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**MODIFIED EVALUATION OF INTELLECTUAL CAPITAL IN RUSSIAN CORPORATIONS BASED
ON THE INCOME APPROACH: PERSPECTIVE VIEW**

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Abstract

The study contains modified strategic evaluation of intellectual human capital in corporations. The evaluation is based on the income approach and implies determination of relative degree of value added by human capital. It is based on simulation modeling and is arranged with special copyright software product, professional judgment of evaluation objects is considered. Practical application of the evaluation contributes to achievement of specific operational and strategic goals of corporations which integrate interests of different stakeholder groups, determines actual and potential interior courses for strategic development in a turbulent environment, and finally, gradually increases intellectual capital value. Promising tool for intellectual capital evaluation in corporations based on the income approach was applied as well as general scientific and special methods – i.e., inductive, deductive, analysis, including coefficient analysis, synthesis, grouping, system thinking, graphic analysis, comparative analysis, economics and statistics analysis, economics and mathematical analysis, extrapolation, expert estimates, methods of structural and logical schemes, copyright software, general MS EXCEL and special purpose EXCEL-VBA, etc.

Keywords

Intellectual capital – Corporation – Income generation approach – Strategic

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Introducción

In order to ensure and maintain corporate status at a high financial level as well as to boost company's value generation, corporations have to correctly evaluate intellectual capital and develop promising areas of its creation and employment. Unbiased evaluation of intellectual capital in corporations provides for their competitive advantages and ensures leading position in the market. Current economic transformations are characterized by the search of areas for rapid costs growth and business attractiveness. It requires development of tools for intellectual capital evaluation in corporations considering key provisions of financial management. Provisions to determine the role of intellectual capital in generation of added value, which determines market value of corporations are disputable and require diligent study. Most of the studies represent actual and retrospective situation with intellectual capital in corporations, and don't take into account either their commercial status or time effect which reduces its value and eliminates corporate growth worth for future. In this respect conducting a modified evaluation of intellectual capital in corporations on the basis of income approach is timely and relevant.

The goal of the study is to develop theoretical and methodological approach for evaluation of intellectual capital in corporations on the basis of income approach, and substantiate the areas of its practical implementation. Achievement of the goal requires to fulfill the following tasks: study economic content and functions of intellectual capital in corporations considering income approach, and provide the grounds of the authors' stipulations; conduct current assessment of intellectual capital in corporations considering income approach; develop and test a model for strategic evaluation of future intellectual human capital based on simulation modeling applying income approach.

Theoretical and methodological basis of the study includes the studies of international and Russian scientists and practitioners, legislative and regulatory documents of Russian Federation Government, Stavropol Territory, Organization for Economic Cooperation and Development¹, the Oslo Manual, as well as periodicals and internal regulatory framework of corporations. Methodological foundation of the research includes systemic, process-based and logical scientific approaches to study evaluation process of intellectual capital in corporations based on income approach.

Working hypothesis of the study is based on the authors' scientific point of view which supposes that creation of modern scientifically based toolset for evaluation of intellectual capital in corporations implies the latter actual and strategic assessment based on income approach. Theoretical significance of the study considers creation of theoretical and methodological provisions for development of toolset for evaluation of intellectual capital in corporations based on income approach. The results may allow further theoretical and methodological researches on the issue of income approach execution in the process of evaluation of intellectual capital in corporations. Some of theoretical and methodological results of the study are attracted as educational and methodological materials in financial disciplines (among which are assessment and appraisal activities), as well as for upgrade training of financial and audit specialists, and etc. Practical significance of the study lays in development and application of particular approaches, methods, techniques, tools, models, and practical recommendations that create theoretical,

¹ Official site of Organization for Economic Co-operation and Development (OECD). oecd.ru/oecd_rf.html

methodological and practical basis for toolset development for evaluation of intellectual capital in corporations based on income approach, and in determining perspectives for the new methodological set implementation.

