

# Intellectual capital management within the framework of the VBM concept

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**Abstract.** Currently, the process of forming new management concepts is ongoing in Russia. At the same time, on the way to the development, creation and implementation of modern concepts, approaches and management systems at domestic enterprises there are several problems, one of which is the problem of intellectual capital management based on the VBM concept. Issues related to the definition of the concept of "intellectual capital", its assessment and management are relevant. The article discusses the features of the VBM concept at the enterprise level, its advantages and disadvantages, implementation problems. The analysis performed in the study made it possible to clarify the economic content of the concept of intellectual capital and identify its key features that allow characterizing it and using specific assessment methods. The article describes the main methods and indicators for assessing intellectual capital, based on which an approach to the assessment and management of intellectual capital of an enterprise is proposed. The approach is based on a combination of two methods for calculating intellectual capital - CIV and MVAIC. The first technique allows to assess the amount of intellectual capital of the enterprise. The second technique allows to reveal the structure of intellectual capital. The joint use of techniques allows to get a valuation of the intellectual capital of the enterprise and evaluate the effectiveness of investments in the development of its components. Criteria for assessing the effectiveness of investments in elements of intellectual capital are proposed.

## 1 Introduction

Currently, there is widespread development and implementation of new management concepts in the enterprise development management system. The most popular are concepts based on value management and the concept of sustainable development [1-5, etc.]. The concept of cost-based management or "VBM management" appeared in Russia at the end of the 20th century and today is widely used by many leading enterprises of the country. The concept itself implies a management of enterprises in which shareholders (investors)

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receive the maximum return on investment, and the enterprise itself, as an open socio-economic system, must strive to maximize its value for its development. Management decisions, management methods and techniques should be directed towards one main goal - to contribute to the growth of business value. The activities of the enterprise should be aimed at ensuring growth in its value, while the indicator of growth in value implies not only an increase in quantitative indicators, but also qualitative growth of the enterprise, i.e. its development, acts as an integral criterion for the quality of management.

The concept of VBM is based on the hypothesis that management entities can influence the results of an enterprise's activities, considering the cost of raising capital, as well as comparing the profitability of an enterprise with alternative options for investing capital. The concept of enterprise management is not only based on actions and managerial decisions aimed at increasing current income or planned for the near future, but also is focused on obtaining higher profits (super-profits) in the distant future. This, in turn, can increase the current and future value of the enterprise.

## **2 Features of the enterprise-wide VBM concept**

The concept of company value management involves the construction of a management system and evaluation of the results of the enterprise's functioning based on specially developed cost indicators and the use of special management levers (functions and tools, often called drivers) developed based on these indicators. The peculiarity of cost-based management from the classical management concept is that with the VBM value management concept, the enterprise management activity is mainly aimed at increasing the value of this enterprise, and in the classical concept, the activity is aimed at generating profit.

The basic principles on which the VBM cost concept is based include [6]: the cash flow generated by the enterprise itself acts as an indicator evaluating the activities of the enterprise; if profitability is higher than the costs that are raised in capital, then new investments should be made to create new value; it is necessary to control the structure of the assets of the enterprise in order to ensure maximum growth of the enterprise.

The following factors contributed to the final implementation of the cost approach [Ibid.]: the emergence of large shareholders represented by insurance and investment funds, in which the value of the enterprise becomes the main indicator of activity; global development of international financial institutions - investment, stock, insurance; the development in the global economy of competition, which is comprehensive, covering not only consumer markets, but also markets for resources, information, etc.; the emphasis of the classical school of management on the final result of the production of the enterprise, which, in turn, does not allow to identify the most effective ways of development; the development of a new direction - value assessment, the need for which arises in many cases when managing an enterprise, including during its restructuring.

The advantages and disadvantages of the Value Based Management concept are presented in Table 1. Despite several advantages, the introduction of a value concept into the activities of modern domestic enterprises encounters serious difficulties. These difficulties are associated with the following factors:

1. Increased subjectivity of the initiator of the assessment when choosing approaches and indicators of cost management, as well as when choosing methods for evaluating individual elements of models.
2. Temporary limitations and static methods and estimates.
3. The existing theoretical and methodological base of cost-based management proceeds from the premise of the possibility of determining and implementing the best and most

efficient use of property, ensuring the maximum flow of benefits, expressed in the growth of the value of the enterprise.

