63±1.69 a	18.50±2.72 a	11.55±2.38 b	Boiled Fried
18.72±2.06 a	18.66±3.40 a	8.32±1.41 b	

Means ± SD of three replicates

Means within each row followed by different letters are significantly different ($p \geq 0.05$).

DISCUSSION

By the end of the physiological dormancy period of potato tubers and initiation of sprouting in which, the weight loss changes in tubers is also initiated and intensified in line with the sprouting development level. As a matter of fact, the initiation and development of tuber sprouting accelerate the breakdown and consumption of the starch stored in potato tubers in order to supply the needed energy for the quick growth and propagation of the sprout meristematic cells. The starch breakdown into simple sugars is a kind of process needing to use water; tuber sprouting development increases evaporation and moisture transpiration, all of which increase tuber weight loss. Longer storage of the sprouted tubers results in increasing shrinkage and moisture content losses [19].

According to the findings of this study, the coriander essential oil, taking appropriate concentration and application sequences, had a competitive inhibitory effect on potato tuber sprouting compared to the control treatment and chlorpropham; however, a longer storage of tubers (more than 3 months) showed a more inhibitory effect of chlorpropham compared to others [table 4]. It is worth noting that the control tuber sprouting was initiated in the first week of the 2nd month of storage (January). Nevertheless, the sprouting of tubers treated with the selected CEO and chlorpropham was delayed until the 3rd week of the 3rd month of storage. Boylston et al., [20] reported that the sprouting of tubers treated with CIPC, salicylaldehyde, and clove extracts was delayed until 5.5, 3, and 3 months, respectively. The equilibrium between the application interval and amount of CEO was a determining factor in achieving an optimal treatment and preserving the needed concentration of monoterpenic compounds in the storage environment. In other words, the monoterpenic compounds are volatile and their concentration is immediately increased after application in the study environment and rapidly declined after a while. Therefore, the number of applications of which is of importance in keeping the inhibitory and effectiveness threshold and cannot be replaced by other components - such as increasing the solution concentration. Kleinkopf et al., [21] had also paid attention to the equilibrium between concentration and the number of applications of mint volatile oils. It seems that a monthly 20µl-application of coriander essential oils is able to preserve the monoterpenic compounds' concentration inhibiting sprouting in the atmosphere around tubers within the effectiveness threshold range; as such, increasing the amount of which did not have a significant impact on controlling sprouting.

The results of the present study are similar to what De Vries [11], Kleinkopf and Frazier [13], and Vaughn and Spencer [22] have reported with respect to the inhibitory effect of caraway, mint, and clove. However, a clear comparison of the inhibitory effect of these compounds cannot be made. Observing the stimulatory effect of a 5µl dose of CEO in tuber sprouting was an important point. In this treatment, there were more sprouted tubers although the total mass weight of sprouts was lower than that in the control treatment. The shape of sprouts (including the grown sprouts and the necrotic ones) in the tubers treated with different concentrations of CEO was consistent with the reported mechanism regarding the effect of monoterpenic compounds on controlling tuber sprouting. It seems that the following hypothesis, compared to other theories, gives a better explanation of the controlling effect of the extracts containing monoterpenic compounds such as CEO. "The alpha- and beta-unsaturated carbonylic compounds or the alcoholic-unsaturated compounds contained in these extracts play an inhibitory role in this process by damaging apical meristem cells of the sprouts. The respiration rate of the apical meristematic cells increasingly rises in the presence of these compounds. This condition progresses in a way that the cell membrane wall fats are severely oxidized and the meristematic tissues are exposed to oxidative stress. Therefore, the cell membrane increasingly loses moisture and impairs the functions such as transferring nutrients into the cells. All these conditions result in cellular death and necrosis. These sprouts take a burnt corky form. However, if the monoterpenic concentration is less than the effectiveness threshold, the lateral sprouts are stimulated and start growing. These sprouts are thinner and of less sprouting volume and thickness compared to those produced by apical meristems [23] [24] [25].

CONCLUSION

To sum up, this study indicated that CEO is a great alternative for mid-term storage of potatoes that can replace chlorpropham for 3 months; the application of which does not have a negative impact on the organoleptic favorability of the processed potatoes from the consumer's perspective. However, to facilitate the complete exclusion of chlorpropham from the potato storage chain, it may seem necessary to study other aromatic extracts and volatile oils with similar structures so as to discover more effective compounds and also the probable impact of their application on the characteristics of the processed potatoes.

CONFLICT OF INTEREST

There is no conflict of interest.

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None

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ARTICLE

INVESTIGATING THE STATUS AND TENDENCY OF MIGRATION OF STUDENTS, AT THE UNIVERSITY OF SEMNAN

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ABSTRACT

Background: This study aimed to evaluate the effect of student satisfaction, Attitude toward image of the university and university atmosphere in the tendency of immigration the elite students from in the Semnan University was conducted. The method of research was descriptive-correlational. The Population and sample consisted of (163) Students elite of Semnan University was. Based on the research findings, the tendency of immigration among the elite students was moderate to high. Also, satisfaction and attitude toward image of the university and university atmosphere, In addition to the having the relationship, ability to prediction the tendency of immigration the elite students from the country have had.

INTRODUCTION

The brain drain phenomenon is a serious problem in recent years in many countries, especially developing countries has been of interest to researchers and experts in various disciplines [1,2]. According to a new report by the International Monetary Fund (2009), Iran currently holds the first place among 91 developing or underdeveloped countries in terms of brain drain statistics in the world. The report shows that approximately 180,000 educated Iranians in the hope of having a better life standard and finding job opportunities leave the country [3,4]. This means an annual output of 21 billion dollars out of the country [5, 6]. According to statistics, 80 percent of the winners of the Science Olympics already have been absorbed in the best universities abroad [7,8]. In systemic theory model, that considers the social system as a system of interacting components, the main hypothesis suggests that physical connection is not a sufficient condition for the creation of a social system and migration will not be investigated based on only one variable but other linked together and balancing multiple variables are considered [9,10]. In this context, one of the most important models about leaving the students from the area of the education system is provided by Tinto [11]. Tinto assumed that students' engagement in universities may lead to positive experiences, which enhance the purposes and commitments to institution, or lead to weak or negative experiences of objective and commitment to the institution. If the student's experience in the university system is positive, it lead to strengthen the objectives and commitments; therefore, strengthen the student's decision to remain in the institution and if students' experiences in the university system are mainly negative, and objectives of the students became weaker and less likely students stay in the system [12]. Altbach et al [2009] also by using model of attraction and repulsion, low quality of education and lack of access to advanced research facilities [13], Lien [2006-1988] by expanding a copy of improper knowledge of the developed countries is leading to a misallocation of resources in education among the most important factor explaining the phenomenon of migration in third world countries [14-16].

Many studies have been conducted in relation to brain drain that they have different view like: Myers (2000) in his research showed that participation in religious organizations affects migration [17]. Jaffari moattar (2008) in his study considered the educational system's weaknesses at the top of motives affecting the brain drain [18]. Murakami (2010) in his research showed that the most important motivating factor in the migration of Japanese researchers is the availability of excellent research environment that has been effective in their decision to return home and researchers who have enjoyed favorable research environment and high satisfaction levels, most likely not return to their homeland [19]. Inayati, Arai and Sarjono's (2012) study showed that education dimension factors including education, is the most influential factor for the students' decision to return to Indonesia [20]. The results Halevi and Moed's (2012) study showed the strongest level of immigration from China, Canada, India, England, Australia and other countries and at the next level countries such as Iran, Mexico, Singapore, Turkey, Ireland, Poland and other countries into the United States of America [21]. Benedict & Ukpere (2012) in their study attributed the reasons of Africa's brain drain to attracting factors (such as high-quality educational system and economic attraction) and repulsion factors (like bugs in infrastructure, educational system) [22]. The study was based on background research and by using theoretical framework based on system models, Model of Tinto, Altbach-Lien theory and in the field of migration; a model of study was presented in [Fig. 1]. The researcher's hypothesis is that variables like the level of satisfaction, image and atmosphere of university have an impact on elite students' immigration tendency. So based on the research conceptual model, the following questions were formulated.

KEY WORDS

Brain Drain, Tendency to Migration, Satisfaction, University Atmosphere

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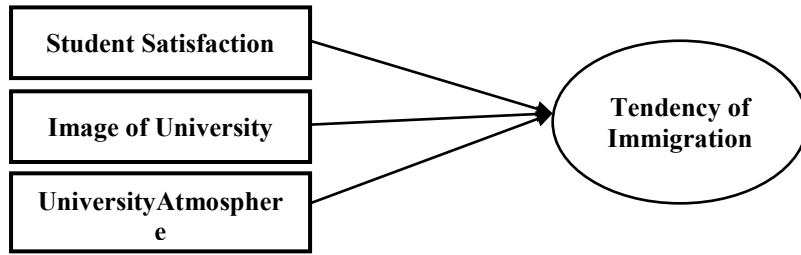


Fig. 1: Research conceptual model.

1. Is there a relationship between the elite students' satisfaction of university and the tendency to immigration?
2. Is there a relationship between the elite Students' attitude towards the image of the university and a tendency to immigration?
3. Is there a relationship between the university atmospheres with elite students' tendency to migrate?
4. The variables of student satisfaction, image and atmosphere of the university to what extent can be the predictor of elite students' tendency to migrate?
5. Are there various tendencies to migrate among the elite university students?

MATERIALS AND METHODS

The study was conducted as a survey in 2016. The study population consisted of elite students of Semnan University (163) in the first semester, according to the latest report of the Office of Gifted and Talented 2015-2016 Semnan University, they have earned ranks first among their contemporaries. Given the number of elite students in order to maximize the accuracy of the study and the possibility to participate in this study and not facing with the difficulty in computing the census sampling method was used to obtain a sample population. For this purpose, the students were given online questionnaires. After a few steps, only 135 people responded to an email, which was only 128 completed questionnaires (Response rate = 78%) and analysis was conducted based on these numbers.

The data collection tools in this study consisted of four questionnaires:

1. Students' tendency to migrate Questionnaire; Janali Zadeh et al. (2014) which includes 8 items Likert scale. Its reliability in this study through Cronbach's alpha was calculated as 0.82 [23].
2. Students' satisfaction Questionnaire; Izadi, Salehi and Gharabaghi (2008): The purpose of this questionnaire was measuring students' satisfaction of educational services. The reliability of the questionnaire through Cronbach's alpha was approved as (0.87) [24].
3. Students' attitudes toward the image of the university Questionnaire; Laura Arpan & Raney (2003): Which aims to investigate attitudes toward universities and the foreground of the questionnaire was modified solely for scientific dimension measurement that in this study this questionnaire was modified solely for scientific dimension measurement; The reliability of the questionnaire through Cronbach's alpha was approved as (0.85) [25].
4. The university atmosphere questionnaire; Nosrati et al. (2015): This questionnaire includes four dimensions of (communication, participation, student-centered, spirituality). The reliability of the questionnaire through Cronbach's alpha was approved as (0.89) [26].

RESULTS AND DISCUSSION

The results of the demographic data of respondents [Table 1], showed that the percentage of female respondents was 54.2 and 89.9 percent were single and 46/8 percent of respondents were under 20 years old and, 52.1 percent of respondents had a B.A.

Table 1: Descriptive statistics of research

1	Gender	Woman: 54/2%		Man: 45/8%	
		Single: 89/8%		Married: 10/2%	
2	Marital Status				
3	Age	Under 20 years:	20 to 30 years:	Over 30 years:	No reply: 2/4%
		46/8%	39/4%	11/40%	
4	Education	PhD: 11/2%	MA: 34/8%	BS: 52/1%	No reply: 1/9%

In the analytical part of the research, as it can be seen from the [Table 2], between all variables there are significant relationships, and the highest correlation coefficients can be seen between the predictor variables, respectively with the variables " student-centered atmosphere component, image of the university, students' satisfaction, university atmosphere (total), the communicative atmosphere component, , the atmosphere of spirituality component ". All of these coefficients are significant at (0.01).

Table 2: The correlation coefficient matrix among variables research

Variables	1	2	3	4	5	6	7	8
Tendency Of Immigration	1							
Significance Level								
Student Satisfaction	-0/552	1						
Significance Level	0/001							
Image Of University	-0/616**	0/648**	1					
Significance Level	0/001	0/000						
Atmosphere Of University	-0/487**	0/456*	0/554**	1				
Significance Level	0/001	0/000	0/000					
Atmosphere Of Communication	-0/382*	0/621**	0/490**	0/518**	1			
Significance Level	0/000	0/000	0/000	0/000				
Atmosphere Of Participatory	-0/352**	0/321	0/392**	0/259**	0/427**	1		
Significance Level	0/000	0/023	0/000	0/022	0/000			
Atmosphere Of Student Centered	-0/634*	0/483*	0/659**	0/707**	0/530**	0/328**	1	
Significance Level	0/000	0/000	0/000	0/001	0/000	0/000		
Atmosphere Of Spirituality	-0/112**	0/451**	0/498**	0/558**	0/409**	0/254**	0/659**	1
Significance Level	0/000	0/000	0/000	0/000	0/001	0/000	0/000	

Note: (*) at the level of (0.05) and (**) at the level of (0.01) are significant

The findings [Table 3] show that the attitude towards the image of the university, the student's satisfaction and the university atmosphere are predictors of criterion variables (R²=0.160).

Table 3: Regression analysis of students' the tendency to migrate the predictor variable

Step	variables	The correlation coefficient	Chi-R	Adjusted R-squared	Standard error estimate
1	Image Of University	-0/616	0/379	0/372	0/254
2	Image Of University	0/423	0/178	0/176	0/148
	Student Satisfaction				
3	Image Of University	0/401	0/160	0/155	0/155
	Student Satisfaction				
	Atmosphere Of University				

With the [Table 4], the standardized regression coefficient (Beta) of attitude toward the image of the university (0.421); the satisfaction of the University (0.110) and variable environment of universities (0.334) is calculated; all of these amounts are significant and thus positively and directly, can predict the tendency to migrate in the elite students.

Table 4: Regression coefficients and statistical tests of regression analysis

Model		UnStandardized regression coefficients		Standardized regression coefficients		t	Significance Level
		B	Standard error	Beta			
1	(Constant)	0/361	0/046			7/879	0/000
	Image Of University	0/114	0/013	0/242		41/692	0/000
2	(Constant)	0/014	0/052			0/270	0/788
	Image Of University	0/773	0/035	0/366		22/102	0/000
	Student Satisfaction	0/286	0/019	0/405		14/806	0/000
3	(Constant)	0/025	0/052			0/478	0/633
	Image Of University	0/797	0/035	0/421		22/890	0/000
	Student Satisfaction	0/249	0/019	0/110		15/112	0/000

Atmosphere Of University	0/178	0/017	0/334	10/459	0/000	
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According to [Table 5], results showed that 6/32 percent of the population had a high tendency to migrate.

Table 5: Distribution of samples based on Levels the tendency to migrate

Levels the tendency to migrate	Abundance	Percent
Low tendency	18	13/3
Middle tendency	73	54/1
Above tendency	44	32/6
Sum total	135	100

The results showed that a reduction in elite students' satisfaction from the university will increase the trend of immigration. The findings suggest that the weakness of the educational system in third world countries is the most important factor affecting immigrant students, it seems, by making changes in educational system, including taking into account the knowledge of localization and matching students with the needs of contemporary society and different industrial sections can prepare the suitable context for Students' motivation and satisfaction of the educational system and, ultimately, attract educated people to the domestic labor market and this can reduce the students' tendency to migration. This hypothesis is in line with Lien (1988, 2006), Jafari moattar (2008), Altbach et al. (2009), Murakami(2010), Inayati, Arai and Sarjono(2010) studies.

The findings showed that, with a negative attitude of the elite students towards the image of university, the immigration tendency will be increased. These findings can manifest this important issue that if the experiences of students in university system are mainly negative, the students' commitments and objectives will be weaker and students are less likely to survive in the educational system. Hence, developing and implementing appropriate plan in the field of improving the quality of scientific and educational systems can not only increase more positive attitude to the image of the university, can also reduce the elite students' tendency of migration. The results of Benedict and Ukpere (2012) approve this hypothesis.

The results showed that if unfavorable atmosphere (communication, participation, student-centered spirituality) prevails at the University, the migration trend rise of elite students will increase. These results on the one hand indicate the effectiveness of the environment on students that is raised and known as a fundamental principle in education; on the other hand suggests, the researchers considered negative atmosphere harmful for the cognitive, social and affective development. So, on campus as student participation in all activities related to special education and science is high and educational structure guaranteed student centeredness and students with extended communication take place in the process and efficiency of other scientific activities in scientific institutions in the country and the world and spiritual atmosphere with thought and knowledge prevails on campus [27,28], because spirituality can increase tolerance of students in adversities [29], and consequently the students tendency to migrate will be reduced. The results of this study are in line with Mayers (2000) studies and Jafari moattar (2008), Altbach et al. (2009), Murakami(2010), Inayati, Arai and Sarjono(2010) studies study approve this hypothesis. Results showed that student satisfaction, thinking about the image of the university and the university atmosphere; predict 16 percent of variations related to the students' tendency to migrate. The findings suggest that the rate of student satisfaction is an important issue for universities and their managers That is, with the acceptance rate, and absorption of elite students is very closely linked because in today's competitive market to attract and retain customers, low rates of admissions, has consequences for universities [30]. On the other hand, the image of universities is very effective on the decisions of elite students and in attracting and keeping talented students [31]. Also, managers of universities should be always thinking about improving the organizational climate, in addition to maintaining an effective and efficient organization and motivate people meet their spiritual and material needs [32].

This study showed that the elite students have high tendency to migrate and brain drain in accordance with the system theory, will not be investigated as the only variable. But multiple variables in relation to each other and moderately are considered; in this regard, in this study, students' satisfaction, students' attitudes toward the image of the university, the environment of universities including collaboration atmosphere, student-centeredness and spirituality were considered that weakness in all these factors from the perspective of elite students, makes them more inclined toward immigration. So to achieve sustainable development the role of university as a research and educational institutions is undeniable [33]. In this regard, developing countries to exit the crisis of Brain Drain should look into the structural changes, especially in their educational system, Because against educational attractions across the borders can merely reduce their repulsion of the education system.

CONFLICT OF INTEREST
There Is No Conflict of Interest.
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None

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ARTICLE

LEARNING STYLES IN STUDENTS OF KERMANSHAH (IRAN) UNIVERSITY OF MEDICAL SCIENCES, 2015

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ABSTRACT

Introduction: Since learning has a major role in health skill development and performing right care method, therefore, students must learn how to act in educational environment as a professional individual. This study is a cross-sectional study, which carried out among 218 students of Kermanshah University of Medical Sciences in 2015. In order to collect data, a questionnaire containing demographic questions and Kolb Learning Style Inventory was used. In the studied sample, 72% of samples were females and 27.1% were males. Among Learning ways, the highest mean correlated to objective experience (34.46) and the lowest correlated to abstract conceptualization (32.51). among the sample, of people who had absorbed learning style was 38 people (17.4%), converging learning style was 86 (39.4%), divergent learning style was 25 (11.5%) and adaptive learning style was 69 (31.7%). There was no statistically significant relationship between learning styles and demographic variables. This study showed that the majority learning style among studied population is converging learning style. Therefore, using appropriate strategies and teaching methods accompanied by this style learning can largely improve the effectiveness of training in the target group.

INTRODUCTION

Education is a complex process that neglecting it can lead to wasting any of the powers and equipment and makes efforts fail, therefore, the development of education and its promotion requires understanding education process and awareness of modern methods of its implementation. This is more important in the education of medical sciences, because the main mission of health-care manpower education training is educating a competent power which having necessary knowledge, attitude and skills to protect and promote the health of society [1]. Since learning has a major role in health-care skill development by right method, Therefore, students in this discipline must learn how to act at educational environment as a professional individual [2]. Teachers and faculty members especially in different university grades to have effective learning and teaching should make use of content knowledge, knowledge of education and knowledge about universality and its characteristics [3]. Many faculty members have sufficient content knowledge in terms of their specialized courses and is obtained due to continuous studying and practice in specific areas of teaching. Many of them equipped with a knowledge related to principles of education, which is also obtained by studying classic texts in the field of education and participating in empowerment courses and workshops. However, acquiring knowledge about learner and his/her character, unfortunately, had often considered unimportant approach to improve classroom teaching [3, 4]. In order to solve this matter, teachers should be familiar with students' preferred learning style. [5]. Learning style refers to the methods and conditions that by it, the learner try to more efficiently and more effectively understanding, processing, storing and recalling what they learn [1]. Such issue can impose responsibilities for teachers in facing with students' educational needs and education, because identification and proper learning styles conducting plays an important role in selecting teaching methods and transferring concepts of others. One reason that some students despite having the best teachers do not learn the matter appropriately is the mismatch between teaching and learning styles [6]. So that according to their individual characteristics receive course concepts of in different ways [7]. So fitting between instructor teaching style and learner's learning style effects the implementation of the curriculum objectives, academic achievement and solving shortcomings of the educational system [8]. A learning style is a complicated method in itself, which the learner in an efficient and effective manner, understand, process, store and retell [9]. Which all of them mean the trying to learn. Kolb, by definition, adult learning is "a process by which knowledge achieved by changing the diversity of experiences. He thinks learning as a process of four stages: According to this process, followed by tangible and concrete experience, reflection and observation takes place, which in turn leads to the formation of abstract concepts. And in the following, such concepts are evaluated through experiments [10]. In this process, learning styles, in fact, is a personalized approach to receive and process information created by genetic characteristics and personal experiences with environmental expectations [11]. Kolb's learning style list is able to categorize learners in one of the 4 major learning styles: convergent, divergent, absorbent and consistent. These learning styles has the following features: Convergent people have a special ability to implement practical ideas that are successful in problem solving and decision making. Given the ability of deductive reasoning

KEY WORDS

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[top-down], they are able to respond to a problem when it has only one answer. Divergent people has power of high imagery and have special attention to meaning and values. Their ability to ideation and looking at objective situations from different angles is justifiable. Attractive people have a good ability to produce theoretical ideas and achieve to inductive reasoning [part to whole]. Compatible person have special capacity for completing certain tasks, active participation in new experiences and carrying out program. When they need to have a quick adaptation with changing conditions they exist, show a good performance [11,12]. So the aim of this study was to determine students' learning styles in Kermanshah University of Medical Sciences using Kolb's style.

There are very few studies regarding the wearing and laundering of lab coats in hospitals and medical practice. This study highlights the role of lab coats acting as vector for transmitting health care infections to the patients and the common areas where contamination occurs.

MATERIALS AND METHODS

This study is a cross-sectional study, which carried out in 2015. In order to collect information, different universities were considered as a class. By appropriate allocating of size sample, each of the classes were selected randomly and entered to the study, all participants were justified about the objectives of study and were entered to the study consent. The study was conducted among 218 students of Kermanshah University of Medical Sciences. In this study, students' learning style and its relation to age, sex, education level, field of study and scores were investigated. In order to collect data, a questionnaire containing demographic questions and Kolb Learning Inventory which are the most common tool for identifying the learning styles was used [13-14,]. In various internal and external studies, validity and reliability of the questionnaire was confirmed [15-18]. This tool categorized learner based on Kolb's learning model that reflective observation against active experimentation and objective experience against conceptualization abstract, classifies in one of the four converging, diverging, absorbing and adaptive learning style, Kolb Learning Inventory consists of 12 questions and each question has four terminals. The questionnaire asks students to choose and determine one of the questions terminals based on how they learn. Scoring manner and Kolb's questionnaire completion is as follows: Proposed responses should be scored from 1 to 4 and are ranked below:

1. If proposed responses is really consistent with your learning, the score should be 4.
2. If proposed responses is somewhat consistent with your learning, the score should be 3.
3. If proposed responses is a few consistent with your learning, the score should be 2.
4. If proposed responses is a little consistent with your learning, the score should be 1.

By collecting the points of each of these 4 options in 12 questionnaire sentences [i.e. scores of same number options in 12 question were summed] four score was obtained that shows individual learning styles: By subtracting the way of thinking score of the score of feelings and subtracting the procedure score of observing method, two score were obtained.

These two scores were obtained from two axes

At one end of the vertical axis, the learning method through feeling and at other end, learning through thinking, and at one end of the horizontal axis learning through performing and at the other end, learning through watching was placed. The two axes constitute the fourth quarter of a square which each quarter represents one of the learning styles. In order to analysis of present data statistical software Spss was used, Central tendency and dispersion for quantitative variables and frequency and percentage for qualitative variables were used. In order to test the hypotheses, Chi-square test was used.

RESULTS

In the sample, 157 persons (72%) of the students were female and 59 persons (27.1%) were boys and between them, 2 people did not express their gender. The largest number of participants in the study, 38 persons (17.4%) in public health field and the lowest number was 1 person (0.5%) were in medical engineering. The average age of participants is 22.27 years with SD of 2.33 and the students score average is 16.27 with maximum of 20 and the minimum is 12. Among learning methods, the highest mean relates to objective experience (34.46) and the lowest relates to abstract conceptualization (32.51). Among the sample, the number of people who were learning absorbing style was 38 persons (17.4%), converging learning style was 86 (39.4%), divergent learning style was 25 (11.5%) and adaptive learning style was 69 (31.7 %)[Table 1].

Table 1: Distribution of learning styles Table

learning styles	frequency	percent
Convergent	86	39.4%
Divergent	25	11.5%
Abstracting	38	17.4%
adaptive	69	31.7%

There is a significant relationship between learning style and students' gender [Table 2]. There wasn't significant difference between learning styles type and students' age distribution ($p = 0.541$) and education discipline ($p = 0.398$). There was no significant difference between the student's grade and learning styles ($p = 0.300$). There wasn't also significant relationship between students' entering years and their learning styles ($p = 0.671$).

Table 2: Learning styles table by sex separation

Learning styles	sex				p-value
	women		men		
	frequency	percent	frequency	percent	
convergent	62	39.5%	23	39%	0.683
divergent	14	8.9%	11	18.6%	
absorbing	28	17.8%	9	15.3%	
adaptive	53	33.8%	16	27.1%	

DISCUSSION

The results of the study showed that converging learning style learning is the most dominant style among students. At other similar studies have shown different results. In a study by De Amor and collaboration carried out on nursing and midwifery students in 2012, the dominant learning style was divergent learning style and about 30 percent of the participants were classified in terms of this style. In this study, the absorbing, consistence and converging learning styles placed at following rank in terms of frequency [11]. In another study by zoogi and colleagues in Australia carried out in 2010, students from 10 different fields of Medical Sciences were evaluated. Similar to the study results, converging learning style, was recognized as the dominant learning style [19]. In study carried out by pian and colleagues who carried out on public health students, fairly distribution between the different types of learning styles was seen [20]. Among the studies that have been done in the country, the study by Ghranmaie and cooperation conducted on nursing and midwifery students showed that the dominant learning style is diverging type [17]. The Study by Azizi and colleagues also suggest that absorbent learning style has higher frequency than other learning styles among medical students [21]. The study by Ranjbar and Ismaili study showed that about 86 percent of the participants (nursing and midwifery students) had consistence learning style [22]. As the results of these studies are shown that the variation and changing in learning styles exist in most studies. Since these studies carried out in different universities and among students with different demographic characteristics, it is necessary to assess dominant learning styles for students of different universities and suggests that it is not possible to use studies among students in a learning environment, even if they have a very similar field of study, as a basis for curriculum at other students. Based on the results of the present study, there was not a significant relationship between learning style and students' gender. There weren't significant differences between students' learning style and age distribution ($p = 0.541$) and education discipline ($p = 0.398$). There was no significant difference between students' grade and learning styles ($p = 0.300$). There was no significant relationship between students' entering year and their learning styles ($p = 0.671$). Unlike our results in the study of Li, age variable is one of the factors that can take a role in determining learning style [1]. As Kolb pointed out in the three-step model (acquisition, specialization and integration), as person's age increases, the emphasis of person on a particular learning style is reduced and can maintain a good relationship with other learning styles -23]. Although the present study does not suggest decisive role of age in determining the learning style, due to a lack of significant differences in age and learning style can indicate a possible association between age and learning style which this relationship is exportable and inferable in experimental or cohort studies. Unlike the results of this study, Straddle et al study also showed that different age groups can show different learning styles (24). Also, unlike the present study, gender has been evaluated as a contributing factor in determining the learning style in several studies [25-28]. Slater and Heroin and colleagues have shown in various studies that the male and female students of medicine and physiology discipline, in terms of their preferred learning style, show considerable variation with each other [25, 26]. This study showed that the dominant learning styles among majority of the students is converging learning styles. Therefore, using the strategies and appropriate teaching methods with this learning style can largely improve the effectiveness of training in the target group.

CONCLUSION

There was no statistically significant relationship between learning styles and demographic variables. This study showed that the majority learning style among studied population is converging learning style. Therefore, using appropriate strategies and teaching methods accompanied by this style learning can largely improve the effectiveness of training in the target group.

CONFLICT OF INTEREST
There is no conflict of interest.

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FINANCIAL DISCLOSURE

None

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ARTICLE

INVESTIGATING THE EFFECT OF FREE ALDEHYDE/PHENOL ANTIBACTERIAL TO CONTROL THE COMMON HOSPITAL-ACQUIRED INFECTIONS INCLUDING PSEUDOMONAS AERUGINOSA, STAPHYLOCOCCUS AUREUS, ESCHERICHIA COLI, ACINETOBACTER, ENTEROCOCCUS

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ABSTRACT

Present work is addressed for the evaluation of the efficiency rate of different free aldehyde/phenol antibacterial for the common hospital-acquired infections including *Pseudomonas Aeruginosa*, *Staphylococcus aureus*, *Escherichia coli*, *Acinetobacter*, and *Enterococcus*. Based on the results, the maximum and minimum phenol-coefficients were provided for Deconex 53 Plus and Sava sept HI, respectively. However, Deconex 53 Plus and Sava sept HI were the strongest and weakest disinfectants, respectively. Final disinfection under laboratory condition was performed, and it can be concluded that the fifth- and fourth- generation of quaternary ammonium compounds (Sava sept HI and Sava sept HP) showed better effects on hospital-acquired infections.

