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FACTORS AFFECTING HOSPITAL INFORMATION SYSTEM ACCEPTANCE BY CAREGIVERS OF EDUCATIONAL HOSPITALS BASED ON TECHNOLOGY ACCEPTANCE MODEL (TAM): A STUDY IN IRAN

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ABSTRACT

Technology acceptance model (TAM) is a valid model for predicting the technology acceptance by the users. This study aimed to identify factors affecting hospital information system acceptance by caregivers (physicians and nurses). This descriptive-analytical study was conducted in 2015. The research population was the physicians and nurses working in public hospitals of the city of Bandar-Abbas in Iran. The convenient sampling method was used to select 172 persons. Data collection tool was a questionnaire which its validity and reliability was measured. Data were entered within SPSS software and analyzed using descriptive and inferential statistics and the Spearman's rho test. Direct and positive relationship exist between the variables of image in using IT applications and perceived usefulness ($R=0.26$, $P<0.01$). The level of computer skills had a direct positive effect on perceived ease of use ($R=0.40$, $P<0.01$) and behavioral intention ($R=0.30$, $P<0.01$). Furthermore, subjective norms only had a positive direct effect on perceived ease of use ($R=0.65$, $P<0.001$). Perceived ease of use had no effect on behavioral intention, but had a direct positive effect on PU ($R=0.46$, $P<0.001$). Also, perceived usefulness had a positive direct effect on behavioral intention ($R=0.61$, $P<0.001$). Image in using IT application, the level of computer skills, subjective norms, Perceived ease of use, and perceived usefulness regarding of the use of IT application had a more prominent role in the acceptance of hospital information system by the users. Therefore, it is necessary to consider these variables while designing, purchasing, or revising hospital information systems.

INTRODUCTION

Information technology has a great impact on different professions. It improves the quality and reduces the executive costs. Healthcare facilities are not an exception in this regard. These institutes produce a great deal of data that should be collected, distributed, registered, retrieved, and summarized. The use of IT in health care services as electronic medical records and electronic health records is fundamental to improve the quality of health and treatment services [1, 2]. The use of technology has made changes in data processing which have led the hospitals to rely on information systems that are tools to receive, retrieve, maintain, process, and display the data. With the advances in technology and the use of the computer, contexts like radiology information system and hospital information system (HIS) were developed in 1950s and late 1960s, respectively. Hospital information system (HIS) is one of the information technology tools that includes all the functions and operations related to the process of providing care to patients in different parts of the hospital [1-5].

In recent years, IT has affected the health sector similar to other sectors and made significant changes in the field of health care and treatment. Many processes in this sector became systematic [2, 3]. In hospital settings, IT in the form of clinical information systems has considerable effects on the improvement of clinical processes and patient satisfaction [4, 6]. It is also interesting that IT may be considered effective by some employees and useless by some others. It is important to pay attention to the facilitators of the acceptance of an information system in the clinical setting in order to achieve the objectives of the health system [6, 7]. The acceptance of IT in health care is markedly different among medical specialists [8] in different institutes and countries [9, 10]. Different factors affect the acceptance of a certain technology in a given hospital including the size of the hospital, dependence on the system, and whether the hospital serves as a teaching hospital [9, 11-15].

There are many publications that focused on the study of acceptance of technology, specifically based on the Technology Acceptance Model (TAM) [16]. This model was developed by Davis et al. it is a valid model

KEY WORDS

Technology acceptance model, Information technology, Hospital information system, Physicians, Nurses

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for predicting the technology by the end users. The model has been used in different areas of health to assess the tendency of the users to accept the technology [17]. Nowadays, many organizations and institutions including the health sector are investing in different technologies; therefore, they should make attempts to accept and use new systems and technologies. In this regard, the use of the verified model based on the TAM for the evaluation of acceptance technology by users is very important [18].

