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## EDITORIAL TEAM

# CONTENTS

# CHAPTER 1
# CURRENT TRENDS IN ECONOMIC DEVELOPMENT

## FACTOR ANALYSIS OF PROFITABILITY (LOSSES) CONSTRUCTION ENTERPRISES IN 1999-2019

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***Abstract.*** *Decomposition of Return on Equity (ROE) after Return on Assets (ROA), Return on Sales (ROS), Total Assets Turnover (TAT) and Equity Multiplier (EM) provides an analytical framework appropriate for observing factors that make and influence profitability. An analysis of the literature makes it clear that classic and modified DuPont models are widely used to analyze the profitability of many industries, including construction. Despite critical feedback from some scientists, this method remains a useful tool for identifying factors influencing the effectiveness of an enterprise, industry, or region. Aims - to calculate the profitability indicators of the "construction" activity enterprises in 1999-2019, to analyze their dynamics and to identify the reasons for the changes. Methods is a widely used Dupont profitability analysis method that involves decomposing the outputs into components in order to identify the effects of those components on the outcome. The profitability indicator analysis of "construction" activity enterprises in 1999-2019 revealed that the construction industry operated at a loss for a decade in a row (2008-2017), which is reflected primarily in the capital structure. During these years, equity decreased to a critical level; in 2015, uncovered losses exceeded the amount of authorized and reserve capital. Only in 2018 the situation started to level off. Factor analysis of profitability indicators has revealed the in depth factors that affect them, namely: loss of the main activity of construction enterprises for ten consecutive years, which caused a decrease in equity to a critically low level and, accordingly, high values of financial leverage. It can be seen that while in the 2000s, the volume of general sources of financing (the amount of liabilities) was 3.65 times higher than the amount of construction capital, in 2009 - 5.2 times, it was 15.5 times in 2019. Therefore, the reverse direction of the financial lever should also be considered. In the case of profitable activity, the financial lever will allow to reach high values of return on equity. But in times of crisis or continuation of a downward trend, this can lead to a loss of financial sustainability in the construction sector.*

***Keywords:*** *DuPont model, Return On Equity (ROE), Return On Assets (ROA), Return on Sales (ROS), construction industry, construction enterprice.*

***JEL Classification: G17, G32, L74***

***Formulas: 4; fig.: 8; tabl.: 1; bibl.: 29***

**Introduction.** According to the State Statistics Service in Ukraine there are about 30 thousand enterprises of "construction" activity, which is 8.3% of the total number of them. For ten years in a row, these enterprises operated at a loss, and only in 2018 they made a net profit of UAH 4,414.1 million.

This situation requires an in-depth analysis of the causes of poor construction efficiency. At present, there is a need for retrospective analysis of the features of the functioning of construction enterprises, as well as for identifying trends in their development and factors affecting the profitability of

construction based on the use of widespread financial instruments, including factor analysis, which makes the study relevant.

**Literature review.** The negative generic indicator of the industry, namely the long-term loss-making of its activity, causes the relevance of factor analysis of a set of profitability indicators, in particular, using deterministic models. They are characterized by the fact that each non-random value of the resultant variable (function) corresponds to each factor (factor) value.

The profitability (loss) analysis method became widespread in economically developed countries. It was proposed by Donaldson Brown, who, back in the 1920s, worked at DuPont (Blumenthal, 1998). Due to its advantages, such as simplicity, speed of obtaining the result, the ability to choose the depth of analysis, etc, this method is quite widespread nowadays. It is based on an equation that shows the relationship between return on equity and performance: return on sales, asset turnover and financial dependency ratio.

The DuPont method is used in various fields. Profitability analysis with this method was used in banking (Almazari, 2012, McGowan and Stambaugh, 2012, Kirikal, Sorg & Vensel, 2011, Hossain and Hossain, 2008, Zahidur Rahman and Mia Rubel, 2018), railway (Ivanilov, Peretyatko & Bozhiday, 2012), pharmaceutical (Sur & Chakraborty, 2006), Sheela and Karthikeyan, 2012) and steel industry (Maji, Sumit, 2014), in construction (Mărginean, Mihălţan & Tepeş Bobescu,2014, Bielienkova,2005, Babayev & Cech, 2016, Sozanski, 2012, Bielienkova, 2010). At the same time, the authors note different performance, approaches, indicators and structure for different types of economic activities, industries, sectors of the economy (Soliman, 2003, Selling & Stickney,1989). (Soliman, 2004), for instance, proposes to use industry model DuPont, in this case the focus of the researcher will be on factors that affect profitability, not their industry specificities.

Some authors criticized Dupont's method (Filatov & Rudykh, 2014, Angell & Brewer, 2003, Wet & Toit, 2006, Filatov & Nechaev, 2014) for proposing alternative factor analysis methods. (Hawawini & Viallet, 1999, Nissim & Penman, 2001, Palepu & Healy, 2008, Soliman, 2008, Brigham & Houston, 2001), proposed various modifications to the method, arguing that the prediction model, based on the decomposition of the resultant metric, can improve its quality depending on a number of different factors. An important result of the research of these scientists was the statement that the use of the Dupont method makes sense only when the factors have different dynamics of change over time, otherwise the use of decomposition does not make sense.