4. The lack of a universal decision-making technology at all functional levels of management, as well as the insufficient mutual coordination of these technologies among themselves by goals and factors, contributes to maintaining adherence to various standards and repeating erroneous decisions.

5. Issues of purchase and sale of an enterprise, when the change of ownership of the enterprise, and as a result of a change of ownership of capital, have not been fully investigated.

6. The studies related to the assessment and consideration in the control loop of information, social, organizational, structural and other types of capital have not been completed.

7. The problem of hierarchical subordination of development management mechanisms at various levels — tactical, strategic, institutional, has not been resolved.

**Table 1.** Advantages and disadvantages of the VBM concept

<b>Advantages</b>	<b>Disadvantages</b>
The VBM concept can be used both internally and by external users, as it is quite understandable	When using this concept, various types of indicators are applied, which imply a special calculation technique, which in turn is a laborious process
It can be used as a comparison tool, for example, in the process of benchmarking, comparing the effectiveness of performance results	For small businesses, using the VBM concept is difficult, as it is difficult to make cost forecasts
It can be used in the formation and distribution of enterprise resources, since it can be used to understand the differences between investments that can create value and not create value	Problems may arise such as managerial costs when introducing the system into enterprise management practice
Allows you to analyze the strategy of the enterprise	The difficulties of mathematical calculation
When using the concept has a good impact on the result of the enterprise	The difficulty of translating accounting indicators to indicators that make economic sense
Allows company management to focus on factors, highlight key factors that create value, and allow you to create higher shareholder value	There are technical difficulties

The main element of cost management is the value of the enterprise. Value acts as the basis for quantitative ratios in equivalent exchange. Determining the value of the enterprise is possible using three generally accepted approaches: comparative, costly and profitable. Table 2 presents the advantages and disadvantages of approaches to calculating the value of the enterprise. The criterion for choosing the optimal management decision is not only a positive investment return on the capital invested in the enterprise, but a certain level of value growth that keeps the invested capital in this field of activity.

Analyzing the above provisions, we can formulate the following definition of enterprise value in the context of development. This is the monetary aggregate flow of all benefits from the use of property, considering the cost of the prospect of additional income in the future, which are assessed at the time of making the management decision. In this case, the effective value of the enterprise in the context of development will be the value of the assets, which is equal to the positive difference of two values: the use value of the assets for the given business owner and the cost of their sale in the market.

**Table 2.** Advantages and disadvantages of approaches to calculating the value of the enterprise

<b>Company Valuation Approaches</b>	<b>Advantages</b>	<b>Disadvantages</b>
Cost approach	based on real assets (current value of assets)	does not include the value of intangible assets and goodwill; based on current data; does not consider future expectations; static; does not consider profit capitalization; it is used to evaluate objects in low-activity markets
Income approach	considers the future benefits of using the facility; considers discounted income, including the discount rate	associated with the determination of the discount rate, which is determined by the market; requires risk; labor intensive
Market (comparative) approach	based on market information; statistically sound; provides high accuracy of results in the presence of market information; sensitive to individual characteristics of valuation objects	data inaccessibility; analogue information needed; no account of future expectations; dependence on activity and market stability; used to evaluate objects in active markets

### 3 Intellectual capital and its place in the VBM concept

Almost in parallel with the VBM concept, the concept of intellectual capital began to develop. The term "intellectual capital" was first used by J. Galbraith in 1969. Wider distribution of this term refers to the first half of the 1990s. In 1993, the Swedish insurance company Scandia published in its annual report data on its intellectual capital, the decisive role in the dissemination of this term was played by T. Stuart's article "Intellectual capital is the main wealth of your company" [7].

