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INDIVIDUAL PROFILE OF INTELLECTUAL CAPITAL AS AN INSTRUMENT OF INTANGIBLE ASSETS MANAGEMENT

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ABSTRACT

In this paper, the author offers methodology for diagnosing intellectual capital at macro, meso- and microlevels on the basis by building individual profiles of the enterprise's intellectual capital and their comparative analysis. Under the individual profile of intellectual capital the configuration of individual factors for the facility is meant which includes explicit variables that directly change the state of intellectual capital and latent variables that affect intellectual capital in the exercise of management influence on the direct variables that make up their composition, which allows us to determine the most effective instruments of influence on intellectual capital. The basis of this methodology is the use of the method of factor analysis, which allows to group all the data under consideration into factor groups, which are characterized by the same dynamics of changes in indicators. Further, based on the correlation-regression analysis within each factor group, variables that directly influence the formation of intellectual capital are singled out. The construction of such a profile at several levels allows not only to identify the features of the formation of a higher level, but also to establish coordinated guidelines for the development of intellectual capital on a "top-down" basis. This article presents the approbation of this method at the macrolevel using the example of creating individual profile of the intellectual capital of countries with innovative drivers of development (according to the WEF methodology) as a reference profile and a petrochemical industry enterprise of PJSC "Kazanorgsintez". As a result of the comparative analysis, recommendations have been developed on the development of the intellectual capital of the enterprise.

INTRODUCTION

KEY WORDS

Intellectual capital,
intangible assets, World
Economic Forum,
measurement of
intellectual capital

Issues related to the assessment of intellectual capital (IC) have emerged almost from the very beginning of the conception of intellectual capital in the late 90s of the twentieth century [1]. A huge contribution to the systematization of methods for assessing intellectual capital introduced K.E. Sveby [2]. In the course of studying the methods in question, we identified the most important advantages and disadvantages inherent in the techniques were arranged into 4 groups [Table 1]

Thus, we formulated the main features that were later embodied in the author's method of diagnosing intellectual capital.

First, it is necessary to use financial and non-financial indicators for a more detailed consideration of the components of intellectual capital.

Secondly, the use of methods of correlation-regression analysis is recommended to determine the internal interrelations of the components of the intellectual capital of the enterprise.

METHODS

In order to solve the problems identified in these methods, the author developed a methodology for constructing individual profiles of intellectual capital at the macro- and micro-levels. In turn, the individual profile of intellectual capital implies the configuration of individual factors for the facility, which include explicit variables that directly change the state of intellectual capital, and latent variables that affect intellectual capital in the management of direct variables that are part of the IC.

This technique involves the implementation of 3 consecutive stages, identical at all considered levels. The only difference is the sets of indicators considered at each level.

Let's consider the contents of these stages.

Normalization of data at a certain level: This stage is necessary to achieve the goal, since most of the variables included in our proposed individual profile are heterogeneous in content, nature and units of measurement.

Conduct a factor analysis of the entire data set to identify groups of indicators, combined into factors:

To do this, we needed a tool that could combine heterogeneous indicators into specific groups, thereby creating a computable aggregate for measuring the dynamics of the indicators of intellectual capital. The factor analysis was carried out using the IBM SPSS Statistics software. Using this program, you can get the following results at this stage:

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- A. The significance of the factors for each time period over which the entire array of variables will be distributed. These series of data will later be used in the process of subsequent correlation-regression analysis.
- B. Matrices of rotated components using the varimax method, which will display the distribution of variables by factors. In the future, it is on the basis of this list of variables that we can distinguish between explicit and latent variables.