INTRODUCTION

Many years ago, Socrates had noted to obstetric infections and prevalence, and in the past century because of undesirable health consequences of these infections to nursing homes and hospitals for diseases such as tuberculosis, smallpox, plague and etc. have become important. Today, because of health promotion these diseases have been approximately eradicated. But main concern about hospital-acquired infections is the opportunistic pathogens such as *Staphylococcus aureus* and *Pseudomonas aeruginosa*. Beside the direct control of these hospital-acquired infections, in a report of (Kyaw et al., 2015) it were found higher rehospitalization rates for patients with *Staphylococcus aureus* and *Pseudomonas aeruginosa* pneumonia. They were annually estimated that the hospital readmissions cost Medicare is about \$17.5 billion. According to Centers for Disease Control and Prevention (CDC) database (in 2002), it has been estimated that >1.7 million hospital-acquired infections occur in hospital patients annually, that this is encompassed about 5% of all the admitted patients to a hospital (Calfee, 2012). The most common nosocomial infections includes: *Escherichia coli*, *Klebsiella pneumoniae*, *Enterobacter cloacae*, *Pseudomonas aeruginosa*, *Acinetobacter* spp., *Staphylococcus aureus* and other non-fermentative Gram-negative bacilli (Hsueh et al., 2005; Obbard and Fang, ; Talebi et al., 2007). Based on the cost analysis estimation that have been reported by (Scott, 2009), it is revealed the overall direct medical costs of hospital-acquired infections in the U.S. hospitals ranging from \$28-\$45 billion each year. Expensive medical costs of the hospital-acquired infections including readmission, rehospitalization, drug and other related costs has caused the control and disinfectant application to be considered as a basic strategy. Although the use of disinfectants may increase the amount of bacterial resistance (Meyer and Cookson) and, it is costly, the application of proper dosage based on a regular plan can be one of the effective control methods. In this regard, to effective use of disinfectants and prevention of infection risk, Spaulding (1968) suggested three categories of germicidal action as follows: were noncritical, semi-critical and critical (Rutala and Weber, 2001). However, the application of suitable disinfectant reagent and method should be considered regarding to control costs, efficiency and decrease of the bacteria resistant to disinfectant. The commonly used disinfectants for devices are including glutaraldehyde, ortho-phthalaldehyde, formaldehyde, chlorine and chlorine-releasing compounds, hydrogen peroxide, peracetic acid, alcohols, phenolics, quaternary ammonium compounds (QACs), and other germicides (Rutala and Weber, ; Simon et al., ; Widmer et al., 2006). Interface between infectious agents and infected person environmental surface such as devices and equipments. From the non-critical items or devices including blood pressure cuffs, bedpans, bed rails, crutches, linens, food utensils, bedside tables, patient furniture and floors (Rutala and Weber, 1999). Low level disinfectants such as QACs, alcohols, Iodinated compounds and free-phenolic/aldehyde disinfectants are commonly used for these items. These compounds were upgraded to improve the disinfection characteristics. Fifth-generation of QACs is a sample of these promotions. These promotions were performed such as removal of the benzene ring, addition of substituent alcohols, amine group and etc. In this regard, the present work was conducted. The aim of present study was to evaluate the susceptibility of five hospital-acquired infections such as

KEY WORDS

Hospital-acquired infections; free aldehyde/phenol disinfectants; MIC; MBC; Phenol coefficient

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Pseudomonas aeruginosa, *Staphylococcus aureus*, *Escherichia coli*, *Acinetobacter*, and *Enterococcus* using the different free aldehyde/phenol disinfectants including new ones (such as *Saya sept HI*, *Deconex 50 AF* and *Septi turbo*) and conventional disinfectants (such as *Saya sept HP*, *Deconex 53 Plus* and *Deconex Solarsept*). To investigate the effect of each disinfectants minimum inhibitory concentration (MIC), minimum bactericidal concentration (MBC), and phenol coefficient (PC) were determined. The second aim the present work was to determine the efficiency performance of disinfectants under laboratory condition.

MATERIALS AND METHODS

Material

All reagents and materials were prepared from authentic company in analytical grade. All disinfectants were provided from Behban Shimi Company, Iran, Borer Chemie AG, and Switzerland. As it can be seen in [Table 1], the characteristics of the used disinfectants are shown.

Bacterial culture detection

Firstly, the samples were cultured in Mueller Hinton Broth medium and were incubated in 37 °C for 24 h, then for identification of the each bacterium the specific medium was considered. For *Escherichia coli* the EMB medium was used. The green metallic luster after 37 °C for 24 h was indicated the presence of *E. coli* in sample. At similar conditions, Mannitol salt agar medium for detecting the *Staphylococcus aureus* was utilized. The Cetrimide agar, Bile Esculine Agar, OF medium were applied to detect and counting the *Pseudomonas aeruginosa*, *Enterococcus*, *Acinetobacter* spp., respectively.

Phenol coefficient (PC)

Phenol coefficient test was developed by Rideal-Walker 1903 and it is originally considered for determining the germicidal efficiency of disinfectants as compared to phenol, and it can be expressed as the following equation:

To determine the PC about 0.2 mL of *Salmonella typhi* was added to different dilutions (1:10, 1:20, 1:30, 1:40, 1:50 and 1:60) of phenol for 24 hours; then, a certain loopful of each dilution was transferred to sterilized tubes containing Mueller Hinton Broth medium at 5, 10 and 15 interval. After incubating the growth of infectious at 37 °C for 48 hours, it was monitored.

Determination of MIC and MBC

The minimum inhibitory concentration (MICs) and minimum bactericidal concentration (MBCs) were determined according to the micro-dilution method [19]. The lowest concentration which can inhibit the growth of exposing bacteria to antimicrobial agent is considered as the minimum inhibitory concentration (MIC). MBC represents the lowest concentration of an antibacterial agent to kill 99.9% when compared to the MIC dilution.

Disinfection under laboratory condition

For evaluation of the disinfectant materials efficiency prior to application in fields this section was considered. To simulate a medicine center such as hospital units a surface such as the ceramic tiles for present work was selected. These tiles with dimension about 15×15 cm were prepared. In the first step, the tiles were rinsed and sterilized in autoclave. Then, to ensure from sterilization tiles surface was taken sampling onto ceramic tiles. All samples were cultured in blood agar medium and were incubated in 37 °C for 24 h. Next, 100 µL of the bacterial strains (0.5 McFarland) were added to tile surface and using the Sterile culture swabs bacterial strains was dispersed onto tile surface. Then, infectious tiles were disinfected by disinfectant materials with different dilutions as [Table 2]. Finally, sampling and cultivating after three times of disinfection about 15, 30 and 45 minutes in blood agar were performed. [Fig. 1] represents the photographic image of disinfection process and positive sample.

RESULTS

Antimicrobial test

To assess the killing potential, the phenol coefficient was determined for both of the disinfectants (new and conventional one). It can be seen in figure 2 that there is significant amounts in phenol coefficient for all type of disinfectants. The phenol coefficients were calculated about 1.33, 0.13, 0.53, 0.27, 1 and 5.8 for *Septi turbo*, *Saya sept HI*, *Deconex 50 AF*, *Saya septHP*, *Deconex Solarsept* and *Deconex 53 Plus*, respectively. The results showed that the relative germicidal efficiency of *Deconex 50 AF*, *Saya septHP* and

Saya sept HI are more than phenol under laboratory conditions. Also, the germicidal efficiency for *Deconex Solarsept* equals phenol and the other disinfectants were relatively weak to killing the *salmonella typhi* rather than phenol. The MIC of different disinfectants against hospital infectious strains is displayed in [Table 3]. Accordingly, to MIC values can be seen disinfectants concentrations and their dilutions for each infection. *Staphylococcus aureus* and *Escherichia coli* were more vulnerable than other infectious. To access minimum inhibition for *Enterococcus* strains higher dosage of disinfectants were required. Regarding the minimum inhibition values, it is clear that the *Saya sept HI* and *Deconex Solarsept* are stronger to inhabit all infectious strains. Among them, *Saya sept HP* with lower dilutions and more amounts of disinfectant mater was recognized as the weakest. Originally, the phenol coefficient method is testing disinfectants against *Salmonella typhi*. This antimicrobial assay have been tested using *Salmonella choleraesuis*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*(Oule et al., 2008). According to results [Fig. 2], it can be found that maximum and minimum phenol coefficient is related to *Deconex 53 Plus* and *Saya sept HI*. This result is demonstrated among tested disinfectants *Deconex 53 Plus* and *Saya sept HI* are the strongest and weakest, respectively. Both disinfectants are from ammonium quaternary compounds category, and this difference probably is related to disinfectant nature and their chemical formula.

Table 1: The characteristics of used disinfectants

Trade name	Characteristics	Trade name	Characteristics
<i>Deconex 50 AF</i>	Ingredients;-didecyl dimethyl ammonium chloride, N,N-Bis(3-aminopropyl)-dodecylamine, coco propylenediamine-1.5-bis-guanidinium acetate -For disinfecting floors, walls and medical devices	<i>Deconex Solarsept</i>	Ingredients;- propan-2-ol, propan-1-ol, N-(3-aminopropyl)-N-dodecylpropane-1,3-diamine -Ready-to-use , alcohol-based, rapid disinfectant -For wipe or spray disinfection of small areas and medical equipment
<i>Saya sept HI</i>	- International Code: 2424 ISIC, 353 CPC -Fourth-generate QACs - For disinfecting dental and medical tools - Ingredients; Dimethyl benzyl ammonium chloride, Alkyl dimethyl benzyl ammonium chloride	<i>Saya sept HP</i>	- International Code:2424 ISIC, 353 CPC -Fifth-generate QACs -Usage surfaces Effective on mycobacterium, virus and air-borne bacteria
<i>Septi turbo</i>	Ingredients; Deionized water, propanol, anticorrosion,Didecyl dimethyl ammonium chloride, protective materials (70% alcohol and 25% QACs) -antibacterial, HIV, HBV -Fast-acting	<i>Deconex 53 Plus</i>	- Ingredients; alkyl propylene diamine guanidinium diacetate N,N-Didecyl-N-methyl-poly(oxyethyl)ammonium propionate -Aldehyde-free instrument disinfectant -For the pre-cleaning and disinfection of medical instruments, including rigid and flexible endoscopes

Table 2: disinfectants dilution for laboratory condition

Disinfectants	Dilution	Disinfectants	Dilution
<i>Deconex 50 AF</i>	1	<i>Deconex Solarsept</i>	1:4
	1:16		1:8
	1:64		1:16
<i>Saya sept HI</i>	1	<i>Saya sept HP</i>	1:8
	1:16		1:32
	1:32		1:64
<i>Septi turbo</i>	1:8	<i>Deconex 53 Plus</i>	1:4
	1:16		1:8
	1:32		1:16

Table 3: MIC results

Disinfectant	<i>Pseudomonas aeruginosa</i>		<i>Staphylococcus aureus</i>		<i>Escherichia coli</i>		<i>Acinetobacter</i>		<i>Enterococcus</i>		
	Spp.	Dilution	Disinf. Dose (µg/mL)	Dilution	Disinf. Dose (µg/mL)	Dilution	Disinf. Dose (µg/mL)	Dilution	Disinf. Dose (µg/mL)	Dilution	Disinf. Dose (µg/mL)
<i>Septi turbo</i>		1:16	12.5	1:64	3.1	1:64	3.1	1:16	12.5	1:16	12.5
<i>Saya sept HI</i>		1:128	1.5	1:256	0.75	1:128	1.5	1:128	1.5	1:64	3.1
<i>Deconex 50 AF</i>		1:32	6.2	1:64	3.1	1:64	3.1	1:32	6.2	1:8	25
<i>Saya sept HP</i>		1:16	12.5	1:32	6.2	1:32	6.2	1:16	12.5	1:8	25
<i>Deconex Solarsept</i>		1:128	1.5	1:265	0.75	1:256	0.75	1:128	1.5	1:128	1.5
<i>Deconex 53 Plus</i>		1:64	3.1	1:128	1.5	1:128	1.5	1:64	3.1	1:16	12.5

To determine the minimum bactericidal concentration (MBC), the MIC samples were cultured in Mueller-Hinton Agar medium and were incubated for 24 hours. After this time, no colony was growth. As a result, the MIC is considered equal to MBC [Table 4]. Based on minimum bactericidal and inhibitory concentration of disinfectant mater can be asserted: *Saya sept HP* > *Septi turbo* > *Deconex 50 AF* > *Deconex 53 Plus* > *Saya sept HI* > *Deconex Solarsept*. Also, *Saya sept HP* was recognized as the weakest disinfectant due to higher amount of disinfectant concentrations. *Staphylococcus aureus* and *Escherichia coli* were more vulnerable strains and *Enterococcus* were more resistance to minimum inhibitory concentration. This fact can be resulted from bacterial characteristics. For example, disinfectant resistance of *Enterococcus* trains (such as *Enterococcus faecalis* and *Enterococcus faecium*) is provided by production of peptidoglycan cell wall precursors (Muto et al., 2003). Some strains of *Staphylococcus aureus* also can secrete extra cellular compounds (mucoid) and it can cause resistance to disinfectant agents. Generally, Staphylococci strains are considered as susceptible to disinfectant agents, but they are resistant to some disinfectants encompassing *ethidium bromide*, *acriflavine*, quaternary ammonium compounds (such as *cetrimide* and *benzalkonium chloride*), and *diamidines* (such as *propamidine isethionate* and *diamidinodiphenylamine dihydrochloride*) (Al-Masaudi et al., 1991). Tennent and colleagues (1989) have reported about the genetic analysis of *Staphylococcus aureus* and its resistance characteristics (genes *qacA-E*) to antiseptics and disinfectants (Tennent et al., 1989). The quaternary ammonium compounds are low-level or weak disinfectants and they are not effective on spore forms. On the other hand, several mechanisms is facilitated the resistance of microorganisms to disinfectants agents that can be asserted as following: modifications in the membrane composition, expression of stress response and repair systems, or expression of efflux pump genes (Hegstad et al., 2010). Despite the low efficiency of quaternary ammonium compounds, there is widespread usage due to inoffensive characteristic (non-phenol and non-aldehyde).

Table 4: MBC results

Spp.	<i>Pseudomonas aeruginosa</i>		<i>Staphylococcus aureus</i>		<i>Escherichia coli</i>		<i>Acinetobacter</i>		<i>Enterococcus</i>	
	Dilution	Disinf. Dose (µg/m L)	Dilution	Disinf. Dose (µg/m L)	Dilution	Disinf. Dose (µg/m L)	Dilution	Disinf. Dose (µg/mL)	Dilution	Disinf. Dose (µg/m L)
Septi turbo	1:16	12.5	1:64	3.1	1:64	3.1	1:16	12.5	1:16	12.5
Saya sept HI	1:128	1.5	1:256	0.75	1:128	1.5	1:128	1.5	1:64	3.1
Deconex 50 AF	1:32	6.2	1:64	3.1	1:64	3.1	1:32	6.2	1:8	25
Saya sept HP	1:16	12.5	1:32	6.2	1:32	6.2	1:16	12.5	1:8	25
Deconex Solarsept	1:128	1.5	1:265	0.75	1:256	0.75	1:128	1.5	1:128	1.5
Deconex 53 Plus	1:64	3.1	1:128	1.5	1:128	1.5	1:64	3.1	1:16	12.5

Saya sept HI mechanism disinfectant is completed through adhesion and it disrupts the cytoplasmic membranes and the vital cell functions. In this compound, there is not benzene ring on didecyldimethylammonium chloride. As a result, it is more stable than other quaternary ammonium compounds and it can be caused high synergy and antimicrobial effects. Despite all the disinfectants, *Deconex Solarsept* is a 'ready-to-use' and alcohol-based disinfectant. Because the stabilizing of blood and dirty on surface when the alcohol-based disinfectant used, the water-based disinfectants are better to act in hospital and medicine center. Also, the use of water-based antimicrobial material is decreasing its effect by interferences such as water hardness, organic and inorganic agents. Based on MIC result, the *Saya sept HP* was introduced as the weakest disinfectants. This fact can be demonstrated by nature of *Saya sept HP*, and it could be caused by water hardness during MIC test analyzing. Since the cultured resulting plates of MIC were growing lower than 15 colonies, so the MBC can be equaled to MIC values [Table 4].

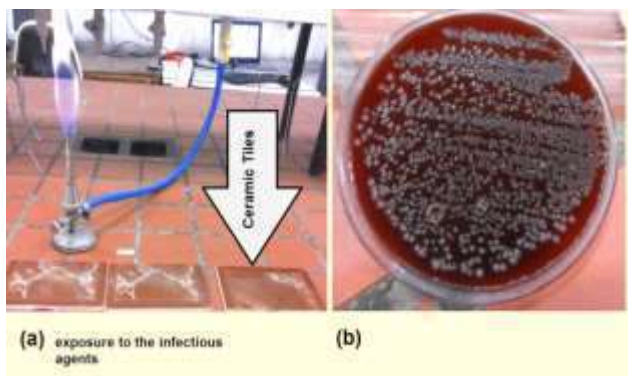


Fig. 1: Effect of disinfectants under lavatory condition (a), positive growth on blood agar (b).

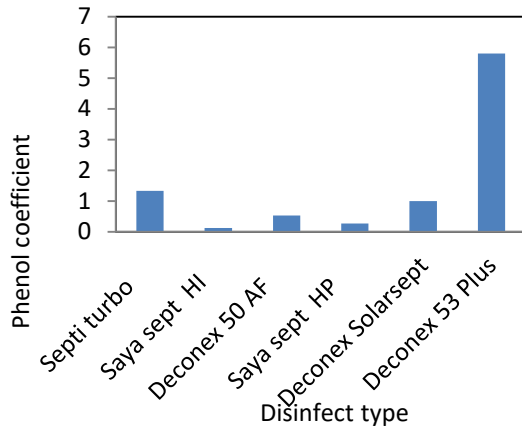


Fig. 2: Phenol coefficient for used disinfectants.

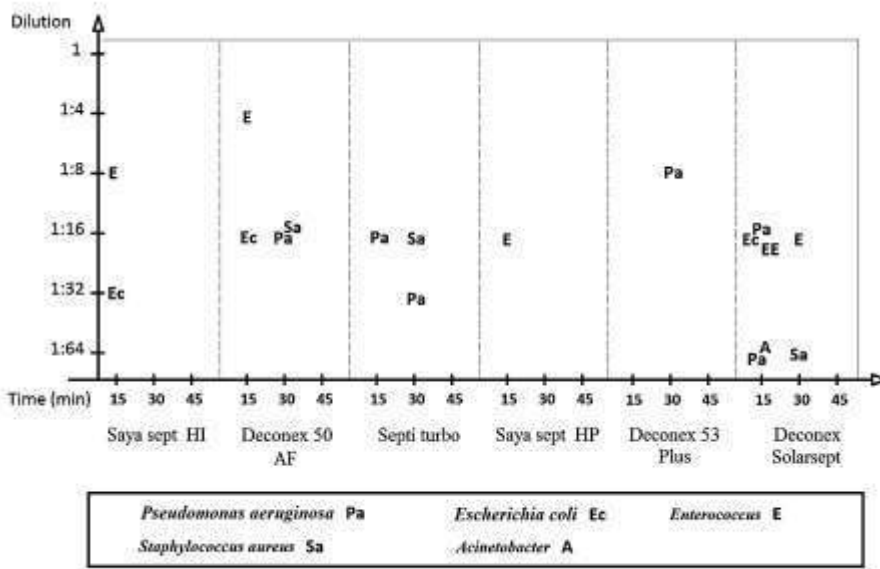


Fig. 3: Disinfectants killing potential evaluation under lavatory condition.

Disinfection under laboratory condition

In the next stage, under laboratory condition the killing efficiency of this mater were studied. At this time, the positive growth of infectious strains was survived at different concentration [Table 2] via three times of 15, 30 and 45 min. The result of this step is represented in [Fig. 3]. Regarding this, it can be seen higher killing potential of *Deconex 53 Plus* and *Septi turbo* for *Enterococcus*. In presence of *Saya sept HP* and *Deconex 53 Plus* grew only *Enterococcus* and *Pseudomonas aeruginosa*, respectively. Higher indicator strains were detected when *Deconex Solarsept*, *Deconex 50 AF* and *Septi turbo* was used. In most cases, at inadequate exposure time (<45) min the infectious strains growth can be seen. In all cases it is clear that *Saya sept HI* and the *Saya sept HP* was able to control *Pseudomonas aeruginosa*. In some dilutions, regeneration of indicators in presence of *Deconex 53 Plus*, *Deconex Solarsept*, *Deconex 50 AF* and *Septi turbo* was observed. At all dilutions in presences of *Deconex 53 Plus*, *Saya sept HI* and the *Saya sept HP* have controlled the *Staphylococcus aureus*. Also, *Escherichia coli* were controlled by *Deconex 53 Plus*, *Septi turbo* and *Saya sept HP* in all dilutions. According to results, regeneration phase was not observed for *Enterococcus*, *Acinetobacter* and *Escherichia coli* under laboratory condition. When the *Deconex Solarsept* was considered *Acinetobacter* growth was rather. On the other hand, *Enterococcus* was not seen when *Deconex 53 Plus* and *Septi turbo* were added. Similarity, Ghasemi and colleagues (2012) have reported that *Deconex* was an effective material when it was used for disinfection of *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Candida albicans* (Ghasemi et al., 2012). Also, Hoseini and colleagues (2006) were demonstrated when *Deconex solarsept* used the amount of *pseudomonas aeruginosa*, *staphylococcus aureus*, *mycobacterium*, and *salmonella typhimurium* are controlled (Hoseini et al., 2006).

CONCLUSION

Based on the results of present work, it can be found that the maximum and minimum phenol coefficient are related to *Deconex 53 Plus* and *Saya sept HI*, and consequently, they are the strongest and weakest disinfectants, respectively. The result of MIC antimicrobial test showed that *Saya sept HI* and *Deconex Solarsept* are effective, and also *Saya sept HP* was recognized as the weakest disinfectant. *Staphylococcus aureus* and *Escherichia coli* were more vulnerable strains and *Enterococcus* were more resistance to minimum inhibitory concentration. The MBC test equaled to MIC values. Final disinfection under laboratory condition was performed, and *Saya sept HI* and the *Saya sept HP* was able to control *Pseudomonas aeruginosa*.

CONFLICT OF INTEREST

There Is No Conflict of Interest.

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FINANCIAL DISCLOSURE

None

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ARTICLE

INVESTIGATE THE RELATIONSHIP BETWEEN ORGANIZATIONAL CLIMATE AND JOB INVOLVEMENT OF SCHOOL PHYSICAL EDUCATION TEACHERS OF JIROFT

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ABSTRACT

Background: The purpose of this study was finding out any relationship between organizational climate of schools and job involvement of physical education teachers at Jiroft city. **Methods:** The population for this study was (130). All teachers were included in this study. Research tools include: a) organizational climate questionnaire (OCDQ-RS), which includes 34 questions and includes 5 factors, that it's two principal behavior and other dimensions of teacher behavior (behavior hopelessly behavior responsibly intimate behavior) to evaluate. B) A questionnaire job involvement containing 20 questions. The Cronbach's alpha questionnaire equal 0.82. **Results:** For Analysis and comparison of methods for data description descriptive statistics and inferential analysis of data, the data distribution was not normal (K-S test), the Spearman correlation coefficient at $P \leq 0/05$ was used. Investigation showed that the behavior of job commitment, sincere attitude, behavior and organizational climate supportive There is a positive correlation. **Conclusions:** Although disappointed by the attitude and behavior of the managers' job grammatical there was a significant inverse relationship. Finally, individuals are ineligible and the ability to run the school, the school will impose many problems. Therefore, efficient and effective management of the organization for excellence in education is obvious and inevitable.

INTRODUCTION

KEY WORDS

Organizational Climate,
Job involvement &
teachers

Education system is one of the organizations in which we have human being balance with environment. Of course, teachers and schools play an important role in this system [1]. Experienced teachers know that any transfer from one school to another, they find a new feeling with clear differences with previous places, School Organizational climate is the real factor of such a feeling. According to the behavior and conduct of personnel, there are various evidences about any relationships among teachers. Whether they have calmness or mutual relations and/or working with each other with full confidence [8]. Perhaps there is stress in school with further reflections in behavior and speech of teachers and their relations with principal and students. It is necessary to have a health and active environment to find out training goals with positive relations among teachers and students [16]. Rather than organizational climate as a group & organizational variant at schools, we have some other effective variants like personal attitudes (organizational commitment, job satisfaction and job involvement) on job quality, playing any roles and responsibilities of teachers. As a result, personnel prefer any jobs in which they have required specialty and freedom. Such an attitude may cause a person feel more mental satisfaction and find his/her job really involving [19].

Litwin & Stringer (1988) defined organizational climate including some personal concepts about the organization and place of work and his/her feeling about different organizational dimensions like independency, organizational structure, allowances, aggressiveness, sincerity, support and clearness [16]. Organizational Climate is similar to a bridge. It is from one side a real aspect of the organization including the structure and leadership regulations and methods. Although it is necessary to have optimized benefit from human resources, financial and equipment resources but potentiality of educational system depends upon different factors like satisfied personnel with high level of loyalty to organization. This is necessary to work in an active and health place with applying all their force for better efficiency [15]. Therefore, it has been always tried to have suitable attitude about various ideas of members and personnel. This is because of their attitudes and related to their important behavior. For example, it is possible to have unsatisfied personnel with lots of absences or leaving the organization for entrance into a better one. Furthermore it has been proved that satisfied personnel have higher level of mental & bodily health. Finally we will conclude that job involvement is an ultra-organizational phenomenon and so much effective in private life of people. [14]. As a result, those personnel with higher level of involvement are more sensitive for selecting any jobs and more attention what they should do. (Narrated from 17). Dezfuli, Shafi Nia and Shetab Booshehir (2009) have studied any relationship between mental health and job involvement. Eskandari & Nisti (2009) studied any relation between equality concept and organizational commitment and satisfaction. Omidi Arjanki, Arizi and Nouri (2008) studied any relation between job characteristics and job commitment and job involvement. Shakiba & Nisti (2007) studied any relation between general health and satisfaction with job involvement. Khoshkan, Shekar Shekan and Nisti (2007) studied any relation between IT, commitment, satisfaction

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remaining and involvement [3, 4]. According to the studies about organizational climate and job involvement, it is clear that organizational climate (open & closed) is effective on both job attitudes (commitment & satisfaction). It may cause an increase in modes and decrease of stress. As a result, it is probable to have any relationship between organizational climate (open & closed) with job involvement. It is specifically to have both leadership styles of school (normative & supportive) with more roles in these relations. Organizational climate is obvious in all dimensions of the organization. Therefore, it is not only effective on conducts of members but also on their attitudes of their jobs [11]. On the other hand, since organizational climate is effective on job involvement, such a research could specify the rate of job involvement of physical education teachers? How much this involvement is affective by organizational climate? Although these are lots of research about job attitudes, but there is a little number of research about job involvement in Iran in the field of physical education. According to the studies, various researches were made about organizational climate of schools and job involvement of physical education teachers separately. But any relation of these two variants was not specified at Jiroft. The author hopes the results of this research could bear important applications for persons in charge of education and principals of schools and provides a suitable situation for any increase in job involvement of teachers.

MATERIALS AND METHODS

The present research is an explanatory and measuring one. It is also applicable from viewpoints of goals. The statistical population includes all physical education teachers, male & female, at Jiroft city (130 persons).

Regarding the present small statistical population, all male and female teachers are included in statistical sample of research. Research tools are: a) organizational climate questionnaire (OCDQ-RS), which includes 34 questions and includes 5 dimensions, that its two principal behavior (normative behavior and supportive behavior) and other dimensions of teacher behavior (behavior hopelessly behavior responsibly intimate behavior) to evaluate. Therefore climate of schools is perhaps closed or open. But in fact sincere behavior of teachers is not included in open organizational climate. This means that schools have either closed or open climate. But this means that there is little or high degree of sincerity among teachers. As a result, sincerity is a general factor in organizational climate. All indexes of this questionnaire have required reliability and validity for measuring important aspects. Reliability of organizational climate questionnaire was approved by Ojaghi (1997). The validity of it was confirmed by the use of Chronbach alpha 0.85. The relevant questions of any dimensions of organizational climate were regulated according to 4-value Likert criterion. Therefore we should select any variants from among four options (very rarely, sometimes, frequently and always). Grading method for the options of (very rarely, sometimes, frequently and always) was respectively 1 to 4.

B) A questionnaire for job involvement including 20 questions. Tadriss Hosseini (1993) obtained the validity coefficient of this test equal to 0.90 by the use of half making method and its reliability through base validity equal to 0.86. Both reliability and validity coefficients were inserted also in the same research by Imami & Taleb Pour (2007) and equal to 0.73. Also Dezfuli (2009) has obtained a validity coefficient of this questionnaire and by the use of Chronbach alpha equal to 0.83. This is a sign of suitable reliability of this research. The researcher has also obtained the reliability of this questionnaire equal to 0.82 by the use of Chronbach alpha. In order to evaluate and compare explanatory data we used explanatory statistical methods for further analysis of research information. Due to the lack of normal data distribution (by the use of K-S test), we used Spearman correlation coefficient at P

RESULTS

About 120 physical education teachers were present in this research. According to the results, the average age of %51 of physical education teachers at Jiroft city was 31-41. With regard to such an age distribution, it is possible to say that all physical education teachers of Jiroft city have considerable experiences in this field. [Diagram 1]

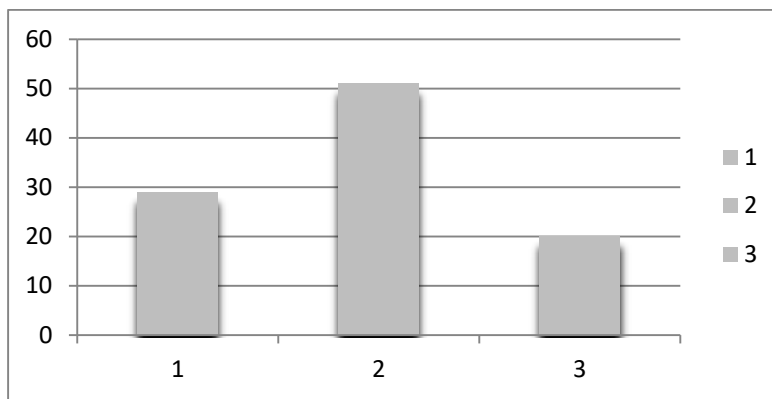


Diagram 1: Distribution of research sample in three age groups

Also the group of Bachelor of Science and Associate Degree holders had the highest rate of degrees and Master of Science had the minimum rate as well.

