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THE ESTIMATION OF INTELLECTUAL CAPITAL AS AN INNOVATIVE DRIVER OF ECONOMIC SECURITY[*]

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The article deals with the estimation of intellectual capital as an innovative driver of national security. The attention is paid to different approaches to intellectual capital estimation, which are structural approach, cost approach, market approach. Certain methods of intellectual capital assesment was investigated by author.

*Keywords***:** *intellectual capital, intangible assets, knowledge economy, estimation, national security*

Introduction. In the reality of global competition intellectual capital gives opportunity to enterprises to create valuables and to provide competitiveness of both separate firms and economy at a whole. The main function of the intellectual capital is to fasten income growth in some degree owing to formation and realization of necessary knowledge system for the company. Knowledge system in its turn provides highly efficient economic activity. Besides, intellectual capital determines quality of

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the management system as it is followed from paper [6, p.16]. It dictates rate and character of the production technologies renewing, which soon will be competitive advantages. Nowadays intellectual capital should be considered as an innovative driver of economic security being crucial to state economic state sovereignty achievement, providing economic development, efficient social policy enforcement, society protection from environmental emergency, national competitiveness increase in the conditions of international economic interdependence [10].

Analysis of recent researches and publications. Particularly, Karl Sveiby [12] confirmed that people create profit, that's why investments into personnel are not to be concerned as expenses; workers' competence is resource to create prosperity.

In 1998 Annie Brooking investigated model "The Technology Broker's Audit" to determine value of the intellectual capital in the firm in money terms and presented structure in the following way: market assets, human assets, infrastructure assets, and intellectual property. This model was investigated for managers in order to diagnose and to develop weak places in the intellectual capital. It is based on the method of directing questions in knowledge management, estimation of research and investigations number, brand value existing. The more positive answers are, the more developed intellectual capital is [2].

Johann and Goran Russ worked out the Index of intellectual capital (hereinafter the IC-Index). They divided intellectual capital into three groups: human capital, organizational capital and customer capital. The aim of IC-Index model investigation was to prognosticate profit from development of new projects and service, through investing money into various intellectual capitals. However it was not been achieved.

Previously unsettled problem constituent. Despite the huge range of academic papers, devoted to the intellectual capital management, the issue of its estimation is still unresolved.

The objective of the article is to analyzed different approaches to estimation of intellectual capital within economic security system.

Results and discussions. In terms of system approach term "security" is adequate to the concept of socio-economic development stability. Stability and security are the most important characteristics of any system, including economic one, they require serious attention from the authorities of any level, especially during the transformations of the system [16].

On the one hand, economic security is a set of measures to counteract threats, and, on the other hand, it is the ability of the system to ensure these measures, to guarantee the development stability and achievement of this development goals [7, p. 75]. In view of this, economic security can only be guaranteed through economic development and economic growth. In this context, the S. Scarlet's viewpoint [14, p. 73] on the formation of economic security through the intensification of innovation development deserves attention. On this basis, economic

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security should be regarded as the state within which resources and market opportunities are effectively used for preventing threats of the external and internal environment concerned the practical use of economic system's intellectual capital. The latter contributes to the increase of economic and social results based on its competitive advantages formation [9, p. 7].

To assess the state of economic security as a complex category, which is influenced by socio-economic, historical, political, cultural, technological and other factors, an appropriate methodological toolkit involved wide range of diverse characteristics has been formed. Given economic security characterizes the level of viability of the economic system, as well as the possibility of its proper functioning not only today but also in the future, there is a need to graded the level of threats – a reasonable critical threshold pointed on economic security state [13, p. 30].

To determine the economic security level, appropriate criteria and indicators are used according to the following estimates [5]:

– resource potential and opportunities for its development;

– the efficiency of the use of resources, capital and labor, comparing with the most developed and advanced countries, as well as the level at which the threats of external and internal character are minimized;

– the competitiveness of the economy – the integrity of the territory and economic space, sovereignty, independence and the ability to confront external threats.

In authors' opinion, the economic system security level should be determined on the base of its intellectual capital indicators. The approach allows combining the security and innovation vectors of the economic system development.

To measure intellectual capital assets monetary (financial, cost) and non-cash methods are used.Thus, depending on how intellectual capital and its elements are estimated, there are the following approaches [3, p. 22-34]:

1. Structural approach, based on using of various units for each element in the intellectual capital; it doesn't foresee general cost estimation; it is used in non-financial models.

2. Cost approach is used to determine total value of the company intellectual capital, therefore cost of its separate components is not calculated.

Under modern conditions if there is no universal methodic to estimate intellectual capital it is necessary to imply both mentioned approaches.

While determining the intellectual capital cost at the enterprise one uses cost indicators. Therefore depending on peculiarities of the concrete situation expenses, profitable and market capitals are used [17, p. 336-345].

According to the profitable approach intellectual capital value is equal to the discount incomes flow, which is expected to be received during the whole period to use this capital.