Method

Research on economic essence of corporations' "intellectual capital" concept based on income approach, both in retrospective and modern conditions

K. Marx defined capital as a self-growing value that creates surplus value; he considered that wage workers create it via their labor. Money is transformed into capital when used as purchasing means for production and labor. Thus, K. Marx² notes that intellectual capital is a part of surplus value creation.

Marginalists M. E. L. Walras³, W.S. Jevons⁴, K. Menger⁵ characterized capital as a production factor that helps workers to execute profitable works.

So, it was stated that the founders and followers of particular economic schools designated intellectual capital as a part of added value generation process, and in the end recognized its value (K. Marx, A. Smith and others).

P. A. Samuelson, V. D. Nordhaus⁶ highlighting the key property in definition of capital, i.e. income generation, considered capital as wealth and as a result of prior someone's personal labor.

Initially, the value of human skills as a form of capital was defined by W. Petty⁷ in "Political Arithmetic". "It is considered correct that wealth, property or stock of the country, which is the result of prior labor, should not disagree with present live labor power, but should be evaluated equally, proportionally, and steadily cover existing social needs."

Modern economist V.V. Bocharov⁸ denoting the main capital attribute, i.e. wealth generation, defined corporation's capital as the cost of funds, at the same time recognizing intangible forms along with monetary and tangible forms.

M. Friedman⁹ identified humanitarian capital as part of corporation's assets, believing that organization's employees are the main future income source.

B. Santo¹⁰ recognizes intellectual organizational capital as part of corporative economic added value generation process. In the Federal monitoring toolkit for innovative

² K. Marx, Capital (Moscow: Publish house for political literature, 1969).

³ M. E. L. Walras, Elements of pure political economy. (Moscow: Isograph, 2000).

⁴ W. S. Jevons, Political Economy: Monograph (St. Petersburg: People's benefit, 1905).

⁵ K. Menger; E. von Boehm-Bawerk & F. Wieser, Basics of political economy (Moscow: Economics, 1992): 231-242.

⁶ P. A. Samuelson & V. D. Nordhouse, Economics (Moscow: Publisher: "Williams", 2015).

⁷ W. Petty, Economics and statistics work (Moscow: Sotsekgiz, 1940).

⁸ V. V. Bocharov, Modern financial management (St. Petersburg: Peter, 2006).

⁹ M. Friedman, "Basic Postulates of Demand Theory", Economic Studies Quarterly, num 14 (1963): 115-144.

¹⁰ B. Santo, Innovation as a means of economic development: textbook; translated from Hungarian (Moscow: Progress, 2005).

activities in intellectual capital of organizations, Russian legislator highlights uncertainty of economic benefit from intellectual property utilization among the factors that hinder innovative activity (On approval of statistics toolset for arrangement of Federal statistic monitoring of the wage workers amount, workplace and remuneration in the fields of education, science, innovation and information technology).

According to IFRS, one of the criteria for recognition of intangible assets – part of intellectual capital in corporations – is its provisions for economic benefits in the future (specific internally generated future economic benefits are clearly separated from the benefits derived from business reputation; it is possible to generate future benefits from other assets applied in relevant activities aimed at income generation) (Official sites of PricewaterhouseCoopers LLP, FBK, Agro Consulting and ACCA).

R. Strack, U Villis¹¹ distinguishes intellectual capital as knowledge leading to profit.

According to V. V. Manuylenko, A. A. Mishchenko¹² intellectual capital means source of intellectual business funding that generates income and / or conditions granting its receipt in the future.

The OECD defines source of potential economic profit in the future as a key specific feature of intellectual capital (official site of Organization for Economic Co-operation and Development).

As proprietary definition of “intellectual capital” in corporation based on income approach was designed the following was taken into account:

- main property of capital as complex economic category is permanent generation of income (K. Marx, A. Smith, etc.);

- determination of its functional purpose and indication of the final goal, i.e. income generation, which in some respects is reflected in the terms of OECD, P. Sullivan, V.V. Manuilenko, A.A. Mishchenko, and Russian legislation.