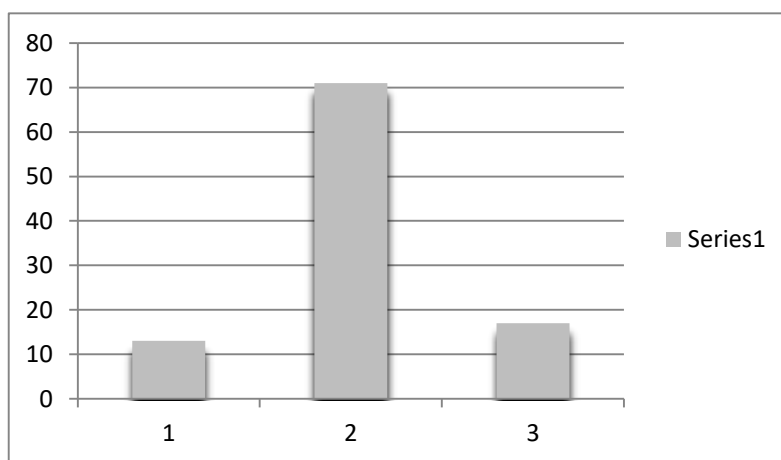


Diagram 2: Frequency distribution of research sample according to academic degree

Another result was a positive and significant relation between job involvement and normative behavior, sincere behavior, supportive behavior and organizational climate. But there is a converse and significant relation between disappointment behavior and normative behavior of principals and job involvement. [Table 1]

Table 1: Any relation between organizational climate dimensions and involvement of physical education teachers

Dimensions of organizational climate	Obligatory behavior		Disappointing behavior		Sincere behavior		Supportive behavior		Normative behavior	
	r	p	r	p	r	P	r	p	r	p
Job involvement	0.62	0.00	-0.58	0.002	0.71*	0.003	0.69*	0.005	-0.64*	0.001

DISCUSSION

Presence of any positive and significant relation between organizational climate and job involvement in this research is in compliance with the same results by Moradi Nia (2009), Mogaji (2002), Rangnekar (2005), Chang (2006), Dimitriades (2007) and Shu Hui (2010). [9, 10, 11]

This result is because of an average and open climate, in which the principal is like an active leader for performing of duties and a relation-based person. All teachers are obliged to teach with mutual respects and really proud of this school. The important index of them is high mode and severity of their work place. As a result, because of satisfying their social necessities and suitable job performance, they have high level of job satisfaction and may accept any stress factors of their organizational climate. This may cause an increase in job involvement of teachers. High level of obligatory behavior level among teachers may cause them to be proud of their school. They are enjoying from working with each other and support their colleagues. [2, 12]. Meanwhile teachers are not worry about each other and also are obliged against success of their students. This means that upon any increase in their obligatory behavior, there is an increase in their job involvement which is in compliance with the same results by Taleb Pour & Imami (2007), Elankumaran (2004), Ping et al. (2009). [5, 7]. There are various situations through the job life in which we face with lots

of disappointments, failures and pressures. Any understanding of the mentioned factors may cause a reduction in job involvement in people. In this research, there is also a significant and negative relation between disappointment behavior and job involvement which is in compliance with the same results by Ghasemi Nejad (2005), Grayson et al. (2007) and Malik (2005). [18, 20]. Disappointment behavior of teachers is mostly because of high interference of principal and colleagues. This may prevent teachers to perform their major teaching duties. In this case, there are lots of managerial ignorance and non-educational duties. Probably this may cause a person who find itself without any power, authority and freedom in performing of duties and finding any organizational goals to have disappointed behavior and finally a reduction in his/her job involvement [14,16]. Sincere behavior of teachers means an integrated and powerful social relations network among all teachers. Such a behavior not only means good relations inside the school but also out of it. Also it has been observed in this study that there is a significant relation between sincere behavior and job involvement of teachers which is in compliance with the same results by Taleb Pour & Imami (2007), Elankumaran (2004), Ping et al. (2009). Such a positive and significant relation is probably due to the presence of a non-official organization inside the school for satisfying social needs through sentimental and social relations among teachers with their colleagues and principals and students [18]. The mentioned kindness may cause an increase in job involvement of teachers. Furthermore, there was a significant relationship between supportive behavior of principals and job involvement of teachers. It is in compliance with researches made by Nickson et al. (2006), Arizi (2005), Chio Hoo (2006), and Uygur & Kilic (2009).[11]. According to the evidences, lower control on people and little control on their speed of work may cause a reduction in their stress and increase of their job involvement. Of course it is necessary to make more researches but according to the evidences, there is an increase of stress and a reduction in job involvement in those jobs which are really important and in which people have no more freedom. In this research, there was a significant and converse relation between normative behavior of principals and job involvement of teachers. This means that any increase in normative behavior of principals we faced with a reduction in job involvement of teachers. It is in compliance with the results of researches made by Ghasemi Nejad (2005), Grayson et al. (2007) and Malik (2005). [10]. Probably the real reason of any converse and significant relation between these two factors are little chances for upgrade and sever rules and regulations and also lack of freedom which may cause some negative attitudes in teachers about their jobs. The result of which is a reduction in their job involvement. [12].

CONCLUSION

According to the researches it is obvious that principals are so much effective on thoughts, feelings and wishes of their fellow persons. The mentioned thoughts and feelings and wishes are effective on all personal aspects and further motivations. Education Organization includes one of the major organizations which should be controlled and managed by a principal. In presence of any persons with lack of competency and required abilities, there will be so many problems imposed on this organization. As a result, it is inevitable to have effective and efficient principals for education organization.

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ARTICLE

THE ROLE OF S.R OF CLUB ON FANS' DEPENDENCY CLUB REPUTATION (CASE STUDY: ON THE TEAM IN THE FOOTBALL PREMIER LEAGUE OF IRAN)

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ABSTRACT

Background/Aim: The aim of this research is to study role of social responsibility of club on club reputation and fans' dependency on team in the football premier league. **Methodology:** The present research is of correlation type and has been performed as a field study. The statistical universe includes all fans of premier league teams in 2013- 2014. The statistical sample was selected among the fans attended sport stadia. Considering at least 9000 fans attended each play, the sample size according to Morgan Table was estimated 380 persons (each team: 190) and available sampling method was used. To collect data,. The social responsibility (Stewart, 2003)) and so the questionnaires of club reputation (Resler, 2010) and questionnaires of dependency on team (Gay et al 2009)standard questionnaires were used as research tool. The content and construct validity of these questionnaires were confirmed in Bakhshande (2012) research, respectively. This was descriptive- correlation field study. Using smartPLS software, the descriptive statistics (mean, frequency) and inferential statistics (structural equal modeling) were analyzed. **Findings:** The findings showed that.1) the provided model had good fitness (GOF) with general model 2) social responsibility as the predictor variables could partially predict 13% club reputation changes also .social responsibility as the predictor variables could predict 1% dependency on team changes.

INTRODUCTION

The economic conditions, physical environment, government regulations and technological progresses influence consumers' requirements and expectations and the company capabilities and its competitors [1]. On the one hand organizations deal with the increasing pressure of profitability reinstatement and on the other hand with the rational behaviors in the society (Walker,2009). In contrast to the traditional views, the task of companies and organizations is not only profitability but also they have some responsibilities in their own business spaces which are mentioned as the social responsibility [2]. According to walker and Kent (2009) the social responsibility in the sport industry is different from the other areas, because this industry has some characteristics that distinguish it from the other organizations in the trade area (Walker and Parnet, 2010).

A club must recognize its possibilities and capabilities alongside satisfying fans' requirements as whole. Accessing to such a recognition requires evaluating all angels of a club including its financial conditions, managerial general skills, production possibilities, research and development possibilities, special technological delicacies, club reputation and marketing skills [1]. A football club like the citizens is an effective member and force of society. A football club, not only in the playground but also in its external activities including social responsibility causes the society progress. The practical evidence shows the initiatives of the social responsibility can have some positive consequences through increasing brand image, reinforcement of reputation, maintenance of employees, selling increase and loyalty stabilization of consumers.The clubs are seeking increase and maintain reputation, therefore they should recognize their own audiences and their values in the relationships.Thus , to increase reputation.

We need a comprehensive and complete definition about the social responsibility. The social responsibility of managers and institutions consists in to be under an obligation to responsiveness and satisfying the expectations of external stakeholder groups such as customers, suppliers, distributors, environment guards and service / production workers along with protecting interests of internal stakeholder groups such as owners or shareholders and unit employees [3]. In today's competitive world, In today's comparative world, the fans are in favor of the clubs and their satisfaction is the major factor of taking competitive profit of the clubs. To satisfy the fans requires meeting their needs completely and identifying exactly their demands, expectations, tendencies, abilities and limitations in usage of the services or purchasing products [4].

The researchers also believe that the fans are considered as pillars of sport industry, because they provide athlete with a live and direct environment, so that the athlete cannot exhibit a good play in the competition [5].

One of the social problems which many of authorities and practitioners of different societies pay attention to it is inattention and lack of commitment of organizations and managers to their own social responsibility and task. This important subject, especially in Iran has been considered due to some certain conditions and necessity of comprehensive development, [6].

Studying the social responsibility issue is important due to several reasons:

KEY WORDS

relationship, social, club, reputation, dependency, football, premier league.

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1)The managers' decisions influence deeply the different parts of the society.2) If the individuals, groups, organizations and institutes of the society hold themselves responsible for various events, happenings and crises and attempt to solve the various problems, many crises and problems will be solved at a short time and a healthy and pacific society will be exist. 3) To improve and protect their place in the society, organizations should pay attention to their own social responsibilities and have legality in the society. 4)All performances of organization influence the society and this effect, good or bad, will be reflected on organization itself ; therefore managers' malfunction causes many problems for society that finally will involve themselves. 5) The cost of society in which managers haven't any sense of responsibility is very high [7, 8].

Onlaor and Rotkanakit (2010) in their research related to costumers' loyalty studied the influence of the social responsibility on customers' loyalty. They found that the degree of customers ' support of the social responsibility has an positive effect on their satisfaction and every four aspects of the social responsibility have an positive and significant effect on customers' satisfaction. Li and Lee (2011) conducted a research related to the interaction effect of the social responsibility and reputation on the customers evaluation. They found that the social responsibility has a positive and significant effect on the customers ' identity and reputation. [9] performed a research related to the factors influencing spectators attendance in Iran that studied the effective factors on the spectators attendance in the football competition between Perspolis and Sepahan.

Studying the relationship between the spectators' motives and their rate of attendance demonstrated that there is a significant relationship between supporting team, escape, emotion of play, awareness of football, clearing play, welfare services and plays entertainment with the rate of spectators' attendance. But there is no significant relationship between interest in a special player and winning the related team with the rate of spectators' attendance. Also [10] in their research concluded that there is a significant and positive relationship between the organizational factors and the social responsibility of the organization. They stated that the employees' mental pattern is the most effective major factor on the social responsibility of the organization. [11] carried out a research titled “ Studying the relationship between the social responsibility and the organizational commitment with conservation in the financial reporting of the companies accepted in Tehran stock market “that was consistent with our studies.

The football clubs maintain their relations to the citizens of society through doing initiatives of the social responsibility (Vindesour, 2001; Wood ad Loosdon, 2001) and thus increases fans' support. One of the ways to return on investment for the clubs is such increased support of fans (Rooska, 2011).

MATERIALS AND METHODS

The present research is of correlation kind and in terms of objective, is functional. The statistical universe of research includes the fans of 16 teams of football premier league (2013- 2014) ; considering there are millions of fans in throughout Iran, and on average about 9000 spectators attended clubs. For more confidence, the researcher selected his statistical sample only among spectators. The sample size was estimated 380 spectators by Morgan Table (each team 190). Considering the probability of fall and increasing generalizability among the fans of each team, 200 questionnaires were distributed and the available sampling method was used.(200× 16)

In this research, 3 inventories were used. The social responsibility inventory has composed of four aspects of ethical, economic, legal and humanistic responsibilities and was measured by 12 questions from the standard inventory (Stewart, 2003). The inventory of reputation has been designed in 2010 by Resler and included 7questions. The dependency on the team inventory has been designed in 2008 by Gay et al. It has 4 questions and is based on 5 point Likert scale. The social responsibility standard inventory (reliability coefficient 0/88) includes four aspects of obedience to law (reliability coefficient 0/78), economic responsibility (reliability coefficient 0/73), ethical responsibility (reliability coefficient 0/89) and humanistic responsibility (reliability coefficient 0/83) that has been validated in Iran by [12]. The content validity and construct of this inventory have also been approved by him. Also, the inventories of the reputation (Resler, 2010) and the dependency on the team (Gay et al. 2009) were used with reliability coefficients 0/76 and 0/70, respectively. *This was descriptive- correlation field study. Using smartPLS software (Partial Least Squares method), the descriptive statistics (mean, standard deviation, frequency) and inferential statistics (structural equal modeling) were analyzed.*

RESULTS

Finding

- 1- Age : 51/2% fans have the age range of 18-24 and 8% were above 45.
- 2- Record of support : 38/5% and 9/2% fans have supported their popular team for 2-5 and 11-15 years, respectively.
- 3- Education : 37/2% and 17/6% fans were holder of diploma and M.A and higher level, respectively.

4- Attendance in one season : 37/8% spectators attend 1-3 times in the club and 17/6% of them, 7-10 times.

5- Following the plays : 68/ 5% spectators follow all plays of their popular team and 6/5% of them don't follow the plays of their own team.

The results of the normality assumption test of the social responsibility and its aspects and the variables of research are provided in the following table (table 1) :

Using software PLS, this study aimed to investigate the role of variables and provide a model. The structural equation model examines model fitness in three parts: 1) Measurement models, 2) Structural model, and 3) General model. The measurement model investigates the reliability and validity of research measurement tools.

Fitness of measurement models: According to PLS algorithm, the reliability, convergent validity, and divergent validity were used to study the fitness of measurement models (Nunnally, 1978, quoted by [13]. The AVE of research structure related factors in original research model showed that all research items were qualified to explain relevant variables.

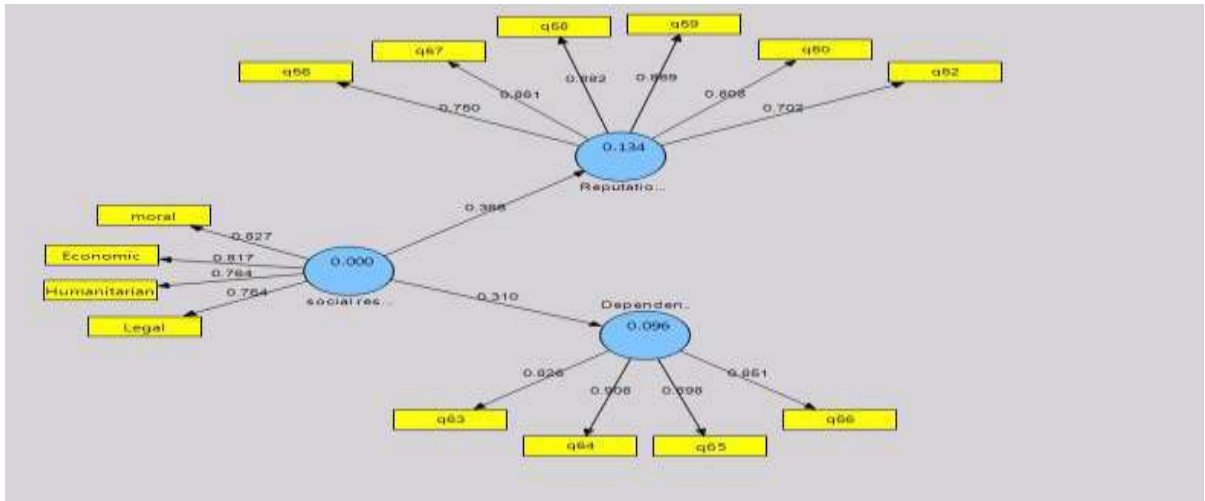


Fig. 1 :bFinal model implemented without removing factor loadings.

Table 1: Verify the validity of variables

Variables	fans' dependency	Club reputation	Social Responsibility	Acceptable values
fans' dependency	0/576			scores must be greater than numbers below and numbers in left side (Confirmation of divergent validity)
Club reputation	0.531720	0/439		
Social Responsibility	0.310148	0.366328	0/395	
Composite Reliability(CR)	0.926394	0.921683	0.871619	More than 0.7 (Fornell and Larckr, 1981)
Cronbach's alpha	0.893764	0.896775	0.803205	More than 0.6 (Chu, Lin, Chang, and Chuang, 2013: 5)
(AVE)	0.759103	0.663812	0.629578	More than 0.5 (Fornell and Larckr, 1981)
R2	0.096192	0.134196		More than 0.4

Note: The numbers in table represent the square root of AVE ([14] method to verify divergent validity)

[Table 1] showed that in measurement model, the coefficients of factor loadings, Alpha Cronbach, combined reliability, and common values which are used to assess the overall value of **model are in good condition**. The AVE scores also confirm the convergent validity.

Fitness of structural model: The result of structural model test (i.e. t-value) of two structures are,12/416,14/949 [Fig. 2]. The obtained standard score (=1.96) shows the suitability of research structural model.

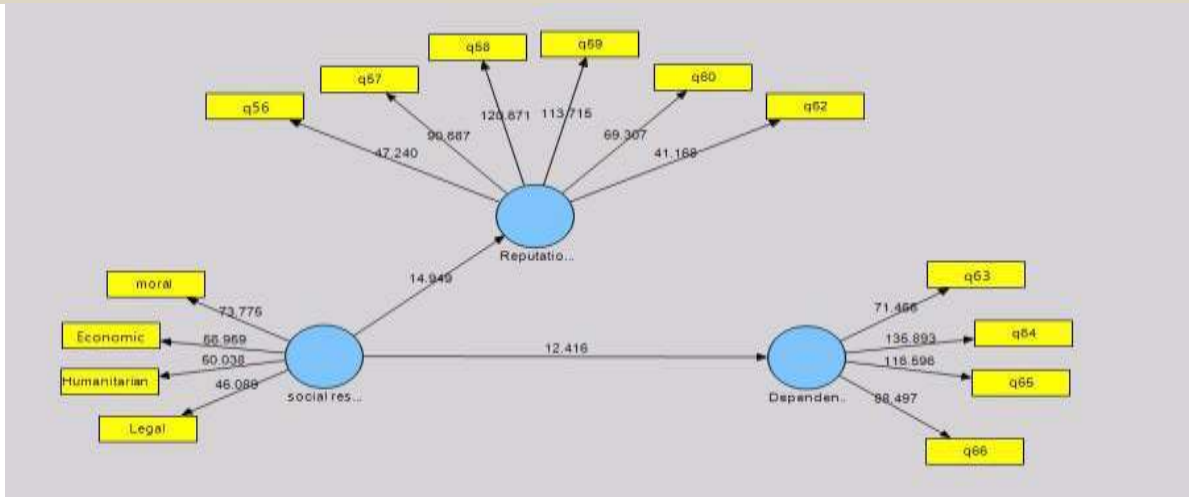


Fig. 2: Structural Model of Research.

Fitness Of General model: The GOF is used to investigate the fitness of general model. This criterion is the square root of multiplying structures' shared values in R2. The 0.01, 0.25, and 0.36 are considered as weak, medium, and strong scores for GOF; the 0.280 score shows that the general model has very medium fitness [15].

$$GOF = \sqrt{COMMU \times R^2}$$

Table 2: Main hypothesis test

Impact level	Path coefficient	Value T	R2	Impact level	Test result
S.R ⇒ fans' dependency	0/310	12/416	0.096	Very Weak	Acceptance of H Directly
S.R ⇒ Club reputation	0/366	14/949	0.134	Weak	Acceptance of H Directly

Since the t-value is greater than 1.96, it can be said that: Social responsibility has a significant impact on fans' dependency of Football Premier League teams' fans.(directly). The social responsibility explains 1% of variance fans' dependency of fans.(directly). (T=12/416). Social responsibility has a significant impact on Club reputation of Football Premier League teams' fans. The social responsibility explains 13% of variance Trust fans of fans. (T=14/949)

CONCLUSION

The aim of this research is to study role of social responsibility of club on club reputation and fans' dependency on team in the football premier league. The findings showed that 1) *the provided model had good fitness (GOF) with general model*, 2) Social responsibility has a significant impact on Products Consumption of Football Premier League teams' fans. The social responsibility explains 13% of variance Club reputation of fans. 3) (T=14/949). Social responsibility has a significant impact on Club reputation of Football Premier League teams' fans. The social responsibility explains 13% of variance Trust fans of fans. (T=14/949). The results of this research are associated with the results of Hayanlaver and Rotkanakit (2010), Lee(2011), [9], [10][11]. The results obtained showed that the social responsibility explains 13% of variance Club reputation of fans, that is weak. In today's world, the trade organizations are seeking the management, reputation and credit. Reputation and ideal mental image of organizational identity increase the management credit and the organization reputation. For example the belief systems and believes play a major role in the individuals' attitude. The incorrect believes which can result in the selling and price reductions could be modified by public relations activities. Many authorities believe that the believes can form the trade products and image and individuals react and behave based on this image . Studying and evaluating the strategic operations provide the possibility of the organizational behavior change or general perception and imagine and the individuals adopt their feelings and believes based on these issues. (Oliver, Sandra69, 2009). However, reputation management is an inseparable part of marketing and the social relations. Today institutions, organizations and foundations recognize the importance of reputation and the social and human relations and perform their own works based on these relations (Oliver, Sandra,25, 2009). Social responsibility has a significant impact on Products Consumption of Football Premier League teams' fans. The social responsibility explains 13% of variance Club reputation of fans. (T=14/949). It seems that social responsibility club has very weak impact on fans' dependency on team and their club. The sport fans along with the other fans feel the commitment and dependency on the special team. They feel an unimaginable commitment to the events, and also have common interests and emotions and feelings to their own team (Melnik, 1993). The fans of a team have some similar characteristics which these characteristics include their common interests, emotions and feelings regarding to their favorite team (Melnik, 1993). The other results also were obtained including the

relationship between reputation and fans' dependency on team which there is a positive and significant relationship between them. It means that increasing reputation increases the fans' dependency on team.

Suggests: According to findings, it is suggested that the Premier League organization, sports organizations, and clubs management departments identify other factors affecting products consumption and also determine the barriers and factors affecting the relationship between social responsibility of clubs and products consumption of fans to improve products consumption. and promote the culture of products consumption among fans.

CONFLICT OF INTEREST

There is no conflict of interest.

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None

FINANCIAL DISCLOSURE

None

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ARTICLE

THE EFFECT OF EIGHT WEEKS OF HYDROTHERAPY ON LIFE QUALITY AND DEPRESSION IN ELDERLY WOMEN OVER 50 YEARS OF JAHROM CITY IN IRAN

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ABSTRACT

Background: Generally, exercise and movement are effective approaches in preventing aging disorders and postponing the process of aging. It is possible to enhance different factors of life quality in elderly individuals and help them to be more independent in daily activities and have a successful aging process by using a regular program of exercise and physical activity. So the objective of this study is to investigate the effect of eight weeks of hydrotherapy on life quality and depression in elderly women over 50 years of Jahrom city in Iran. **Methods:** The present study is quasi-experimental with pre-test and post-test. The statistical population includes 15 people of elderly women over 50 years that were selected by convenience sampling. Hydrotherapy was implemented for 8 weeks (24 sessions). The levels of depression and life quality were measured before and after the implementation of hydrotherapy by using Beck depression inventory and also the questionnaire of life quality SF36. Data analysis was done using descriptive and inferential statistics and paired t-test and also Kolmogorov-Smirnov test. **Findings:** The mean age of the 15 women participated in the study was 55.62± 4.48. The results of paired t-test show that there is a significant difference between mental aspects of life quality before and after the intervention (p-value=0.001). The results of this test also show that there is a significant difference between the physical aspects of life quality before and after the intervention (p-value=0.002). T test results show that there is a significant difference between the depression level of elderly women before and after the intervention of hydrotherapy exercise (p-value=0.004). **Conclusions:** According to the results of the present study, it appears that the practice of hydrotherapy is effective on reducing depression and increasing the life quality in elderly women and can be considered as an effective method of intervention.

INTRODUCTION

Increasing and rapid growth of aging population and the deep influence of this phenomenon on the social and economic conditions have provided the field of multilateral approaches such as social, physical and psychological attitudes [1]. Aging is considered as a biological phenomenon that is natural and inevitable [2]. Aging is associated with declines in physical and psychological abilities. This issue is associated with machine and sedentary lifestyle of today and it accelerates the process of aging and has doubled physical, mental and social problems. It also imposes enormous costs on society for protecting the health of elderly people [3]. Increasing older population due to the reduction in birth, health improvement and increased life expectancy have increased the necessity to attention to the problems of this group of the society. According to statistics provided by the World Health Organization in 2000, the number of people aged 60 and more was 600 million, and by 2025 this number will reach 2.1 billion [4]. In Iran, according to the census of 1385 (2006), country's aging population will be more evident after 1410 (2031), and the population of people aged 60 and more is estimated as 27.7% and it is expected that elderly population of Iran will show off after 1410 and in this year, about 25 to 30 percent of the population will have more than 60 years and according to several issues, it will highlight elderly people [5]. As a spread word, Life quality consists of different concepts such as physical status, social cohesion, emotional status and health perception and based on medical assessments, it describes issues such as health, the performance of the patient, effect of the treatment and eventually the quality and effectiveness of treatment and patient care [6-7]. Health-related quality of life is affected by disease and its treatment, it is also affected by features such as the ability to cope with problems, living conditions and socio-economic status of an individual [8-9]. In many elderly individuals, aging is associated with loss of energy and fitness and all of these factors reduce the quality of life [10]. In recent years, life quality has become one of the most important clinical research topics and it is used for distinguishing the differences between patients, predicting the consequences of disease and the diagnosis of the extent of effectiveness of interventions in improving patients [9]. Depression is one of the major issues of elderly period and involve many elderly individuals as a result of various factors relevant to the last phase of life such as chronic diseases, the lost of friend and loved ones and the inability to perform one's favourite activities. Elderly people feel that they have lost control of their own lives as a result of poor eyesight, hearing and other physical changes as well as external pressures such as limited financial resources. This kind of issues and problems leads to negative emotions such as sadness, anxiety, low self-esteem, social exclusion and dejection in elderly people and the depression is the most serious mental disorder and a serious and perilous result of these emotions [12]. Various approaches can be used in order to reduce depression and enhance the quality of life. One of the most useful methods is the physical activity and exercise. In addition to the physical benefits, exercise has many psychological benefits among which we can cite stress reduction and life quality enhancement. In general, we can say that aging is associated with continuous and gradual changes that increase chronic discomforts and restrictions in movements [19-20]. As studies have shown, people over 60 years have

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hydrotherapy exercise,
depression, elderly
people, life quality

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turned significantly from sport and 40% of people aged 65 to 74 years are inactive. However, older adults and elderly people need to exercise to improve their health. By doing exercises, they can have better sense and perceptions of life [21]. And it seems that the most appropriate manner for older people who have restrictions in exercises out of the water is the exercise in water that has a long and considerable history and leads to mental relaxation and pain relief cause buoyancy reduces weight, as a result, it provides comfort and ease in movement in water for people who have trouble moving on land. Resistant properties of water can also have some sort of resistance training conditions and in addition to the physical benefits; they make also spiritual interests [22-23]. Since several studies have been conducted in Iran about elderly people, by reviewing available articles until the present study, we didn't find any research about the effects of hydrotherapy on two factors of life quality and depression in older people and most studies have investigated only one of these two factors. The existence of such a vacuum and also the importance and effectiveness of self-control and non-pharmaceutical intervention methods like training and exercises in water (hydrotherapy) made us conduct the present research with the aim of investigating the effectiveness of hydrotherapy on life quality and depression of elderly women.

MATERIALS AND METHODS

Research Approach

The present study is quasi-experimental with pre-test and pas-test. The statistical population consists of 15 people of elderly women over 55 years that were selected by convenience sampling method. Subjects have voluntarily participated in this study after the completion of consent form. After choosing samples, Beck depression inventory and the questionnaire of life quality were given to them. Then subjects have done exercises in water for 8 weeks under the supervision of experienced instructors in the pool of the city of Jahrom. They did water therapy exercises for 24 sessions (three 60-minute sessions per week). The sessions of water therapy exercises consist of three parts of warming up, exercise and cooling down. The sessions began with ten minutes of walk in water and then the main program began that included stretching, strength and endurance exercises. In the final ten minutes of each session, cooling and balance exercises were done. Finally, at the end of each session, stretching and flexibility exercises were carried out for 5 minutes for taking back elderly people to rest position. After 8 weeks of hydrotherapy, the questionnaires were given again to elderly people. The exercises were performed in afternoon for all patients. Measuring tools of this study consist of: 1. The questionnaire of life quality & 2. Beck depression inventory.