Table 1: Advantages and disadvantages of methods for assessing intellectual capital [2,3,4]

Group name	Calculation methods included in this group	Advantages	Disadvantages
Market Capitalization Methods (MCM)	Market- to book value, The Invisible Balance Sheet, Calculated Intangible Value, Investor assigned market value (IAMV™), FIMIAM	Easy calculation, applicable for express IR analysis	The difference between book value and market value is not fully explained by intellectual capital
- Return on Assets methods (ROA)	Value Added Intellectual Coefficient (VAIC™), Economic Value Added (EVA™), Knowledge Capital Earnings,	Allows to estimate the cash flow generated by the intellectual capital	It is difficult to separate a part of the income attributable to the use of intellectual capital
Direct Intellectual Capital methods (DIC)	Human Resource Costing & Accounting (HRCA 1), HR statement, Citation-Weighted Patents, Technology Broker, Accounting for the Future (AFTF), Inclusive Valuation Methodology (IVM), Total Value Creation, TVC™, Intellectual Asset Valuation, The Value Explorer™, Intangible assets statement, Dynamic monetary model, EVVICAE™	Allows to estimate in a monetary form the components of the intellectual capital	subjectively determine the cost of such components as human capital and the reputation of the company - The cost does not take into account the synergistic effect of the interaction of the components of the IC
Scorecard Methods (SC)	Intangible Asset Monitor, Holistic Accounts, IC-Index™, Value Creation Index (VCI), Knowledge Audit Cycle, Intangible assets statement, Meritum guidelines, Value Chain Scoreboard, IC Rating™, Intellectus model, IC-dVAL™, Danish guidelines, Public sector IC, Topplinjen/ Business IQNational Intellectual Capital Index, SICAP, IAbM, Regional Intellectual Capital Index	Allow to describe in as much detail the state of components of intellectual capital	- Do not give an answer to the question of the integral state of the intellectual capital of the enterprise and its internal structure - Do not allow to estimate the intellectual capital in monetary form

Identification of explicit and latent variables that affect the formation of a factor:

The construction of a model for the allocation of direct variables, according to our approach, implies carrying out a regression analysis in which the values of the factor obtained in the course of factor analysis are used as a dependent variable, and as independent variables the variables entering the factor according to the matrix of the rotated components.

Due to the construction of the model, we obtained dependencies on variables that directly influence the formation of the factor.

In accordance with generally accepted rules [5], the constructed model must meet the following criteria:

1. The value of the coefficient of determination is above 0.7;
2. The modular value of t-statistics is higher than t-critical;
3. Lack of autocorrelation.

If the model does not meet at least one of the above criteria, the model is rebuilt, but with a decrease in the number of independent variables per unit. This procedure continues until the model meets all the criteria.

As a result of building a profile, we can get the following information:

1. What intellectual resources, characterized by the considered indicators, are interrelated and what is the nature of these interrelations at the researched level.
2. Which of the intellectual resources are the most manageable, that is, what resources are possible effective impact for improving the intellectual capital of the facility.

Based on these two fundamental aspects of the profile, one can assess to a certain extent the perfection of the composition and structure of the profile of the intellectual capital of the object.

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To create a formation of individual IC profiles, one needs systems of indicators which enable it to be comprehensively characterized. In the above study, we examined the indicators characterizing intellectual capital at macro and micro levels.

Macro level

Currently, there is a large number of methods, to some extent describing various aspects of the country's competitiveness, in which elements of intellectual capital are considered [6, 7-11, 12, 13]. But the acknowledged leader in the issue of integrated assessment of intellectual capital is the Global Competitiveness Index (GCI) [7-11]. A big advantage of the GCI methodology is the division of countries into 3 main groups, which makes it possible to compare the dynamics of the competitiveness of countries with different levels of development. Another important role is played by the fact that in the GCI methodology the indicators characterizing innovation activity at the enterprise level are considered in more detail, which is the basic element of the intellectual capital of the country and the region. The GCI methodology implies the use of 113 indicators, from which we selected indicators that are drivers of increasing competitiveness through innovative development of the country.

The second group of indicators was considered at the micro level. For the convergence of the results and the interconnection of individual profiles at the micro and macro levels, it was necessary to use a system of indicators corresponding to the indicators at the macro level [Fig. 1].