So, according to the authors (2017), intellectual capital in corporations means economic category of “capital” that represents value invested in special non-traditional assets in intangible and other forms, that constantly circulates and either generates profit or provides preconditions for future profits, thus becoming a part of added economic value. In practical terms, the authors’ interpretation of intellectual capital in corporations based on income approach provides for the ground in development of method for intellectual capital evaluation, since from theoretical point of view the best measure of capital is the one that exactly conforms to theoretical interpretation.

The essence of economic category of “intellectual capital” in corporations is expressed in its functions, which are interpreted by Russian and international authors in various terms. It is reasonable that the process of intellectual capital creation should be

¹¹ R. Strack & U. Villis, “Rave: Integrated Value Management for Customer, Human, Supplier and Invested Capital”, *European Management Journal*, Vol: 20 num 2 (2002): 14-158.

¹² V. V. Manuylenko & A. A. Mishchenko, “Evaluation of intellectual capital as strategic factor in development of innovations in commercial organizations”, *Financial analytics: problems and solutions*, num 39 Vol: 321 (2016): 16-27.

focused at practical execution of its functions. Most authors consider that the main function of organization's intellectual capital is rapid profit boost that is the result of generation and trading complex knowledge, items and interactions serving its best performance. With reference to income approach, the overall intellectual capital – in our opinion – performs as the function for ensuring and maintaining profitability.

Thus, when creating tools for evaluation of intellectual capital in corporations, the following should be considered:

1. Given that intellectual capital is proficient to execute its main property, i.e. generate income, evaluation is based on methods of income approach that require improvement and adaptation.

2. Given the specifics of the subject of evaluation, i.e. "intellectual capital" in corporations, income approach in evaluation can be implemented in various modifications.

Methodological justification of preferred method for intellectual capital evaluation by income approach

If consider development of intellectual capital by the principle of "existing intellectual capital in corporation versus future potential innovations", it is important to note that definition of GII innovations global index contains human capital, that is a factor; its calculation is based on profitability indicators and regional indicator: rated by income and region, and innovation efficiency coefficient.

Among income approach methods to evaluation of intellectual capital in corporations (market capitalization, value added method (i) by Ante Pulic, Austrian scientist), variously applied method of added value by A. Pulic¹³ (2004) reflects contribution of tangible and intangible assets into added value. One of its modifications is full-fledged indicator of intellectual value added, which determines its relative efficiency and proficiency to create added value in corporations by means of human capital (it can be equated with labor costs) (h), organizational capital (o), capital employed (c):

$$i = h + o + c \quad (1)$$

where h – added value (profit – (cost of sales – labor costs¹⁴)) / labor payment expenditures;

o – (added value – human capital) / added value;

c – added value / invested (own) capital

Human and organizational capital yield evaluates efficiency of intellectual capital in corporations. Human and organizational capitals are in reverse position to each other (the more added value is produced by human capital, the less is produced by organizational

¹³ A. Pulic, "Intellectual capital – does it create or destroy value?", Measuring Business Excellence, Vol: 8 num 1 (2004): 62 – 68.

¹⁴ Labor costs – real carrier of intellectual resources is not included into expenditures

capital) and vice versa. Intellectual added value indicator means vary in the range of 1.5 - 15. Its high value indicates that corporation utilizes its real capital more efficiently due to sufficient amount of intellectual capital.

Intellectual capital of a corporation is a good lever for other types of capital, since it ensures better performance and efficiency of the latter. Increase of intellectual capital may result in more efficient and rational utilization of other assets. Any corporation that generates value added via intellectual capital mobilizes the best employees, builds loyalty, generates new financial flows, and creates sustainability, allowing that stakeholders (financial managers) take long term financial decisions.