The questionnaire of life quality

For investigating the life quality related to the health position, life quality questionnaire (SF36) were used. Montazeri et al. investigated the validity and reliability of this questionnaire in 2005. This questionnaire contains 36 items with 8 subscales about health conditions. The score is determined according to the number of options for each item. Generally, the questionnaire was divided in two dimensions of physical and mental health. Physical health included subscales of public health, role limitation due to physical reasons, bodily pain and physical function and the factor of mental health included subscales of role limitation due to emotional reasons, social functioning, vitality and mental health. The score of each dimension is calculated based on the score of its subscales. The total score of subscales is calculated and this number will be divided in the number of subscales and in this way, the score of physical and mental factors is calculated. To calculate the total score of the questionnaire, total numbers drawn from each subscale were divided into 8 (total subscales) and the obtained number should be a number between 0 and 100. The lowest score in this questionnaire is 0 and the highest score is 100. 0 shows the worst position and the number of 100 shows the best position in terms of exercises.

Depression inventory

The severity of depressive symptoms of elderly women is measured by Beck Depression Inventory (1961). This inventory contains 28 items. Each item (4 sentences) evaluates one aspect of depressive symptoms that were graded in terms of severity of symptoms. The score will be between 0 (for inexistence of the sign) and 3 (For the most intense position of the sign). The total score of this inventory varies between 0 & 63 and shows respectively the mildest to the most severe degree of the symptom. The total score of an individual will be calculated by adding the scores of each item. The following scores can be used for showing the general level of depression: the score of 0-13 indicates the non-existence or a low degree of depression, the score of 14-19 indicates a mild depression, the score of 20-28 indicates a moderate depression and the score of 29-63 shows an intense depression. Beck reported 81% as the coefficient of Cronbach's alpha [25-26]. Obtained data were analysed by inferential statistics. Normal distribution of data was tested by Kolmogorov-smirnov test, also the calculations of the mean and the standard deviation of the data were done by descriptive statistics methods and the comparison between groups was by inferential statistics (T test and Wilcoxon test). The significance level of P is considered as less than 0.05 (Alpha less than 0.05).

RESULTS FINDINGS

The mean age of the 15 women participated in the study was 55.62 ± 4.48 . The mean BMI (Body Mass Index) of the women participated in the study was 30.74 ± 5.66 before the intervention and 30.24 ± 5.35 after the intervention of hydrotherapy. The average level of depression before the study was 12.07 ± 7.32 and this level was 4.87 ± 5.30 after the study. This decline in depression level is appropriate. The averages of variables of heart rate, diastolic and systolic blood pressure, weight, BMI and depression have been reduced. The average of other variables have increased.

Table 1: The effect of 8 weeks of hydrotherapy on the physical dimension of life quality

Variable		Difference between before and after	Standard deviation	Confidence interval		t	p-value
				up	down		
Physical dimension of life quality	Before	26.43	6.89	41.22	11.64	3.834	0.002
	After						

The score of physical dimension was obtained from the questionnaire of life quality. This score is between 0-100. T test results in [Table 1] show that there is a significant difference in the physical dimension of life quality, before and after the intervention of hydrotherapy ($p\text{-value}=0.002$). This result shows that 8 weeks of hydrotherapy enhanced the physical dimension of life quality. The rate of this enhancement was 26.43.

Table 2: The effect of 8 weeks of hydrotherapy on the mental dimension of life quality

Variable		Difference between before and after	Standard deviation	Confidence interval		t	p-value
				up	down		
Physical dimension of life quality	Before	23.61	4.35	32.96	14.27	5.423	0.001
	After						

The score of mental dimension was obtained from the questionnaire of life quality. This score is between 0-100. T test results in [Table 1] show that there is a significant difference in the mental dimension of life quality, before and after the intervention of hydrotherapy ($p\text{-value}=0.001$). This result shows that 8 weeks of hydrotherapy enhanced the mental dimension of life quality. The rate of this enhancement was 23.61.

Table 3: Comparison of depression level of elderly women before and after the intervention of hydrotherapy

Variable		Difference between before and after	Standard deviation	Confidence interval		t	p-value
				up	down		
Physical dimension of life quality	Before	-7.2	2.09	11.65	2.70	-3.435	0.004
	After						

The results of T test in [Table 3] show that there is a significant difference in the depression level of elderly women before and after the intervention of hydrotherapy ($p\text{-value}=0.004$). The depression level has decreased after the intervention of hydrotherapy. This result shows that this period of the hydrotherapy practice has been effective on the depression of elderly women and has decreased it.

DISCUSSION

In many elderly people, the process of aging is associated with loss of power, energy and fitness and all these factors are considered as lowering of life quality. Components of improvement of functional performance that include muscle strength, endurance, balance strength, flexibility and range of motion, both separately and in combination will help elderly people to do a range of everyday required movements and have a more active life and enhance their life quality. In addition, through coherence and effective programs for the improvement of the functional ability, they can prevent the loss of their physical functionality and decrease and postpone it. According to the findings of the present study, there is a significant difference in the life quality of elderly women, before and after the intervention of hydrotherapy. In a study conducted by Bahram et al. (2011) with the objective of investigating of the effectiveness of 12 weeks of selective training of Pilates on life quality of non-athlete elderly men, the results showed that different dimensions of the life quality of elderly men would enhance after one period of selective training of Pilates [27]. Also Igor et al. (2007) have concluded in a study that exercise and physical activity promote the physical function and muscle strength and enhance the score of the evaluation of life quality [28]. The research results of Pengel et al. (2002) show that there was not a significant effect in the enhancement of life quality of subjects after 6-12 weeks of exercise [29]. According to the studies, this result shows that hydrotherapy exercise is not effective on life quality of elderly women, these results are consistent with the findings of Pengel et al. (2002) that after six weeks of training in water, no significant impact was seen in the promotion of life quality of subjects but the results are not in line with the findings of Maher [30], Parker et al. [31], Aslankhani et al. [32], Kargarfard et al. [33], Bahram et al. [27] and Igor et al [28]. In the study of Kargarfard et al. (2001), at the beginning, subjects had a low quality of life, but by time and practice sessions, their life quality improved gradually [33]. It seems that the reasons of life quality enhancement during training exercises in water are followings: 1. Coming out of home and getting into a happy environment 2. More communications with others that improved their social performance (Doing group activities) 3. Some properties of water that are comforting factors. 4. Learn the exercises in the water and the ability to float in a swimming pool increase the self-confidence and a sense of ability in subjects. T test results showed that there is a significant difference in the depression level of elderly women, before and after the prevention of hydrotherapy (p-value=0.004). The depression level has decreased after the intervention of hydrotherapy. This result shows that hydrotherapy exercise has been effective on the depression of elderly women and reduced it. In the study of Dadashpour et al. (2012) with the title of "effects of water treatment practice on the depression level of elderly men", the results indicated that hydrotherapy practice in water is effective on the depression level of elderly men and reduce their depression [34]. Sayyadi Anari et al. (2002) investigated the effects of exercise on depression in elderly women, they concluded that the intervention will lead to a reduction of depression in elderly women [35]. Trivedi et al. (2006) conducted a study to investigate the effect of exercise on the depression. The results show that the hydrotherapy exercises in water reduce depression [36]. Somehow, Barrett and Smerdely [37] didn't find a significant relationship between the physical activity and depression reduction of elderly people in their research. Although the mentioned researches are in line with the results of the present study, but what distinguishes this study was that the exercises were conducted in water that is a suitable environment for elderly people cause the buoyancy of water reduces weight and as a result, it provides a convenient and easy mobility for people who have trouble moving on land. On the other hand, the present study is not consistent with the studies of Barrett, Smerdely and Salmon who have not found a significant relationship between the physical activity and depression reduction in elderly people, the reason of this inconsistency can be the type of practice cause aquatic exercises create comfort and joy [38]. It is possible to use the findings of conducted studies for the society and especially the community of elderly women and create motivations for them. The findings of this research showed that hydrotherapy practice is effective on depression reduction. No significant difference was found concerning life quality and exercise in water. In overall, the results of the study showed that hydrotherapy is effective on depression reduction and factors of life quality of elderly women. Therefore, it is recommended to this part of the society to do these exercises cause it's effective on their life quality and a more joyful life. According to the above findings, we can state that providing the equipments of these sports for the purposes of sports administrators, success in encouraging this stratum of society to exercise in water and also exercise with music as two sports with the right conditions for elderly women reduce significantly the complications and problems of elderly people and machine life and promote the level of their life quality.

CONCLUSION

According to the results of the present study, it appears that the hydrotherapy practice is effective on depression reduction of elderly women and can be considered as an effective intervention method but it has no effect on the life quality of elderly women.

CONFLICT OF INTEREST

There is no conflict of interest.

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FINANCIAL DISCLOSURE

None

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ARTICLE

PALLIATIVE EFFECT OF CATECHIN FLAVONOIDS (GREEN TEA) ON ACETIC ACID DERIVED PAIN IN RATS

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ABSTRACT

This research was designed to study the effects of catechins (green tea flavonoids) on acetic acid derived visceral pain in rats. The study is based on a completely randomized experiment with two groups, and two factors were studied. Mean values were compared using GLM procedure of SAS software (9.3). Duncan test was used for comparing mean values in each test, and Dunnett method was used for comparing mean values of each experiment for the control group. Injection of catechin, activated GABAergic system (in visceral pain), reducing acid pain, and the difference between the mean values in this study was statistically significant ($P < 0.05$). Then the role of GABA_B in this phenomenon was emphasized. It can be concluded that there is a relationship between visceral pain, opioid system, and GABAergic system, which is slightly proven in the present study.

INTRODUCTION

Pain is one of the most complex and extraordinary senses, this sense is the most common symptom of diseases, and it's the most common reason for physician visits. Pain does not only include stimulating of the nerve fibers terminals and transferring it to the CNS, but also its quantity and quality is affected, and could be changed by a wide variety of experiences. This matter shows a complex neural mechanism for intervention in pain experience and the psychological response dedicated to that [1]. Among them, visceral pain is a complex pain, which is created by stimulation of pain receptors by a variety of pathophysiological reasons in different organs, such as colon, bladder and stomach, and obtained data is transmitted to the central nervous system by means of afferent pathways. According to various studies, neurotransmitters participating in the analysis of pain are divided into two "opioid" and "non-opioid" categories. These two systems can work together closely, to regulate the pain mechanisms. Despite various commonly used methods of pain relief and treatment, Researchers are still looking for new and better methods of treatment for this physiological phenomenon. Despite the advanced pharmaceutical and chemical drugs for pain relief, lack of ability to succeed the treatment, and widespread side effects of treatment is affecting patients [2]. Use of herbal medicine is quickly developing for treatment of a wide range of diseases, and special attention is paid to the protective effects of antioxidants (with natural origin) against poisoning caused by chemical agents [3]. Today, tea is considered as a beneficial source of pharmacological and biological activities to human health. Therapeutic properties of tea extract and its catechin polyphenols, has led to conducting scientific studies on prevention and treatment of various diseases by this extract [4]. In the past, extensive studies have been performed in tea and its flavonoid compounds. Flavonoids are derived from plants' secondary metabolism, which are widely found in plants territory. Flavonoids can be divided into six groups based on the structure and position of the heterocyclic oxygen ring, namely flavones, flavanones, isoflavones, flavonols, flavanols, and anthocyanins. The most important flavonoids, present in tea, are flavonols, or to be more precise, catechins [5]. Catechins are categorized into four main ingredients of ECG, EGC, EC and EGCG and four sub-ingredients of GC, CG, C and GCG, which are epimers of the four original above materials [6]. Catechin (C), epi-catechin (EC), epi-gallo-catechin (EGC), epi-catechin-gallate (ECG), epi-gallo-catechin-gallate (EGCG), gallo-catechin-gallate (GCG) are six catechins in tea which are responsible for the biological characteristics of tea, such as antioxidant [7], antimicrobial [7, 8], anti-cancer [7, 9] and anti-mutagenicity [7] activities. Catechins consist more than 30% of tea dry matter [7]. Therefore, the objective of this study was to investigate the effect of catechin flavonoids on visceral pain derived by acetic acid in rats.

MATERIALS AND METHODS

In this study, adult male Wistar rats weighing 200-250 g were used. Mice were stored as groups of six rats in polyethylene cages in a room with ambient conditions and the optimum temperature about 23 ± 2 °C and 12 hours of light period, and the animals were fed with commercial pellet food while food and water was freely available for them. All tests were performed within 8 am to 3 pm and each rat was used once for the test. All the principles of laboratory animal care standards, such as laboratory temperature and humidity, were taken into consideration. Bought from Sigma company, Sterile normal saline solution, acetic acid 1 percent (this solution was diluted from pure acetic acid), catechin, and baclofen was used in the study. The study was performed in 10 tests, and 16 groups with 6 rats in each group, and a total of 96 rats. To create and study visceral pain, Writhing test (one of the standard tests to create and study visceral pain) was performed in the study. Intra peritoneal injection of acetic acid (1%) was used to create visceral pain in Writhing test method. Before beginning the test, animals were put into a glass container for 30

KEY WORDS

catechin, GABAergic system, rats and visceral pain

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minutes with dimensions of 20 × 30 × 40 cm to avoid stress, and also for the laboratory animals to get used to the condition (this amount of time is called Adaptation). After the adaptation period, the animal was brought out of the enclosure glass slowly, and after constraining and injecting the study drug, one ml of acetic acid (one percent) was injected into the peritoneal area, and immediately after, animals were placed into the glass chamber and latency time, the first abdominal contractions' time, and the number of abdominal contractions after injection of acetic acid was recorded in special forms for an hour with an interval of five minutes. In order to investigate visceral pain, Mirror of pain device was used, which is made of a wooden framework, a cubical glass box in dimensions 20 × 30 × 40 cm, and a mirror in dimensions of 30 × 40 cm which is placed in 45 degrees inside the wooden frame, which this mirror makes the observer able to see abdomen part of the rat easily during the time of creating and recording abdominal contractions.

Statistical analysis method

Each completely randomized experiment was performed with six replications; which statistical model is as follows:

$$Y_{ij} = \mu + T_i + \epsilon_{ij}$$

μ = Average of total population

T_i = The effect of the i-th treatment

ϵ_{ij} = The effect of random error with zero mean and Q^2 variance

GLM procedure of SAS (9.3) software was used for comparison of mean values. Duncan test was used for comparing mean values in each test, and Dunnett method was used for comparing mean values of each experiment to control group.

RESULTS

injection of 5 mg Catechin per kg of body weight, took 1091/17 seconds for first contraction to start from latency period, and it caused 1/6178 full contractions of the abdominal wall.

The results showed that 5 mg of catechin per kilogram of body weight, had a significant effect on the onset time of first abdominal wall contraction from latency period ($P < 0.05$), And reduced acetic acid (1%) derived visceral pain, but it didn't have a significant effect on the number of full contractions in the abdominal wall, although a reduction in number was recorded [Table 1]. Also the main effects of acetic acid are shown in [Table 2]. The results showed that intra peritoneal injection of catechin, had significantly reduced onset time of first abdominal wall contraction from latency period, but it didn't have a significant effect on the number of full contractions in the abdominal wall.

Table 1: Effect of catechin injection

Writhing test (NO)	Latency time (sec)	
4/ 1594 ^b	761/ 21 ^b	Acid acetic + Catechin 0 ^{mg} /kg
		%1
1/ 6178 ^b	1091/ ^a 17	Acid acetic + Catechin 5 ^{mg} /kg
		%1
0/381	35/0271	SEM
<0/0001	<0/0001	P-value

Table 2: Main effects of acetic acid

Writhing test (NO)	Latency time (sec)	%	
035 ^b / 2	0 ^a	5/0	Acid acetic
375 ^a / 12	/1478	1	Acid acetic
208 ^a / 9	0 ^b / 466	2	Acid acetic
	8 ^b / 386		Acid acetic
615/1	812/79		SEM
0013/0	<0/0001		P-value

Table 3: Interactions between the effects of catechin and acetic acid

Writhing test (NO)	Latency time (sec)	
4/ 1594 ^b	761/ 21 ^b	Acid acetic +Catechin0 ^{mg} /kg
		%1
1/ 6178 ^b	1091/17	Acid acetic + catechin 5 ^{mg} /kg
		%1
0/381	35/0271	SEM
<0/0001	<0/0001	P-value

DISCUSSION AND CONCLUSION

The results of the study indicate that the catechin (green tea flavonoid), has analgesic effects on acetic acid-induced pain. Recently, the effect of flavonoids on pain and inflammation caused by pain reactions have been studied, and their anti-inflammatory and analgesic effects have been proven. Studies on a new herbal flavonoid, called the Hypolytin8-glucoside (obtained from the plant Hypericum) in rats, have shown that it has anti-inflammatory effect on acute inflammatory phase, and has no effect on the chronic or long-term phase [10]. oral administration of catechins in amounts of 60 to 120 mg per kilogram of body weight, reduced arthritis-derived secondary inflammation in young rats. [11]. Possible mediators in the inflammatory pain, induced by acetic acid, are still not well recognized. It is reported that bradykinin, neuro quinine and prostanoids are involved in sensory fibers activation after intraperitoneal injection of propionic acid, lactic acid and acetic acid.

Catechin (C), epi-catechin (EC), epi-galo-catechin (EGC), epi-catechin -gallate (ECG), epi-galo-catechin-gallate (EGCG), galo-catechin-gallate (GCG) are six catechins in tea which are responsible for the biological characteristics of tea, such as antioxidant [7], antimicrobial [7, 8], anti-cancer [7, 9] and anti-mutagenicity [7] activities. Catechins consist more than 30% of tea dry matter [7]. According to different studies performed on catechins, the effects of catechin on pain, in particular visceral pain, has not been studied yet. Therefore, the recent findings and results from this study, indicate that the catechins have visceral analgesic effects on acetic acid derived pain. In conclusion, the results of this study showed that, catechin induces analgesia through the mechanism of in acetic acid derived visceral pain.

CONFLICT OF INTEREST
There is no conflict of interest.

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ARTICLE

INVESTIGATING EFFECT OF CATECHIN FLAVONOIDS (GREEN TEA) AND BACLOFEN ON VISCERAL PAIN INDUCED BY ACETIC ACID

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ABSTRACT

This research was designed to study the twin effect of baclofen and catechin on acetic derived visceral pain in rats. In this study, adult male Wistar rats weighing 200-250 g were used. Mice were stored as groups of six rats in polyethylene cages in a room with ambient conditions and the optimum temperature about 23 ± 2 ° C and 12 hours of light period. All tests were performed within 8 am to 3 pm and each rat was used once for the test. Sterile normal saline, acetic acid solution 1%, catechin and baclofen (bought from sigma company) were used in the study. Visceral pain response was investigated by intra peritoneal injection of normal saline. Visceral pain response after pre-injection of catechin in amount of 5 mg per kg body weight before baclofen in amount of 2.5 mg per kg body weight was studied. Each completely randomized experiment was performed with six replications. Mean values were compared using GLM procedure of SAS software (9.3). Duncan test was used for comparing mean values in each test, and Dunnett method was used for comparing mean values of each experiment for the control group. Results showed that, the onset time for first contraction to start from latency period in injection of 2.5 mg baclofen per kg of body weight, and 5 mg catechin per kg of body weight was 1001/833 seconds, and it caused 0/978 full contractions of the abdominal wall. It can be said that catechin induces analgesia by baclofen dependent mechanism.

INTRODUCTION

Pain is one of the most complex and extraordinary senses, this sense is the most common symptom of diseases, and it's the most common reason for physician visits. Pain does not only include stimulating of the nerve fibers terminals and transferring it to the CNS, but also its quantity and quality is affected, and could be changed by a wide variety of experiences. This matter shows a complicated neural mechanism for experience interference and psychological response to pain [1,2]. Pain receptors are free nerve endings in the body, which Unlike other sensory receptors, do not have adaptation, or adaptation in them is extremely low; The mismatch allows pain receptors to warn the person about the damage making stimulus that causes pain as long as its present. pain receptors are sensitive to chemical, mechanical, and thermal stimulants, and following the tissue damage and release of chemical mediators such as Bradykinin, histamine, and prostaglandin are stimulated, and send the pain signals to the central nervous system by nerves, and eventually, pain is felt by stimulating the cerebral cortex [3]. Among them, visceral pain is a complex pain, which is created by stimulation of pain receptors by a variety of pathophysiological reasons in different organs, such as colon, bladder and stomach, and obtained data is transmitted to the central nervous system by means of afferent pathways. According to various studies, neurotransmitters participating in the analysis of pain are divided into two "opioid" and "non-opioid" categories. These two systems can work together closely, to regulate the pain mechanisms. Examples of opioid system includes adrenergic, cholinergic, serotonergic, histaminergic, and GABAergic [4].

Adaptation in them is very low, and it lets the pain receptor to warn the person as long as the damaging stimulant is present. pain receptors are sensitive to chemical, mechanical, and thermal stimulants, and following the tissue damage and release of chemical mediators such as Bradykinin, histamine, and prostaglandin, they are stimulated, and send the pain signals to the central nervous system by nerves, and eventually, pain is felt by stimulating the cerebral cortex [3]. visceral pain is a complex pain, which is created by stimulation of pain receptors by a variety of pathophysiological reasons in different organs, such as colon, bladder and stomach, and obtained data is transmitted to the central nervous system by means of afferent pathways. According to various studies, neurotransmitters participating in the analysis of pain are divided into two "opioid" and "non-opioid" categories. These two systems can work together closely, to regulate the pain mechanisms. Examples of opioid system includes adrenergic, cholinergic, serotonergic, histaminergic, and GABAergic [4]. Flavonoids are derived from plants' secondary metabolism, which are widely found in plants territory. Flavonoids can be divided into six groups based on the structure and position of the heterocyclic oxygen ring, namely flavones, flavanols, isoflavones, flavonols, flavanols, and anthocyanins. The most important flavonoids, present in tea, are flavonols, or to be more precise, catechins. Catechins are antioxidants, and they have beneficial effects for the body. Catechin (C), epicatechin (EC), epi-gallo-catechin (EGC), epi-catechin -gallate (ECG), epi-gallo-catechin-gallate (EGCG), gallo-catechin-gallate (GCG) are six catechins in tea which are responsible for the biological characteristics of tea, such as antioxidant [7], antimicrobial [7, 8], anti-cancer [7, 9] and anti-mutagenicity [7] activities. Catechins consist more than 30% of tea dry matter [5]. Brain uses various neural mediators including Aminergic systems. Histaminergic system is one of mammals' aminergic systems which regulates many of the brain actions including grabbing of food, cardiac and respiratory functions, neuro endocrine responses, learning, and memory, by means of 4 types of receptors namely H₁, H₂, H₃, and H₄ [6,7].

KEY WORDS

baclofen, catechin, rat

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Histamine is one of the aminergic neuro transmitters and it has an important role in regulation of a number of physiological and pathological events. In mammals, neural histamine is made in a few number of neurons gathered in Tuberomammillary core in posteriorhypothalamus. These neurons' appendices penetrate to most of brain's parts and interfere with many of the brain activities, such as sleeping and waking, hormones secretion, cardiovascular control, body temperature, food grabbing, and development of memories [8].

Despite various commonly used methods of pain relief and treatment, Researchers are still looking for new and better methods of treatment for this physiological phenomenon. Herbal medicines are the best replaces for synthetic medicines, due to their less side effects, higher availability, and economical reasons. This study was performed to investigate effects of catechin (green tea flavonoid) and baclofen, on acetic acid derived visceral pain in rat.

MATERIALS AND METHODS

In this study, adult male Wistar rats weighing 200-250 g were used, Mice were stored as groups of six rats in polyethylene cages in a room with ambient conditions and the optimum temperature about 23 ± 2 ° C and 12 hours of light period, and the animals were fed with commercial pellet food while food and water was freely available for them. All tests were performed within 8 am to 3 pm and each rat was used once for the test. All the principles of laboratory animal care standards, such as laboratory temperature and humidity, were taken into consideration. Sterile normal saline and acetic acid solution 1% (this solution was diluted from pure acetic acid), were used in the study. Catechin and baclofen which was used, were bought from Sigma company.

Control group, consisted of 6 rats, were investigated for visceral pain response after intra peritoneal injection of normal saline.

On this stage, visceral pain was created and investigated by intra peritoneal injection of acetic acid 0.5,1, and 2 percent in volume of 1 ml. then visceral pain response was studied after oral administration of catechin in amounts of 5,10, and 20 mg per kg body weight. in this stage, visceral pain was studied after intra peritoneal injection of baclofen in amount of 2.5, 5, and 10 mg per kg body weight. Then visceral pain response after pre-injection of catechin in amount of 5 mg per kg body weight before baclofen in amount of 2.5 mg per kg body weight was studied.

to create and study visceral pain, Writhing test (one of the standard tests to create and study visceral pain) was performed in the study. Intra peritoneal injection of acetic acid (1%) was used to create visceral pain in Writhing test method. Before beginning the test, animals were put into a glass container for 30 minutes with dimensions of 20 × 30 × 40 cm to avoid stress, and also for the laboratory animals to get used to the condition (this amount of time is called Adaptation). After the adaptation period, the animal was brought out of the enclosure glass slowly, and after constraining and injecting the study drug, one ml of acetic acid (one percent) was injected into the peritoneal area, and immediately after, animals were placed into the glass chamber and latency time, the first abdominal contractions' time, and the number of abdominal contractions after injection of acetic acid was recorded in special forms for an hour with an interval of five minutes. In order to investigate visceral pain, Mirror of pain device was used, which is made of a wooden framework, a cubical glass box in dimensions 20 × 30 × 40 cm, and a mirror in dimensions of 30 × 40 cm which is placed in 45 degrees inside the wooden frame, which this mirror makes the observer able to see abdomen part of the rat easily during the time of creating and recording abdominal contractions.

Statistical analysis method

Each completely randomized experiment was performed with six replications.

GLM procedure of SAS (9.3) software was used for comparison of mean values. Duncan test was used for comparing mean values in each test, and Dunnett method was used for comparing mean values of each experiment to control group.

RESULTS

Results obtained from intra peritoneal injection of catechin showed that it significantly has reduced the onset time of first abdominal wall contraction from latency period, but it didn't have a significant effect on the number of full contractions in the abdominal wall. A number of results suggest that injection of 2.5 mg of baclofen per kilogram of body weight, significantly reduced the onset time of first abdominal wall contraction from latency period and also the number of full contractions in the abdominal wall, and the onset time for first contraction to start from latency period in injection of 2.5 mg baclofen per kg of body weight, and 5 mg catechin per kg of body weight was 1001/833 seconds, and it caused 0/978 full contractions of the abdominal wall.

Table 1: Different percent of acetic acid's main effect

Writhing test (NO)	Latency time (sec)	%	
2/ 035 ^b	1478/ 0 ^a	0/5	Acetic acid
12/ 375 ^a	466/ 0 ^b	1	Acetic acid
9/ 208 ^a	386/ 8 ^b	2	Acetic acid
1/615	79/812		SEM
0/0013	<0/0001		P-value

Table 2: Twin main effect of baclofen and catechin

Writhing test (NO)	Latency time (sec)	
6/ 715 ^a	673/ 417 ^c	Acetic acid+catechin0 ^{mg} / _{kg} +baclofen0 ^{mg} / _{kg} %1
1/ 603 ^b	849/ 000 ^{bc}	Acetic acid+catechin0 ^{mg} / _{kg} +baclofen1 ^{mg} / _{kg} %1
2/ 034 ^b	1178/ 333 ^a	Acetic acid+catechin5 ^{mg} / _{kg} +baclofen0 ^{mg} / _{kg} %1
1/ 201 ^b	1004/ 000 ^{ab}	Acetic acid+ catechin5 ^{mg} / _{kg} +baclofen1 ^{mg} / _{kg} %1
0/538	49/536	SEM
<0.0001	<0.0001	P-value

DISCUSSION AND CONCLUSION

The results of the study indicate that the catechin (green tea flavonoid), has analgesic effects on acetic acid-induced pain. Recently, the effect of flavonoids on pain and inflammation caused by pain reactions have been studied, and their anti-inflammatory and analgesic effects have been proven. Studies on a new herbal flavonoid, called the Hypolytin8-glucoside (obtained from the plant Hypericum) in rats, have shown that it has anti-inflammatory effect on acute inflammatory phase, and has no effect on the chronic or long-term phase [10]. Possible mediators in the inflammatory pain, induced by acetic acid, are still not well recognized. It is reported that bradykinin, neuro quinine and prostanoids are involved in sensory fibers activation after intraperitoneal injection of propionic acid, lactic acid and acetic acid [11]. . Catechin (C), epi-catechin (EC), epi-galo-catechin (EGC), epi-catechin -gallate (ECG), epi-galo-catechin-gallate (EGCG), galo-catechin-gallate (GCG) are six catechins in tea which are responsible for the biological characteristics of tea, such as antioxidant, antimicrobial, anti-cancer, and anti-mutagenicity activities. Catechins consist more than 30% of tea dry matter [5]. Recently, catechins have attracted much attention in the scientific community and among the general public due to their beneficial effects on health, and their performance such as antioxidant, anti-mutagenic, anti-tumor and anti-cancer characteristics. However, not many studies have been done on their analgesic effects and since Gamma Amino Butyric Acid (GABA), is specified as an inhibitory neurotransmitter in the central nervous system of mammals, describing the relationship between catechin and GABAergic system in moderating visceral pain is important.

It seems that each of opioid receptors, act separately and specifically. In opioid receptor knocked-out mice, μ receptors were affected in response to chemical, mechanical and thermal supraspinal pain. κ receptors mediated thermal and chemical visceral pain spinally, and δ receptors mediated inflammatory and mechanism pains. Studies on oxidative stress induced by Chlorpyrifos in rats, showed that catechin and

quercetin were able to prevent stress-related injuries. In another study, oral administration of catechin for 4 weeks improved Chlorpyrifos induced lung toxicity in rats but it did not prevent lung toxicity completely. Studies on herbal Polyphenols, such as catechin, Teaflavin, Malvidin and cyanidin showed that catechin by the amount of 35 mg per kg body weight has anti-inflammatory effect on intestinal damages caused by ketoprofen, and it effectively heals the gastric ulcers. Research has shown that certain flavonoid and cystosterol compounds, have anti-inflammatory and analgesic effects. Russian olive Leaves and fruits contain significant amounts of flavonoids compounds. Russian olive was introduced as an analgesic and anti-inflammatory fruit and it is used for treatment of rheumatoid arthritis. Studies on the fruits and leaves of the russian olive plant, approved its anti-inflammatory and analgesic effects. Despite the different studies on the catechins, still catechin's effect on pain, in particular visceral pain has not been studied yet. Therefore, due to the recent findings, and results of this study, catechins, have a baclofen sensitive visceral analgesic effect on visceral pain induced by acetic acid. In conclusion, the results of this study showed that in visceral pain induced by acetic acid, the catechin induces analgesia through the baclofen affiliated mechanism. Catechin also weakens acetic acid derived pain by its GABAergic receptors [12].