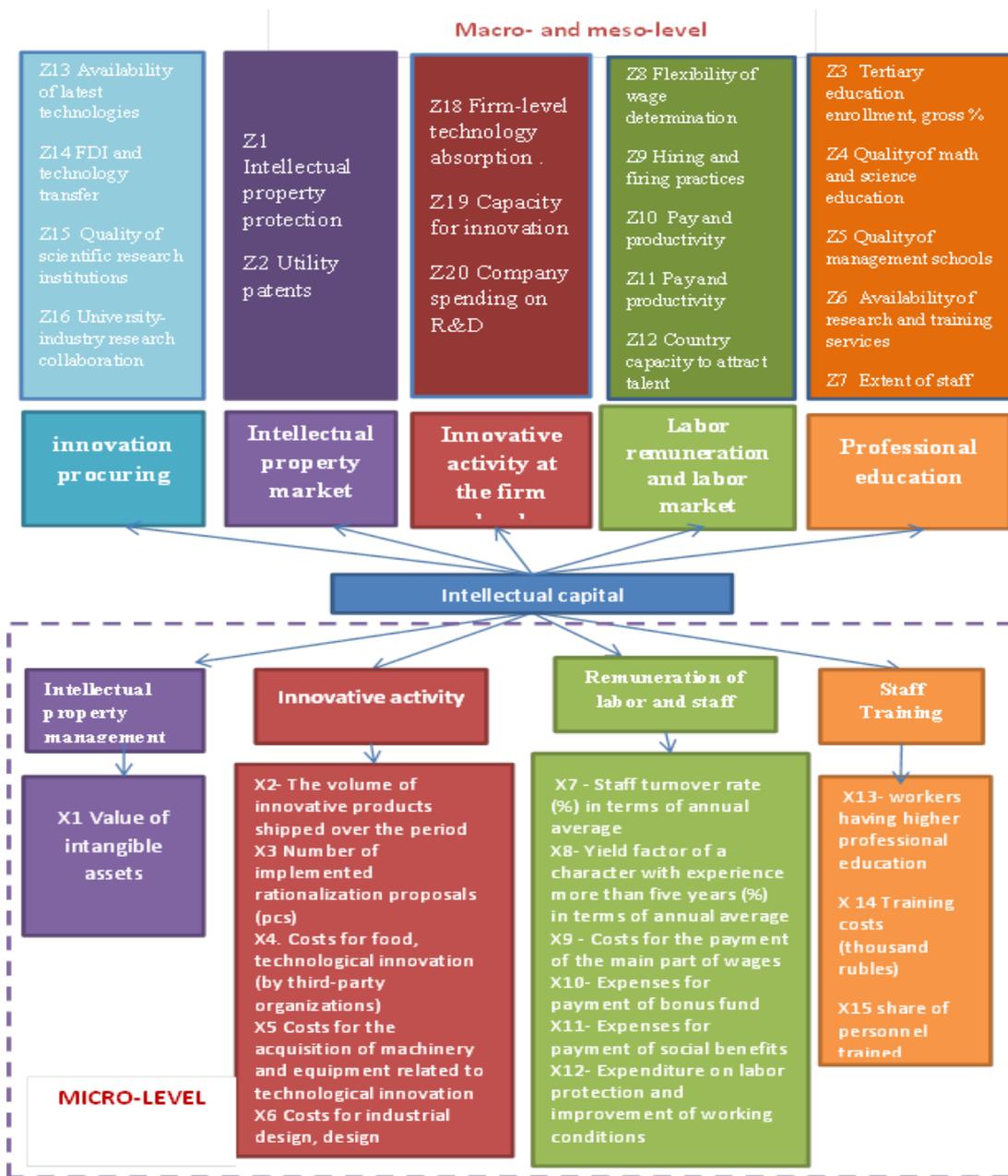


Fig. 1: Indicators of intellectual capital at micro and macro levels.

In a process of selecting indicators at the micro level, the author put forward a priority criterion - these indicators should be collected centrally in any region of the country, being a part of statistical reporting, annually (or quarterly) submitted by the enterprise. The author also suggests indicators that can be included in the list of statistical reports because of their informative ness and ease of information collection.