Following the logics of the study, it is considerable estimate intellectual value added by A. Pulik's method, determining contribution of human, organizational involved capital into creation of added value - Table 1. Given that intellectual capital is a product of science and business interaction, corporations involved in research and production activities become of particular interest. In this regard, "Eskom" JSC Science and Production Complex (SPC) (Official site of the "Eskom" JSC SPC) was selected for the research.

Indicators	YY							
	2010	2011	2012	2013	2014	2015	2016	2017
Ratio for value added by means of human capital	7,613	4,656	4,432	10,565	5,678	8,061	2,298	7,342
Ratio for value added by means of organizational capital	0,869	0,785	0,774	0,905	0,824	0,876	0,565	0,864
Ratio for value added by means of involved capital	1,191	1,372	1,264	1,054	0,873	2,031	–	–
Intellectual added value	9,673	6,813	6,47	12,524	7,375	10,968	0,397	1,097

Table 1

Evaluation of intellectual capital in "Eskom" JSC SPC based on added value method by A. Pulik (units, consider as fragment)

The estimates stipulate variations in the values of intellectual added value indicator according to A. Pulik's method. Values of intellectual added value indicator in "Eskom" JSC SPC vary between 2.466 - 12.524, human capital played the most significant role in creation of intellectual added value during retrospective period, then in 2010 – 2015 so did working capital, the values of which in 2016 - 2017 turned negative due to financial difficulties in the corporation. The values of intellectual added value indicator, determined by means of another method, range from 0.417 to 0.954 units. It is noteworthy that role of organizational capital in creation of added value is insignificant. "Eskom" JSC SPC inefficiently uses intangible assets. Among encouraging factors is that A. Pulik's added value method is distinguished for highlighting specific operational interconnections, correlation of resources and financial results, and integration of such financial indicators as revenue, costs, value added. The method includes such advantage as reflection of intellectual capital role in corporate value creation; among disadvantages is neglect of time factor that reduces cost of intellectual capital and eliminates reflection of increasing value of corporation in future. According to M.- C. Chen, S.-J Cheng, and Y. Hwang¹⁵ it is critical that in A. Pulik's method innovative capital is not included into organizational capital, since

¹⁵ M.- C. Chen; S.- J. Cheng & Y. Hwang, "Empirical investigation of connection between intellectual capital and company's market value and financial performance", *Journal of Intellectual Capital*, num 2 (2005): 159-176.

that requires additional R&D expenses]. Still, static character is a common drawback of most methods for evaluation of intellectual capital in corporations, including the one by A. Pulik. It disrupts one of the features of intellectual capital which is deriving future result; and the next stage of the research is aimed to eliminate that.

Development and trial of the model for evaluation of strategic intellectual capital in corporations based on a special software program

Existing studies on development of intellectual human capital in corporations make possible to note that in contrast to the organizational stakeholder capital intellectual capital:

- is not included in intangible assets;
- involved in creation of added economic value mostly when corporation reaches its best indicators' values.

In view of the foregoing, creation and evaluation of human capital should be denoted as central competency, which must be refined, developed and maintained appropriately. Key competence of human capital, which is trainability and development of personnel in future, is presented as follows:

Trainability and development of personnel in future = (2)

(Invested recourses X Uncertainty) X "Value" of Errors

It is believed that errors (failures) being inevitable consequences of unknown earlier activities create value that is measured by their profitability. Intellectual culture requires tolerance to failures; to minimize errors it is advisable to minimize costs and maximize profits.

It is advisable that a method containing uncertainty factor is included into the toolset for prospective evaluation of human capital in corporations, since the factors affecting intellectual capital in corporations are of uncertain character; moreover, it is influenced by uncertainty of the economic benefits from utilization of intellectual property. Intellectual capital operates in conditions of uncertainty which indicators transform randomly. In this regard, description of perspective evaluation of human capital in financial management system of corporations is carried out by the means of Monte Carlo simulation (stochastic) method, which is implemented for important strategic financial decisions.