**Aims.** Aims is a comparative analysis of the profitability of construction companies in different years using the Du Pont method.

**Methods.** The author used the DuPont methods of profitability analysis, which involve decomposing the resulting indicators into components in order to identify the effects of these components on the result. This method, which is widely used to derive an impact of various factors of an individual enterprise on

profitability, can be applied to analyze the profitability indicators of individual groups of enterprises or the construction industry as a whole.

The initial data of the study are the calculations of the State Statistics Service on indicators of enterprise development of the "construction" activity type in 1999-2019. Data for 2019 was used for the first half of the year. The following indicators were selected for the stydy (State Statistics Service of Ukraine, 2019): indicators of enterprises by constructions (non-negotiable assets, current assets, assets, equity capital, current liabilities and provision, liabilities, undistributed income (pending loss), net profit (loss) of enterprises by their size by type of economic activity, financial results of enterprises, production value). Building a " hierarchy tree " helps to reveal the impact of these indicators on the result – return on equity.

**Results.** A major business goal is to operate at a profit. The main indicator of a business effectiveness is its profitability. There exist a large number of profitability indicators and their opposite – loss indicators in the world. Profitability measurement is the subject of interest to creditors, investors, managers and all other enterprise stakeholders. The most appropriate tool for this measurement is the analysis of profitability ratios, the productivity of which consists in numerous calculations and the interpretation of business ratios in order to draw conclusions on a firm's ability to generate profit.

Dynamics of construction profitability (loss) indicators in 1999-2018 are given in Table. 1 and Fig. 1 They are calculated by the authors according to data (State Statistics Service of Ukraine, 2019).

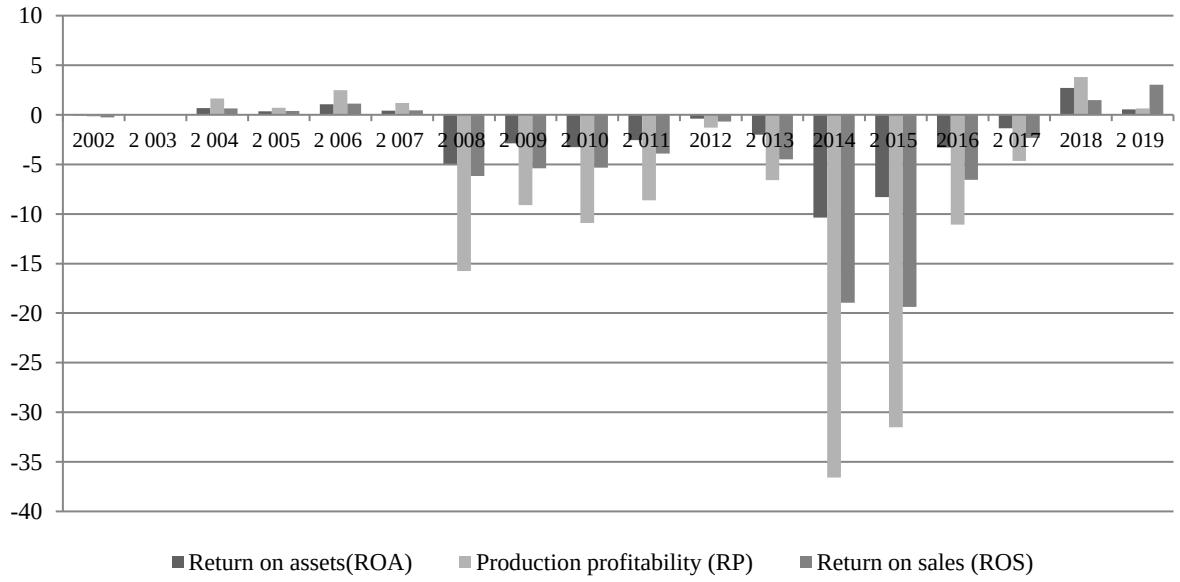


**Figure 1. Dynamics of construction profitability (loss) indicators in 1999-2019**

*Sourse: calculated by the authors according to data (State Statistics Service of Ukraine, 2019)*

