

Methodical approaches to evaluation of intellectual capital of enterprises

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Abstract

The intellectual capital that allows you to form a strong competitive advantage and is crucial for the successful existence of any enterprise.

The purpose of the article is to generalize the methods of intellectual capital valuation.

The existing methodological approaches to evaluation of the intellectual capital of the enterprise have been systemized in the article.

The experience has been summarized and the analysis of methodical approaches to evaluation of intellectual capital has been carried out. Indicators for the analysis of human, organizational, client and social capital of intellectual capital have been distinguished. The most used approaches for estimating intellectual capital, their calculation mechanism and groups of methods have been determined.

Thus, today there are several basic approaches to valuing intellectual capital (cost; income; market), as well as a significant number of methods for estimating the value of intellectual capital of the enterprise. However, there is no single common approach or methodology for evaluating intellectual capital.

One of the most promising and convenient methods of evaluating intellectual capital is the Balanced Scorecard (BSC), which includes: finance; customers; internal business processes; innovation, training and professional growth. It is proposed to add an indicator of "communicative competence" of both personnel and management of the enterprise to the component "training and professional growth", because the process of information transfer is the basis for successful operation of the enterprise and directly affects the formation and increase of intellectual capital.

Keywords: intellectual capital; indexes; intangible assets; enterprise; evaluation methods; approaches to evaluation.

Introduction

The dominant position in the social environment is occupied by those people who have a significant amount of knowledge, information, skills and creative thinking. The development of the economic sphere depends on the processes of functioning of intellectual capital, which acts as a kind of innovative way of developing the state economy. It is intellectual capital that allows you to form a strong

competitive advantage and is crucial for the successful existence of any enterprise. However, there are a number of unresolved theoretical issues that prevent the effective regulation of the economy in terms of formation and use of intellectual capital. In this context, a special place is occupied by the improvement of analytical and evaluation procedures for the formation and use of intellectual resources by

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domestic enterprises. Since, in order to make effective management decisions, it is important to have relevant data on the availability and use of information resources, which ensures high

relevance of work on the study of methodological and methodical aspects of evaluating the intellectual capital of enterprises.

Material and methods

Issues related to the study of intellectual capital are the subject of research by a large number of domestic and foreign scientists. Drucker P. (1993) explored the essence of intellectual capital, emphasizing that it is a significant resource, not just another resource along with traditional factors. In his opinion, the importance of traditional factors has given way to information-intensive, and they have gained an advantage in the pursuit of competitive advantage. The essence of intellectual capital was also studied by Bontis N. (1996), Bassi Laurie J. (1997), Brooking E. (1996), Sveiby K. E. (2018). T. Stewart (1997) studied the components of intellectual capital. K.-E. Sveiby (1997) linked the components of intellectual capital to the intangible assets of the enterprise.

Cronje and Moolman (2013) suppose that the process of measuring intellectual capital for both internal and external purposes involves the use of financial and non-financial measurement methods. Much of the researchers consider the importance of evaluating intellectual capital by a system of balanced scores, in particular (Kaplan R. S., Norton D. P. (1996), Dzhezdzhula V., Yepifanova

I. (2018)). Rehman J., Hawryszkiewicz I., Sohaib O., Namisango F. (2021) the importance of implementing measures that enhance skills, motivation and capabilities is empirically proved, which provides growth of intellectual capital and competitive advantage. Gupta, K., Raman, T. V. (2021) used the modified value-added intellectual coefficient (VAIC) as an opportunity to measure intellectual capital and return on assets to measure the financial performance of firms. As a result, total intellectual capital and its components have a significant impact on financial results.

Muhammad Azam, Jawaid Ahmed Qureshi (2021) explored factors that build Employer Brand Image (EBI) for attracting and retaining intellectual capital comprising human capital too.

The importance of intellectual capital to assess the potential of the enterprise as a whole is emphasized by Yepifanova I., Dzhezdzhula V. (2021), Voynarenko M. et al (2021).

However, effective management of intellectual capital involves the choice of methods for evaluating intellectual capital, which remains controversial.