The study of intellectual capital is a new direction in enterprise management. The problem of its assessment is because there is no single methodology for assessing and measuring intellectual capital, and the current reporting does not allow for a realistic assessment of intellectual assets. Exploring the economic essence of the category of "intellectual capital" [7-9 etc.], we can conclude:

1. In its economic essence, intellectual capital is an enterprise resource necessary for an economic entity to produce products or provide services. Adding value to the enterprise, thereby potentially contributing to profit;
2. The main difference between intellectual capital and other resources of the enterprise is the difficulty to uniquely identify, evaluate and use it in full;
3. It is unique for each business entity, can be used an unlimited number of times in the process of production of goods and services.

Structurally, intellectual capital includes human, organizational, social, and managerial capital [10]. Intellectual capital also includes intangible assets of an enterprise, which are rights to various types of intellectual activity, including: exclusive rights to works of science, literature and art, exclusive rights to computer programs and databases, etc.

Analysis of various VBM models shows that most models do not allow considering the influence of non-financial factors on the performance of an enterprise [11]. At the same time, models that include the ability to consider non-financial factors (MVA, q-Tobin) are so highly aggregated models that they do not allow constructing models of the relationship of these factors with the resulting indicator. Even though some studies based on econometric models have revealed a high level of correlation between the value of

intellectual capital and q-Tobin, the question of intellectual capital management remains open.

This leads to an obvious contradiction: why are enterprises of the same size and legal form operating in the same markets, i.e. having the same levels of cost of equity and borrowed capital, achieve different results. Within the framework of the value concept, an answer to such a question is impossible to obtain. The cost management models proposed later based on the interests of stakeholders allowed to somewhat reduce the tension of this problem but did not completely solve this problem due to certain limitations of the stakeholder approach.

A breakthrough in solving this problem became possible thanks to the introduction of the concept of intellectual capital. Analyzing the causes of the concept of intellectual capital, the following factors can be noted. Intellectual capital, in its economic essence, reflects the possibility of creating super profits by an enterprise. Based on the resource concept of the enterprise, intellectual capital is a set of features of connections in the mechanism of using diverse financial, material and intangible, both identifiable and unidentifiable resources, which in turn are transformed into hard-to-copy competitive advantages, which ultimately ensures the success of the enterprise.

It is important to understand that an increase in the value of a company determines not the intrinsic value of intangible assets as assets in general, but the ability of the company's management to effectively use the intangible resources at its disposal. The key to this should be a quantitative assessment of the impact of intangible assets on the value of the company, as well as the subsequent formation of the use algorithm.

Thus, it becomes obvious that an approach to assessing and managing the value of an enterprise using the approaches of intellectual capital seems to be productive, based on a combined valuation that considers both the total value and structure of intellectual capital. The main methods and indicators for calculating intellectual capital are presented in the Table 3.

## 4 The approach to the assessment and management of intellectual capital of the enterprise

One of the problems in assessing intellectual capital is that looking at the elements of intellectual capital, such as investment, for example, in personnel (human capital), marketing and advertising (consumer capital), and the development of digital infrastructure (structural capital) requires a correlation of costs and cash flows returns on these investments. However, the analysis of the methods considered in table. 4 shows, that none of the presented approaches allows this. At the same time, the absence of such a technique makes it difficult to develop and analyze the results of the enterprise's activities in managing its intellectual capital.

To resolve this contradiction, a methodology was proposed for valuing the elements of intellectual capital, based on the calculation of two indicators of intellectual capital, one of which, CIV, takes into account the economic essence of intellectual capital, as part of the assets generating extra profits and including discounting of excess profit, and the second indicator VAIC (MVAIC) allows you to take into account the structure of intellectual capital. To calculate the CIV, the following formula was used:

If  $ROA_{comp} > ROA_{ind}$ , then CIV was calculated:

$$CIV = \sum_{i=1}^{\infty} \frac{(PreTaxEarning_i - TangibleAssets_i \times ROA_{ind(i)}) \times (1-t)}{WACC} \quad (1)$$

where:  $ROA_{comp}$  – average annual return on assets of an enterprise over the past three years;