**Table 1. Dynamics of construction profitability (loss) indicators in 1999-2018**

| indicator | | years | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| ROE | % | 1,03 | 0,11 | 2,74 | -0,14 | 0,05 | 2,15 | 1,26 | 3,81 | 1,72 | -29,08 | -15,05 |
| ROA | % | 0,67 | 0,07 | 1,47 | -0,07 | 0,02 | 0,01 | 0,00 | 0,01 | 0,00 | -0,05 | -0,03 |
| RP[1] | % | 3,53 | 0,26 | 4,27 | -0,17 | 0,06 | 0,02 | 0,01 | 0,02 | 0,01 | -0,16 | -0,09 |
| ROS | % | 3,46 | 0,33 | 4,79 | -0,26 | 0,07 | 0,07 | 0,00 | 0,01 | 0,00 | -0,06 | -0,05 |
| indicator | | years | | | | | | | | | | |
| | | 2010 | 2011 | 2012 | 2 013 | 2014 | 2 015 | 2016 | 2017 | 2018 | 2019[2] | |
| ROE | % | -18,62 | -17,69 | -3,33 | -18,31 | - | - | - | - | 36,78 | 8,29 | |
| ROA | % | -0,03 | -0,03 | 0,00 | -0,02 | -0,10 | -0,08 | -0,03 | -0,01 | 0,03 | 0,005 | |
| RP[1] | % | -0,11 | -0,09 | -0,01 | -0,07 | -0,37 | -0,32 | -0,11 | -0,05 | 0,04 | 0,01 | |
| ROS | % | -0,05 | -0,04 | -0,01 | -0,04 | -0,19 | -0,19 | -0,07 | -0,02 | 0,01 | 0,03 | |

1. Production profitability
2. Indicators for 2019 use the data for the first six months hereafter

*Sourse: calculated by the authors according to data (State Statistics Service of Ukraine, 2019)*

The graph helps to identify three periods of rise and fall, which coincide with the cycles of Jugler (7-10 years) and Kuznets (15-20 years), namely:
1) 1999-2007 (the industry operated at a profit, with profitability gradually decreasing);
2) 2008 - 2017 (the industry operated at a loss, gradually forming the imbalance in the sources of financing, which in 2015-2017 led to the "leaching" of equity, etc.);
3) 2018-2019 (there is a profit again, but the imbalance of liabilities, namely a significant lack of equity, remains).

*1. Analysis of return on assets by two-factor model (Izmailova, 2005):*

The indicator of return on equity (another name of the indicator - economic return, return on assets) is determined by the formula:

$$ROA = \frac{NP}{\overline{A}} = \frac{NP}{(A_1 + A_2)/2}, \qquad (1)$$

*where NP – net profit; A1, A2 (Assets1 and Assets2) - assets at the beginning and end of the reporting period.*

If the numerator and the denominator are multiplied by the net proceeds from the volume of products (goods, services) sold by the economic entities by types of economic activity – V, then the return on assets can be considered as the product of two indicators, multipliers, namely: the profitability of the realized products ROS and total asset turnover – TAT. The economic substance of the TAT shows how much revenue is attributable to each monetary unit that has been invested in the assets.

$$ROA = \frac{NP}{\overline{A}} \times \frac{V}{V} = \frac{NP}{V} \times \frac{V}{\overline{A}} = ROS \times TAT, \qquad (2)$$

The relationship between the impact of two factors: profitability of realization and turnover of capital on the capital profitability is shown in Fig. 2.

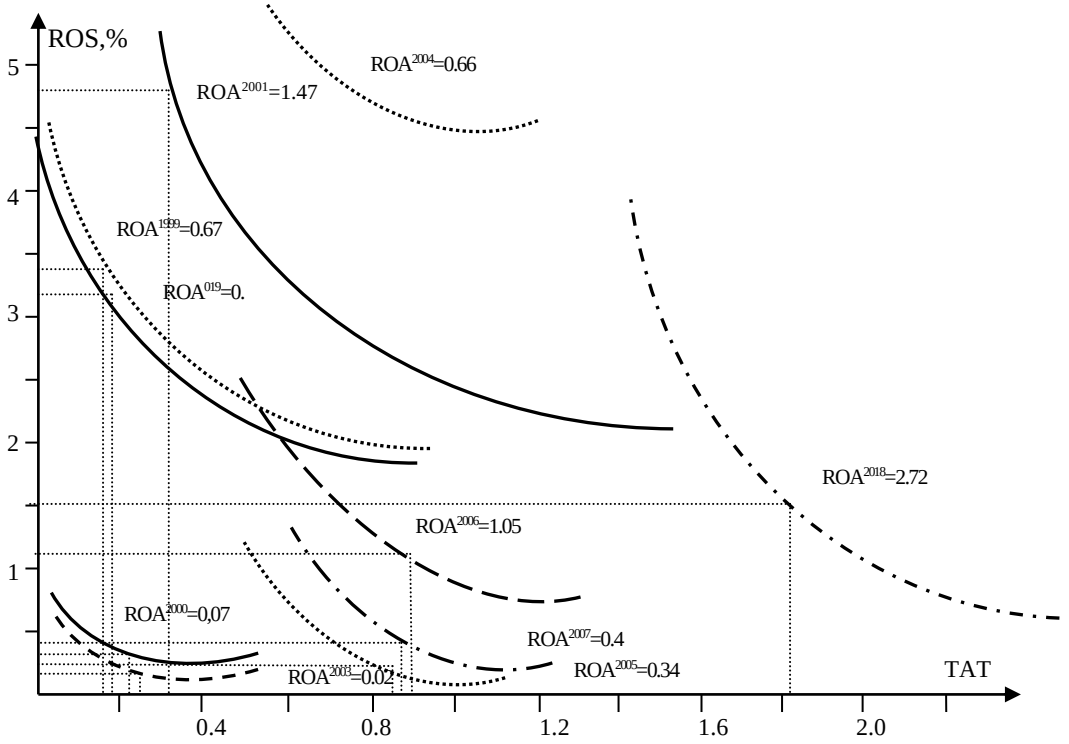


**Figure 2. Analysis of return on assets by two-factor model**

*Sourse: calculated by the authors according to data (State Statistics Service of Ukraine, 2019)*

Each point of the transformation curve shows what the combination of the return on sales of the product and the return on capital can look like, so that the return on assets is at a certain level. In our example - in 2008 - 2.72%%, while in 2001 - 1.47% and so on.