The second necessary criterion in the selection of indicators is their universality, that is, the indicators can be used in any industrial enterprise, regardless of the industry and the characteristics of the company's strategy.

Thus, we selected the following 20 indicators for assessing intellectual capital at the macro level and 15 indicators at the micro level, presented in [Fig. 1].

Main part

To approbate the proposed methodology, the author constructed a number of models. At the macro level, the model of intellectual capital of economically developed countries with innovative production drivers according to the WEF classification is constructed. The study used data from 37 countries that are members of this group for 2015. The choice of this group of countries is due to the need to identify a reference profile with which a comparative analysis at the micro level will be carried out.

As a result of regression models, we have identified the following results at the macro level: in Factor 1, five direct variables were identified: "the quality of personnel training"; "The ability of the country to retain talent"; "Accessibility of new technologies"; "The level of assimilation of new technologies"; «Intellectual potential». In the second factor group, only 1 variable "payroll / productivity" is direct.

For an acceptable comparison of individual profiles of intellectual capital, it was necessary to transpose the selected indicators at the macro level to comparable indicators at the micro-level, as shown in [Fig. 2]

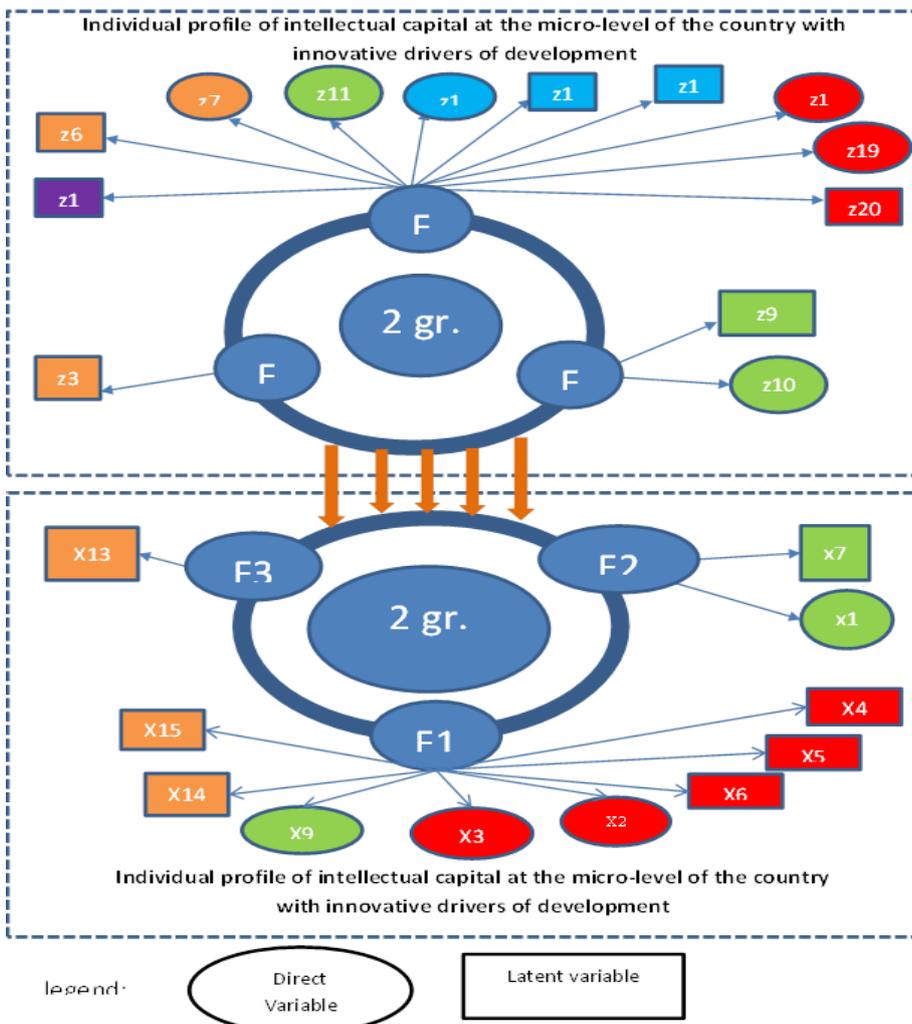


Fig. 2: Individual profile of intellectual capital, characterizing countries with innovative drivers of growth at the micro- and macro level.