Results and discussion

Knowledge is a real beneficial force, a means of achieving social and economic results. Management is the use of knowledge to find the most effective ways to use the available information in order to obtain the necessary results. The scientist also supports the idea that the world is ruled by knowledgeable people. Indeed, many people have access to tangible and financial resources, while only knowledge and intellectual capital can lead to real innovations, including those introduced in the Circus du Soleil, Tesla, Solar City, PayPal, and others.

The key characteristic of the conditions for the capitalization of Ukraine's economy is the forced high transparency, along with structural and technological heterogeneity, the lack of

modernization of the heavy industry sector and the low level of industrialization of industries and regions. The factor that can change the situation in a positive way is the use and increase of intellectual capital of the enterprise.

Nowadays intellectual capital is developing rapidly and is the main source of innovative development and economic competitiveness of both enterprises and the state. Intellectual capital is a concept that refers to intangible assets without which the company cannot operate.

Intellectual capital, according to P. Drucker, is a significant resource, and not just another resource along with traditional factors. Under the conditions of an innovative economy, the importance of traditional factors gave way to

information-intensive ones, and they benefited in the quest for a competitive advantage (Drucker P. (1993)).

Intellectual capital is essentially an intangible asset, an integral part of the goodwill, which, given the skillful management of the company, can bring significant growth in income, profits, and ultimately the competitiveness and market value of the enterprise (Dzhedzhula V. et al, 2018).

Scientists and researchers (Edwinsson L., Malone M. (1999), Popelo O. V. (2015)) usually divide the intellectual capital of the enterprise as follows: human capital; intellectual capital; client capital; social capital.

Human capital is a set of knowledge, skills, creative abilities, as well as the ability of owners and knowledge-intensive employees to meet the requirements and objectives of the enterprise. Organizational or structural capital is computer software, databases, organizational structure, patents, trademarks, organizational mechanisms that ensure the productivity of employees and the operation of the enterprise. Market or consumer capital is future consumers of products of the enterprise, the ability of the product to meet the needs of consumers

Evaluation of intellectual capital has certain features and complexity, because such evaluation includes not only knowledge of people, but also their moral values, the image of the organization, its structure, information systems, characteristics of intellectuals.

A feature of the evaluation of intellectual capital is the complexity of its measurement. There is still no current standard for measuring intellectual capital. Today a large number of different methods have been developed to evaluate intellectual capital, which differ both in the set of calculated indicators and in qualitative characteristics.

There are also certain criteria for developing an intellectual capital evaluation system (Marr B., Gray D., Neely A. (2003)):

- evaluation must be transparent and reliable;
- criterion of economy (comparison of income and expenses);

- compliance with the strategic and tactical goals of the enterprise;

- generating the necessary information for stakeholders.

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Taking into account the components of intellectual capital and how the capital of the enterprise is valued, the following approaches are distinguished (Table 1) (Lyashenko N. Ye. (2012)):

- cost approach, which is used to determine the total value of intellectual capital of the enterprise, but the value of its individual elements is not taken into account;

- structural approach, which is based on the use of different units of measurement for each of the elements of intellectual capital, but the overall valuation of this approach is impossible. The structural approach is mostly used in non-financial models.

Today, there is no single generally accepted method of evaluating intellectual capital and its constituent elements, and therefore, in this case, it is advisable to use in parallel cost and in-kind indicators.

To assess the value of intellectual capital, companies often use cost indicators. In this case, depending on the specifics of certain situations and the calculation of various indicators or coefficients, the following approaches are often used: cost, income or market approaches (Fig.1).

It is worth noting that the cost and market approaches have certain disadvantages, in particular the cost method has a very limited use in estimating the value of intellectual capital. The results of costs in the intellectual, scientific-research areas are risky and do not have a clear direct relationship with the amount invested (sometimes significant investments do not yield any results, and sometimes at insignificant costs, an ingenious discovery is formed, which will increase the company's position in the market and increase net profits), and the market approach, despite giving fairly accurate results, also has some limited use, it can be used only for those components of intellectual capital that have such analogues.