According to the initial data of the construction activity (averaged over 1999-2003) (Bielienkova, 2005):

$$\text{ROA} = \frac{265.7}{17800} \times \frac{16205}{16205} = \frac{265.7}{16205} \times \frac{16205}{17800} = 0.016 \times 0.91 = 0.0146\text{, or } 1.46\%.$$

According to the initial data of the construction activity in 2009 (State Statistics Service of Ukraine, 2019):

$$\text{ROA} = \frac{-4439}{153663} \times \frac{82370.9}{82370.9} = \frac{-4439}{82370.9} \times \frac{82370.9}{153663} = -0.054 \times 0.536 = -0.029\text{, or } -2.9\%.$$

According to the initial data of the construction activity in 2019 (State Statistics Service of Ukraine, 2019):

$$\text{ROA} = \frac{828.2}{154687.9} \times \frac{27427.7}{27427.7} = \frac{828.2}{27427.7} \times \frac{27427.7}{154687.9} = 0.0054 \times 0.177 = 0.005, \text{ or } 0.5\%.$$

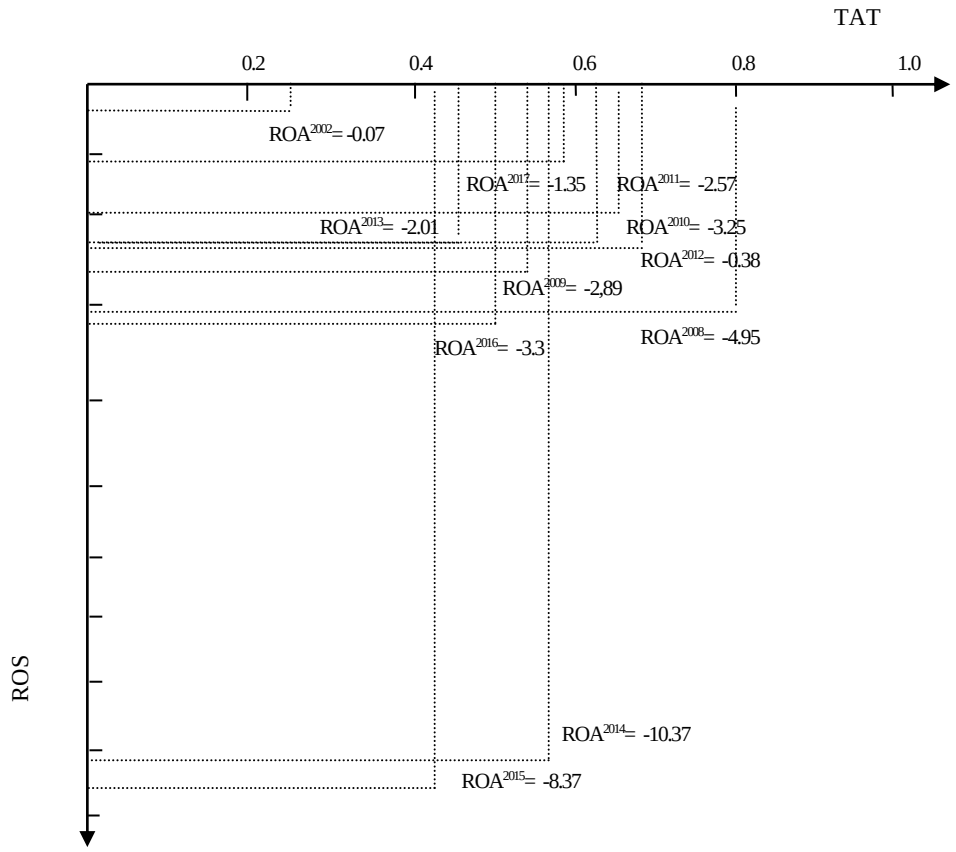


**Figure 3. Analysis of loss of assets by two-factor model**

*Sourse: calculated by the authors according to data (State Statistics Service of Ukraine, 2019)*

In Fig. 3 it can be seen that the loss of capital of construction enterprises is caused by the negative profitability indicators of the sold products as a result of the loss of all activity. The most challenging for the industry were years 2014-2015 - the years of political and structural transformation of the economic system. However, since 2016, the construction industry has adapted to economic changes, as evidenced by the loss reduction.