- $ROA_{ind}$  – average annual return on assets of enterprises in the industry over the past three years;
- $WACC$  – weighted average cost of capital;
- $TangibleAssets_i$  – tangible assets of an enterprise;
- $PreTaxEarning_i$  – pre-tax earnings;
- $t$  – three-year average tax rate

**Table 3.** The main methods and indicators for assessing intellectual capital

Method name	Calculation Method	Main indicators
Return on Assets methods – ROA, Methods for measuring intangible assets	the difference between the market value of the company before considering the deduction of taxes for a certain period and the tangible assets of the company. The resulting indicator is compared with industry	EVA, CVA, ROA, CIV Knowledge Capital Earning, Calculated Intangible Value
Market Capitalization Methods – MCM	the difference between the market capitalization of the company and the equity of its shareholders	Market to Book Value IAMV FiMIAM
Q-Tobin index	dividing the market value of the company (or capitalization) by the balance cost of the business structure (or the amount of costs to replace physical assets).	Tobin’s Invisible Balance
Direct Intellectual Capital methods - DIC	individual components of intellectual capital are determined, and then the total assessment of the intellectual capital of the enterprise is calculated	Citation-weighted patents HRCA HR Statement The Value Explorer TVC Intellectual Asset Valuation AFTF
Scorecard Methods – SC	determine the various components of intellectual capital that will be presented in a scorecard or in charts	IC – Index Business IQ National IC Holistic Accounts IC Rating Value Chain Score Board
Scandia Method	Allows you to evaluate intellectual capital in terms of "value creation", i.e. evaluate information about any “hidden values” that may not have been discovered. The index system is used	MAGIC IC-dVAL Balanced Score Card Intangible Assets Monitor Danish Guidelines Meritum Guidelines Knowledge Audit Cycle Value Creation Index
Method VAIC (MVAIC)	Allows you to evaluate the contribution of integrated elements of intellectual capital to the creation of added value	VAIC (MVAIC)

In the case of an infinite period of intellectual capitalization, it is simplified to the following form:

$$CIV = \sum_{i=1}^{\infty} \frac{REOI_i}{WACC} = \frac{REOI}{WACC}. \tag{2}$$

VAIC calculation method:

$$VAIC = HCE + SCE + CEE, \tag{3}$$

where:  $HCE$  – shows how efficiently human capital is used (equal to the ratio of

- value added to labor costs);
- SCE* – shows how efficiently organizational capital is used (equal to the ratio of value added minus human capital and value added);
- CEE* – shows how well used capital is used

The individual components of VAIC were calculated as follows:

$$HCE = VA / HC, \tag{4}$$

- where: *VA* – value added;
- HC* – human capital;

$$SCE = SC / VA, \tag{5}$$

- where: *SC* – structure capital;

$$CEE = VA / CE, \tag{6}$$

- where: *CE* – book value of net tangible assets of a company.

However, the VAIC methodology has several drawbacks that are proposed to be overcome by introducing an additional term reflecting the contribution of Relative capital to relative or consumer capital. This technique is called MVAIC – Modified Value-Added Intellectual Coefficient.

Method for calculating the MVAIC indicator:

$$MVAIC = HCE + SCE + CEE + RCE, \tag{7}$$

- where: *RCE* – shows how effective is the use of relational or consumer capital (equal to the ratio of the sum of the costs of selling, advertising, marketing to value added);

$$RCE = RE / VA, \tag{8}$$

- where: *RE* – the amount of the costs of sales, advertising, marketing.

Thus, if excess returns are generated by intellectual capital, we can say that the components of this capital can be estimated based on the corresponding components of the MVAIC indicator, which are responsible for intellectual capital, namely: *HCE*, *SCE*, *CEE*, *RCE*. It becomes possible to evaluate the contribution of each component of intellectual capital to the growth of value added. The corresponding values can be compared with the value of investments in the reporting period in the development of the corresponding elements of intellectual capital:

*IHC* – investments in human capital in the form of additional incentives, trainings, additional training and retraining of personnel;

*IRE* – investments in the development of consumer capital.