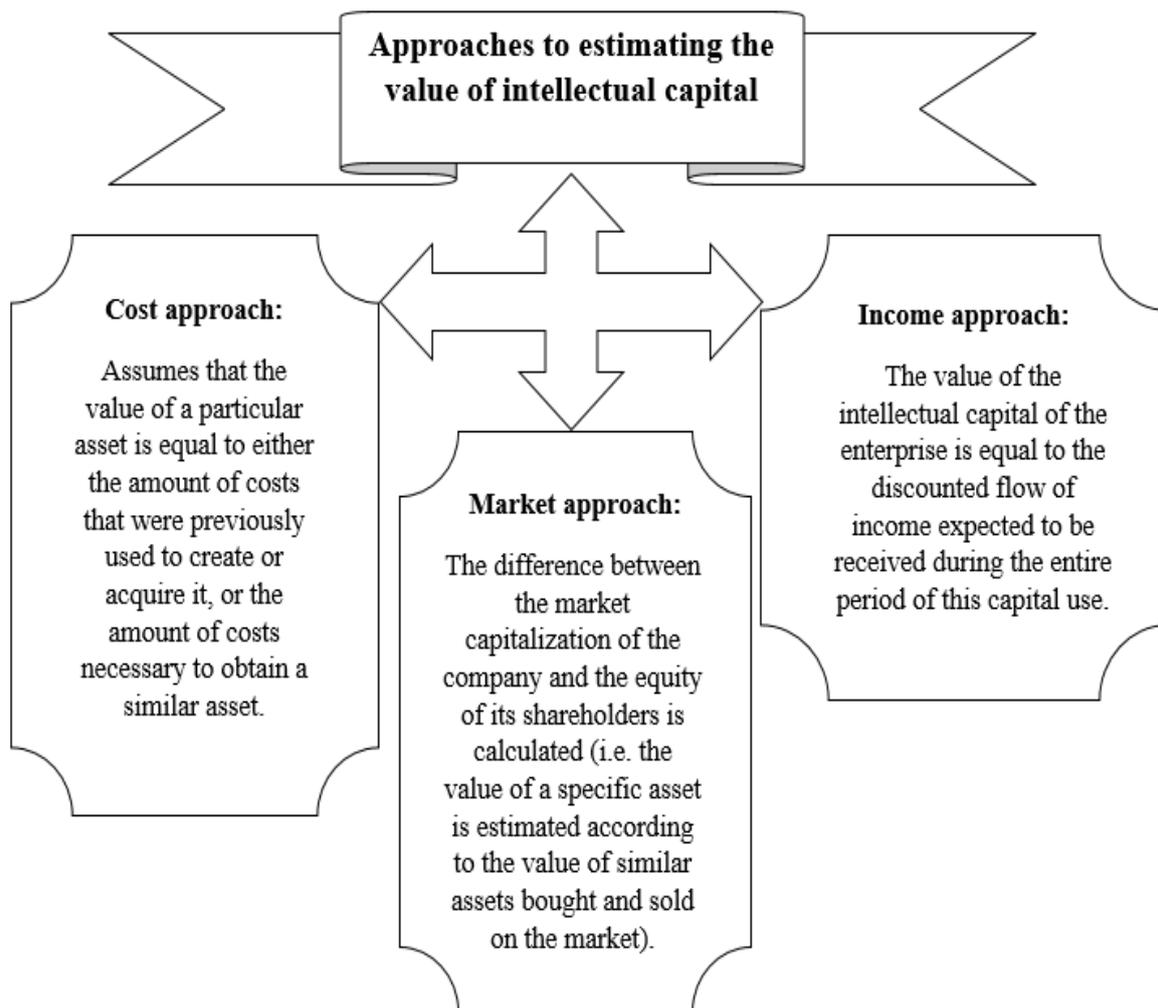


Fig. 1. Approaches to assessing the value of intellectual capital

(formed on the basis of Marr B., Gray D., Neely A. (2003), Popelo O. V. (2015) Ramanauskaitė A., Rudžionienė K. (2013))

The calculation mechanism for each approach is shown in Table 1.

Today, a significant number of different methods of estimating the value of intellectual capital of the enterprise are available.