*2. Analysis of return on equity on a three-factor model.*

More than 100 years ago, DuPont's managers proposed to consider return on equity (ROE) as a product of the following three indicators: return on sales (ROS), asset turnover (TAT) and debt ratio io (ratio of total capital to equity) - DR that is:

$$\text{ROE} = \text{ROS x TAT x DR} = \frac{NP}{EK} = \frac{NP}{V} \times \frac{V}{\overline{A}} \times \frac{\overline{A} = \overline{L}}{EK}, \qquad (3)$$

*where NP is net profit; V — Volume of products (goods, services) sold by the economic entities by types of economic activity; EC- equity capital, A — assets; L — Liabilities.*

These three indicators respectively characterize the operational, investment and financial performance of the entities. Therefore, in the developed countries the most important final indicator in the financial analysis practices is return on equity which focuses the results of all enterprise activities.

Each of the three mentioned factors, the multipliers, in turn, depends on the other indicators. For example, sales profitability depends on the amount of profit from the sale, which, in turn, depends on the prices, costs, volumes and structure of sales of products. In turn, the costs depend on the prices of the used resources and the amount of their expenditure and so on. Consistently, considering level by level, you can build an extensive hierarchical "tree" of relationships of indicators. The top of this tree is the return on equity. By changing the values of indicators at any level, including even the farthest from the top, one can trace their effect on the resultant (criterion) indicator, that is, the “top of the tree”. Computer technologies enable to quickly calculate the totality of options for influencing the final measure and to choose the best option for implementation.

We will calculate the average return on equity for the period 1999 - 2003 (Bielienkova, 2005):

$$\text{ROE}=\frac{267.5}{8255}=\frac{265.7}{16205}\times\frac{16205}{30163}\times\frac{30163}{8255}=0.016\times0.54\times3.65=0.0324 \text{ or } 3.24\%.$$

The return on equity for the 2009 (State Statistics Service of Ukraine, 2019):

$$\text{ROE}=\frac{-4439}{29499.8}=\frac{-4439}{82370.9}\times\frac{82370.9}{153662.2}\times\frac{153663.2}{29499.8}=-0.054\times0.54\times5.2=-0.15 \text{ or } 15\%.$$

The return on equity for the 2019 (State Statistics Service of Ukraine, 2019):

$$\text{ROE}=\frac{828.2}{9994.6}=\frac{828.2}{27427.7}\times\frac{27427.7}{154687.9}\times\frac{154687.9}{9994.6}=0.0302\times0.177\times15.48=0.0829$$

or 8.29%.

From the above three-factor model of return on equity, it follows that its value is significantly affected by the increase in the share of borrowed funds, i.e. the so-called financial leverage (leverage), which is accompanied by an increase in the risk of financial independence loss. In view of this risk, the financial analyst determines and regulates the level of financial leverage, that is, determines how much percent will change the return on equity when changing the financial result (before payment of interest on credit and income tax) by 1% with different loan capital shares in liabilities.

It can be seen that while in the 2000s the volume of general sources of financing (the amount of liabilities) exceeded 3.65 times the amount of own

capital of construction, in 2009 - 5.2 times, in 2019 - 15.5. times. Therefore, the reverse direction of the financial lever should also be taken into consideretion. With a slight decrease in the financial result, return on equity will decline substantially in enterprises with high financial leverage and, insignificantly, with low ones.

*3. Analysis of return on equity by five-factor model.*

The list of multiplier factors that determine return on equity can be expanded. These are important indicators of financial condition such as liquidity, current assets turnover, ratio of urgent liabilities and capital of the construction organization.

The expanded formula for determining the effect of factors on the return on equity is (Bielienkova, 2005):

$$\text{ROE} = \frac{NP}{EK} = \frac{NP}{V} \times \frac{A = L}{EK} \times \frac{CL}{A} \times \frac{CA}{CL} \times \frac{V}{CA}, \qquad (4)$$

*where PA, PE are respectively current assets and current liabilities according to the balance of construction.*

The five-factor model includes the following indicators: profitability of realization, coefficient of financial dependence, share of time commitments in the currency of balance, ratio of general coverage (current solvency), turnover of current assets.

The return on construction equity for the period 1999 - 2003 is calculated as the product of the following indicators (Bielienkova, 2005):

$$\text{ROE} = \frac{265.7}{8255} = \frac{265.7}{16205} \times \frac{30163}{8255} \times \frac{10093}{30163} \times \frac{10737}{10093} \times \frac{16205}{10737} = 0.016 \times 3.65 \times 0.33 \times 1.06 \times 1.51 = 0.0324,$$

or 3.24%, where 10093, 10737 are average annual current liabilities and current assets.

The return on equity for the 2009 (State Statistics Service of Ukraine, 2019):

$$\text{ROE} = \frac{-4439}{82370.9} \times \frac{153662.2}{29499.8} x \frac{75089.6}{153662.2} \times \frac{87868.2}{75089.6} x \frac{82370.9}{87868.2} = -0.054 \times 5.2 \times 0.49 \times 1.2 \times 0.94 = -0.15$$

The return on equity for the 2019 (State Statistics Service of Ukraine, 2019):

$$\text{ROE} = \frac{828.2}{27427.7} \times \frac{154687.9}{9994.6} \times \frac{108872.6}{154687.9} \times \frac{120894.9}{108872.6} \times \frac{27427.7}{120894.9} = 0.0302 \times 15.48 \times 0.7 \times 1.11 \times 0.227 = 0.0829,$$

From the obtained calculations it can be seen that the indicator of profitability of production activity has a significant impact on the return on equity (Fig. 5). The inability of construction companies to adapt to the changes caused by the global economic crisis of 2008 increased as a result of the events of 2014, which resulted in the long-term loss of production activity of construction enterprises, which only gradually began to emerge from the crisis in 2018.