Ratio for value added by human capital is defined as an indicator evaluating prospective intellectual human capital of corporations. It is reasoned by the following:

- its dynamic variability identifies it as a random value, which has a non-zero probability not to reach the desired value;
- ground for calculation of human capital indicator is labor costs identified by investments in staff development (when changing HR principles and stimulation procedures);

Modified evaluation of intellectual capital in Russian corporations based on the income approach: perspective view pág. 513

- it contains simulated absolute indicator, which is labor costs, thus demonstrating direct interconnection of relative and absolute indicators characterizing human capital;
- it demonstrates efficiency of human capital;
- national and international lawmakers normatively recognize that reduction of labor costs impact corporations' performance as element of human capital¹⁶.

Strategic values of the value factor added by human capital are determined on the basis of copyright software program Excel-VBA "Software to determine future intellectual human capital in corporations"¹⁷ (V. V. Manuylenko, G.A. Ermakova, 2019). Simulations create scenarios for intellectual human capital in future. Simultaneously, patent portfolio that shows aggregate results of intellectual efforts of each corporation is supplemented with an intellectual property item which is a component of organizational capital in corporations, thus optimizing risks of uncertain licensing potential and a lack of patenting. On the basis of 60,000 Monte Carlo experiments, empirical distribution function for strategic values of human capital added value indicator is built - Figure 1.

Results and discussion

In theoretical block of the research

- definition of "intellectual capital" in corporations based on income approach is formulated as a value invested into special non-traditional assets in intangible and other motional forms that generate income and / or provide for the future profits and serve to create added economic value.

- it is stated that process of intellectual capital generation in corporations should be aimed at maintenance of the function that secures and sustains profitability.

In practical block of the research

– advantages and shortcomings were identified; where to prove advantages, the role of intellectual capital in corporation's value generation is represented and to show shortcomings, actual and retrospective evaluation of intellectual capital in corporations without taking into account time factor.

- A. Pulik's method was tested, which reveals significant role of human capital in generation of intellectual added value;

- it is noted that there are no substantiated provisions for assessments on how corporate intellectual capital reacts to changes in dynamic external environment.

¹⁶ On approval of statistics toolset for arrangement of Federal statistic monitoring of the wage workers amount, workplace and remuneration in the fields of education, science, innovation and information technology: Rosstat Regulation № 563. August, 30 2017.

¹⁷ V. V. Manuylenko & G. A. Ermakova, Software to determine future intellectual human capital in corporations. 2019. (RF) № 2019613737.

In methodological block of the research

– practical value of the model based on the special software product was stated. The model allows determining strategic values for the indicator of value improved by human capital. Evaluation of intellectual human capital on the basis of professional conclusions implies comparison of actual and strategic values of human capital value added ratio, the difference is estimated – Table 2, the results are synchronized, the grounds for possible deviations are determined, and favorable areas of intellectual capital evaluation in corporations are identified.