CONFLICT OF INTEREST

There is no conflict of interest.

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None

FINANCIAL DISCLOSURE

None

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ARTICLE

EFFECT OF SACLOFENAND CATECHIN FLAVONOIDS ON PAIN RELIEF IN RATS

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ABSTRACT

This research was designed to study the effects of saclofenand catechin on acetic derived visceral pain in rats. In this study, adult male Wistar rats weighing 200-250 g were used, Mice were stored as groups of six rats in polyethylene cages in a room with ambient conditions and the optimum temperature about 23±2 ° C and 12 hours of light period, and the animals were fed with commercial pellet food while food and water was freely available for them. All tests were performed within 8 am to 3 pm and each rat was used once for the test. Normal saline and acetic acid solution (1%) were used in the study. Visceral pain response was investigated before injecting catechin in amount of 5 mg per kg body weight, before saclofen 1 mg per kg body weight. In the control group which was consisted of 6 rats, visceral pain response was investigated by intra peritoneal injection of normal saline. Each experiment was performed completely randomized with six replications. Mean values were compared using GLM procedure of SAS software (9.3). Duncan test was used for comparing mean values in each test, and Dunnett method was used for comparing mean values of each experiment for the control group. Results obtained from twin injection of 5 mg catechin per kg body weight and 1 mg saclofen per kg body weight showed that it had a significant effect on onset time of first contraction of the abdominal wall from latency period ($p < 0.05$) and reduced visceral pain caused by acetic acid (1%). It also had a significant effect on the number of abdominal wall full contractions and reduced its number. It can be said that catechin induces analgesia by saclofen dependent mechanism.

INTRODUCTION

Pain is one of the most complex and extraordinary senses, this sense is the most common symptom of diseases, and it's the most common reason for physician visits. Pain does not only include stimulating of the nerve fibers terminals and transferring it to the CNS, but also its quantity and quality is affected, and could be changed by a wide variety of experiences. This matter shows a complicated neural mechanism for experience interference and psychological response to pain [1,2]. Pain receptors are free nerve endings in the body, which Unlike other sensory receptors, do not have adaptation, or adaptation in them is extremely low; The mismatch allows pain receptors to warn the person about the damage making stimulus that causes pain as long as its present. pain receptors are sensitive to chemical, mechanical, and thermal stimulants, and following the tissue damage and release of chemical mediators such as Bradykinin, histamine, and prostaglandin are stimulated, and send the pain signals to the central nervous system by nerves, and eventually, pain is felt by stimulating the cerebral cortex [3]. Among them, visceral pain is a complex pain, which is created by stimulation of pain receptors by a variety of pathophysiological reasons in different organs, such as colon, bladder and stomach, and obtained data is transmitted to the central nervous system by means of afferent pathways. According to various studies, neurotransmitters participating in the analysis of pain are divided into two "opioid" and "non-opioid" categories. These two systems can work together closely, to regulate the pain mechanisms. Examples of opioid system includes adrenergic, cholinergic, serotonergic, histaminergic, and GABAergic [4]. Adaptation in them is very low, and it lets the pain receptor to warn the person as long as the damaging stimulant is present. pain receptors are sensitive to chemical, mechanical, and thermal stimulants, and following the tissue damage and release of chemical mediators such as Bradykinin, histamine, and prostaglandin, they are stimulated, and send the pain signals to the central nervous system by nerves, and eventually, pain is felt by stimulating the cerebral cortex [3]. visceral pain is a complex pain, which is created by stimulation of pain receptors by a variety of pathophysiological reasons in different organs, such as colon, bladder and stomach, and obtained data is transmitted to the central nervous system by means of afferent pathways. According to various studies, neurotransmitters participating in the analysis of pain are divided into two "opioid" and "non-opioid" categories. These two systems can work together closely, to regulate the pain mechanisms. Examples of opioid system includes adrenergic, cholinergic, serotonergic, histaminergic, and GABAergic (4). Flavonoids are derived from plants' secondary metabolism, which are widely found in plants territory. Flavonoids can be divided into six groups based on the structure and position of the heterocyclic oxygen ring, namely flavones, flavanons, isoflavones, flavonols, flavanols, and anthocyanins. The most important flavonoids, present in tea, are flavonols, or to be more precise, catechins. Catechins are antioxidants, and they have beneficial effects for the body. Catechin (C), epi-catechin (EC), epi-galo-catechin (EGC), epi-catechin -gallate (ECG), epi-galo-catechin-gallate (EGCG), galo-catechin-gallate (GCG) are six catechins in tea which are responsible for the biological characteristics of tea, such as antioxidant (7), antimicrobial (7, 8), anti-cancer [7, 9] and anti-mutagenicity [7] activities. Catechins consist more than 30% of tea dry matter (5). Brain uses various neural mediators including Aminergic systems. Histaminergic system is one of mammals' aminergic systems which regulates many of the brain actions including grabbing of food, cardiac and respiratory functions, neuro endocrine responses, learning, and memory, by means of 4 types of receptors namely H₁, H₂, H₃, and H₄ [6,7].

Histamine is one of the aminergic neuro transmitters and it has an important role in regulation of a number of physiological and pathological events. In mammals, neural histamine is made in a few number of neurons gathered in Tuberomammillary core in posterior hypothalamus. These neurons' appendixes

KEY WORDS

saclofen , catechin, rat

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penetrate to most of brain's parts and interfere with many of the brain activities, such as sleeping and waking, hormones secretion, cardiovascular control, body temperature, food grabbing, and development of memories [8].

Despite various commonly used methods of pain relief and treatment, Researchers are still looking for new and better methods of treatment for this physiological phenomenon. Herbal medicines are the best replaces for synthetic medicines, due to their less side effects, higher availability, and economical reasons. This study was performed to investigate effects of catechin (green tea flavonoid) and saclofen as mediators, on acetic acid derived visceral pain in rat.

MATERIALS AND METHODS

In this study, adult male Wistar rats weighing 200-250 g were used, Mice were stored as groups of six rats in polyethylene cages in a room with ambient conditions and the optimum temperature about 23 ± 2 ° C and 12 hours of light period, and the animals were fed with commercial pellet food while food and water was freely available for them. All tests were performed within 8 am to 3 pm and each rat was used once for the test. All the principles of laboratory animal care standards, such as laboratory temperature and humidity, were taken into consideration. Sterile normal saline and acetic acid solution 1% (this solution was diluted from pure acetic acid), were used in the study. Catechin and baclofen which was used, were bought from Sigma company. Control group, consisted of 6 rats, were investigated for visceral pain response after intra peritoneal injection of normal saline.

On this stage, visceral pain was created and investigated by intra peritoneal injection of acetic acid 0.5,1, and 2 percent in volume of 1 ml. then visceral pain response was studied after oral administration of catechin in amounts of 5,10, and 20 mg per kg body weight. in this stage, visceral pain was studied after intra peritoneal injection of saclofen in amount of 2.5, 5, and 10 mg per kg body weight. Then visceral pain response after pre-injection of catechin in amount of 5 mg per kg body weight before saclofen in amount of 2.5 mg per kg body weight was studied.

. to create and study visceral pain, Writhing test (one of the standard tests to create and study visceral pain) was performed in the study. Intra peritoneal injection of acetic acid (1%) was used to create visceral pain in Writhing test method. Before beginning the test, animals were put into a glass container for 30 minutes with dimensions of 20 × 30 × 40 cm to avoid stress, and also for the laboratory animals to get used to the condition (this amount of time is called Adaptation). After the adaptation period, the animal was brought out of the enclosure glass slowly, and after constraining and injecting the study drug, one ml of acetic acid (one percent) was injected into the peritoneal area, and immediately after, animals were placed into the glass chamber and latency time, the first abdominal contractions' time, and the number of abdominal contractions after injection of acetic acid was recorded in special forms for an hour with an interval of five minutes. In order to investigate visceral pain, Mirror of pain device was used, which is made of a wooden framework, a cubical glass box in dimensions 20 × 30 × 40 cm, and a mirror in dimensions of 30 × 40 cm which is placed in 45 degrees inside the wooden frame, which this mirror makes the observer able to see abdomen part of the rat easily during the time of creating and recording abdominal contractions.

Statistical analysis method

Each completely randomized experiment was performed with six replications. GLM procedure of SAS (9.3) software was used for comparison of mean values. Duncan test was used for comparing mean values in each test, and Dunnett method was used for comparing mean values of each experiment to control group.

RESULTS

Results obtained from twin injection of 5 mg Catechin per kg of body weight, and 5 mg saclofen per kg of body weight, showed significant effect on the onset time of first contraction of abdominal wall from latency period ($P < 0.05$) and reduced acetic acid (1%) derived visceral pain.

Table 1: Different percent of acetic acid's main effect

Writhing test (NO)	Latency time (sec)	%	
2/ 035 ^b	1478/ 0 ^a	0/5	Acetic acid
12/ 375 ^a	466/ 0 ^b	1	Acetic acid
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1/615	79/812	SEM
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Table 2: Twin main effect of saclofen and catechin

Writhing test (NO)	Latency time (sec)	
6/ 715 ^a	673/ 417 ^c	Acetic acid+catechin0 ^{mg} / _{kg} +Saclofen0 ^{mg} / _{kg}
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2/ 034 ^b	1178/ 333 ^a	Acetic acid+catechin5 ^{mg} / _{kg} +Saclofen0 ^{mg} / _{kg} ⁰
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1/ 201 ^b	1004/ 000 ^{ab}	Acetic acid+ catechin5 ^{mg} / _{kg} +Saclofen1 ^{mg} / _{kg}
		%1
0/538	49/536	SEM
0/0003	<0/0011	P-value

CONCLUSION

The results of the study indicate that the catechin (green tea flavonoid) and saclofen have analgesic effects on acetic acid-induced pain. Recently, the effects of flavonoids on pain and inflammation caused by pain reactions have been studied, and their anti-inflammatory and analgesic effects have been proven. Studies on a new herbal flavonoid, called the Hypolytin8-glucoside (obtained from the plant Hypericum) in rats, have shown that it has anti-inflammatory effect on acute inflammatory phase, and has no effect on the chronic or long-term phase [9]. oral administration of catechins in amounts of 60 to 120 mg per kilogram of body weight, reduced arthritis-derived secondary inflammation in young rats. [10]. Possible mediators in the inflammatory pain, induced by acetic acid, are still not well recognized, therefore, saclofen showed a mediator effect in the current study. It is reported that bradykinin, neuro quinine and prostanoids are involved in sensory fibers activation after intraperitoneal injection of propionic acid, lactic acid and acetic acid. Catechin (C), epi-catechin (EC), epi-galo-catechin (EGC), epi-catechin -gallate (ECG), epi-galo-catechin-gallate (EGCG), galo-catechin-gallate (GCG) are six catechins in tea which are responsible for the biological characteristics of tea, such as antioxidant, antimicrobial, anti-cancer, and anti-mutagenicity activities. Catechins consist more than 30% of tea dry matter (5). Recently, catechins have attracted much attention in the scientific community and among the general public due to their beneficial effects on health, and their performance such as antioxidant, anti-mutagenic, anti-tumor and anti-cancer characteristics. However, not many studies have been done on their analgesic effects and since Gamma Amino Butyric Acid (GABA), is specified as an inhibitory neurotransmitter in the central nervous system of mammals, describing the relationship between catechin and GABAergic system in moderating visceral pain is important. It seems that each of opioid receptors, act separately and specifically. In opioid receptor knocked-out mice, μ receptors were affected in response to chemical, mechanical and thermal supraspinal pain. K receptors mediated thermal and chemical visceral pain spinally, and δ receptors mediated inflammatory and mechanism pains. Studies on oxidative stress induced by Chlorpyrifos in rats, showed that catechin and quercetin were able to prevent stress-related injuries. In another study, oral administration of catechin for 4 weeks improved Chlorpyrifos induced lung toxicity in rats but it did not prevent lung toxicity completely. Studies on herbal Polyphenols, such as catechin, Teaflavin, Malvidin and cyanidin showed that catechin by the amount of 35 mg per kg body weight has anti-inflammatory effect on intestinal damages caused by ketoprofen, and it effectively heals the gastric ulcers. Research has shown that certain flavonoid and cystosterol compounds, have anti-inflammatory and analgesic effects. Russian olive Leaves and fruits contain significant amounts of flavonoids compounds. Russian olive was introduced as an analgesic and anti-inflammatory fruit and it is used for treatment of rheumatoid arthritis. Studies on the fruits and leaves of the russian olive plant, approved its anti-inflammatory and analgesic effects. Despite the different studies on the catechins, still catechin's effect on pain, in particular visceral pain has not been studied yet. Therefore, due to the recent findings, and results of this study, catechins, have a baclofen sensitive visceral analgesic effect on visceral pain induced by acetic acid. In conclusion, the results of this study showed that in visceral pain induced by acetic acid, the catechin induces analgesia through the saclofen affiliated mechanism.

CONFLICT OF INTEREST

There is no conflict of interest.

ACKNOWLEDGEMENTS

None

FINANCIAL DISCLOSURE

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ARTICLE

PAIN BEHAVIOR AFTER PLANTAR INJECTION OF FORMALIN IN RATS

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ABSTRACT

This study aims to review rats' pain behavior after plantar injection with 1, 2.5 and 5 percent formalin. There were 6 rats in the first group, i.e. the control group. The response of these rats to pain after the plantar injection with normal saline was reviewed. There were also three other groups each of which had 6 rats. In these groups, the somatic pain was created through a plantar injection with 1, 2.5 and 5 percent formalin with a 50µL volume and then it was reviewed. In order to review the data, the analysis of variance method was used as well as the GLM procedure in the SAS software. In addition, Tukey test was used to compare the means. According to the results, the plantar injection of normal saline made no significant change in licking or hitting the injected food after 5 minutes or in the interval of 15 to 40 minutes. The only significant difference was seen in the first five minutes (0-5) ($P < 0.05$). On the other hand, the plantar injection of formalin at 1, 2.5 and 5-percent concentrations led to licking and hitting the injected foot in the time intervals of 0-5, 15-20, 20-25, 25-30, 30-35, and 35-40. It can be concluded that the behavioral response to pain in this study can be narrowed down to 2 phases of hitting and licking the spot of injection on the foot.

INTRODUCTION

Sensing pain and perceiving it are some of the most important functions of the nervous system which provides the necessary information associated with a damaging or a potentially damaging stimuli. It designs the suitable reaction given the type of the stimulus. Pain is a complex phenomenon and includes both sensory and emotional components. This means that pain is a sensory experience which is accompanied by incentive responses and also by somatic and motor adaptations. From this perspective, nociception is an essential process is a necessary process and it is a prerequisite for a living creature to survive [1]. To put it simply, pain is a protective sensory experience to make the person aware of harms and damages to the body tissues. One of body's defense mechanisms that protects the tissues and organs against harm is the sense of pain which makes the central nerve system aware of the part of body that is being damaged. That is how the patient would think of a solution. Adjustment of pain is a complex process which depends on many physiological, neural and hormonal factors. Sensitivity to pain and nociception might be increased or decreased because of some environmental occurrences along with changes in the chemical mediators that are released in the body. It is significantly important to know these chemical mediators in order to soothe the pain. Numerous parts of the central nervous system play roles in transferring and processing different types of pain. Some of the most important ones are Hypothalamus, thalamus, somatosensory cortex, cingulate cortex, hippocampal formation, amygdala, Sylvius periaqueductal gray matter, Habenula, insular cortex, striatum and cerebellum [2]. Pain is a sensory experience which is together with sensory and emotional components. There is a difference in the sensory component since it depends on the spinothalamic tracts to the ventral posteromedial and ventral posterolateral nucleus of thalamus. The nociceptors send the information to the somatosensory parts of cortex 1 and 2. It is because of the sensory processing in the aforementioned upper levels of the cortex that the quality of pain, the painful stimulus, the intensity and duration of pain are perceived. The emotional responses to the painful stimulus include attentions, awareness, somatic and autonomic reflexes, endocrine responses and emotional changes. These mentioned factors are responsible for the undesirable essence of the painful stimulus. Emotional responses to the transmission in multiple ascending pathways depend not on trigeminal and spinothalamic tracts but on the spinoreticular tract and the spinocerebellar tract as well. The parts of the cortex that play a role in these responses are insula and cingulate gyrus. Moreover, a few tracts were recently discovered which directly connect the spinal cord to the limbic system including amygdala, without thalamic relays [1]. There are considerable evidences that suggest that sensory stimuli are even perceived without the cortex and this is true for pain in particular. These areas in the cortex are apparently responsible for an accurate and significant discriminating interpretation of pain and some of its emotional components. However, the cortex is not needed for the nociception alone [3].

KEY WORDS

Pain Behavior, Saline, Formalin, Rat

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In this regard, formalin has been widely used in order to review pain in this study. Usage of formalin and its behavioral responses have come to be known as formalin test. The formalin test is one of the standard tests for measuring the responses to the chemical painful stimuli. This test was presented to the world by Dubisson and Dennis (1977)[4]. Just like any other aldehydes, formaldehyde combined with amine groups has a toxic effect on the cell depending on the concentration. Although formalin has been rather well-known as a painful matter for a couple of years now, but it was because of the invention of Dubisson and Dennis (1977) that two separate phases of the sensing pain. The formalin test is a test that measures the pain of rats. The first phase starts immediately after the injection in about 5 minutes and the second phase starts around 20 minutes after the injection. In this method, a way has been presented to quantify pain. It included raising, licking, biting the injected leg and reduction of the weight that leg could bear based on the entire time that was spent in various behavioral conditions. Some changes were made in this test and since then, it has been used as one of the valid tests for measuring pain. It seems that two separate stimuli cause the two-phased pain sensing behaviors seen in this test. The role of bradykinins, cytokines and arachidonic acid metabolites has been strongly emphasized in one or both of the formalin pain. The first phase is neurogenic, the direct stimulation of nociceptors. According to the results of the experiments, the matter P and bradykinins are involved in the first phase; whereas, histamine, serotonin, prostaglandins and bradykinin play their roles in the second phase. In a study, the B₂ antagonists of bradykinin inhibited pain responses in the second phase but were not effective in the first one. The role they played showed the environmental inflammatory processes in the second phase of the formalin pain. On the other hand, the nonsteroidal anti-inflammatory drugs such as indomethacin decreased the pain in the second phase; while it couldn't do so in the first phase [5, 6]]. Numerous methods have been presented in order to assess the formalin pain. For instance, after injecting back of the foot or plantar surface of the rat, some researchers only measured a single parameter including throwing, shaking, jerking/flinching or licking the foot. On the contrary, some have used some fixed characteristics for scoring.

In this regard, formalin has been widely used and its behavioral responses have been standardized and this test has come to be known as the formalin test. 0.1 to 5 percent formalin was used in this test. The volume of formalin varied from 5 to 10 microliters. This substance was injected to various parts of the body including back of the hand and foot, upper lip, intraperitoneal and in the colon, in order to create and then review the behavioral and hormonal responses, visceral and somatic pains.

After formalin was injected, the behavioral responses such as licking, biting, chewing and holding that certain body part still have been recorded in two phases. The first phase is the 5 to 10 minutes immediately after the injection (called neurogenic pain) and the second phase starts 15 to 20 minutes after the injection for about 30 to 40 minutes when an increase is seen in the behavior (called inflammatory pain). There is a 5 to 15-minute time interval between the two phases when the responses to pain decrease.

Responses to pain were recorded through measuring the duration of licking and biting the injected foot. According to the cited experiences, it is way better to record the behaviors of the rats than to use the scoring method.

A research studied duration of licking and biting the toe of the injected foot with 5-percent formalin in the time intervals of 0 – 5 minutes and 20 – 40 minutes after the injection. The first phase is neurogenic and it is created by the direct stimulation of nociceptors and there is no chemical mediator in this phase.

In the second phase, the formalin pain is an inflammatory pain and it is created through the involvement of inflammatory mediators such as prostaglandins, bradykinins, histamines and enzymes.

In brief, this study showed that varapamyl, nifedipine and diltiazem inhibit formalin-induced pain behavior and it has analgesic and anti-inflammatory effects. These effects can be associated with the role of calcium channels in nerve cells on one hand and the release of inflammatory mediators from the cells on the other. However, further reviews are needed in order to investigate the exact role of the calcium channels inhibiting inflammatory pain in human beings and other living creatures [4].

The formalin test was also used for reviewing the analgesic effects of Eugenol, because this test has been known as a valid research model among various aspects of chronic pain. It determines the spinal central sensitivity after the environmental inflammation. There are also numerous reports that indicate that neurotransmitter systems such as the substance P, glutamate, serotonin and histamine play role in the formalin responses [7].

In order to review the pain mechanisms, formalin has been used as a painful substance at various concentrations when injected in different parts of the body. According to these studies, it has been specified that a two-phased pain is created after the plantar injection of formalin. Histamine is frequently used for reviewing the inflammation mechanisms. Histamine stimulates the neural fibers transmitting pain and releases pain-related neuropeptides. A sense of itch and pain is created in the skin when histamine is injected [8].

MATERIALS AND METHODS

In this study, adult male Wistar rats were used. These rats weighed 200 to 250 grams and they were bought from Faculty of Veterinary Medicine of Tehran University. The rats were divided into groups of six and they were put in plastic cages in a room with desirable temperature of about 23±2°C, desirable environmental conditions and 12 hours of light. They were fed with commercial pellet food. They had 24/7 access to food and water. All of the experiments were performed in the time interval of 8 to 15 hours. Commercial 37-percent formalin was used and normal saline was added to it in order to prepare the 5, 1 and 2.5% formalin solution.

There were 6 rats in the first group, i.e. the control group. The respond of these rats to pain after the plantar injection with normal saline was reviewed. There were also three other groups each of which had 6 rats. In these groups, the somatic pain was created through a plantar injection with 1, 2.5 and 5 percent formalin with a 50µL volume and then it was reviewed.

In order to review the sense of pain in all groups, the formalin test was used. This text was first presented by Dubisson (1977) and it is now a valid method used for reviewing chronic pain. In the present study, the somatic pain was created through a plantar injection with 1, 2.5 and 5 percent formalin with a 50µL volume and then it was reviewed. As it was already mentioned, using various concentrations of formalin creates pain in the rats' plantar. On the other hand, Responses to pain were recorded through measuring the duration of licking and biting the injected foot. According to the cited experiences, it is way better to record the behaviors of the rats than to use the scoring method (4). In this method, we have a plantar subcutaneous injection of formalin.

The rats were lightly kept with a towel and they are injected with 50 µL formalin solution with the concentration of 1 percent on the foot plantar using the needle number 28. When the foot plantar is injected with diluted formalin, the animal immediately reacts by pulling back the foot and whines and tries to run. The rats are instantly put inside the pain mirror so that their behavioral response to pain would be reviewed. The response to pain caused by plantar injection of formalin has two phases. In this present, the animal's behavior in the first five minutes and in the time interval of 15 to 40 minutes were considered as the first and second phase of pain. Figure 3-4 shows the animal licking the injected body part after it was injected with formalin in the pain mirror device.



Fig. 1 : Licking the injected part of the body after plantar injection of formalin in the pain mirror device.

Review of pain behavior

The pain mirror device was used to create the behavior caused by plantar injection of formalin which was then reviewed. This device has one basis and one box. The box is made of shatterproof glass with the dimensions of 25×30×30 on a framework and it has a mirror with a 45-degree angle [Fig. 2]. It is because of the 45-degree angle that every move the animals make can be monitored. There are various factors that might make the animals stressed such as putting them in a cage, keeping them awake, separating one from the group, moving them from one room to another with different lighting and smell. Since there are numerous stressful factors, thus the researchers must try to minimize these factors [9]. In order create a compliance between the animals and the environment, they are transferred to the laboratory four hours before the experiments begin and they are placed inside the glass box in the pain mirror device half an hour before the beginning of the test. The animals are taken out of the box to be injected with formalin and are put back in it after the injection. [Fig. 2] illustrates the pain mirror box used in this study.



Fig.2: The pain mirror device used in this study.

The statistical analysis method

The data obtained from plantar injection with normal saline (control group) and with formalin (experimental group) was analyzed using the statistical method factor repeated measures (factorial) and then the Duncan. On the other hand, the data obtained from the experiment where the solution was injected was analyzed by one-way analysis of variance method (ANOVA) and then the Duncan test was used. The significance level has been $P < 0.05$. In the experiments associated with determining the response, the proper dose of the substance has been specified by processing different nonlinear models such as second-pseudo, broken line, broken line with two breaks and exponential function, etc. The rate of determination coefficient has been selected as the best model and the desirable response is obtained from it. The GLM procedure of the SAS software was used for the analysis of variance and the Tukey method was used to compare the means.

RESULTS

[Fig. 3 and 4] illustrate the duration of licking and hitting the injected foot after the plantar injection with normal saline and formalin at the concentrations of 1, 2.5 and 5%. Figure 5 and 6 show them in 5-minute intervals (0 – 5 and 15 – 40).

The plantar injection with normal saline did not cause a considerable behavior in 5-minute intervals and between 15 and 40 minutes after the beginning of the experiment. The only significant difference it made was in the first 5 minutes (0 – 5) ($P < 0.05$). Plantar injection of formalin at concentrations of 1, 2.5 and 5% made the animals lick or hit their foot in the following time intervals: 0 – 5, 15 -20, 20 – 25, 25 – 30, 30 – 35, and 35 – 40.

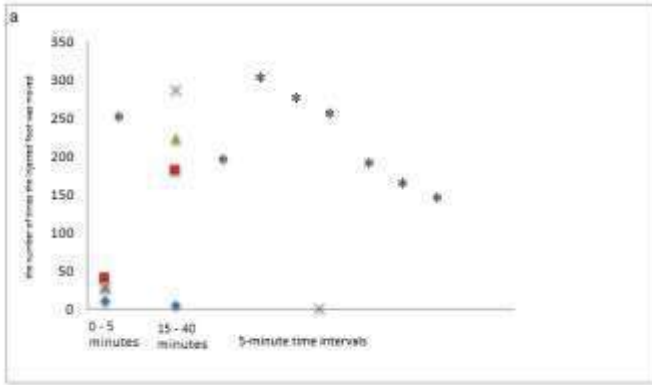


Fig. 3: The number of times the injected foot was moved (plantar injection of formalin).

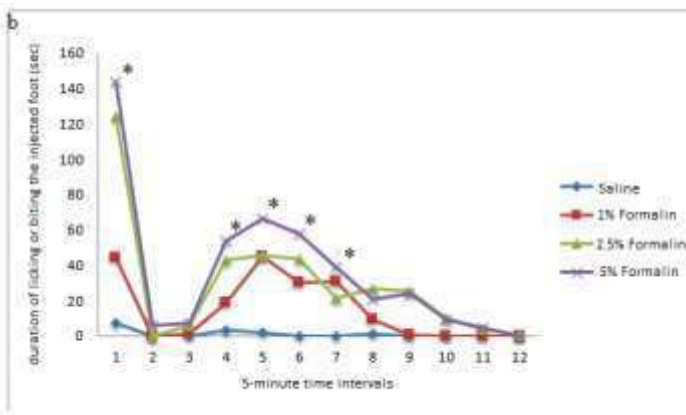


Fig.4: Duration of licking and biting the foot (plantar injection of formalin)

* Shows that there is a significant difference at the level of $P < 0.05$ compared with plantar injection with normal saline and other time intervals take 5 minutes.

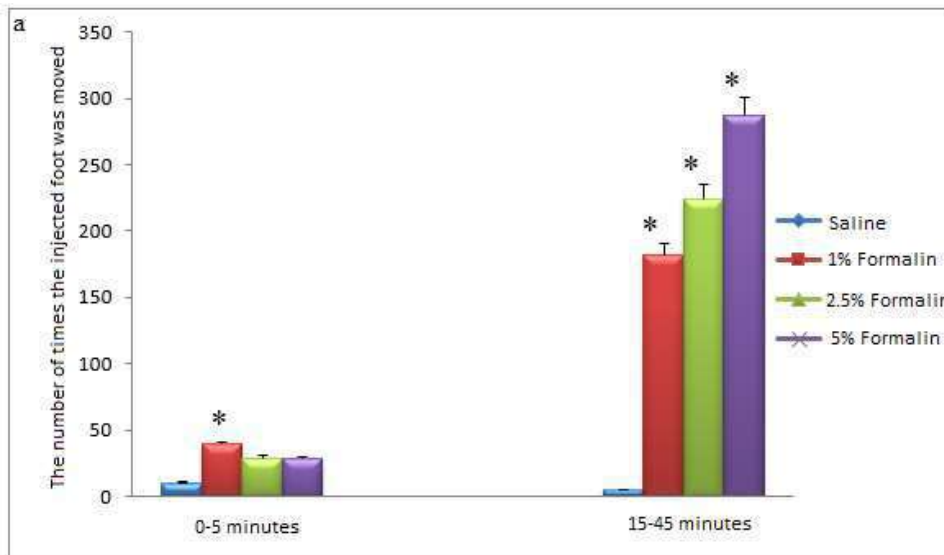


Fig.5 : The number of times the injected foot was moved (plantar injection of formalin).