The most popular is the evaluation of intellectual capital by 25 methods, which are grouped into 4 categories (Sveiby, K.E. (1997), Sveiby K. E. (2018), Kovtunenکو K. V., Skorokhodova L. B. (2013)):

- Direct Intellectual Capital methods (DIC). They include all methods that are based on the detection and valuation in cash of assets or individual elements of intellectual capital of the enterprise. After that, the integrated indicator

of the intellectual capital of the enterprise (Intellectual Asset Valuation, Technology Broker, etc.) is estimated;

- Market Capitalization Methods (MCM). These methods assume that the resulting difference between the market and book value of assets is the value of the intellectual capital of the enterprise (Tobin's q, Market-to-Book Value, etc.). These methods have disadvantages, namely: conditional certainty of intellectual capital and obstacles in distinguishing from the difference between the values of the factor "business reputation" and the factor "partnerships of the enterprise";

Table 1 – The mechanism of calculation of the cost, income and market approaches

Name of the approach	Calculation mechanism
Property (cost) approach (Asset-based approach.)	$EV = ARS - L,$ <p>where ARS is the amount of resources spent on assets; L is liabilities.</p>
Income approach in assessing the value of the enterprise (DCF approach).	$EV = \sum_{t=1}^n \frac{FCF_t}{(1+r)^t},$ <p>where n is the period for which there are forecast values of cash flows; r is discount rate taking account the risk and cost of capital;</p> <p>FCF_t is the net cash flow available to the company in period t. Cash flow (FCF) is calculated by the following formula:</p> $FCF = EBIT \times (1 - tax) - (CAPEX - D),$ <p>where EBIT (earnings before interest and taxes) - income before taxes and interest on the loan; tax is effective tax rate; CAPEX (capital expenditures) - investment costs for the purchase of fixed assets, as well as the cost of servicing loans for their acquisition; D is depreciation.</p>
Estimation of the value of the enterprise on the basis of the market approach (Market approach), in particular the method of comparing the multipliers	$VEM = I \times M,$ <p>где VEM is the value of the enterprise, calculated on the basis of a comparison of multipliers;</p> <p>I is the value of the indicator being compared (net revenue, profit, CF, etc.) at the assessed enterprise; M – multiplier (calculated using data from an analogous enterprise). Basically, the following indicators act as multipliers:</p> <ul style="list-style-type: none"> - the ratio of price (corporate rights or enterprise) to net sales revenue; - the ratio of the enterprise price to the operating cash flow; - the ratio of price to net profit; - the ratio of the market rate of corporate rights to the balance sheet.

(summarized according to Marr B., Gray D., Neely A. (2003), Popelo O. V. (2015) Ramanauskaitė A., Rudžionienė K. (2013))

- Scorecard Methods (SC) provide, first, the identification of indicators and indices of intellectual capital of the enterprise; secondly, the development of indicators and indices for certain components; third, presentation in the system of calculation of indicators (points and points) (Skandia Navigator Balanced Score Card, Value Chain Score Board, Business IQ, etc.). The main disadvantage of this group of methods is that the evaluation results are informative and do not

provide a monetary assessment of the value of intellectual capital of the enterprise;

- Methods based on return on assets (Return on Assets methods - ROA). To determine the average additional return on intellectual capital, the difference is multiplied by the tangible assets of the enterprise. After that, by discounting the received cash flow, you can estimate the value of intellectual capital (Sveiby K. E. (2018)).

The group of ROA methods also has disadvantages, in particular, the lack of a limit on intellectual capital and various forms of intangible assets. However, the quantitative assessment of this group of methods of intellectual capital of the enterprise most accurately assesses the level of intellectual capital and the degree of its impact on the results of the enterprise.

There are also a number of other methods that are used to evaluate the intellectual capital of the enterprise (Fig. 2).

Harrison and Sullivan (2000) summarize the indicators of intellectual capital into two main groups: qualitative and quantitative. In turn, quantitative indicators are divided into monetary and non-monetary methods (Harrison S, Sullivan P. H. (2000)).

Batubara S. M. et al (2021) proposed a new measurement model for intangible asset named Modified Value-Added Intellectual Capital (MVAIC). This measurement model measured intangible asset in a robust way. MVAIC is a broadly measure of Intellectual capital based on the previous VAIC model. However, MVAIC included relative capital efficiency (RCE). The value of relative capital is obtained from the amount of expenses incurred for marketing.

Models that are based on a combination of financial and non-financial methods and are used to assess intellectual capital include the Norton and Kaplan Balanced Scorecard, Skandia Navigator, Intangible Assets Monitor.