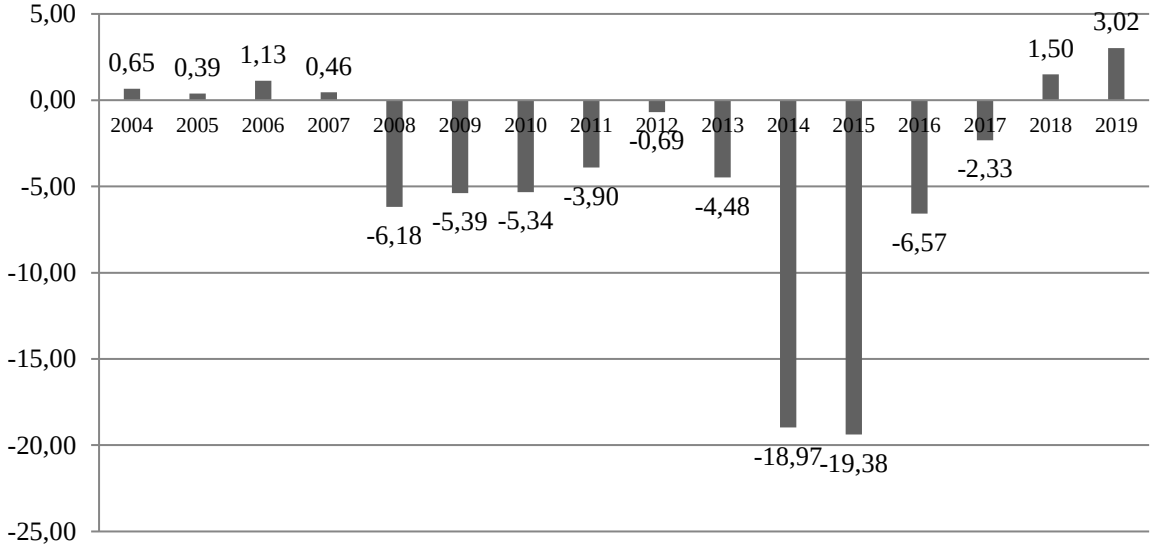


**Figure 5. Profitability (loss) of production activity of enterprises of the construction industry**

*Sourse: calculated by the authors according to data (State Statistics Service of Ukraine, 2019)*

Another factor that has influenced the efficiency of the industry is the asset turnover ratio. Asset turnover characterizes the efficiency of use of all resources available in construction enterprises, regardless of their sources. The normative value of this indicator is absent, but the faster the resources of enterprises are rotated, the better. Reduced resource rotation indicates a decrease in the financial well-being of the enterprise. The turnover of assets of the construction industry since 2004 has been gradually declining, with the exception of 2018 (Fig. 6).

While in 2004 1 UAH assets of the construction industry was accounted for 1 UAH 01 kop. net sales revenue, in 2015 it was only 43 kopecks. This indicates a significant decrease in business activity of construction companies in the years 2009 - 2017. However, in 2018, 1 UAH assets of the construction industry is accounted for 1.82 UAH sales revenue. For the first quarter of 2019, it is 18 kopecks, reaching almost half of 2015. That is, there is a tendency to increase business activity.

From the three factor model of Dupont it follows that the value of profitability (loss) of equity of the enterprises of the industry is also significantly influenced by the coefficient of financial dependence (financial leverage). It

shows the ratio of debt to equity and signals an increasing risk for construction companies to lose their financial independence.