As for structural capital, here, in our opinion, the following approach can be used. All other investments not related to investments in fixed assets, as well as not being essentially investments in *IHC* and *IRE*, can be classified as investments in structural capital. Thus, the intellectual capital of the enterprise will be created by the following elements: directly by human capital, structural capital and consumer capital:

$$IC = CIV = HC + RE + SC = CIV \cdot k_{HC} + CIV \cdot k_{RE} + CIV \cdot k_{SC} \tag{9}$$

where the coefficients of the components of intellectual capital are defined as follows:

$$k_{HC} = \frac{HCE}{HCE + RCE + SCE}, k_{RE} = \frac{RCE}{HCE + RCE + SCE}, k_{SC} = \frac{SCE}{HCE + RCE + SCE} \tag{10}$$

Estimates of the components of intellectual capital obtained using expression (9) can be used in the future to analyze the effectiveness of investments in elements of intellectual capital and monitor the implementation of their development programs developed at the enterprise. This can be done by comparing the amount of investment in individual elements of intellectual capital with the growth rate of these elements.

To estimate the value of individual elements of intellectual capital, it is proposed to use the following model:

$$HC = CIV \frac{HCE}{HCE + SCE + RCE}; SC = CIV \frac{SCE}{HCE + SCE + RCE}; RC = CIV \frac{RCE}{HCE + SCE + RCE} \quad (11)$$

where:  $HC, SC, RC$  – human capital, structure capital and consumer capital of the enterprise, respectively;  
 $CIV$  – indicator of the estimated intangible (intellectual) value of the enterprise, as a discounted stream of excess profits;  
 $HCE, SCE, RCE$  – indicators of the effectiveness of the use of human capital, structural capital and consumer capital of a commercial enterprise, respectively.

The estimates obtained represent the capitalized part of the excess profit of the enterprise due to human capital, structural capital and consumer capital (11). In order to evaluate the effectiveness of investments in the elements of intellectual capital in the reporting period, inequalities can be used:

$$\Delta HC_i > IHC_i \geq 0; \Delta SC_i > ISC_i \geq 0; \Delta RC_i > IRC_i \geq 0; \quad (12)$$

where:  $\Delta HC_i; \Delta SC_i; \Delta RC_i$  – change in human capital, structural capital and consumer capital of a trading company, respectively, for the i-th reporting period, rub.  
 $IHC_i; ISC_i; IRC_i$  – investments in human capital, structural capital and consumer capital of a trading company, respectively, for the i-th reporting period, rub

If the indicated inequalities are satisfied, then we can conclude about the effectiveness of investments in the elements of intellectual capital due to the development of digital solutions. If these inequalities are not fulfilled, it is necessary to revise the approaches to managing the intellectual capital of an enterprise. The disadvantage of the proposed methodology, according to the authors, is the need to obtain sufficiently detailed information about the activities of the enterprise and its current and strategic investment activities. This makes it difficult to use the results of enterprises that do not publish the results of their activities [12]. At the same time, for public companies that publish accounting and management reports, this technique allows you to obtain the necessary information [13].

## 5 Conclusion

In the work, based on a combination of CIV and MVAIC methods, an approach to the valuation of the elements of the intellectual capital of an enterprise is proposed. This approach allows us to evaluate the contribution of each element to the growth of the intellectual capital of the enterprise, as well as evaluate the effectiveness of investments in these elements. Of course, another approach can be used to calculate the structure, however, at the present time, generally accepted methods for valuing the components of intellectual capital have not been developed.

Consideration of intellectual capital as a key competence of the enterprise, allowed to expand the list of factors affecting the volume of sales, costs, profitability of the enterprise, as well as its value. Elements of intellectual capital that are part of key competencies can be estimated based on the costs of their creation and maintenance. A methodology for assessing the effectiveness of investments in the intellectual capital of an enterprise is proposed, which is based on a combined assessment of the elements of intellectual capital using the CIV and MVAIC methods. The methodology proposes criteria for evaluating the



effectiveness of investing in elements of intellectual capital, which are based on a comparison of the intensity of the growth rates of intellectual capital elements with the amount of investment in the intellectual capital of a trading company.

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