American researchers D. Norton and R. Kaplan proposed a balanced score system (BSC). The purpose of creating such a system is to establish correspondence between strategic goals and the results of their achievements, visualization and creation of a basic picture of enterprise development.

The key idea is that the value of the enterprise is created not only by tangible assets, but largely by intangible assets in the extended sense of the term (Kaplan R. S., Norton D. P. (1996), Kaplan R. S., Norton D. P. (1997)).

The balanced score system consists of four blocks, which are designed to answer the following questions (Kaplan R. S., Norton D. P. (1996), Kaplan R. S., Norton D. P. (1997)):

1. Finance: What can interest shareholders?

It includes indicators: coefficient of autonomy (financial independence); coverage ratio (total solvency); profitability of products (goods, works, services); operating profit; marginal income; return on invested capital.

2. Customers: What is the feedback from our customers?

It includes indicators: market share and sales channels; degree of satisfaction; attracting new customers; number of complaints and customer loyalty.

3. Internal business processes: What are our characteristics to be better than our competitors?

It includes indicators: cost and results of production; production cycle efficiency; quantity of returned products (size of defected goods); release of new products; technical equipment of production staff.

4. Innovation, training and professional growth: How can the state of the enterprise be improved (what knowledge, skills, technologies and other intangible assets)?

Innovations include such indicators: the number of products that have been certified and accepted by the market; the percentage of sales of new products in total.

Training and professional growth of employees provides and is responsible for the long-term development and improvement of the enterprise.