The TAM is one of the technology acceptance analysis models. This model analyzes the user's behavior based on the conditions and the way new technologies are used. The model has been implemented in many field studies and analyzes the necessary explanations on a technology that are required by the user and all the limitations that result in lack of technology acceptance by the user's; these analyses are proportionate by the user's need. This model has constantly developed. The main objective of the TAM is to provide a basis for predicting the effect of the external factors on internal factors [19]. A study by Wu et al (2007) on the utilization of the mobile health technology indicated that self-efficacy was an important and effective factor on the idea of the healthcare staff to use the mobile health program. Computer skills also had a positive effect on the comprehension of the simplicity of the use of HIT applications. They also found out that learning and using the new IT application was easier for care givers with computer skills [20].

Since physicians and nurses are the largest and yet most important users of HISs. Thus, they have central role in the acceptance and success of those systems [21, 22]. Sharifian et al. suggested that nurses' acceptance of HISs was influenced by factors such as performance expectancy, effort expectancy, social influence and facilitating conditions. Furthermore, they declared that performance expectancy had the strongest effect on user intention [23]. Whether the users in the area of health accept HISs indicates its success or failure in that area and organization. On the other hand, with regards to the heavy costs of purchasing and implementing these technologies, they are considered a failure if they are not employed by users, even if they are good and beneficial technologies. As a result, the acceptance of HISs by the users, especially by physicians and nurses is of utmost importance. Therefore, the aim of this study was to evaluate the factors affecting the acceptance of HIS by the physicians and nurses in the teaching hospitals of Hormozgan University of Medical Sciences based on the TAM.

MATERIALS AND METHODS

This descriptive-analytical study was conducted in 2015. The research population was the physicians and nurses working in Shariati, Shahid Mohammadi, and Children's Hospitals of the city of Bandar-Abbas in Iran. The convenient sampling method was used to select 172 persons. The data collection tool was a questionnaire that was designed for the evaluation of IT acceptance (hospital information system) based on the TAM. In this study, we use of the questionnaire that designed by Ping Yu et al. [17] study after obtaining the author permission. This questionnaire included demographic information in addition to 18 questions in 6 domains of behavioral intention (BI) to use IT applications (2 questions), perceived usefulness (PU) of IT applications (4 questions), perceived ease of use (PEOU) of IT applications (4 questions), social norms (SN) regarding of the use of IT applications (2 questions), image in using IT applications (3 questions), and voluntary use of IT applications (3 questions). The questions related to the domains were scored according to a 5-point Likert scale (0: totally disagree, 5 totally agree). In addition, the questionnaire contained one question to determine the total capability of using the computer.

The questionnaire was translated into Persian language. The test-retest method with an interval of 15 days was employed to evaluate the reliability of the questionnaire using the Pearson correlation coefficient ($r=87\%$). The validity of the questionnaire was corroborated by a panel of experts. The researcher attended the aforementioned hospitals in person for data collection and gave the questionnaire to the participants after providing them with necessary explanations on the objective and methodology of the study. SPSS was utilized for data analysis using descriptive and inferential statistics and the Spearman's rho test.

RESULTS

The results of the study showed that most of the participants were female ($n=117$, 63.6%) and aged 30-39 years old (42.9). The majority of the study population were physicians ($n=99$, 53.8%). The highest frequency of work experience was for below 1 year. The highest frequency of computer skill level was related to medium computer skill ($n=73$, 39.7%) [Table 1].