An expense approach supposes that some assets cost is equal to either

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expenses, spent earlier for its creation, or purchase, or expenses, which are necessary to buy analogical asset under modern conditions. But this method is bloodedly used while estimating intellectual capital, because expenses results in scientific and research sphere are not prognosticated and have no direct connection with capital investment amount: sometimes great expenses are vain, and sometimes one needs little efforts to conduct great discovery, which allows to improve positions in market organization and to increase profit amounts.

Market approach foresees estimation of some asset cost according to analogical assets, purchased and sold at the market (considering possible differences). This approach gives precise results, but it is bound used. It may be used only for those elements of intellectual capital, which have analogues. Sometimes one can use combinations of these approaches in practice [17, p. 336-345].

Sveiby's approach arouses special interest. It distinguishes 25 methods, subdivided into 4 categories [12].

The first methods group includes all methods, based on identification and estimation in monetary equivalent of separate assets or elements of the intellectual capital. As they are estimated, there is integral estimation of the intellectual capital in the company. Therefore it is not necessary that all assets evaluations are concluded. More complicated formula may be used.

Owing to methods from the second group difference between market capitalization of the company and own capital of its stockholders is calculated. The received value is observed as its intellectual capital value, or non-material assets.

Methods to calculate return from assets are based on calculation of difference in ratio between economy subject's profit for some period in time (considering taxes) and its material assets cost and analogical factor in branch at a whole. Product of the received difference and estimated economy subject's material assets is average profit from intellectual capital. Then, one determines cost of the intellectual capital through direct capitalization or discounting of the received monetary flow.

Methods from the forth group help to identify different components of the non-material assets or intellectual capital, to investigate and to give indicators and indexes through marks counting. Using of methods by point system doesn't foresee to get monetary estimation of the intellectual capital. These methods are similar to methods of the diagnostic informational system [6, p. 22-34; 11].

Methods to measure intellectual capital are developed for more clear understanding of all non-material assets types, and also with purpose to create logic theory, which explains how such assets have to be revealed and measured, in order to estimate organization value. It is foreseen that confirmation of the market cost estimations will lead to capital flows optimization, and as a result, will increase market economy efficiency. Thus, we can conclude that nowadays Sveiby's investigations have consistent character and can be partially used in practice to measure intellectual capital at the enterprises.

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Q-Tobin coefficient, suggested by laureate of Nobel Prize in Economy in 1981 J. Tobin, is used to estimate intellectual capital. It is calculated as ratio between market value of the firm and its assets proper value. If q-Tobin coefficient is more than 1, it describes high level of the intellectual capital, practical use of which gives ability to get superprofits. Today coefficient value for efficient companies is 5-10 units. It is higher in knowledge-intensive branches, and for firms, occupied in computer technologies and software sphere, it can be several hundreds. The main factor in production is intellectual capital at such companies, and material assets do not practically create valuables, functioning as infrastructural provision [3, p. 22-34].

Besides mentioned above methods, there is also one interesting approach to determine the most perspective assets of the intellectual capital, called Economic Real Assets Value Enhancer (EcRAVE), method to measure economic added value which is created by the intellectual capital components. The suggested way to calculate index EcRAVE is based on assumptions of researchers about fact that economic profit is formed by company during increasing of its profitability at the middle-branch level [8, p. 348-358]. Assumptions about that fact that intra-sectoral differences in company profitability is explained by unique non-material assets of each company, were used in studies of the foreign capital markets [1; 4].

The described method includes three approaches: Custonomics, Workonomics, Supplynomics [8, p. 348-358].

The first approach is based on the idea, that relations with purchasers earn profit for company, when the company realizes production in great amounts, than in average in the branch, or with higher price. Therefore the following factors are corrected:

– expenses for clients involving: high price or realization amount may be explained by high expenses to involve customers. Thus, in order to compare results of the company activity with industry average, it is necessary to correct profit;

– company size, to balance its impact on factors, one has to compare not absolute results in company and branch activity, but relative ones, i.e. calculated per unit of the investment capital.

Formula to calculate economic added value, created owing to relations with purchasers is [8]:

$$EVA_c = (TR - ComExp) - TR_{ind.adj} = (\frac{TR - ComExp}{IC} - \frac{TR_{ind} - ComExp_{ind}}{IC_{ind}}) \times IC, \quad (1)$$

where EVA_c – economic added value, created owing to relations with purchasers, money units;

TR – profit of the company, money units;

TR_{ind} – industry average profit, money units;

$TR_{ind.adj}$ – industry average profit, corrected for expenses to involve purchasers,

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money units;

ComExp – commercial expenses of the company (trade and marketing), money units;

ComExp$_{ind}$ – industry average commercial expenses, money units;

IC – investment capital of the company, determined as sum of the percent duties and own capital, %;

IC$_{ind}$ – industry average investment capital, %.

According to Workonomics approach, key resource is human capital. The whole added value of the company is created by its workers. Therefore it is also necessary to consider indirect expenses to involve capital and to correct factor on the company size, expressed by workers' quantity. In spite of the approach Custonomics, another factor of rating is used, because added value per one worker is observed as result of intellectual capital use.