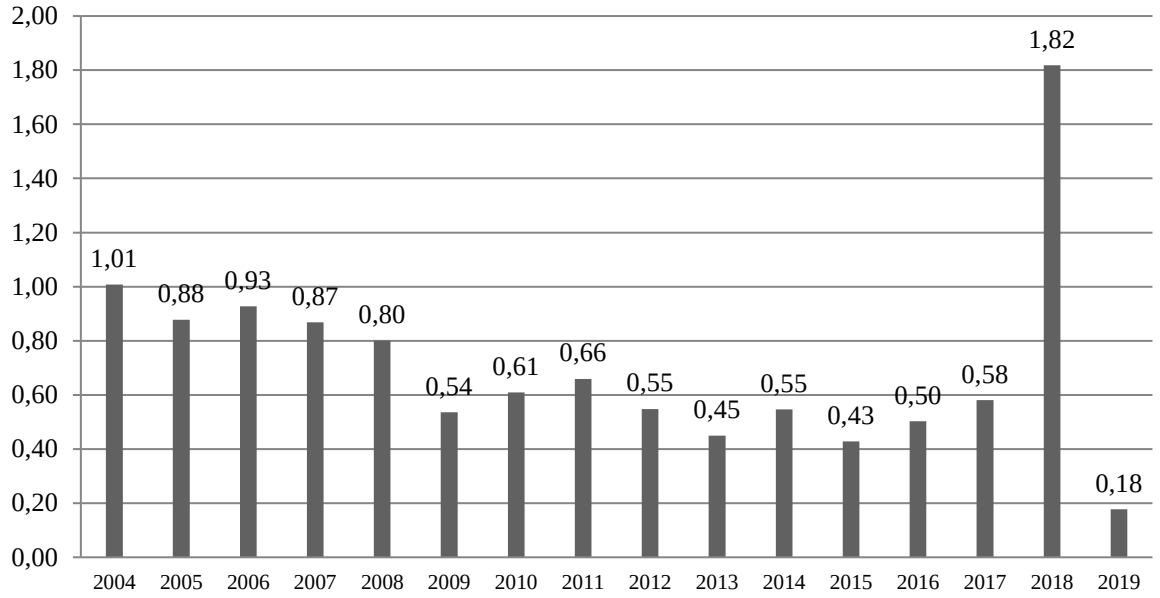


**Figure 6. Turnover of assets of construction industry enterprises**

*Sourse: calculated by the authors according to data (State Statistics Service of Ukraine, 2019)*

The level of financial leverage makes it possible to determine how much interest will change the return on equity when the financial result (before payment of interest on credit and income tax) is changed by 1% in the case of different loan capital shares in liabilities.

Since construction companies operated at a loss for 10 consecutive years, uncovered losses reached a critical value in 2014, and in the years 2015-2017 exceeded the equity of construction enterprises (Fig. 7).

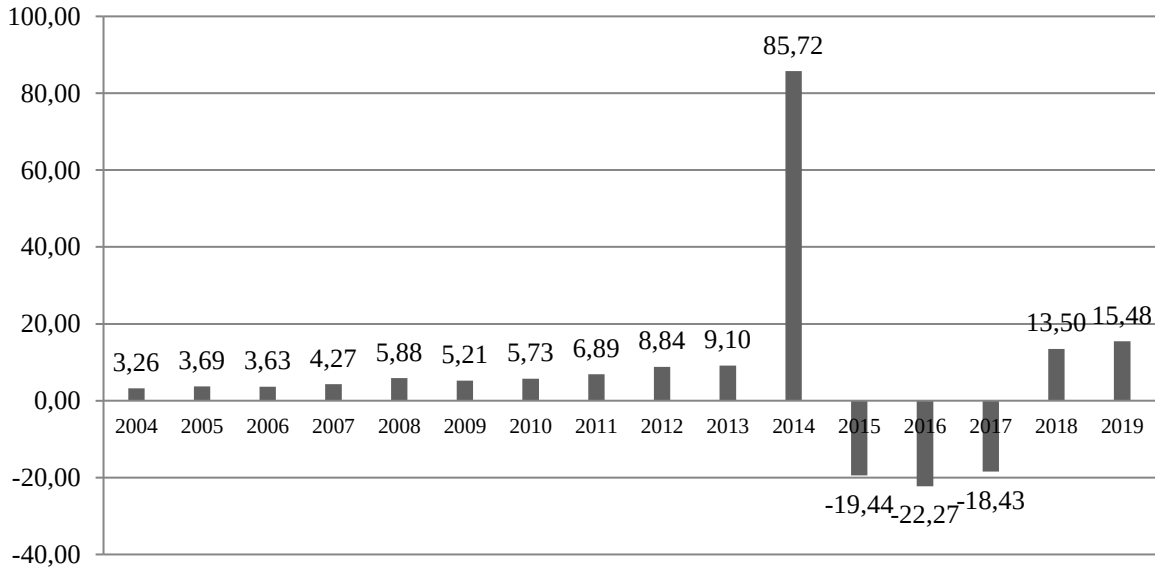


**Figure 7. Increase in the level of financial dependency (CFF) of construction companies from 2005 to the first half of 2010**

*Sourse: calculated by the authors according to data (State Statistics Service of Ukraine, 2019)*

Since these years are not typical for the industry, we will analyze the financial dependence of the industry, excluding atypical values, namely data for 2014-2017 (Fig. 8).