Table 1: Respondent demographics

Characteristics	Number	Percent
Sex	Male	65 35.3
	Female	117 63.6
	No answer	2 1.1

Age	20–29	66	35.9
	30–39	79	42.9
	40–49	32	17.4
	50–59	4	2.2
	60 and above	1	0.5
No answer	2	1.1	
Job level	Physician	99	53.8
	Nursing	84	45.7
	No response	1	0.5
Work experience	Under 1 year	51	27.7
	1-10 year	37	20.1
	11-15	32	17.4
	15-20	19	10.3
	Over 20 years	13	7.1
No answer	32	17.4	
Computer skills	Poor	8	4.3
	Below average	9	4.9
	Average	73	39.7
	Above average	30	16.3
	Good	53	28.8
Excellent	11	6	

The correlations between the four demographic variables were calculated as follow:

Table 2: The correlations between the four demographic variables

	Age	Work experience	Computer skills
Age	-----	0.769*	0.132
Work experience	0.769*	-----	0.769*
Computer skills	0.132	0.769*	-----

A strong and significant correlation ($R^2=0.76$, $p<0.001$) was found between job level and age of respondents. Also a weak, but significant and positive correlation between age and computer skills of respondents ($R^2=13$, $p<0.01$) was determined.

Subjective norm and Voluntariness to use, which were 0.43 and 0.54 respectively, Cronbach's, for the remaining four dimensions were all above the 0.7 threshold and ranged from 0.71 to 0.84. Finding within table 3 indicated that the highest mean was dedicated to measurement items of Perceived usefulness; also the lowest mean was dedicated to measurement items of Voluntariness to use hospital information system. These findings suggest that "Perceived usefulness" and "voluntariness" respectively had the highest and lowest impact on the users of the hospital information system respectively.

Fig. 1 shows the findings of the evaluation of the relationship between the variables of the TAM indicating the positive effect of image in using IT applications (image) on PU and the positive effect of computer skill level on PEOU as well as its direct effect on BI. Social Norms only had a positive effect on PEOU. In fact, 67% of the PEOU changes were determined by computer skills and SN; as for the linear regression equation, the effect of computer skills and SN on PEOU was 0.40 and 0.65, respectively ($PEOU = 0.65*SN + 0.40*Computer$).

Moreover, 34% of the PU changes were determined by PEOU and image; the effect of image and PEOU on PU was 0.26 and 0.46, respectively. Its regression equation is as $PU = 0.46*PEOU + 0.26*Image$. In addition, PEOU only had a positive effect on PU with no effect on BI; the effect of PU and computer skills on BI was 0.61 and 0.30, respectively, and 52% of the BI changes were determined by computer skills and PU ($BI = 0.61*PU + 0.30*Computer$).

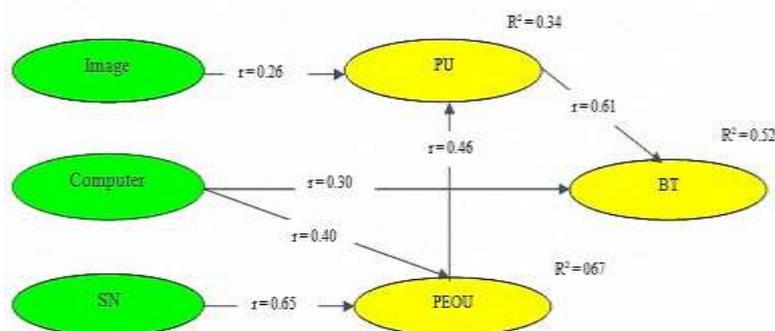


Fig. 1: The relationship between the variables of the TAM

Table 3: Summary of the measurement of hospital information system acceptance dimensions (based on five-point Likert scale ranging from 1: strongly disagree to 5: strongly agree)

Dimensions	Cronbach's α	Measurement items	Mean	S.D.	Min.	Max.
Behavioral intention (BI)	0.724	If no significant barriers exist, I	3.82	0.87	1	5