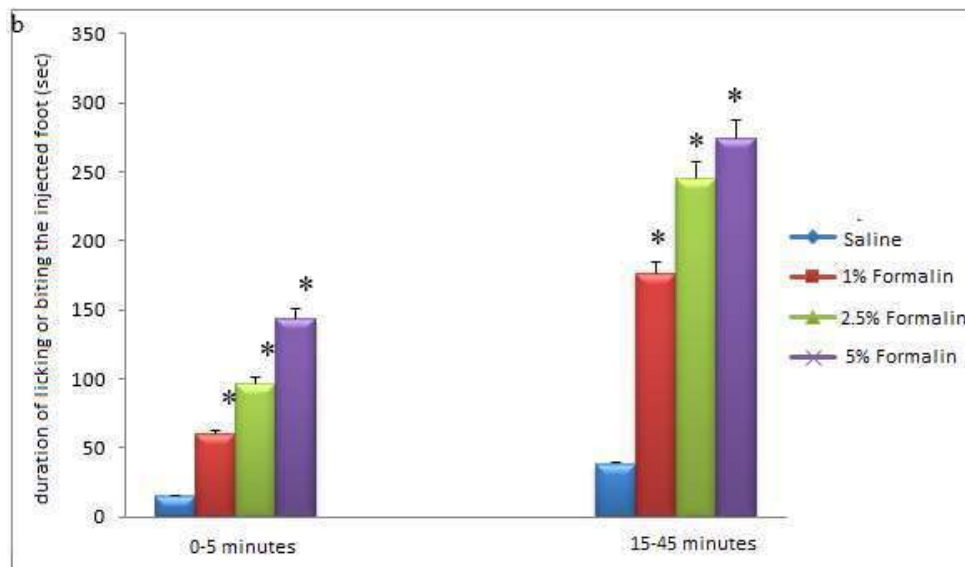


Fig. 6: Duration of licking and biting the foot (plantar injection of formalin).

* Shows that there is a significant difference at the level of $P < 0.05$ compared with plantar injection with normal saline and other time intervals take 5 minutes.

CONCLUSION

This study aims to review rats' pain behavior after plantar injection with 1, 2.5 and 5 percent formalin. The results of the study show that injecting the inner level of the paw of rats with normal saline with a volume of 50µL creates an insignificant behavioral reaction just in the first 5 minutes after the injection. Depending on the research method, in the control group, various volumes of normal saline is used in most researches and perhaps it is mostly because of the fact that this solution is isotonic which means that it does not create the reactions associated with tonicity and pressure at the place of injection. The likelihood of creation of mild reaction to pain in the first five minutes after the injection with normal saline can be because of the fact that the needle is used for a subcutaneous injection. Despite the fact that the needle number 28 has been used for the subcutaneous injection in the present study, even if any other needle was used, only putting the needle in the body tissues would create pain reactions because the nociceptors are stimulated. In previous studies, in the first five minutes after injecting the foot plantar of rats with normal saline with a volume of 50µL, a weak pain reaction has been reported.

Figure 3 shows the duration of licking the foot plantar or hitting it after the injection with formalin at the concentrations of 1, 2.5 and 5%. A significant difference ($P < 0.05$) was seen in the first, third and eighth time interval after the plantar injection of formalin at the concentrations of 1, 2.5 and 5%. In other words, in terms of time, formalin creates a two-phased pain (first phase: minutes 0 to 5 and second phase: minutes 15 to 40). Therefore, there is no contrast between this study and previous reports regarding the two phases of the pain caused by injection with formalin, which becomes totally clear. The first phase is neurogenic and it is created by the direct stimulation of nociceptors and there is no chemical mediator in this phase. In the second phase, the formalin pain is an inflammatory pain and it is created through the involvement of inflammatory mediators such as prostaglandins, bradykinins, histamines and enzymes.

The results of the present study showed that a two-phased pain behavior is felt when the foot plantar of rats is injected with formalin. These two phases are: hitting or licking the injected body part.

The formalin solutions (0.2 to 10%), as substances that cause pain, are used in order to review the tonic pain mechanisms through frequently injection various parts of body, especially foot plantar and face and in order to report the two-phased pain behaviors with an interphase between these two (5, 8, 10). Although subcutaneously injecting the ear of a rabbit or sheep with formalin has always created a one-phased pain for 10 minutes after the injection [11].

In this test, various concentrations of formalin have been used (from 0.1 to 5%). The volume of formalin varied from 5 to 10 microliters. This substance was injected to various parts of the body including back of the hand and foot, upper lip, intraperitoneal and in the colon, in order to create and then review the behavioral and hormonal responses, visceral and somatic pains.

After formalin was injected, the behavioral responses such as licking, biting, chewing and holding that certain body part still have been recorded in two phases. The first phase is the 5 to 10 minutes immediately after the injection (called neurogenic pain) and the second phase starts 15 to 20 minutes after the injection for about 30 to 40 minutes when an increase is seen in the behavior (called inflammatory pain). There is a 5 to 15-minute time interval between the two phases when the responses to pain decrease. Subcutaneously injecting the upper lip of rats with 5% formalin creates a two-phased pain

(12). In 1995, Clowly et al reviewed the effect of injecting rats with various concentrations of formalin on their pain behavior. They concluded that concentrations of 0.5 and higher create a two-phased pain; thus, the suggested formalin at concentrations of 0.5 to 5 for creating pain in rats' foot plantar [12]. Nonetheless, the pain behavior obtained from this study was a two-phased pain behavior shown as licking and hitting the injected body part. This means that this study complies with others.

CONFLICT OF INTEREST

There is no conflict of interest.

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None

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ARTICLE

THE REAL QUALITY OF MATERNITY CARE IN IRAN HOSPITALS: A QUALITY ASSESSMENT STUDY

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ABSTRACT

Promotion of the level of quality was declared as one of the five global strategies to improve reproductive health programs in 2004. The World Health Organization accentuates on the monitoring and assessing the structure, process, and outcome of services in order to promote the level of quality. This study aimed to evaluate the quality of midwifery care provided for natural childbirth in two selected hospitals of Urmia University of Medical Sciences. This analytical study was conducted on 200 women with normal pregnancy admitted to the hospitals. They were all selected using census sampling technique. In this study, a questionnaire was used to collect the required data. The questionnaire was filled out in four stages of birth with a midwife observation. Finally, in order to analyze the data, SPSS20 statistical software was utilized. The mean quality of midwifery care in the cities of Khoy and Bukan was 38.06 ± 0.59 and 32 ± 7.69 , respectively. According to the results of Mann-Whitney statistical test, there was a significant difference ($p=0.000$) between the mean quality of midwifery care in the two cities. This means that the means are not equal, and the mean quality of midwifery care in Khoy is higher than that in Bukan. The quality of midwifery care for the four stages of childbirth showed that in most areas under review, though the level of quality was not desirable, patients' satisfaction with the provided services was at a high level. According to the results of the current study, it was found that despite the importance of midwifery care in improving maternal health, quality of care is not desirable and it is necessary for the authorities to take some actions in order to improve the quality of midwifery services using specialized personnel, development of staff, and paying attention to the mental needs of patients, etc..

INTRODUCTION

Despite the fact that most women reach childbearing age in a desirable health status, mortality and morbidity among pregnant women continues to increase. Most of the morbidity and mortality of mothers occur within peripartum and postpartum. Complications of postpartum period are responsible for more than half of maternal deaths. [11].

Nowadays, the difference in maternal mortality in developed countries and developing countries designate the biggest difference of all health indicators. The rate in underdeveloped and developing countries varies from 1 in 15 to 1 in 50, whereas in developed countries, the rate varies from 1 in 4,000 to 1 in 10,000 [26].

In line with the Millennium Development Goals to reduce maternal mortality, Iran pledged to decrease the maternal mortality rate to 20 per 100000 births by 2015.

Each year, about one million and two hundred thousand births occur in the country among which more than 90% are carried out in hospitals (Ministry of Health and Medical Education (MOHME) of Iran 2004). On the other hand, from 1996 to 2005, 2585 maternal deaths and in 2005, 295 cases of maternal death were reported of which 86.7% occurred in hospitals and 60% of them was due to medical, nursing and midwifery errors (Motlagh MI 2006).

However, statistics related to maternal mortality rate is still high compared to the goals of the World Health Organization. This happens while women access to maternity care has increased, but due to poor quality of services, the maternal mortality rate is still high (Parsaee, Saeed Soltani, Reza. 2002).

Large number of maternal deaths can be avoided by providing standard care which is expected in the country concerned (Anderson, A., Mac Farlynj 2000).

Therefore, in addition to increasing the coverage of care, service quality must be improved. Promoting the quality of services was declared as one of the five global strategies to improve the reproductive health program in 2004 (World Health Organization 2005), and many countries attempted some interventions to promote the quality of maternity care (UNFPA 2009).

An investigation into the causes and circumstances of maternal mortality and the assessment of the quality of services is the first step to improve the health of pregnant women. This implies that in order to improve the outcome of service, the quality of services must be measured first in order to improve services to strengthen the weaknesses of the program (Kwast b 1998).

Although addressing the quality is inherent and doctors and other health providers have historically been looking for quality care in any form, the assessment and promotion of the quality of health care dates back to the mid-nineteenth century in England. At that time, the famous nurse Florence Nightingale, served in the Crimean War. He was the first one who detected a logical relationship between the quality nursing care

KEY WORDS

Maternity, patient care, patient,

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to wounded soldiers and reducing the mortality rate of them. During the twentieth century, Nightingale's works were followed by several scientists including Kadman, Flexner, Peterson, Moorhead, and Bain in the United States of America. Although each one's work was related to only one aspect of quality health care, their studies suggested one thing they all had in common and that was to better provide quality services, first of all, we need to assess the quality (Al_Assaf AF & June A Schmele 1997).

Unfortunately, in daily activities of health system organizations, the quality assessment of such activities is not an easy task. Since quality of health care has various aspects, each one looks at these aspects from their own perspectives. As it was mentioned above, all theories share a special place in the quality of health services and the need to evaluate it because the ultimate goal of quality assessment is to improve the results of the plans as well as to make them effective; in other words, to promote the quality of health care services. Crosby believes that something that cannot be measured cannot be promoted. Quality assessment not only shows the way to implement health programs, but also highlights the failure of the programs so that the problems can be completely solved (Stephanie G. Sherman 1999).

West Azarbaijan is one of the biggest province of Iran. One of the main characteristic of this province is two nations that is unique in Iran. The north of province is Shie and the south is Sonie with different believe and behavior such as pregnancy and delivery. Khoy (Shie) and Bukan (Sonie) are the biggest cities of north and south province. Although, quatitave indicators such as maternal mortality, maternal and are increasing, qualitative indicators are unequal. This study will show us then reality of this.

MATERIALS AND METHODS

This study was conducted in Khoy and Bukan cities, located in West Azarbaijan Province, Iran. The study sample consisted of all pregnant women who had full-term pregnancy (42-37 weeks), and referred to hospital for delivery.

Sampling was not carried out in this study and all pregnant women referred to delivery wards within the study period (three months) that undertake natural childbirth process entered into the study. Therefore, instead of sampling, census was used. All pregnant women referred to delivery wards within the study period (the period of one month) undertake natural childbirth process. Given the reports of the previous month in the hospital, it was estimated as almost 100 individuals and since for each mother two questionnaires would be filled out, in practice, the sample size was estimated about 200 people. According to the same texts, such number will produce valid results.

The instrument applied to collect data in this study was a 55-item questionnaire that evaluates the observance of the scientific standards of the first stage of delivery, intermittent auscultation of the fetal heart, continuous monitoring of fetal heart rate, and maternal contractions, use of the partograph, the second stage of midwifery care, the third stage, and the fourth stage of delivery (postpartum) and that the measures used are in the form of "yes" and "no".

To assess the validity of the questionnaire, its content was assessed by 5 specialists in the field (supervisor, one gynecologist who was a faculty member, one Master of Midwifery who was a faculty member, and one faculty member specializing in maternal and child health, and finally, Deputy chief of Midwifery, Urmia University of Medical Sciences), and was eventually approved by consensus. To evaluate the reliability, since the questionnaire measured a total concept, after 10 questionnaires were completed in the Center of Gynecology and Obstetrics of Urmia University of Medical Sciences (Kosar Center), the Cronbach's alpha coefficient was calculated as 0.79 that indicated a good internal consistency between the items and that the reliability of the questionnaire was approved.

After the researchers obtained permission from the authorities for Research and Technology and Treatment Deputy of Urmia University of Medical Sciences, and coordinated with the officials of Health Center in Khoy and Bokan and selected and trained the interviewers, we went to the hospitals where the study were to be conducted and informed consent was taken from the pregnant women in hospitals, and filled in the questionnaires. The mothers who were not inclined to participate in the project or their pregnancy were terminated cesarean section were excluded from the study. To reduce bias, the Questionnaire was completed by the mother at postpartum and before discharge from the hospital. For mothers who were not literate enough to complete the questionnaire, the researchers read the questions and tried not to induce any opinions on the expectant mother, and drew her confidence on the confidentiality of information exchanged.

In order to present descriptive characteristics of the studied population, charts, frequency tables, and descriptive statistics including mean and standard deviation were used. To compare the mean satisfaction scores of the two cities under study, independent t-test and to compare the correlation between satisfaction scores in each city studied, the Spearman correlation coefficient were run. A significance level of less than 5% was considered as significant. Data analysis was performed using SPSS20 software.

Findings

The mean quality of midwifery care in the cities of Khoy and Bukan was 38.06 ± 0.59 and 32 ± 7.69 , respectively. According to the results of the Mann-Whitney statistical test, there was a significant

difference ($p=0.000$) between the mean quality of midwifery care in the two cities. This means that the means are not equal, and the mean quality of midwifery care in Khoy is higher than that in Bukan.

The mean quality of midwifery care with regard to intermittent auscultation of the fetal heart in Bukan and Khoy were 1.17 ± 0.77 and 1.34 ± 0.91 , respectively. According to the results of the Mann-Whitney statistical test, there is no significant difference ($p=0.204$) between the mean quality of midwifery care with regard to intermittent auscultation of the fetal heart in the two cities. This means that the means are equal.

The mean quality of midwifery care with regard to continuous monitoring of the fetal heart rate and uterine contractions in Khoy and Bukan are 0.67 ± 0.89 and 0.37 ± 0.91 , respectively. According to the results of the Mann-Whitney statistical test, there is a significant difference ($p=0.000$) between the mean quality of midwifery care with regard to continuous monitoring of the fetal heart rate and uterine contractions in the two cities. This means that the means are not equal, and the mean quality of midwifery care in Khoy is higher.

The mean quality of midwifery care with regard to the use of the partograph in Khoy and Bukan are 0.08 ± 0.27 and 0.37 ± 0.91 , respectively. According to the results of the Mann-Whitney statistical test, there is a significant difference ($p=0.004$) between the mean quality of midwifery care with regard to the use of the partograph in Khoy and Bukan. This means that the means are not equal, and the mean quality of midwifery care in Bukan is higher.

The mean quality of midwifery care with regard to the technical care of the first step of delivery in Khoy and Bukan are 11.07 ± 3.70 and 8.32 ± 2.02 , respectively. According to the results of the Mann-Whitney statistical test, there is a significant difference ($p=0.000$) between the mean quality of midwifery care with regard to the technical care of the first step of delivery in Khoy and Bukan. This means that the means are not equal, and the mean quality of midwifery care in Khoy is higher.

The mean quality of midwifery care with regard to the technical care of the second step of delivery in Khoy and Bukan are 11.75 ± 3.22 and 9.69 ± 3.31 , respectively. According to the results of the Mann-Whitney statistical test, there is a significant difference ($p=0.000$) between the mean quality of midwifery care with regard to the technical care of the second step of delivery in Khoy and Bukan. This means that the means are not equal, and the mean quality of midwifery care in Khoy is higher.

The mean quality of midwifery care with regard to the technical care of the third step of delivery in Khoy and Bukan are 4.18 ± 1.24 and 3.44 ± 1.28 , respectively. According to the results of the Mann-Whitney statistical test, there is a significant difference ($p=0.000$) between the mean quality of midwifery care with regard to the technical care of the third step of delivery in Khoy and Bukan. This means that the means are not equal, and the mean quality of midwifery care in Khoy is higher.

The mean quality of midwifery care with regard to the technical care of the fourth step of delivery in Khoy and Bukan are 9.55 ± 2.18 and 9.01 ± 2.80 , respectively. According to the results of the Mann-Whitney statistical test, there is a significant difference ($p=0.023$) between the mean quality of midwifery care with regard to the technical care of the fourth step of delivery in Khoy and Bukan. This means that the means are not equal, and the mean quality of midwifery care in Khoy is higher.

The mean satisfaction of service recipients in the field of hospital facilities in Khoy and Bukan are 10.75 ± 3.27 and 10.41 ± 2.55 , respectively. According to the results of the Mann-Whitney statistical test, there is a significant difference ($p=0.034$) between the mean satisfaction of service recipients in the field of hospital facilities in Khoy and Bukan. This means that the means are not equal, and the mean quality of midwifery care in Khoy is higher.

The mean satisfaction of service recipients in the field of treatment of employees in Khoy and Bukan are 17.71 ± 4.22 and 17.38 ± 5.44 , respectively. According to the results of the Mann-Whitney statistical test, there is no significant difference ($p=0.814$) between the mean satisfaction of service recipients in the field of treatment of employees in Khoy and Bukan. This means that the mean qualities of the two groups are equal.

The mean satisfaction of service recipients in the field of technical performance of staff in Khoy and Bukan are 32.76 ± 9.99 and 34.31 ± 7.15 , respectively. According to the results of the Mann-Whitney statistical test, there is no significant difference ($p=0.585$) between the mean satisfaction of service recipients in the field of technical performance of staff in Khoy and Bukan. This means that the mean qualities of the two groups are equal.

The mean satisfaction of service recipients in the field of mother's participation in cares in Khoy and Bukan are 6.47 ± 2.61 and 6.79 ± 1.65 , respectively. According to the results of the Mann-Whitney statistical test, there is no significant difference ($p=0.641$) between the mean satisfaction of service recipients in the field of mother's participation in cares in Khoy and Bukan. This means that the mean qualities of the two groups are equal.

Table 1: Distribution of absolute and percentage frequency of the quality of midwifery care from the perspective of technical standards

No		Yes			
Frequ ency	Perce ntage	Frequ ency	Perce ntage		
280	93.3	20	6.7	Was serum connected to the mother?	1
0	0	300	100	Were drugs such as atropine, hyoscine, or promethazine was administered to the mother?	2
4	1.3	296	98.7	Was the mother shaved?	3
6	2	294	98	Was the mother became enema?	4
4	1.3	296	98.7	Was the mother stimulated?	5
73	24.3	227	75.7	Was the mother autonomous in walking and selecting the desired position in labor?	6
154	51.3	146	48.7	Was the mother encouraged to drink fluids?	7
130	43.3	170	56.7	Was the mother encouraged to empty her bladder?	8
241	80.3	59	19.7	Were the pain-relief methods used?	9
55	18.3	245	81.7	Was vaginal examination performed every 4 hours in the latent phase?	10
44	14.7	256	85.3	Was vaginal examination performed every 2 hours during the active phase?	11
162	54	138	46	Was the mother's vital signs controlled once every four hours in the latent phase?	12
168	56	132	44	Was the mother's vital signs controlled every 2 hours during the active phase?	13
149	49.7	151	50.3	Was uterine contractions evaluation performed every 30-60 minutes?	14
134	44.7	166	55.3	Was uterine contractions assessed every 30 minutes during the active phase?	15
46	15.3	245	84.7	Was the heartbeat of the fetus assessed in the first stage of labor in low-risk cases at least once every 31 minutes and in case of high risk at least every 15 minutes?	16
221	73.7	79	26.3	Was the heart rate checked for 60 seconds after the uterine contraction?	17
250	83.3	50	16.7	Was auscultation of fetal heart rate checked at the same time?	18
276	92	24	8	Was continuous monitoring used?	19
245	81.7	55	18.3	In terms of any evidence of risk (fetal heart rate greater than 161 and less than 111 and passing meconium and beginning oxytocin infusion, etc.) was continuous monitoring applied?*	20
293	97.7	7	2.3	In terms of any abnormal results of NST, was one of the auxiliary methods such as fetal heart rate, fetal blood sampling, and stimulation of the head performed?*	21
218	72.7	82	37.3	Was the mother in the supine position when Monitoring was carried out?*	22
285	95	15	5	Was Decision-making for interventions during labor performed based on the partograph?	23
244	81.3	56	18.7	If the rapid termination of pregnancy was required, was cesarean section was performed within 30 minutes?*	24
57	19	243	81	Was the mother transferred to the maternity in due time?	25
182	60.7	118	39.3	Did the midwife wash her hands properly before delivery?	26
24	8	276	92	Did the midwife use sterile gloves?	27
35	11.7	265	88.3	Were perineal or washing serum used or in case of episiotomy, was Betadine used?	28
114	38	186	62	Was the fetal heart rate checked every 15 minutes During labor?	29
211	70.3	89	29.7	Were the mother's vital signs measured at least once in labor?	30
131	43.7	169	56.3	Were uterine contractions recorded every 15 minutes During labor?	31
23	7.7	277	92.3	Was the mother forced to straining?	32
9	6.3	281	93.7	Was pressure on the belly performed for the delivery?	33
135	45	165	55	Was episiotomy performed?	34
40	13.3	260	86.7	If the mother was in the lithotomy position was Ritgen modified maneuver carried out for the head to come out? If the mother was in UpRIGHT position, was the head of the fetus supported?	35
130	42.3	173	57.7	After the head came out, was the neck circumference controlled with regard to the presence of umbilical cord?	36
18	6	282	94	After the head came out, were the mouth and nose of the baby sprayed?	37
170	56.7	130	43.3	Immediately after birth, was the baby prone on the mother's abdomen and were arms skin to skin contact with her?	38
19	6.3	281	93.7	Was the uterus examined after delivery?	39
147	49	153	51	Was the stomach touched to ensure that there is no other fetus?	40
19	6.3	281	93.7	After the head came out, was the neck circumference controlled with regard to the presence of umbilical cord?	41
42	14	258	86	Was the controlled traction of cord done after clamping?	42
102	34	198	66	Were the pair and shades controlled?	43
31	10.3	269	89.7	Was uterine massage performed?	44
51	17	249	83	Was it become clean by washing Serum, perineum or clean cloth?	45
73	24.3	227	75.7	Were mother and baby kept warm?	46
38	12.7	262	87.3	Was the mother controlled for postpartum hemorrhage rate?	47
26	8.7	274	91.3	Were anterior, posterior regions and vaginal wall controlled to detect the extent of the tear or episiotomy?	48
136	45.3	164	54.7	Was the mother controlled in terms of the signs of hematoma?	49
65	21.7	235	78.3	Was anesthesia used To repair the tear and episiotomy?	50
65	21.7	295	86.3	Were small tears restored in the absence of bleeding in postpartum?	51
41	13.7	295	86.3	Was disinfectant poured on perineum in postpartum?	52

23	7.7	277	92.3	Was ice or bag put on mother's womb in postpartum?	53
19	6.3	281	93.7	Was bladder catheterization performed in Postpartum?	54
18	6	282	94	Was cervical controlled in Postpartum?	55

In the [Table 1], the highest quality was related to item 2, prescription of drugs such as atropine and hyoscine or promethazine with 100 percent and the lowest quality was related to item 21, in the case of abnormal result of NST, an assessment of fetal health such as sampling the fetal blood and stimulation of head/ Vibroacoustic, etc. with 3.2 percent.

DISCUSSION

In this study, which was conducted for the first time in the cities of Khoy and Buchan, located in northwestern Iran, West Azerbaijan Province on 200 women with normal pregnancy, it was found that in Bukan, the mean quality of midwifery care was 37 ± 69.7 , whereas in Khoy, it was 38.06 ± 0.59 and that the quality in Khoy was higher than that in Bukan, and the overall mean quality Buchan was 35.54 ± 9.13 , which indicates that the quality of midwifery care is at a low level and according to the Kruskal-Wallis test ($P = 0.0001$) the quality of midwifery care is significantly different in the two cities, and the means are not equal.

With regard to the first objective "to determine the quality of midwifery care in four stages (first, second, third and fourth stages of delivery), from the perspective of technical aspects, in Khoy and Bokeran hospitals, "the results indicate that in the first stage of delivery, the means for Bukan and Khoy were 8.32 ± 2.02 , and 11.75 ± 3.22 , respectively i.e. compared to Bukan, the quality of care in the first stage was higher in Khoy.

In the second stage, the mean quality of midwifery care in Bukan, and Khoy was 9.69 ± 3.31 , and 11.75 ± 3.22 , respectively and the quality of care in the city of Khoy is higher than the other two cities.

In the fourth stage, the mean quality of midwifery care in Bukan, and Khoy was 9.01 ± 2.80 , and 9.55 ± 2.18 , respectively and the quality of care in the city of Khoy is higher than the other two cities.

The results of the study by Oryan and colleagues entitled "An investigation into the quality of midwifery care provided to pregnant women admitted to the selected Hospitals of Yazd in 2012", one of the central and southern provinces of Iran, showed that the mean quality of midwifery care in the first and second stages was 49%, and in the third and fourth stages, it was 67%. The results of their study are inconsistent with those of the current study in the way that the mean quality of care was higher in the first and second stages.

Simbar and colleagues in 2009 conducted a study in the selected hospitals of Kurdistan University of Medical Sciences, located in the West of Iran. Midwifery cares were presented at various stages of delivery with the mean percentage of compliance with desired situation, in the first stage (71.4%) in the second stage (63.03%), in the third stage (80.63%) and in the first two hours after delivery (70.50%). This is not consistent with the result of our study. This difference may be due to the high number of births and midwife large volume of work, no care for afterbirth on the part of the midwife and negligence to comply with the standards by the authorities.

The results obtained from the study by Simbar and colleagues in 2003 in hospitals affiliated to Shahid Beheshti University of Medical and Health Services in Tehran, the quality of care provided in the fourth stage (postpartum) was poor in most cases. The results of this study are consistent with the results of the current study. the quality of care in the third and fourth stages (postpartum) was low.

The results of the study by Karimiyan, et al in 2011 in hospitals of Kashan University of Medical Sciences in the central and southern regions of Iran showed that the quality of midwifery care in four steps is not desirable. The results of this study are consistent with those of our study.

With regard to the second objective "to determine the intermittent auscultation of the fetal heart rate in Bukan and Khoy hospitals" the obtained results suggest that the means for Bukan and Khoy were 17.1 ± 0.77 , and 1.34 ± 0.91 , respectively i.e. compared to Bukan, the quality of care was higher in Khoy. In total, the overall mean was 1.27 ± 0.81 . In Bukan and Khoy, the assessment of fetal heart in the first stage in low-risk cases at least once every 31 minutes and every 15 minutes in high-risk cases had the highest quality (81%) and the hearts beat for 60 seconds after childbirth and uterine contraction in Bukan and Khoy had the lowest quality (16%) and simultaneous auscultation of heart rate had the lowest quality (15%).

The results of the study by Karimiyan and colleagues in 2011 in hospitals of Kashan University of Medical Sciences showed that auscultation of fetal heart was not of high quality and given the importance of controlling the fetal heart rate, auscultation of fetal heart every half hour in low-risk pregnancies is essential at this stage (Cunningham L & Williams, 2014). In this study, no auscultation for a full minute and lack of the release of the outcome to the mothers are considered as the causes of low quality of this kind of care.

Oryan and colleagues conducted research at the selected Hospital of Yazd in 2012. In their study, no auscultation for a full minute and lack of the release of the outcome to the mothers are considered as the causes of low quality of this kind of care. This is not consistent with the current study which may pertain to the shortage of medical staff and the large volume of midwives' work in this case.

With regard to the third objective "to determine the quality of midwifery care in the context of continuous monitoring of heart rate and uterine contractions, in Khoy and Boker hospitals", the results indicate that the means for Bukan and Khoy were 0.37 ± 0.91 , and 0.67 ± 0.89 , respectively i.e. compared to Bukan, the quality of care was higher in Khoy. No study was found in this respect.

With regard to the fourth objective "to determine the quality of midwifery care in the field of Partograph, in Khoy and Boker hospitals", the results indicate that the means for Bukan and Khoy were 0.37 ± 0.91 , and 0.67 ± 0.89 , respectively i.e. compared to Bukan, the quality of care was higher in Khoy. In total, the midwifery care had the mean of 0.05 ± 0.21 i.e. a low quality. In Bukan, the quality is high (100%), whereas in Khoy, the quality is low (8%).

Oryan and colleagues conducted research at the selected hospitals of Yazd in 2012. The results suggest that on the control of uterine contractions. Lack of recording Partograph is a major cause of the mean quality of care.

Simbar and Associates conducted studies in 2007 at the selected hospitals of Kurdistan University of Medical Sciences. The results showed that controlling uterine contractions must be done in the active stage of delivery to prevent uterine hyper or hypotonicity (increase or decrease in the strength of contractions of the uterus) and must be recorded every half hour in terms of the number and duration (Clemenstone S & Al 2002, World Health Organization 1994, Cunningham G & Al 2005). This midwifery care process was provided with low quality.

Anderson and Johansson reported that one of the major causes of maternal death after childbirth is the poor quality of care (Anderson F, Johnson T (2001)). The standardization of care in the postpartum period appears to improve the quality of essential services. This study is consistent with the study.

Anderson and Johansson reported that one of the major causes of maternal death is the poor quality of care after childbirth (Anderson F, Johnson T (2001)). Accordingly, the standardization of care in the postpartum period appears to improve the quality of essential services.

The quality of care on uterine assessment was the most desirable area which is important in the diagnosis and prevention of complications of uterine bleeding and can be a factor in reducing maternal deaths due to obstetric hemorrhage (Margolis L & Kotelchuk M, 1996).

According to the above-mentioned studies, limited episiotomy has benefits such as reducing damage to the perineal muscles (Carroli and Mignini 2009), less bleeding and pain for the patient (Mignini and Carroli 2009, and Cunningham et al. 2005). Given the importance of these cases, restricted use of episiotomy rather than the routine use is recommended (Aukee 2006, Dannecker 2004, Kudish 2008).