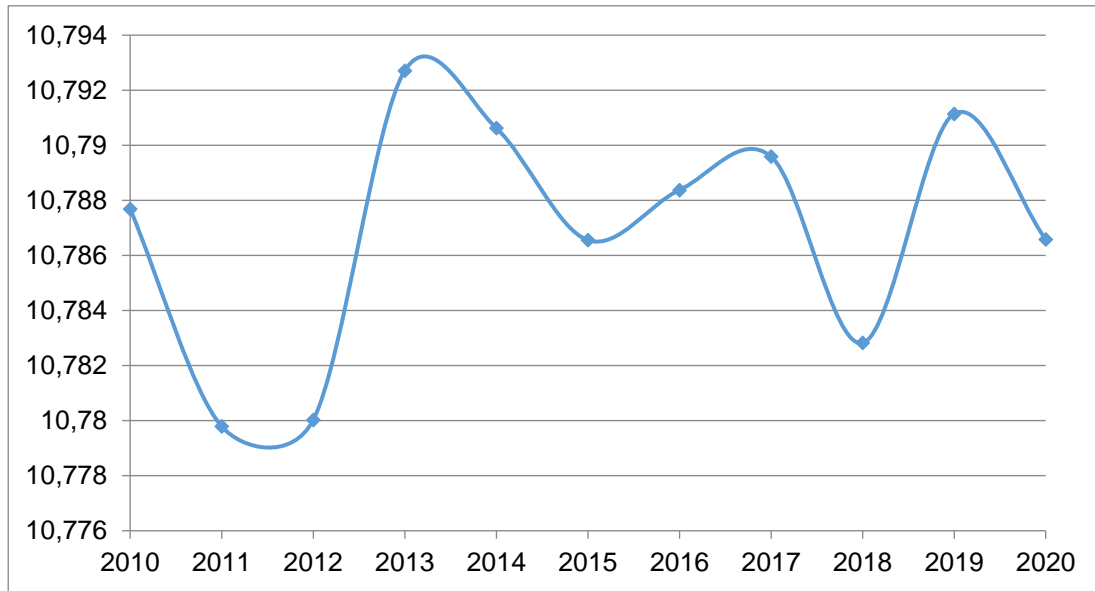


Figure 1

Distribution of strategic values of the indicator of value improved by human capital in “Eskom” JSC SPC (developed by authors V. V. Manuylenko, G. A. Ermakova)

YY	Current, units	Strategic, units.	Current/ Strategic values of the indicator of value improved by human capital, %
2010	7,6129	10,7877	– 29,4
2011	4,6556	10,7798	– 56,8
2012	4,4315	10,7800	– 58,9
2013	10,5647	10,7927	– 2,1
2014	5,6784	10,7906	– 47,4
2015	8,0613	10,7866	– 25,3
2016	2,2979	10,7884	– 78,7
2017	7,3420	10,7896	– 32,0
2018 <i>strategic perspective</i>		10,7828	
2019 <i>strategic perspective</i>		10,7911	
2020 <i>strategic perspective</i>		10,7866	

Table 2

Evaluation of gap between current and strategic values of the indicator of value improved by human capital in “Eskom” JSC SPC

It is advisable that excess of strategic values of indicator over current ones is demonstrated when financial strategies in financial management system of corporations are developed. Strategic measure of value added by human capital is of a clear competitive advantage. At the same time, planned future results of intellectual activity in corporations are taken into account.

Simulated values for the ratio of value added by human capital during retrospective period conform to criterion level (1.5 - 15 units), and exceed the best actual values in "Eskom" JSC SPC $> = 10.565$ units, that proves their strategic nature. Boundary between strategic and actual values of the ratio for value added by human capital varies in Eskom JSC SPC between 2.1% - 78.7%. Absolute indicator for simulated human capital in the form of labor costs explains that increase of added value should be strategic area of intellectual capital development in corporations. Suggested model for prospective evaluation of intellectual human capital demonstrates such properties of intellectual capital in corporations as future results, and uncertainty of operational environment.

Discussions

Evaluation of intellectual capital in corporations should be based on its forecasted future. Relation of intellectual capital and both future and current value was noted in abstinence theory by English economist N. W. Senior, who based on interconnected characteristics of labor and capital explained that present benefits present higher value than future benefits. Labor is "a sacrifice" of an employee who lays aside leisure and rest, whereas capital is "a sacrifice" of a capitalist who yields most of the profit in favor of production assets. Accordingly, a person who invests his own funds into business deserves remuneration since he limits his personal opportunities to sell part of wealth at present and restricts current benefits in the name of the future¹⁸. Future value of intellectual capital means investing money in a given period (alternative university students), and transform it into intellectual capital at a certain cost over a certain period of time^{19,20,21}. Alternatively, traditional NPV analysis may be replaced with method of economic value added (EVA), which demonstrates intellectual capital performance in corporations as financial decisions quality indicator. Given – as earlier noted – that one of the identifying features of intellectual capital in corporations is obtaining future benefits, it is reasonable to associate intellectual capital to such resources, and indicate how it can be part of EVA creation. Attracting proposed adapted income approach to evaluation of intellectual capital in corporations, any corporation may independently develop and improve this advanced toolset in financial management system, taking into account specifics of corporation's development.