		would consider use IT.				
		Given the opportunity, I would like to use IT.	4.14	0.78	1	5
Perceived usefulness (PU)	0.842	Using IT could enhance my effectiveness.	4.21	0.79	1	5
		Using IT may improve my job performance.	4.22	0.77	1	5
		Using IT may enhance the quality of my work.	4.19	0.81	1	5
		Using IT is relevant to the delivery of residential care.	3.88	0.86	1	5
Perceived ease of use (PEOU)	0.798	Learning electronic documentation is easy for me.	3.59	0.94	1	5
		Using IT is compatible with all aspects of my work	3.56	0.96	1	5
Subjective norm (SN)	0.430	I find electronic documentation system easy to use.	3.32	0.93	1	5
		Electronic documentation system is not cumbersome to use.	3.03	1.02	1	5
		My manager influences my intention to use IT.	3.49	0.99	1	5
		My colleagues will encourage me to use IT.	3.30	1.02	1	5
Image	0.714	People at other aged-care facility who use IT have more prestige than those who do not use.	3.36	1.03	1	5
		People at other aged-care facility who use IT have a high profile.	3.14	1.03	1	5
		Using IT is a status symbol of my aged-care facility.	3.55	0.94	1	5
Voluntariness	0.541	Although it might be helpful, using IT is certainly not compulsory in my job.	3.03	1.11	1	5
		My supervisor does not require me to use IT.	2.82	1.09	1	5
		My use of IT is voluntary.	3.32	1.10	1	5
Work experience	-----	How long have you worked in aged and community care sector?	9.93	7.18	1	36
Computer skill	-----	How would you rate your current ability to use computers in general?	3.78	1.21	1	6

DISCUSSION

The results of the present study showed that the image of using the technology is an important determinant of PU, because there was a direct and positive relationship between the variables of image and PU ($R=0.26, P<0.01$). A study by Ping Yu et al. revealed that the image of IT use had no effect on PU [17]. Compare the results of present study with a similar study indicate lack of agreement of these studies. Moreover, the level of computer skills had a direct positive effect on PEOU ($R=0.40, P<0.01$) and BI ($R=0.30, P<0.01$).

The results of the study by Ping Yu et al. showed that the level of computer skills had a significant positive effect on BI ($R=0.41, P<0.001$) and PEOU ($R=0.18, P<0.05$) [17]. Wu et al. also reported that computer skills had a positive effect on PEOU of HIS applications [20]. The results of our study are in line with the findings of these studies.

Furthermore, SN only had a positive direct effect on PEOU ($R=0.65, P<0.001$). Langarizade et al. [24] and Ping Yu et al. [17] showed the significant positive effect of BI on SN ($R=0.38, P<0.01$ and $R=0.26, P<0.01$). It could be stated that SN is an important and influential factor on PEOU. PEOU had no effect on BI but had a direct positive effect on PU ($R=0.46, P<0.001$) although Langarizadeh et al. [24] reported that BI had a positive effect on PEOU ($R=0.46, P<0.01$). Furthermore, Ping Yu et al. [17] also reported a positive direct relationship on BI. The results of the present study are different from the findings of other studies in this regard; other studies showed the effect of PEOU on BI while we did not find such an effect.

Moreover, PU had a positive direct effect on BI ($R=0.61, P<0.001$). The study by Langarizadeh et al. [24] also revealed that BI had a significant positive effect on PEOU ($R=0.52, P<0.01$). In addition, Ping Yu et al. [17] confirmed a positive direct relationship between BI and PU ($R=0.30, P<0.01$). The findings of the present study are in line with these results. In our study, the voluntary use of IT had no significant relationship with other variables, which is similar to the results of the studies by Langarizadeh et al. [24] and Ping Yu et al. [17].

CONCLUSION

Finally, it could be concluded that most of the evaluated variables were more or less effective on the acceptance of information technology by users. In this study, image in using IT, the level of computer skills, SN, PEOU, and PU had a more prominent role in the acceptance of information technology by the users. Therefore, it is necessary to consider these variables while designing, purchasing, or revising hospital information systems. The voluntary use of information technology had no significant relationship with other evaluated variables.

CONFLICT OF INTEREST

The author declares no competing interest in relation to the work.

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FINANCIAL DISCLOSURE

None

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