At the micro level, we selected a large petrochemical enterprise of the Republic of Tatarstan: PJSC "Kazanorgsintez" ("KOS"). The study used indicators that passed the normalization procedure on a quarterly basis for the period 2009-2015. for PJSC "KOS".

In the study of explicit variables, we also found explicit variables in 2 factor groups. In the first group, two direct variables were discovered: "Staff turnover rate (%) in terms of average annual" and "Costs for payment of the main part of wages". In the second group, the explicit variables are "The coefficient of turnover of a character with an experience of more than five years (%) in terms of the average annual" and "Training costs (thousand rubles)"

When comparing the profile of the intellectual capital of PJSC "Kazanorgsintez" with countries with innovative drivers of development, we obtained the results presented in [Fig. 3].

In general, there are several important features. Firstly, in the most significant factor F1, PJSC "KOS" has much fewer variables: in particular, there are significantly fewer variables from the block of innovation activity, most of these indicators are distributed among 3 factor groups, but in this group, "CBS" degree than in the individual profile of countries with innovative activities observed indicators characterizing the staffing and wages. The second similar factor is F2 at the level of countries with innovative activity, it characterizes the staffing and wages, however, in "CBS" this indicator also includes the indicator from the group of personnel training.

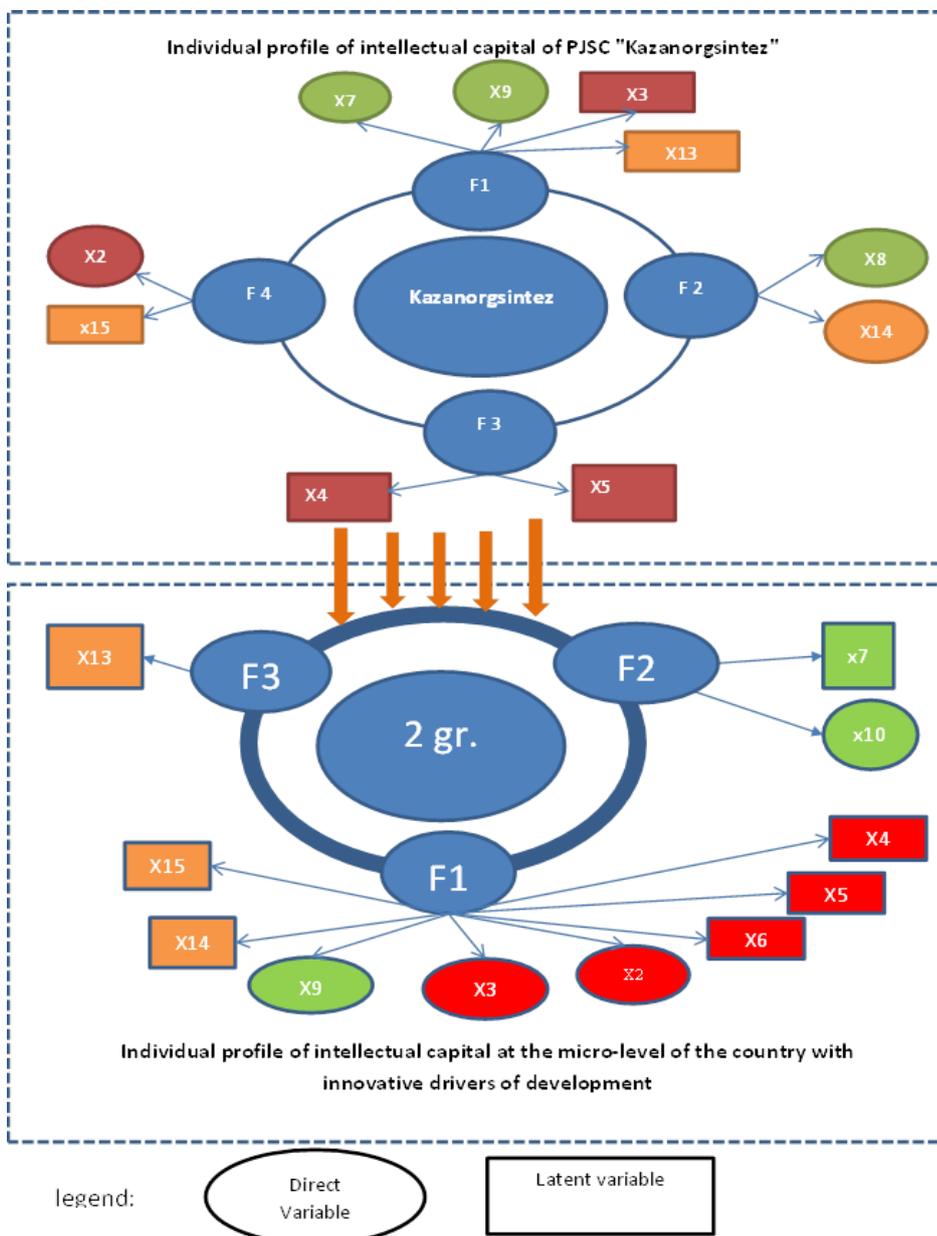


Fig. 3: Individual profile of intellectual capital, characterizing countries with innovative drivers of growth and PJSC "Kazanorgsintez".

The third factor group F3 of countries with innovative drivers of development is characterized by indicators from the training system group, however at the level of "CBS" such a dependence can be characterized by both F3 and F4. This does not give grounds for talking about the similarity of these factor groups. As for the general structure, the profile of PJSC "KOS" has 9 out of 10 coinciding indicators with the profile of countries with innovative drivers of development. Thus, we can conclude that the profiles of the intellectual capital of a given enterprise are sufficiently similar to those of economically developed countries.

SUMMARY

The analysis showed that the factor groups of the enterprise are similar in configuration with the benchmark indicators of countries with innovative economies.