Formula of the economic added value calculation, created by workers from the company, is [8]:

$$EVA_w = VA - VA_{ind.adj} = (\frac{VA}{P} - \frac{VA_{ind}}{P_{ind}}) \times P, \qquad (2)$$

where *EVA$_w$* – economic added value, created by workers from the company, money units;

VA – added value of the company, defined as difference between profit and material expenses, money units;

VA$_{ind}$ – industry average added value;

VA$_{ind .adj}$ – industry average added value, corrected on the company size, money units;

P – number of workers in the company, people;

P$_{ind}$ – industry average number of workers, people.

Within the Supplynomics approach one calculates economic added value, created by relations with suppliers. The example of such capital is stable business relations with suppliers, and as a result, giving discounts by them. These discounts are shown in the factor of material expenses. The material expenses are corrected on the level of profit in the company and capital productivity.

According to the mentioned above, one suggests formula to calculate economic added value, created by relations with suppliers [8]:

$$EVA_s = (\frac{Costs_{ind}}{TR_{ind}} \times \frac{1}{C_{ind}} - \frac{Costs}{TR} \times \frac{1}{C}) \times TR, \qquad (3)$$

where *EVA$_s$* – economic added value, created by relations with suppliers;

Costs – material expenses of the company;

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Costs$_{ind}$ – industry average material expenses;
TR – profit of the company;
TR$_{ind}$ – industry average profit;
C – capital productivity of company;
C$_{ind}$ – industry average capital productivity.

We can conclude that suggested factors consider direct and indirect costs and may be calculated using data from open sources. Depending on which resource is intellectual capital core for the company, one can choose proper factor. However, this approach has disadvantage: it does not give ability to compare companies operating at the international markets, in case of comparing industry average factors.

Besides methods mentioned above, to estimate intellectual capital there are separate factors [17, p. 336-345], which describe possibilities to generate and accept ideas and plans of innovations and bringing them to the level of technologies, goods, organizational managerial decisions. They are used mostly at the micro-level. The following are most commonly used:

1. Index of the inventing activity ($I_{i.a.)}$.

$$I_{i.a.} = \frac{N_i}{N_w}, \tag{4}$$

where N_i – number of inventions; N_w – number of engineering and technical and scientific workers.

2. Index of the engineering and technical and scientific software ($I_{i.s.}$).

$$I_{i.s.} = \frac{N_{t.s.e.}}{N_e}, \tag{5}$$

where $N_{t.s.e.}$ – number of technical and scientific employees; N_e – total number of employees.

3. Index of the personnel educational level ($I_{e.d.}$) at the enterprise.

$$I_{e.d.} = \frac{N_{h.s.}}{N_e}, \tag{6}$$

where N_{hs} – number of people with higher or secondary special education, which corresponds enterprise activity specialization.

4. Index of the highly qualified workers turnover (I_t).

$$I_t. = \frac{N_{rhqw}}{N_{hq}}, \tag{7}$$

where N_{rhqw} – number of workers with high qualification, resigned during the year; N_{hq} – total number of workers with high qualification.

5. Index knowledge renewing ($I_{k.r}$).

$$\tag{8}$$

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$$I_{k.r.} = \frac{N_{wat.}}{N_e},$$

where N_{wat} – number of workers, who had advanced training or additional training during the last 3–5 years.

Conclusions and further researches directions.

To summarize, it would be noted there are a lot of different approaches and methods to estimate intellectual capital of the company and nation in general as an innovative driver of economic security. All methods mentioned above should be used in complex to estimate current level of intellectual capital and choose appropriate path to manage it. Further researches directions include the investigation on synchronization within processes of intellectual capital development and growth the national economy growth, as well as the creation of their synchronization mechanism.

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ОЦІНКА ІНТЕЛЕКТУАЛЬНОГО КАПІТАЛУ ЯК ІННОВАЦІЙНОГО ДРАЙВЕРУ ЕКОНОМІЧНОЇ БЕЗПЕКИ

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Стаття присвячена оцінці інтелектуального капіталу як інноваційного фактора економічної безпеки. Увага приділяється різним підходам до оцінки інтелектуального капіталу, таким як структурний підхід, витратний підхід, ринковий підхід. Автором досліджувались деякі методи оцінки інтелектуального капіталу.

Ключові слова: *інтелектуальний капітал, нематеріальні активи, економіка знань, оцінка, економічна безпека*

ОЦЕНКА ИНТЕЛЛЕКТУАЛЬНОГО КАПИТАЛА КАК ИННОВАЦИОННОГО ДРАЙВЕРА ЭКОНОМИЧЕСКОЙ БЕЗОПАСНОСТИ

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Статья посвящена оценке интеллектуального капитала как инновационного фактора экономической безопасности. Внимание уделяется различным подходам к оценке интеллектуального капитала, таким как структурный подход, затратный подход, рыночный подход. Автором исследовались некоторые методы оценки интеллектуального капитала.

Ключевые слова: *интеллектуальный капитал, нематериальные активы, экономика знаний, оценка, экономическая безопасность*