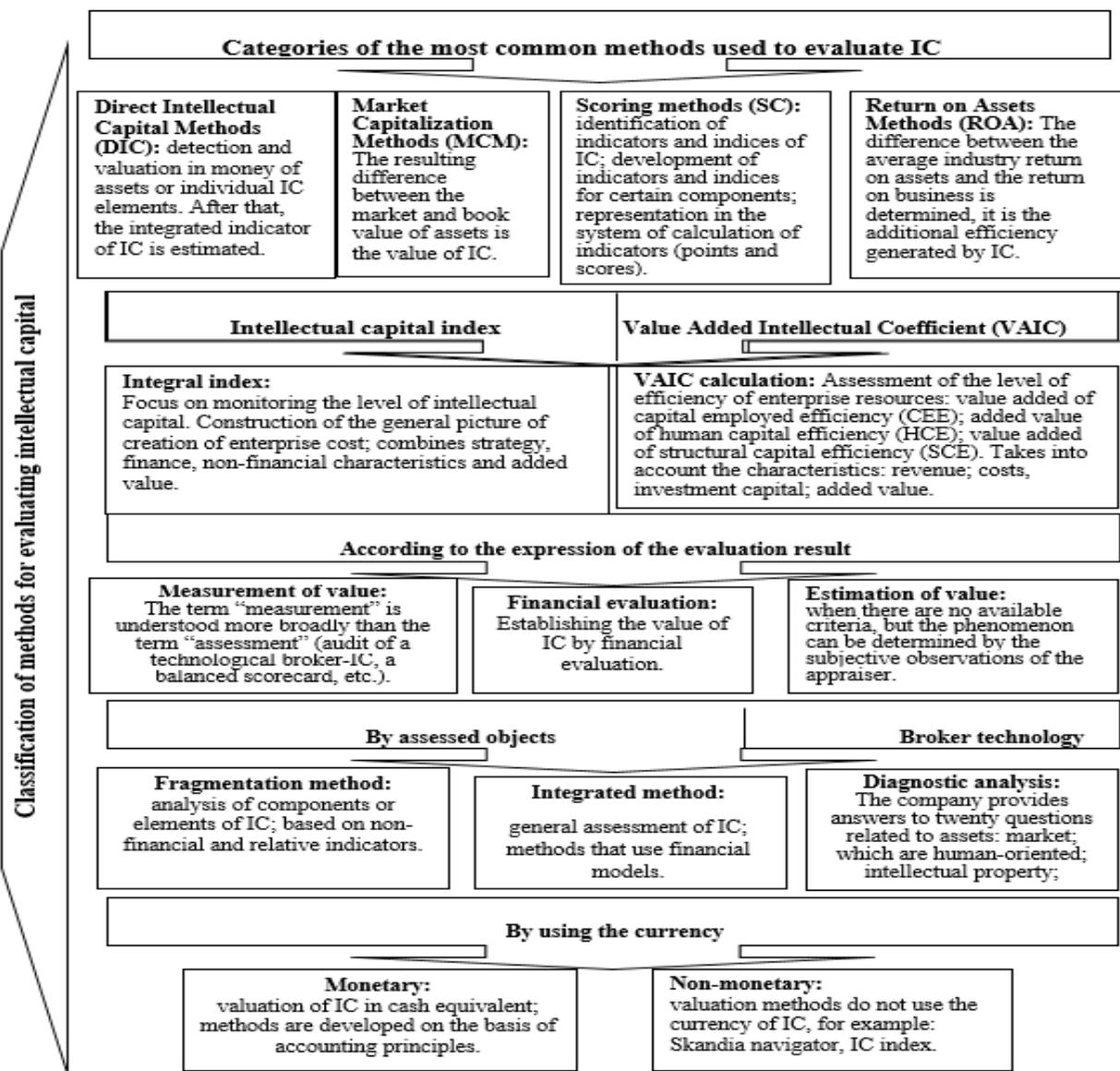


Fig. 2. Classification of methods for evaluating intellectual capital

(formed on the basis of Kaplan R. S., Norton D. P. (1996), Kaplan R. S., Norton D. P. (1997), Ramauskaitė A., Rudžionienė K. (2013))

They are usually determined by the following indicators, staff turnover rate, staffing, employee qualifications, duration of employee training. However, in our opinion, it is necessary to include communicative competence of both the personnel and management of the enterprise in this system of indicators. Communicative competence can be assessed by such indicators as: the level of ability to collective (team) work; degree of adaptability; ability to resolve conflict situations; level of stress resistance; possession of leadership characteristics.

Accordingly, to determine these indicators, it is necessary to conduct periodic surveys and questionnaires of employees, because effective communication provides a high level of quality management decisions. The entire management system of the organization is built on communication, and communication competence can guarantee the rational use of existing intellectual assets and ensure their continuous development.

The Skandia Navigator was first proposed by Leif Edvinson in 1998, when he was the corporate director of intellectual capital at the

Swedish financial services company called Skandia. It was Leif Edvinson who became the world's first corporate director of intellectual capital, and has become a leading proponent of measuring intellectual capital (Andriessen D., 2004). During his time, he released several applications, trying to quantify the company's intellectual property on a model called Navigator. In later publishers with co-author Michael Malone, the authors explain the need to measure intellectual capital and how to achieve it with the Navigator Skandia model.

Navigator Skandia's intellectual capital valuation model reflects four key aspects of its business (Edvinsson & Malone, 1997):

- Financial component;
- Customer focus;
- Focusing the process;
- Focus on renewal and development.

Conclusions

Thus, today there are several basic approaches to valuing intellectual capital (cost; income; market), as well as a significant number of methods for estimating the value of intellectual capital of the enterprise. However, there is no single common approach or methodology for evaluating intellectual capital.

One of the most promising and convenient methods of evaluating intellectual capital is the Balanced Scorecard (BSC), which includes: finance; customers; internal business processes; innovation, training and professional growth. It is proposed to add an indicator of "communicative competence" of both personnel and management

of the enterprise to the component "training and professional growth", because the process of information transfer is the basis for successful operation of the enterprise and directly affects the formation and increase of intellectual capital.

However, the disadvantages of using this model include a significant number of indices (more than 100). The intangible asset monitor, developed by Eric Swaby, identifies three types of intangible assets that take into account the discrepancy between the book value and the market value in the firm's valuation. "Balance", which is not included in the book value, refers to the individual competence of employees, internal and external structure (Sveiby K.E., 1997).

Since the assessment of intellectual capital involves taking into account a significant number of indicators, including qualitative, it is necessary to build a mathematical model of decision support based on the theory of fuzzy logic and hybrid neural networks (Voynarenko M. et al, 2016).

Promising areas of further research are to improve the methodological approach of the Balanced Scorecard (BSC) to evaluate the intellectual capital of the enterprise (adjusted for the specifics, needs and conditions of a particular enterprise), as well as building a mathematical model to support decision-making based on fuzzy logic and hybrid neural networks.

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