A big advantage of PJSC "KOS" is a relatively large number of coinciding direct indicators that affect the formation of intellectual capital. However, the problem at PJSC "KOS" is a large number of factor groups, which may indicate a lack of systematicity, a weak connections between the blocks of management of intellectual capital, which is a consequence of the evolutionary development of some of them. To solve this problem, the company needs to develop a clear strategy for managing intellectual capital, on the basis of which horizontal interrelationships between functional blocks from the field of R & D management and management should be built. Another problem of the enterprise is an ineffective system of motivating staff. This conclusion can be drawn from the fact that the structure of the profile does not include indicators of costs for the payment of a bonus fund, which is the most important in the formation of intellectual capital in innovative countries.

CONCLUSION

The approach proposed by the author on the basis of building individual profiles of intellectual capital at the enterprise level allows:

1. Conduct an analysis of internal resources and factors of the internal environment in the process of developing and adjusting the enterprise development strategy.
2. Identify the most important indicators for the formation of an enterprise's intellectual capital, integrate them into the system of performance indicators of the enterprise and create a system of incentives that ensure their implementation.
3. Based on the company's profile, it becomes possible to build a system of management tools for the correction and growth of the enterprise's intellectual capital.

For purposes of regional management of the economic sphere, the construction of intellectual capital profiles of enterprises allows:

1. Create a generalized profile of the industries and manufacturing industry in the region as a whole. This profile allows identifying key breakthrough growth points and developing specific government support programs aimed at developing key areas.
2. Conduct a comparative analysis of enterprise profiles by economic activities, clusters and municipalities.
3. Develop strategic documents on the development of the region and municipalities.

CONFLICT OF INTEREST

There is no conflict of interest.

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None

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