In general, it seems that in this research, much work of midwives, hospitalization, abortion, and preparation for cesarean section in delivery ward, and admission of women with complications can be considered as important reason to reduce the mean performance of the maternity ward staff. Given that maintaining and improving maternal health depends largely on the provision of services by medical staff, officials need to improve the quality of midwifery services by applying specialists, motivating them to raise the quality of services, developing staff, paying attention to the psychological needs of the patients and providing facilities for the presence of patient accompaniment, etc. Also, holding more educational courses on practical skills of delivery ward, installation of the protocols of Ministry of Health or promotion of the use of partograph and familiarization of staff on how they can use them to improve the quality of cares such as proper and on time evaluation of vital signs and fetal heart rate and control of contractions can be effective. Such protocols result in continuous appraisal of staff performance by managers and can improve the quality of midwifery cares and ultimately, increase customers' satisfaction and health.

CONFLICT OF INTEREST

None

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ARTICLE

THE EFFECT OF IMPLEMENTING A PERFORMANCE-BASED PAYROLL SYSTEM ON EMPLOYEE SATISFACTION IN A STATE HOSPITAL(A CASE STUDY OF MASIH DANESHVARI HOSPITAL)

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ABSTRACT

The present study used a questionnaire approved by the treatment department to obtain employees and physicians' satisfaction. The statistical population of the current study included all the personnel of Masih Daneshvari Hospital including the staff and physicians. The sample size was thoroughly studied with the return of more than half of the questionnaires. Data were analyzed using SPSS. The results indicated that there was a statistically positive significant correlation between the performance-based payment system and personnel satisfaction in 2015.

INTRODUCTION

Nowadays, human resource is considered as one the most important organizational resources which is responsible for achieving organizational productivity and, ultimately, plays a key role in the entire society. Therefore, being aware of the concepts and structures pertaining to human resource is essential [1]. One of the main concepts which, on the one hand, draws many theoretical and fundamental efforts and, on the other hand, has become more important in all levels of management and human resources in organizations is employees' job satisfaction [18,24].

As all agree, human resource is considered as the most important factor in any country's development. Thus, attentions to human emotions and motivations in any organization, especially the ones like hospitals active in service-providing sectors in which people are responsible for accomplishing major affairs, is essential and of high priority. Due to the fact that productivity and efficiency of the entire organization is crucial, evaluating and recommending effective ways to create more job satisfaction and increase efficiency is predominant [6].

One of the most important and, perhaps, the most controversial concepts which not only draws many theoretical and fundamental efforts but also has become more significant in all levels of management and human resources in organizations is job satisfaction [23]. That's because job satisfaction affects many organizational variables. Several studies have shown that job satisfaction is accounted as one of the vital factors in increasing productivity, personnel's sympathy to the organization, sense of belonging and commitment to the workplace, quantity and quality of work, maintaining decent and humane relationship in workplace, proper communications as well as raising the spirit and love of work [10]. In general, job satisfaction refers to one's feeling of happiness, consent and satisfaction with their job in the organization in relation to having a proper position, talents, gaining success in job, securing reasonable needs, maintaining career advancement, having successful experiences and organizational atmosphere [21,3].

The success of any organization depends on appropriate allocation and use of tools, equipment, money, raw materials and human resources in its organizational programs. This is possible provided that the organizations be able to efficiently use the skills, talents and personal and collective traits of their employees in achieving organizational objectives [29].

Job satisfaction is defined as the match between individuals' perception of their needs and earnings from their job. It has been considered as one of the most crucial research variables in organizational behavior and as a pivotal variable in organizational theories and research [19].

Organizations that are active in service-providing sectors, including hospitals in which people are responsible for many major affairs, attention to human resource and human resource management is more evident than organizations whose most affairs are accomplished by tools and machines. That's

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because extrinsic motivation and things like that have undeniable effects on individuals [20]. In fact, the features of any job influence the responsibilities and duties of employees and may lead to either job satisfaction or job dissatisfaction (Mashabaki,11).

The significance of job satisfaction relies on its crucial role it has in the enhancement and development of organization as well as health and welfare of its human resource, on the one hand, and on the fact that the concept of job satisfaction, in addition to its numerous and sometimes complicated definitions and conceptualizations, is the confluence of many scientific fields including psychology, sociology and even economy and politics, on the other hand [15].

Despite the fact that most of the great companies and organizations in the country, Iran, grant diverse bonuses to their employees under different titles such as Accord and Karate etc., experience has shown that such rewards and bonuses have merely compensated for and restored the salary and, thus, do not have any considerable effect on employees' motivation. In general, bonus is a pleasant outcome following a favorable behavior on employee's part to increase the likelihood of its recurrence [9].

Job satisfaction encompasses all the facts related to wage, labor, supervision, facilities, conditions and performances in an organization [32]. Lack of attention to job satisfaction disrupts organizational system in the long run and causes rebellion, loss of the sense of responsibility, and eventually staff turnover (Johnson et al, 1996). In nursing profession, job satisfaction is considered absolutely vital with respect to the sensitive and significant role of nurses in health, prevention and care of patients [17 ,8]. Otherwise, job dissatisfaction can have negative effects on the approach nurses take towards patients' care and subsequently decreases the quality of care along with negative social, economic and psychological effects it brings as the result of loss of health and health care in the country [34, 16].

With regard to the point that in hospitals, like other organizations, human plays a pivotal role in the core of organization and employees are employed in compliance with government regulations, insufficient salary, unfair wage and inefficiency of payment system causes many troubles including employees' dissatisfaction, absence, turnover, strikes, complaints and other organizational problems. Consequently, the goal of the management in organizations should be attracting, retaining and thriving qualified human resource for the sake of which developing a fair payment system is essential for achieving this objective. In the era of globalization, any organization which fails to produce and progress faster and cheaper with higher quality than its global rivals will be removed from the market. In the field of competition, only the organization which makes the most use of all its human resource capacity will survive.

Given that wage is the most main step in the employee-employer relationship, the prerequisite for establishing a vigorous relationship is that the employee's income would suffice for his family and himself and feel satisfied with his income while comparing it with other employees with the same condition. Therefore, one of the objective of developing a payment system is developing a fair system for all the employees and creating conditions for them to not leave their organization in the competitive market [25 ,11,12,13].

The process of payment system is an activity through which organization evaluates individuals' performance in order to directly and indirectly reward them either monetary or non-monetary bonuses within the framework of their legal regulations and their payment power. Payment systems have a series of intrinsic features; however, they are dependent on the environment in which they are deployed. Therefore, the government and health system executives in different countries should devise a method complying with the regulations and rules of the country to ensure the achievement of organizational goals.

The significance of payment system is to the extent that has long been the subject of debate by many developing and developed countries in the field of financing health services since 1980. The mechanisms used in fee payment to health service providers is of supreme importance. The advantages of an efficient payment system include attracting potential job seekers, retaining staff, creating motivations in employees, paying according to legal regulations, restraining organizational costs and streamlining strategic goals (50% of organizational costs include salaries and wages). Currently, a lot of employees have been receiving other benefits, including incentive payments, in addition to their salary and hourly wages; this indicates that personal incentive and collective payments influence employee's performance and thereby overall organizational performance by 30% and 15-20% respectively [25].

Job satisfaction is affected by various factors such as salaries and wages, spirits and mood, communications, policies, job dimensions, work discipline and personality traits of employees (Seyed Javadian et al., 2002). Every day, the relationship between job satisfaction and life satisfaction becomes significant more than ever in terms of demographic trends. Studies have shown that when the personal and professional life of individuals are more compatible, they are happier and more satisfied than ever. Therefore, the interaction between job satisfaction and life satisfaction has a significant effect on the physical health and psychological wellbeing of individuals (Saatchi, 1995). Since the responsibility of public health has been entrusted to the Ministry of Health and Medical Education and its personnel play a crucial role in this regard especially in medical treatment, its success requires adept managers who not only have the knowledge of scientific management methods but also identify influential factors on employees' performance and satisfaction and provide better conditions for higher quality services

(Robbins, 1998). The main responsibilities of hospital managers include making efforts in retaining human resources and creating the sense of job satisfaction in employees (Farhadian, 1996).

Studies in Germany and Norway showed that Norwegian physicians had higher job satisfaction than German physicians in hospitals contributing to the satisfactory working hours, adequate salary and sufficient benefits in Norway (Rosta et al., 2009). Zahedi et al. found that most of the employees had a desired job satisfaction in terms of their supervisor, colleagues and nature of work while they had a job dissatisfaction in terms of promotions and monthly salary (Habib et al., 2003). Since high job satisfaction in hospital employees increases elevated health care services and enhances patients' satisfaction with these services along with the crucial role of hospital personnel in providing health care services to patients, the current research intended to investigate the relationship between the performance-based payment system and job satisfaction amongst the employees in Masih Daneshvari Hospital.

Thus, it can be said that a worker or a clerk who is motivated is in the state of tension i.e. there is a kind of imbalance between he and his workplace. He takes actions and make many efforts to relieve from the tension. The more his tensions, the more he endeavors. If his efforts successfully meet his needs, his tension decreases (Robbins, 1995).

In order to create an effective link between the payment and performance, it is necessary to evaluate the performance in a valid way. If we cannot draw a link an important bonus, like payment, to the results, it results in demotivation and low performance. Daily pay, lack of transparency and standard allocation of duties, assigning additional workload to employees as well as lack of monetary values of employee's daily activities lead to employees' dissatisfaction and is the waste of financial and human resource in organizations [25].

Regarding the aforementioned points and drawing on the prior research results along with results of interviews from hospital personnel at different levels, the present research aimed at identifying influential factors of implementing a performance-based payment system on job satisfaction and detecting probable changes in job satisfaction of hospital personnel from different perspectives as well as changes in influential factors on job satisfaction. To this end, the current study tended to identify and evaluate the effects of performance-based payment system on job satisfaction of employees in Masih Daneshvari Hospital, drawing on prior related research before and after implementing such a system. For the purpose of this study, it also investigated whether there was any significant relationship between employees' job satisfaction and their workplace, interaction with colleagues, salary and benefits, professional status, job security, monitoring and supervision, managerial policies and personal life.

MATERIALS AND METHOD

The current research is descriptive-analytical study intending to compare the levels of job satisfaction between employees in Masih Daneshvari Hospital by implementing a performance-based payment system. Methodological foundations of this study is based on surveys. A questionnaire, approved by medical treatment department, was used to evaluate job satisfaction in employees and physicians. The research population included all the personnel including the employees and physicians of the hospital. The sample size consisted of 500 personnel using simple sampling method. The participants filled out the questionnaires and obtained data were statistically analyzed by SPSS.

RESULTS

Age

Amongst the overall 529 subjects, 512 participants answered the questions about age. Accordingly, the most frequent age range was 25 to 35 which compromised 51.4% of the overall sample while the least frequency belonged to the age range of under 25 including 33 participants which constituted 6.4% of the overall sample size.

Table 1: Frequency of respondents in terms of age.

Age	Frequency	Percentage	Cumulative Frequency Percentage
Under 25	33	6.4	6.4
25 – 35	263	51.4	57.8
35 – 45	166	32.4	90.2
Above 45	50	9.8	100
Overall	512	100	

Sex

Amongst the overall 529 subjects, 527 participants answered the questions about sex. About 183 personnel (34.7%) were male while 344 personnel (65.3%) were female.

Table 2: Frequency of respondents in terms of sex.

Sex	Frequency	Percentage	Cumulative Frequency Percentage
Male	183	34.7	34.7
Female	344	65.3	100
Overall	527	100	

Educational Level (University Degree)

Amongst 529 subjects, almost 524 participants answered to the question about educational level. The most and the least frequencies respectively belonged to Bachelor’s degree with 276 participants (52.7%) and PhD with 1% frequency (5 personnel).

Table 3: Frequency of respondents in terms of educational level.

Educational Level	Frequency	Percentage	Cumulative Frequency Percentage
High School	25	4.8	4.8
Diploma	120	22.9	27.7
Nursing Diploma	13	2.5	30.2
Associate Degree	47	9	39.1
Bachelor’s Degree	276	52.7	91.8
Master’s Degree	38	7.3	99
PhD	5	1	100
Overall	524	100	

Work experience

Almost 511 participants answered to question about work experience. The most and the least frequencies belonged to respectively under 5 years of experience with 165 participants (32.3%) and above 20 years of experience with 40 participants (7.8%).

Table 4 : Frequency of respondents in terms of work experience.

Work Experience	Frequency	Percentage	Cumulative Frequency Percentage
Under 5 Years	165	32.3	32.3
5 - 10	142	27.8	60.1
10 – 20	164	32.1	92.2
Above 20 Years	40	7.8	100
Overall	511	100.0	

Marital status

About 518 participants answered the question about marital status. Accordingly, 336 of them were married with the most frequency (64.9%).

Table 5: Frequency of respondents in terms of marital status.

Marital Status	Frequency	Percentage	Cumulative Frequency Percentage
Married	336	64.9	64.9
Single	167	32.2	97.1
Other	15	2.9	100
Overall	518	100	

Employment status

About 501 participants answered the question about employment status. The most and the least frequency belonged to respectively firm contract with 289 participants (57.7%) and contractual with 28 participants (5.6%).

Table 6: Frequency of respondents in terms of Employment Status.

Employment Status	Frequency	Percentage	Cumulative Frequency Percentage
Formal Contract	91	18.2	18.2
Probational Formal Contract	55	11	29.1
Firm Contract	289	57.7	86.8

Contractual	28	5.6	92.4
Project	38	7.6	100
Overall	501	100	

Hypotheses

Central tendency indices and dispersion indices (standard deviation) of variables in 2013

The mean and SD of job satisfaction and other variables including workplace conditions, interaction with colleagues, salary and benefits, professional status, job security, monitoring and supervision, managerial policies and personal life in 2013 are presented in the following [Table 7].

Table 7: Mean and SD of Variables in 2013

Variables	Mean	SD	Size
Workplace Conditions	23.3	5.06	529
Interaction with Colleagues	10.46	3.41	529
Salary and Benefits	12.88	2.8	529
Professional Status	11.8	3.7	529
Job Security	15.9	3.6	529
Monitoring and Supervision	13.8	3.1	529
Managerial Policies	8.4	2.4	529
Personal Life	11.07	1.1	529
Job Satisfaction	107.46	17.31	529

Secondary Hypotheses 1 to 8 for 2013

Null hypothesis

There is not any statistically significant relationship between job satisfaction and other variables.

Hypothesis 1

There is a statistically significant relationship between job satisfaction and other variables. In order to testify the hypotheses, Pearson correlation was used since there was interval gap between data and the relationship between the variables was sought.

The following table present the Pearson correlation, P-value and the results.

Table 8: Pearson Correlation for Job Satisfaction with other Variables in 2013.

Variables	Job Satisfaction	P-value	Critical Level	Correlation	Size
Workplace Conditions	0.561	0.00	0.05	Significant	529
Interaction with Colleagues	0.568	0.00	0.05	Significant	529
Salary and Benefits	0.601	0.00	0.05	Significant	529
Professional Status	0.518	0.00	0.05	Significant	529
Job Security	0.553	0.00	0.05	Significant	529
Monitoring and Supervision	0.394	0.00	0.05	Significant	529
Managerial Policies	0.289	0.00	0.05	Significant	529
Personal Life	0.251	0.00	0.05	Significant	529

As illustrated in the above table, there was a significant relationship between all variables (independent) and job satisfaction (dependent) in 2013. Therefore, the null hypothesis, indicating not any relationship, was rejected and it was concluded that there were not evidences supporting the null hypothesis. The P-value of all variables was smaller than the critical level i.e. 0.05. therefore, 5 in 100 cases may not result in such an outcome.

Central Tendency Indices and Dispersion indices (Standard Deviation) of Variables in 2015

The mean and SD of job satisfaction and other variables including workplace conditions, interaction with colleagues, salary and benefits, professional status, job security, monitoring and supervision, managerial policies and personal life in 2015 are presented in the following table.

Table 9: Mean and SD of Variables in 2015

Variables	Mean	SD	Size
Workplace Conditions	20.3	5.3	529
Interaction with Colleagues	9.8	3.1	529

Salary and Benefits	11.67	3.2	529
Professional Status	10.9	3.4	529
Job Security	13.6	3.9	529
Monitoring and Supervision	12.5	4.2	529
Managerial Policies	8.2	2.8	529
Personal Life	9.07	2.5	529
Job Satisfaction	97.05	23.18	529

Secondary Hypotheses 1 to 8 for 2015

Null hypothesis

There is not any statistically significant relationship between job satisfaction and other variables.

Hypothesis 1

There is a statistically significant relationship between job satisfaction and other variables. In order to testify the hypotheses, Pearson correlation was used since there was interval gap between data and the relationship between the variables was sought. The following [Table 10] present the Pearson correlation, P-value and the results.

Table 10: Pearson Correlation for Job Satisfaction with other Variables in 2015.

Variables	Job Satisfaction	P-value	Critical Level	Correlation	Size
Workplace Conditions	0.644	0.00	0.05	Significant	529
Interaction with Colleagues	0.677	0.00	0.05	Significant	529
Salary and Benefits	0.749	0.00	0.05	Significant	529
Professional Status	0.705	0.00	0.05	Significant	529
Job Security	0.723	0.00	0.05	Significant	529
Monitoring and Supervision	0.744	0.00	0.05	Significant	529
Managerial Policies	0.741	0.00	0.05	Significant	529
Personal Life	0.683	0.00	0.05	Significant	529

As illustrated in the above table, there was a significant relationship between all variables (independent) and job satisfaction (dependent) in 2015. Therefore, the null hypothesis, indicating not any relationship, was rejected and it was concluded that there were not evidences supporting the null hypothesis. The P-value of all variables was smaller than the critical level i.e. 0.05. therefore, 5 in 100 cases may not result in such an outcome.

Main hypothesis

Implementing a performance-based payment system has a significant effect on job satisfaction in Masih Daneshvari Hospital.

With regard to the fact that the study was dealing with a same group which were measured (repeated measurement) within two different time intervals, two test should be applied to compare the probable difference between the intervals. Since each pair of comparisons (Samples) was exactly identical and independent of each other within different time intervals, "T-student Test for Dependent Samples" was used to testify the hypothesis. The last assumption to test the hypothesis with "T for Dependent Samples" was the normality of the difference which was not violated.

Null hypothesis

Implementing a performance-based payment system does not have any significant effect on job satisfaction in hospital personnel.

Hypothesis 1

Implementing a performance-based payment system has a significant effect on job satisfaction in hospital personnel.

Table 11: T-dependent Test for the Main Hypothesis

Variable	Mean	SD	SD of Differences	SEM	Confidence Level at 95%		T-Value	Alpha or Error Level	DF	P-Value
					High	Low				
Job Satisfaction in 2013	107.4	17.3	22.2	0.96	8.5	12.3	10.7	0.05	528	0.000

Job Satisfaction in 2015	97.05	23.1								
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According to the results, T-value was 10.7 and became significant at an error level of 0.05 with a DF of 528. The observed difference between the mean of job satisfaction in 2013 and 2015 was significant. Therefore, there was not any sufficient evidence supporting the null hypothesis i.e. the null hypothesis was rejected.

In order to measure the degree of effect, Eta Squared Formula was used:

$$\eta^2 = \frac{t^2}{t^2 + (N - 1)}$$

The value obtained through this formula was 0.17 indication a significant effect.

DISCUSSION AND CONCLUSION

Satisfaction with factors related to the nature of job including importance of job, type of job, whether it is satisfying or motivating, job satiety and diversity etc. are relatively favorable in hospitals. It seems that such satisfaction with the nature of job in hospitals is mainly due to its involvement in human life and it is attained once the treatment and rehabilitation of the most infirm patients is satisfactorily achieved [33]. On the other hand, satisfaction with occupational structures and managerial factors in hospitals including managerial and supervisory factors, delegation, development, promotion to higher positions, security etc. which are all, to some extent, related to the legal and issues and occupational structures that exist in hospitals, is relatively low. The presence of complicated and improper occupational rules and regulations for personnel along with severe monitoring and lack of sufficient authority for the personnel to decide how to perform all lead to dissatisfaction. This shows that it is necessary for hospitals to modify their managerial structures and organizational regulations [33].

Furthermore, the relationship between payment system and performance evaluation is greatly important especially in organizations which define salaries based on employees' performance. Currently, most of physicians and hospitals are in favor of a performance-based payment system and consider it a motivational program. They state that the compensation for the services given by service providers and enhancement of the quality of services are the primary goal of this method. Other goals include direct and indirect cost control by reducing mistakes and excessive use of services.

According to Herzberg's Hygiene Theory, salary and wage are hygiene factors which do not necessarily lead to satisfaction but inhibit dissatisfaction. Adam's Equity Theory states that personnel compare what they give to organizations (skills and talents etc.) with what they receive from organization in return and compare themselves with other personnel. Research has shown that employees find an insignificant relationship between performance and payment.

Moreover, employees believe payment is dependent on non-performance factors such as position and length of service. In fact, dynamic payment systems especially incentive payment systems aim at tightening this relationship. The phrase "the more you produce, the more you gain" creates an immediate link between these two variable.

Therefore, if we would like a performance or competence-based payment, we need to evaluate performance and competence of individuals. In order to make a fair, justice, compatible and transparent evaluation, teams and personnel should state how they were evaluated and how the results have increased their payment.

According to what has been discussed earlier, it is obvious that job satisfaction, in general, is a favorable, positive and pleasant sense one has about his job. Most of scientist find social factors, workplace and nature of job effective in job satisfaction. All the theories on job satisfaction care more about meeting personal, financial and psychological needs of individuals and give attentions to the employee's needs and expectations. A manager should know that satisfice human resource will increase organizational efficiency as they avoid absence at work and will transfer happiness from work to home and then to society. However, opposing ideas have also been proposed in this regard indicating that job satisfaction does not have a significant effect on efficiency. Relationships between colleagues is considered as the most important factor in determining job satisfaction. Several studies have indicated that when employees were allowed to select their colleagues, their job satisfaction increased and labor costs decreased. On the other hand, traditionally speaking, management has been proposed as a crucial occupational dimension. Studies have shown that an employee-oriented management leads to more job satisfaction than labor-oriented management. In general, it is worth noting that job satisfaction which is resulted from organization communicative system depends on the difference between what one would like to attain and what he really attains through communication with organization.

One of the problems in implementing any payment system is the dissatisfaction of some employees with the allocated bonuses; for which the payment system of hospitals is not an exception. One of reasons contributes to injustice and lack of defining comprehensive indices in the evaluation of employees. In other words, there are various methods to measure. Thus, it is essential that individual payment distribution system be based on a systematic, certain and equal method as well.

Managers of organizations should have a positive relationship with organizational commitments resulting in job satisfaction, presence, organizational prosocial behaviors and job performance while having a negative attitude towards turnover (Farhangi et al., 2003) and can be a critical index to determine the efficiency of employees in organization [2].

Since the "main hypothesis" was not followed based on a proper plan and the time interval between the two test was considerably long (regarding internal consistency and its statistical regression which endanger the internal consistency of the research) and that the same test was deployed for both intervals, it is not efficient enough to conclude "the effect of a specific training program or assignment and implementation of a special program."

The present study can only describe job satisfaction in 2013 and 2015 and compare their relationship; however, it cannot consider the difference between the means as the result of the "effect" of a program or a period on employee's job satisfaction; this is one of the "limitations" of the current study. Further Research Suggestions

The results of the present study are useful for the managers of hospitals to conduct further studies and eliminate dissatisfaction factors and strengthen satisfaction factors. Since a majority of dissatisfaction factors is related to guidelines and bylaws set by Ministry of Health and, hence, managers cannot change them a lot, it is recommended that the Ministry of Health conduct such studies in a broader sense to improve occupational motivation in personnel of hospitals and avoid dissatisfaction factors. Considerable attention is also suggested to be given to having a master plan for hard-work and wage changes, granting occupation promotion based on qualification and skills, increasing personality rights of on-shift nurses, lending low-interest mortgage, increasing welfare facilities in nursing system as well as enculturating the society about the significance and occupational value of nurses and hospital personnel in order to reduce job dissatisfaction and increase job satisfaction.

Explaining the necessity and importance of job satisfaction among hospital staff and its significant role in increasing the efficiency of hospital activities requires more actions through holding seminars and conferences for managers and authorities of hospitals by Ministry of Health.

Increasing job satisfaction improves the quality of services. Low job satisfaction requires more attention on the part of authorities and relevant organizations.

Organizations should consider a series of factors such as setting rules and regulations, giving proper salary and benefits, participating in decisions and appreciating individuals to motivate the staff and create job satisfaction. They should also respect the principle of justice and fairness in paying salary and benefits and do not discriminate between the staff. The management of organizations should be able to develop a performance evaluation system which can accurately evaluate the actual performance of employees. The management should not discriminate between male and female employees in their participation in decisions.

Monetary bonuses cannot solely be the basis of participation in organizations. Successful and efficient organizations use monetary bonuses only for securing costs of living. However, non-monetary bonuses should not be overlooked. In order to recognize the fundamental needs of employees, there should be continual evaluation programs. As perceptual skills are primarily important in identifying individual performance indicators, companies should set a proper score to this factor in the payment system the devise.

CONFLICT OF INTEREST

None

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ARTICLE

A STUDY OF TOURISM ROLE GUIDELINE STRATEGIES AND IMPROVEMENT OF RURAL VALUES IN THE SUSTAINABILITY OF RURAL SYSTEMS

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ABSTRACT

Most villages have a two-bit old and who, during various historical periods remain open, and the lack of organization and review them, destroy them provides background, while the high capacity of these tissues, to develop tourism as one of the most important regional and local development strategies, in the villages and the country is the need to evaluate the role of tourism, and improve their ability tissues with rural values, rural development, and stability systems it provided. The present study is an applied. The research method is analytical type. The study sample included professionals, tourists and officials of Holi village, is in 2016. The number of population, the equivalent of 1,500 people has been considered. The sample size of 305 people, according to Cochran formula was determined. For statistical data analysis, and to describe the results of the questionnaire, the strategic model was swot. Results indicate that, in considering the weight of opportunities, threats, strengths and weaknesses should be noted that, long history and deep-rooted strength of the tissue, with a score of 0. 8, the disadvantage of increasing the price of land and housing, in the context of value the weight rating 0. 48, the opportunity to sell livestock products and garden surrounding villages, in the context of the village with a score of weight 1, and the threat tends to Villa and build new homes, inconsistent with the context of the village, with a score of 0. 8 wt. the most important are as noteworthy. In evaluation of different strategies, the most important strategy can be valuable tissue encourage residents to participate in the development of infrastructure and tourism facilities, and monetize this way, the executive overseeing the construction and preparation of building codes in and out of range tissue value of the village, in order to preserve the rural landscape and architectural identity of the Islamic Revolution housing Foundation and the VA said.

INTRODUCTION

It is clear that tourism activities, as well as any other interested military function, is planning to provide the optimum use of available opportunities to overcome the limitations and difficulties facing the development of rural tourism, along with the removal and reduction of their duties, engage in tourism other economic sectors, to accomplish. Can be used to develop a sustainable tourism program, will provide the following basic steps [1]. Negative impacts of tourism on local communities, which may include the withdrawal of welfare benefits for the host community, demand for scarce resources, such as drinking water, excessive dependence on tourism host areas, inappropriate behavior and cultural insensitivity tourists [2]. Because rural areas, vulnerable and prone source of environmental change, social and economic, in particular, experience has shown that tourism everywhere spontaneously and accidentally, without planning and effective management, expanded, negative consequences brought, and it has long-term problems than benefits [3].

Rural areas in Iran, due to climatic diversity, a variety of materials and indigenous technology, harmony of man and nature, species unique and unmatched qualities of space, over an extended period and in certain places offer. Villages during the course of your life, because of extensive links with the natural and historical contexts, created many of the values of historical, cultural, natural, tourism, and architecture. . . Which were part of the national capital and cultural identity and history of the land, are considered. Rehabilitation of Rural valuable monuments and sites, in direct contact with areas of social and economic life of the inhabitants of the village, which, together with the hierarchical chain, and each grain directly related to the collection, to emphasize the values of the place, from all aspects and attributes [4]. Rural residents as a bridge between economic growth and ability village, and the protection and utilization of valuable monuments and sites, and heritage sites are, and rural communication and living environment, the balance between man and nature. Citizens (regional indigenous tourism) that concern urban life and car and its problems, to bring to the village, or tourists who wish to visit the historical sites of value which, in the village where he spent a few days there, in any case, the economic burden is positive for the village. That's why upgrading projects, open Reviving that with regard to body and texture village, the village is in the range of valuable town, a place for better communication between residents and tourism development, and is necessary.

High capacity, for the development of tourism as one of the most important regional and local development strategies, in the villages and the country is the need to evaluate the potential of tourism and its role in tissue development with rural values, the field of rural development and sustainability of the systems it provides.

Research History

Peri Pishbar *et al* [5], a study to evaluate the role of tourism and improvement of tissues with rural values, the sustainability of rural systems, using the model SWOT, Case village's Citadel. Abbas-Zadeh *et al* [6], in the study, methods of assessing the value of historical contexts, aimed at developing cultural

KEY WORDS

guideline strategy,
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tourism issue. Haji Zadeh *et al* [7] in a research valuable role in rural areas, sustainable development of rural tourism, case study acted Kandovan. Khodadadi and Mohammad Nejad [8] the article examines the role of tissue-value rural tourism development (Case study: Javaherdeh village of Ramsar) began.

MATERIALS AND METHODS

The present study is an applied. The research method is analytical type. The study sample consisted of professionals, tourists and officials Holi village, is in 2016. Total population of 1,500, have been considered. The sample size of 305 people, according to Cochran formula was determined. To evaluate the role of tourism, and improving rural valuable tissue in three different sections (social, economic and physical), the size of the strengths, weaknesses, potential and opportunity, a questionnaire of 42 questions prepared. For statistical data analysis, and to describe the results of the questionnaire, the strategic model was swot. Also, various statistical data, corporate brochures and statistical offices of the organization were enjoying.