¹⁸ A. S. Bulatov, Economics. 2-nd edition updated and revised. (Moscu: BEK,1999).

¹⁹ G. A. Ermakova, Creation of organizational "intellectual capital" concept by representatives of various economic schools. Science of Russia: Goals and Objectives: a collection of scientific papers based on the materials of IV International Scientific and Practical Conference. Ekaterinburg: Publish House SIC L-Journal, 2017).

²⁰ G. A. Ermakova, Justification of present and future value in evaluation of intellectual capital in organization. Development of science and education trends: collection of scientific papers based on materials of XXIX International Scientific and Practical Conference. Samara: NIC L-Journal, Part 1 (2017): 38-39.

²¹ G. A. Ermakova, "Research of modern economic essence of "intellectual capital" concept of organizations", Eurasian Journal of Law, num 8 Vol: 111 (2017): 369-371.

Conclusions

Developed model for prospective evaluation of intellectual human capital in financial management system of corporations provides for the following:

- determine intellectual capital role as a source for future value added creation, and introduce results of intellectual activities as competitive advantages to economics turnover;
- establish required values for the indicator, identifying what “future” means, and considering that obtaining future results is one of its main properties;
- identify a range of possible scenarios for intellectual capital performance, considering further opportunities for financial strategy development;
- comprehensively present all possible uncertainties that arose during creation and development of intellectual human capital;
- determine values of strategic intellectual capital, and compare them with current values;
- eliminate deficiency of A. Pulik's method considering the value of corporation's future growth, ultimately increasing the cost of intellectual capital over time;
- create evaluation data base executing basic principles of objectivity, reliability, accuracy, providing for further development of Monte Carlo method;
- merge and develop human and stakeholder capitals causing synergy interest for each category of stakeholders (government, employees, financial managers, consumers, suppliers, etc.), minimizing cooperation risks with stakeholders;
- promote specific style of employee behavior (intellectual culture demonstration) connecting labor costs with strategic indicators which characterize intellectual capital, affect remuneration, and ultimately stimulate intellectual work;
- arrange connection of employee benefits and performance through information system, increasing efficiency of both information and cultural capital;
- evaluate remuneration policy and intellectual culture in corporation, ultimately minimizing risks of incompliance with certain values, ethical standards, behavioral and communications standards, social responsibility, etc .;
- eliminate risks of uncertainty with licensing potential and low patenting via inclusion in organizational capital intellectual property in the form of software program (inclusion of a copyright software into commercial exchange reflects execution of commercial function by intellectual organizational capital);
- suggest and implement a patent evaluation model based on modeling connection of patents and business value;
- determine intellectual capital role in strategic financial decision taking;
- identify risks of financial and intellectual capital mutual performance; independent study of intellectual capital in corporations was carried out by S. S. Galazova, V. V. Manuylenko²² ;
- develop methodic, methods, and tools for assessing risks and uncertainty: A.V. Rutkauskas, V. Stasytyté²³ .

²² S. S. Galazova & V. V. Manuylenko, “Formation of stakeholders' client capital in trade institutions”, *European Research Studies Journal*, num 20(4B) (2017): 398-411.

²³ A. V. Rutkauskas & V. Stasytyté. Effectiveness, reliability and subject risk–shaping drivers for the set of possibilities and utility function when investment decision is made under uncertainty. The 6th International Conference “Business and Management 2010: May 13–14. Vilnius, Lithuania. 2010. 176-183.

Model is universal in application; it can be used as a toolset for strategic planning for intellectual capital and other economic indicators, as well as to promote intellectual efforts, which represent the ground for intellectual capital in corporations. Model for prospective evaluation was tested in the system of intellectual capital evaluation at “Eskom” JSC SPC and other corporations.

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