RESULTS

Analysis, SWOT, to study the internal factors (strengths and weaknesses) and external factors affecting the area (opportunities and threats), the development and sustainability of rural systems, based on tourism and development boom textures rural values, in the study area, the used [9]. In fact, this method as a tool to identify strategic issues, and provide appropriate guidelines and strategies in elderly [7].

The final analysis of factors affecting the rural tourism

The results of the analysis of internal factors affecting the rural system (IFAS)

Using internal evaluation matrix of relationships between different topics, identify and evaluate, and to provide solutions to them, (David, 2004, 36). The organization of internal factors in the case, strengths, and weaknesses facing the system, using the calibration factors and considering the importance of each of the strengths, and weaknesses with respect to the effect of each of them [10], tourism and improve the functions of tissues with rural values, the sustainability of rural systems, computing and described in [Table 5].

Table 5: The results of the analysis of internal factors (strengths)

Rating Weighted	Grading	Weight	Strengths
0.8	4	0.20	History, and root tissue
0.5	1	0.05	There is a strong link between people's social
0.54	3	0.17	Cultural and sports event
0.3	3	0.10	Booming service economy, based on the presence of tourists
0.18	2	0.09	Increase the percentage of service activities, and job creation service
0.18	2	0.09	There are public spaces in tissue
0.14	2	0.07	For multi-family dwellings shared yard
0.06	1	0.06	Being made a joint public places, the people in between houses
0.68	4	0.17	Texture combination with environmental factors.
93.2		1	Total

According to the strengths, the strengths of history, and root tissue with a score of 0. 8, in the first place, and texture combined with environmental factors, with 68 Thread 0. In second place is located. Among all cases, a strong social link between the inhabitants of options, with a score of 0. 05 in the lowest position, is located.

Rating Weighted	Grading	Weight	Weaknesses
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Table 6: Analysis of internal factors (weaknesses)

0.4	4	0.10	Changing demographics, and the loss of traditional social stratification in context
0.14	2	0.07	Polarization living and working patterns, in context based on native
0.27	3	0.09	Changing traditional practices and consumption patterns.
0.03	1	0.03	Changing social relations, neighbors
0.27	3	0.09	Reduction of agricultural activities
0.48	4	0.12	Rising cost of land and housing, in the context of value
0.4	1	0.04	Land and housing speculation, and the inability to buy housing on behalf of the Native
0.4	1	0.04	Increase in new construction exotic and distinctive texture
0.27	3	0.09	Tends to be high-rise building, as well as the figures and village view
0.44	4	0.11	Increased damage to the environment, rural
0.24	3	0.08	Burnout part of the fabric of rural buildings
0.12	2	0.06	Density and congestion on roads in the village
0.24	3	0.08	Lack of water and wastewater infrastructure
98.2		1	Total

According to the [Table 6] above, the increase in the price of land and housing in the context of value, weighted with a score of 0.48, in the first place and increasing damage to the environment of the village, with a score of 0.44 weights are in second place. Among other options, changing social relations, neighbors, weighted with a score of 0.03, is located at the lowest position.

The results of the analysis of external factors affecting the rural system (EFAS)

To organize external factors, opportunities and threats in the form of aspects of the system, using the calibration factors, and given the importance of opportunities and threats, and with respect to the effect of each of them, and tourism functions tissue value, in line with the development of sustainability, the following table were calculated.

Table 7: Analysis of external factors (opportunities)

Rating Weighted	Grading	Weight	Opportunities
0.28		0.14	Holding annual sports event, in place of the old and valuable
0.92	4	0.23	Welcome and hospitality of the inhabitants of tissue from tourists
1	4	0.25	The sale of livestock products and garden surrounding villages, in the context of rural
0.42	3	0.21	Traditional houses valuable functional changes in tissues, in association with tourism functions
0.34	2	0.17	Construction of hotels, motels and hospitality in the context of the village, in order to develop tourism
96.2		1	Total

Based on the above [Table 7], the sale of animal products and rebellious villages, the village tissues weight score one in the first place, and welcome and hospitality tissue residents, tourists with weight rating 0.92, was in second place. At the lowest weight, holding various sporting events annually, in the old location and value with a weighted Thread 0.28, has been replaced.

Table 8: Analysis of external factors (threats)

Rating Weighted	Grading	Weight	Threats
0.05	1	0.05	The absence of the indigenous population, in cold seasons
0.3	3	0.10	The arrival of non-native population in the context
0.8	4	0.20	Villa building and construction of new homes tend to be in conflict with the rural context
0.54	3	0.17	Entry of non-indigenous, rural tourism in economic activity
0.27	3	0.09	Seasonal and temporary jobs in tissue
0.18	2	0.09	Lack of stable jobs for young people
0.14	2	0.07	Open villages, and minor texture valuable
0.12	2	0.06	Increased entry of vehicles to the tissue, and tissue damage to valuable Change indigenous materials, and the use of materials incompatible with the climate and the environment
0.68	4	0.17	Total
3.08		1	Threats

According to the table above, tends to Villa and build new homes, contrary to the texture village with weight rating 0.8, is regarded as the most important threat in the region, and then change the local materials and

the use of incompatible materials, with the climate and perimeter weighting with a score of 0.68, was in second place. At the lowest level entry in the context of non-native population, the weight score is 0.03.

The analysis of strategic factors

By analyzing the strategic factors, planners have taken a strategic decision, can the strengths, weaknesses, threats and opportunities, be limited to a smaller number of factors. This article deals with re-weighting of each of the factors included in the tables to analyze internal and external factors, have been conducted. In fact, the heaviest elements in the two tables in terms of weight should be transferred to the analysis of strategic factors [11]. This is particularly important strategic factors influencing sustainable rural system, based on the value of tourism and tissue, and is summarized in the following [Table 9].

Table 9: The analysis of strategic factors (SFAS)

long time	planning		Rating Weighted	Grading	Weight	Factors
	midterm	short term				
*	*		0.8	4	0.20	S1 = Deep-rooted historical and texture
*		*	0.68	4	0.17	S2 = the perfect combination of fabrics, with environmental factors.
		*	0.54	3	0.17	S3 = cultural and sports event
		*	0.48	4	0.12	W1 = rising cost of land and housing, in the context of value
		*	0.44	4	0.11	W2 = increased damage to the environment, rural
		*	0.4	4	0.10	W3 = changing demographics, and the loss of traditional social stratification in context
*		*	1	4	0.25	O1 = the sale of livestock products and garden surrounding villages, in the context of rural
*		*	0.92	4	0.23	O2 = welcome and hospitality tissue residents, tourists
		*	0.42	3	0.21	O3 = change in tissue function with the traditional ones, in association with tourism functions
		*	0.8	4	0.20	T1 = tends to Villa and build new homes, contrary to the texture village
*		*	0.68	4	0.17	T2 = Change indigenous materials, and the use of materials incompatible with the climate and the environment.
*		*	0.54	3	0.17	T3 = entry of non-indigenous, rural tourism in economic activity

Now, with the interference of each factor on each other, the different competitive strategies / invasive (so), diversity (st), revision (WO), and the defensive strategies (wt) that will be considered, as follows.

Strategies

Competitive Strategies / invasive (so)

In this strategy, focusing on the strengths of internal and external opportunities are based, are as follows:

- Encourage resident's texture valuable partner in the development of infrastructure and tourism facilities, and earn money this way.

Diversification (st)

The diversification of the inner strengths, and focused external threats, and include the following:

- reinforce the traditional village squares and open spaces together to maintain and introduce cultural practices, including celebrations of local ferries, music, folk dances, crafts, local foods to maintain social cohesion.

The strategic review (WO)

Emphasized the weaknesses of internal and external attempts to take advantage of opportunities, in order to eliminate weaknesses facing rural areas, and include the following:

- Diversification of facilities, activities and tourism services, in order to increase the number of tourists in the whole fabric of the village, and reduce pressure on valuable tissue in order to earn money and create jobs.

Defensive strategies (wt)

The strategy is based vulnerability rural area, focuses include:

- Steer investments from constructions and land speculation, and housing to create residential camps and rented houses for tourists, with the value of the surrounding tissue.

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CONCLUSION

Based on what was studied and analyzed, the SWOT analysis showed that the weighted survey opportunities, threats, strengths and weaknesses, it is noteworthy that, long history and deep-rooted strength of the tissue, with a score of 0.8, the disadvantage of increasing the price of land and housing, in tissue-value weighted with a score of 0.48 spot sales opportunities livestock products and garden surrounding villages, in the context of the village with a score of weight 1, and the threat of attitudes to constructions and construction new, contrary to the texture village with weight rating 0.8, as the most important cases are noteworthy. In evaluation of different strategies, the most important strategies can be valuable tissue encourage residents to participate in infrastructure development and tourism facilities, and monetize this way, the executive overseeing the construction and preparation of building codes in and out of Groups of valuable rural context, in order to preserve the rural landscape and architectural identity of the Islamic Revolution housing Foundation and VA, diversification of facilities, activities and tourism services in order to increase the number of tourists, the whole fabric of the village, and reduce the pressure the valuable context, in order to earn money and create jobs, and direct investments from constructions, and land and housing speculation, to create residential camps and rental homes for tourists in the surrounding tissue valuable feature.

CONFLICT OF INTEREST

There Is No Conflict of Interest.

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None

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ARTICLE

THE EFFECT OF THE CHOLINERGIC SYSTEM ON PLANTAR PAIN RESPONSE IN RATS

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ABSTRACT

The aim of this study was to investigate the effects of cholinergic system in the plantar pain of rats. In this study, adult male Wistar rats weighing 200-250 g were used, Mice were stored as groups of six rats in plastic cages in a room with ambient conditions and the optimum temperature about 23 ± 2 ° C and 12 hours of light period, and the animals were fed with commercial pellet food while food and water was freely available for them. All tests were performed within 8 am to 3 pm. physostigmine solution 0.01 was used as muscarinic receptor agonist. In the control group (group one), the number of mice were 6, which were injected in plantar section with normal saline, and formalin pain response was investigated. In the second group, subcutaneous physostigmine (0.2 µg) was injected before formalin 1%. In the third group, subcutaneous physostigmine (0.1 µg) was injected before formalin 1%. In the fourth group, subcutaneous physostigmine (0.05 µg) was injected before formalin 1%. Formalin pain response was studied 20 minutes after subcutaneous injection of physostigmine in quantities 0.05, 0.1 and 0.2 mg per kg body weight. Physostigmine was scheduled to be injected 20 minutes before formalin injection. GLM ANOVA procedure of SAS software was used to check the data, and Tukey test was used to compare mean values. The results showed that subcutaneous injection of physostigmine in quantities 0.05, 0.1 and 0.2 mg per kg of body weight, reduced pain response in both the first and the second phases significantly ($P<0.05$). The duration of licking and biting the injected paw by subcutaneous injection of physostigmine by the amount of 0.1 mg per kg of body weight, had a significant reduction ($P<0.05$) than 0.05 mg. It can be concluded that the cholinergic receptors may have a role in regulating the pain.

INTRODUCTION

Pain and understanding it is one of the most important acts of the nervous system that provide required information about the existence of an injury or a lesion or threats they would create, and plans the appropriate response according to the type of stimulus. Pain is a complex phenomenon and includes both sensory and emotional components. In other words, pain is a sensory experience accompanied by motivational responses, which is made by autonomous motor coordination. From this perspective, understanding the pain is a necessary and prerequisite process for the survival of an organism [1].

Pain control is done through various systems and receptors. One of them is cholinergic system which is one of the few pain modulating systems that inhibits both constant and tonic pains in the cortex, the brain stem, and the spinal cord. Cholinergic system impacts applied by different receptors, mostly opioid analgesics, that induce their effect by binding to specific receptors coupled with G protein [2].

There is not enough information available on existence and importance of this core's muscarinic cholinergic receptors' neurons in pain control. Study was designed to determine the presence or absence of cholinergic muscarinic receptors in the dorsal (DPGI) and lateral (LPGI) paragigantocellularis core, and its role in controlling acute and chronic pain in young adult rats by formalin test.

Research results indicate that neurons in the dorsal and lateral parts of PGI core cholinergic receptors, have cholinergic muscarinic receptors which has a main role in understanding the pain, injection of Scopolamine which is an antagonist of this receptor, caused significant analgesia in both sub-sectors of DPG1 and LPGI in both acute and chronic phases of pain. Therefore, concerning that inhibition of cholinergic receptors of PGI core has reduced pain in rats, 1- it can be concluded that these neurons are cholinergic receptors, and 2- These receptors are involved in pain processing by this core.

On the other hand, the effect of scopolamine in lateral side of PGI core on pain intensity is more durable [3]. Physostigmine is an herbal alkaloid not only stimulates muscarinic and nicotinic sites in autonomous nervous system, but it stimulates nicotinic receptors in neural-muscle connection. Average duration time of it, is 2-4 hours. This drug increases tones in bowel or bladder, which makes it able to be used in obstruction incidents. Use of this drug in the eyes causes meiosis, and reduces the pressure inside the eyeball, and it is prescribed in glaucoma disease.

KEY WORDS
pain receptors,
physostigmine,
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Thioperamide[H3 receptor antagonist] increases histamine recycling in the brain and because no other drug family is capable of that, it is used widely in the behavior studies. Over the past seventy years, all researches that was done on histamine, fully focused on the role of histamine in allergic diseases [4]. Therefore, to investigate the role of cholinergic system in the mechanism of the histamine effect, Physostigmine(muscarinic receptors agonist] and Atropine (muscarinic receptors antagonist] was used alone or along with histaminergic agents.

Tytgat (2009] examined hyoscine butyl bromide's function, as an anticholinergic compound on visceral pain and abdominal cramps. Emphasizing the good efficacy of the combination on these pains, he pointed that this ability is because of its high affinity to muscarinic receptors along the digestive tract and also binding affinity to nicotinic receptors which causes "ganglions block effect" [5].

The importance of studying the mechanisms involved in developing and feeling the pain process is to identify and manage pain, hence these are two major current practices in animal and human medicine. Up to date, a large number of studies concerning neuro transmitter systems' role in feeling pain, are focused on investigating opioid system, and role of other neuro transmitters, especially cholinergic system, has not been studied yet. However, the results of some studies with a focus on investigating potential relation between cholinergic system's performance and feeling pain, represents considerable evidence implicating the role of this system in processing pain. The present study was designed to determine the effects of muscarinic anticholinergic antagonists (atropine], on chronic pain, and mechanisms involved in it.

MATERIALS AND METHODS

Adult male Wistar rats weighing 250-200 g were purchased from the School of Veterinary Medicine Tehran for the study. , Mice were stored as groups of six rats in plastic cages in a room with ambient conditions and optimum temperature about 23 ± 2 ° C and 12 hours of light period, and the animals were fed with commercial pellet food while food and water was freely available for them. All tests were performed within 8 am to 3 pm.

Eserine Physostigmine (0.01 Mg/Kg) solution (Sigma-Aldrich Co) used as an agonist of muscarinic receptor. In the control group (group one), the number of mice were 6, which were injected in plantar section with normal saline, and formalin pain response was investigated. In the second group, subcutaneous physostigmine (0.2 µg) was injected before formalin 1%. In the third group, subcutaneous physostigmine (0.1 µg) was injected before formalin 1%. In the fourth group, subcutaneous physostigmine (0.05 µg) was injected before formalin 1%. Formalin pain response was studied 20 minutes after subcutaneous injection of physostigmine in quantities 0.05, 0.1 and 0.2 mg per kg body weight. Physostigmine was scheduled to be injected 20 minutes before formalin injection.

To investigate pain in all groups, formalin test was used, which first was described by Dvubyson (1977) and now is a valid method in studying chronic pain. In order to induce and study pain and its responses in rats, formalin with 5 percent concentration was used in 50 microliter volume, and as mentioned earlier, using different concentrations of formalin causes a pain in feet of rats. On the other hand, pain responses was recorded by the method of measuring the duration of foot licking and biting (based on the experiences listed, this recording behavior in rats, is better than scoring method) [6]. In this method formalin was injected in the skin of the plantar section.

The animal was constrained calmly using a towel, and 50 microliter of formalin solution (1percent concentration) was injected to plantar area using needle 28. Plantar injection of diluted formalin to foot area, causes a rapid reaction in rat which includes stepping back the foot, trying to run, and groaning. Then the rat is put into the pain mirror device to investigate pain behavior. Plantar formalin pain behavior is a two-step sense. First step and second step of rat's pain behavior, was considered at intervals 0-5 minutes and 15-40 minutes, respectively.[Fig. 4-3]shows licking of injection area behavior after injection of formalin in pain mirror device.



Fig.1: Licking of injection area, after plantar injection of formalin and placing the rat in the pain mirror device.

Pain behavior

Pain mirror device was used in order to create and investigate the behavior of plantar formalin induced pain. Box was made of safety glass with dimensions of 25 × 30 × 30, which was placed on a framework, containing a mirror at an angle of 45 degrees. (Figure 2) placing a mirror with 45 degrees makes us able to see all animal's movements. Regarding that stress is induced by placing the rat in the case, waking it up forcedly, separating the animal from the group, moving it to another room, and by putting it in a new smell and light condition, hence, the stress should be minimized before starting the test [7]. In order to adapt to the environment, rats were transferred to the laboratory four hours before starting the experiment, and they were placed in the glass box of pain mirror device, half hours before the test. Rats were brought out of the case before injection, and after, they were put back in the glass case.

[Fig.2] shows an example of the pain mirror device which was used in this study.



Fig. 2: The pain mirror device which was used in this study.

Statistical analysis method

Based on the data from plantar injection of normal saline (control) and formalin in the foot paw with repeated factor measure statistical method (Factorial), and then Duncan test, and based on data's significant level, P was considered <0.05. In tests concerning to determine the appropriate dose response with different non-linear processing such as quadratic models, Broken Line, Line break with two defeats, exponential function, etc., the most suitable model is chosen by the coefficient of determination, and favorable response is achieved from it. GLM procedure of SAS software was used to analyze the variance, and Tukey test was used to compare mean values.

RESULTS

As shown on [Fig.3-4], subcutaneous injection of physostigmine in quantities 0.05, 0.1 and 0.2 mg per kg of body weight, reduced pain response in both the first and second phases significantly (P<0.05) . The

duration of licking and biting the injected paw by subcutaneous injection of physostigmine by the amount of 0.1 mg per kg of body weight, had a significant reduction ($P < 0.05$) than 0.05 mg.

Subcutaneous injection of atropine (2 mg per kg body weight) didn't cause significant effects on formalin pain, but pre-injection of atropine (2 mg per kg body weight) prevented a significant reduction ($P < 0.05$) for physostigmine (0.1 mg per kg body weight) derived pain in the second step of pain response (as foot kicking).

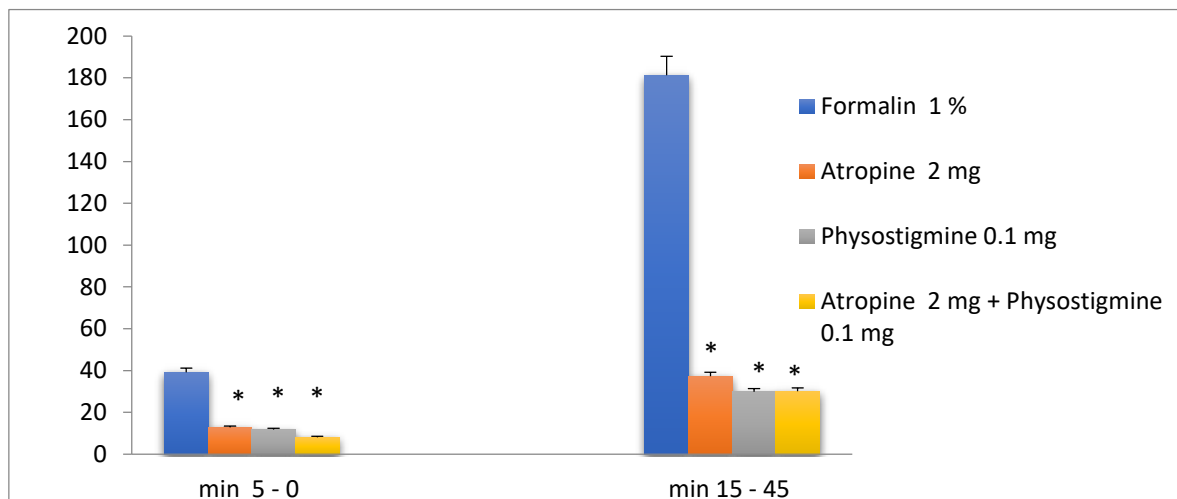


Fig. 1: The number of injected foot shock (Physostigmine subcutaneous injection).
* Indicate a significant difference in ($P < 0.05$) level with formalin 1% group

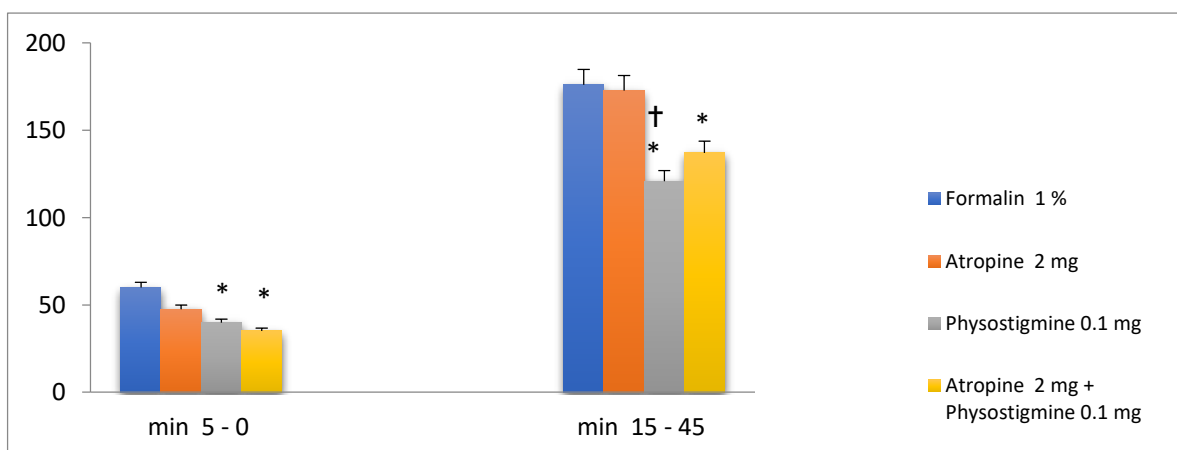


Fig. 2: Duration of licking and biting the leg (Physostigmine subcutaneous injection)
* Indicate a significant difference in ($P < 0.05$) level with formalin 1% group
† Indicate a significant difference in ($P < 0.05$) level with Physostigmine 0.05 mg group

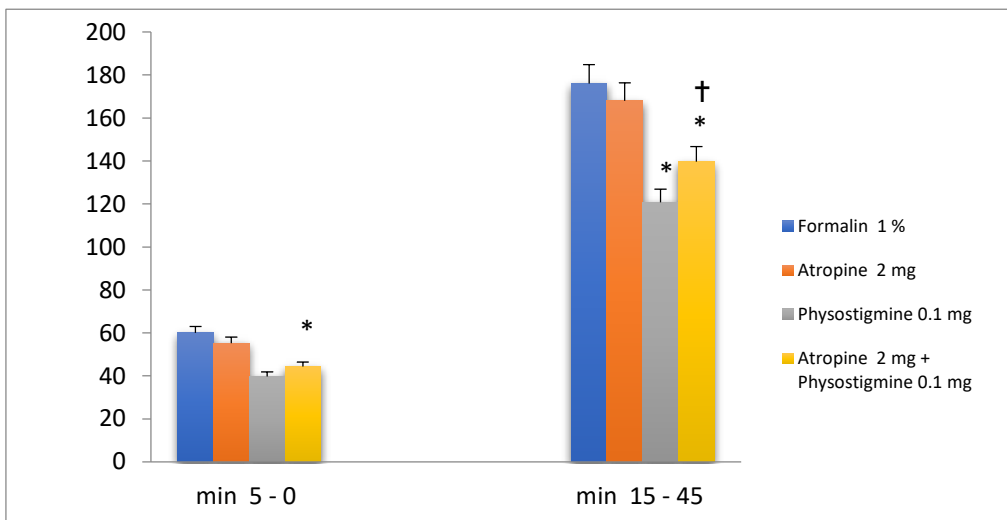


Fig. 3: Duration of licking and biting the leg (Atropine and Physostigmine subcutaneous injection).

* Indicate a significant difference in (P<0.05) level with formalin 1% group

† Indicate a significant difference in (P<0.05) level with atropine 2 mg group

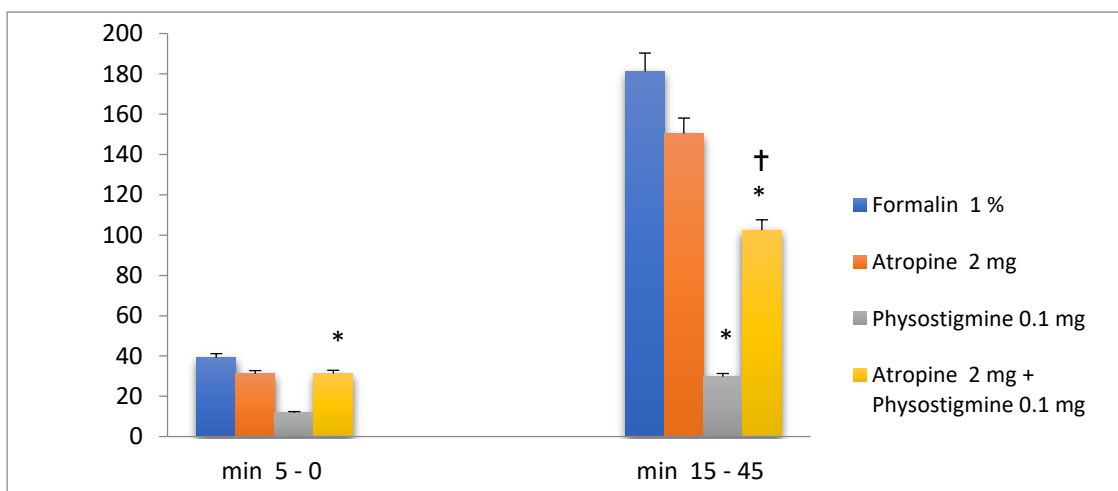


Fig.4:The number of injected foot shock (Atropine and Physostigmine subcutaneous injection).

* Indicate a significant difference in (P<0.05) level with formalin 1% group

† Indicate a significant difference in (P<0.05) level with atropine 2 mg group

CONCLUSION

In the present study, plantar subcutaneous injection of physostigmine created an analgesic effect in formalin induced pain test. In addition, subcutaneous injection of atropine alone did not change the pain intensity, but pre injection of atropine, inhibited the analgesia induced by physostigmine. These findings showed that cholinergic receptors may have a role in regulating pain. Several neurotransmitters play a role in processing and feeling the pain in the nervous system, but the role of cholinergic system in this context has not been investigated as well. In order to review anticholinergic effects on pain, the impact of atropine subcutaneous administration (2 mg per kg) on chronic pain sensation in male rats was studied by the formalin test. The

results obtained in this experiment, showed that atropine receiving male rats had a higher pain threshold than the control group.

Pain relief effect of atropine showed no significant difference in male rats' test. The findings of this study indicate that anticholinergic agents such as atropine can reduce chronic pain. This study aimed to draw a clear picture of anticholinergic muscarinic antagonists (atropine) impact on chronic pain and the mechanisms involved in it.

Geraldine et al. (1999) investigated pain relief effect of atropine by In vivo and In vitro methods.

During in vivo study, low concentration of atropine increased electrical stimulated and nicotine derived contraction in the ileum of Guinea pigs, but it inhibited electrical stimulated and drug (such as nicotine) derived contraction.

During In vitro study, Intracerebroventricular administration of atropine, reduced acute and visceral pain in mice and rats. Based on these results, the probable mechanism of atropine pain relief property is attributed to its effect on muscarinic receptors, and muscarinic M1 receptor is assumed to have an effect in this process. In summary, based on the results of this study, atropine can have pain relief properties as a para sympathetic combination.

The importance of studying the mechanisms involved in developing and feeling the pain process is to identify and manage pain, hence these are two of the major current practices in animal and human medicine. Up to date, a large number of studies concerning neuro transmitter systems role in feeling pain, are focused on investigating opioid system, and role of other neuro transmitters especially cholinergic system has not been studied yet. However, the results of some studies with a focus on investigating potential relation between cholinergic system performance and feeling pain, represents considerable evidence implicating the role of this system in processing pain. The present study was designed to determine the effects of muscarinic anticholinergic antagonists (atropine) on chronic pain and mechanisms involved in it.

The results of this study show that the average chronic pain threshold is higher in the male intervention group than the male control group. It means that male rats receiving atropine, felt significantly lower chronic pain than normal saline receiving mice. Five types of receptors are described for cholinergic system named M₁ .M₂ .M₃ .M₄ .M₅. These five types are involved in major activities of the cholinergic system including pain and analgesia, stress, tolerance and addiction, learning and memory, neurological disorders and movement [8]. Physostigmine acts through M1 receptors and atropine is a competitive muscarinic receptors' antagonist with high affinity to M1 receptors. Physostigmine and atropine are frequently used to investigate the role of cholinergic system in peripheral, spinal, and spinal trigeminal pain-analgesia mechanisms. Administration of Physostigmine in formalin pain, reduced first and second step of pain in rats, and local injection of atropine completely inhibited analgesic effect of Physostigmine.

Therefore, it can be expected that the cholinergic system would regulate the mechanisms of pain in peripheral surfaces, and the study showed that the activation and inhibition of the peripheral cholinergic system in surface level, impacts on feeling pain with plantar origin.

CONFLICT OF INTEREST

There is no conflict of interest.

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None

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