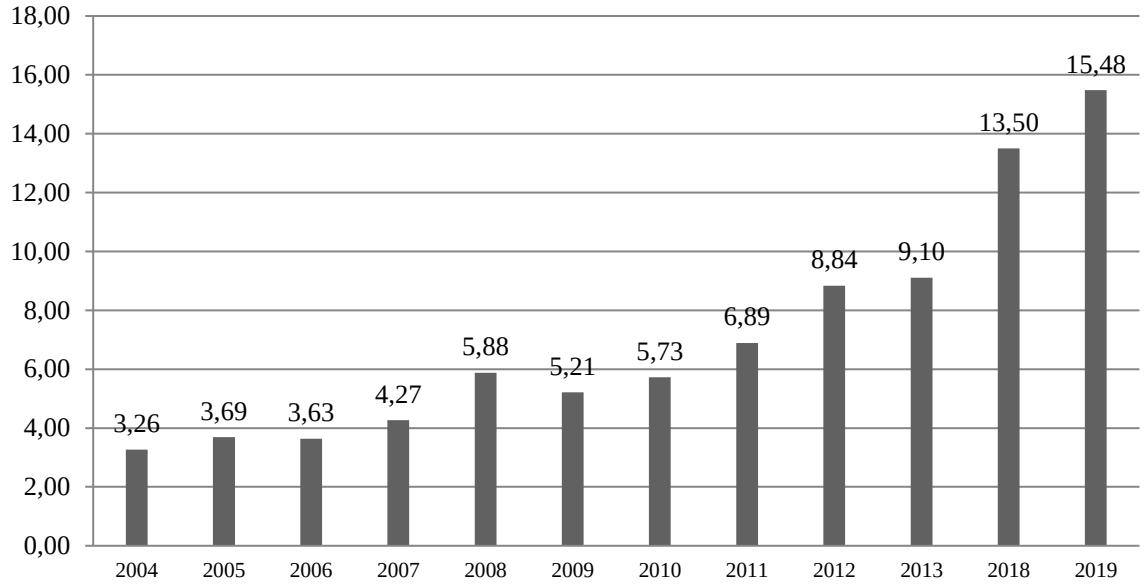


**Figure 8. Increase in the level of financial dependency (CFF) of construction companies from 2004 to the first quarter of 2019**

*Sourse: calculated by the authors according to data (State Statistics Service of Ukraine, 2019)*

In 2004-2007, the ratio was less than 5, which means that the loan capital exceeded its own one less than 5 times, in 2008 1 UAH of own capital was accounted for UAH 5.58 of all sources of financing, and this indicator is gradually increasing, indicating a critically low share of equity in funding sources.

The increase in the share of borrowed capital has its advantages in many cases, as debt is profitable in the period of economic development, expansion of the activity of enterprises, and while increasing inflation. In addition, the borrowing fee is gross and not taxed.

However, with the increase in the share of borrowings in the capital structure, there is an increase in the amount of payments with a fixed term and the likelihood of failure to pay interest and the principal amount of debt during adverse market conditions. This leads to an increase in the level of financial risk. That is, with the increase in the volume of work performed, the profits will more effectively work, develop, receive greater return on invested capital by those enterprises that have more importance of financial leverage. Conversely, in times of falling, sharply declining work, these businesses will suffer greater losses per unit of equity than those pursuing a more moderate borrowing policy. Thus, a significant share of borrowed funds in the structure of the balance sheet of construction enterprises, which were one of the main sources of growth of the construction industry in the period of development, significantly reduces the stability of enterprises in the industry during the crisis period.

**Discussion.** The results of the analysis confirmed the conclusion that the main cause of damage to construction companies is a sharp decrease in business activity in the country due to the global financial and economic crisis and military actions in the east. The obtained imbalances of economic development were completely overcome only in 2018. The growth trends are also observed in 2019, however, the resulting growth is not yet stable enough and may be affected by many external and internal factors.

The use of Dupont models for the profitability (loss) analysis of the construction industry allowed us to more thoroughly analyze the factors that influenced this indicator. The financial analyst, using MS Excel, can see how any changes to individual factors or their totals affect the value of the final indicator.

**Conclusion.** Analysis of the profitability indicators of the "construction" activity enterprises in 1999-2019 revealed that the construction industry worked at a loss for a decade in a row (2008-2017). This was reflected primarily in the capital structure. During these years, equity decreased to a critical level; in 2015, uncovered losses exceeded the amount of authorized and reserve capital. Only in 2018 the situation started to level off. Factor analysis of profitability indicators allowed to identify in depth the most influential factors, namely: loss of the main activity of construction enterprises during ten consecutive years, which led to a decrease in equity to a critically low level and correspondingly high financial leverage (in the 2000s - 3.65; in 2009 - 5.2 times, in 2019 - in 15.5 times.) Therefore, the reverse direction of the financial lever should also be considered. In the case of profitable activity, the financial lever will allow to reach high values of return on equity. But in times of crisis or continuation of a downward trend, this can lead to a loss of financial sustainability in the construction sector.

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# THE PREREQUISITES FOR THE FORMATION OF BUSINESS STRUCTURES IN THE CONTEXT OF MODERN GLOBALIZED SPACE

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***Abstract.*** *It is proved that the development of modern business is influenced by many external factors, were named «global problems» of humanity. Annually, the number and depth of humanity's global problems is only increasing. It is proved that all global problems are interconnected and form the so-called "global syndrome". Finding out about the global problems of humanity will help you better understand the future prospects for the development of world and individual businesses. It is determined that the world business is now in the third wave of development namely "prosumer economics"; changing views on the effectiveness of the enterprise; reorientation and transformation of mass production enterprises to small-scale or flexible production under the order of a specific consumer; transform large corporations, reorienting themselves into business structures; transition of the world business to the active use of information technologies. These trends indicate a change in the modern sustainable account a new stage of the evolutionary development of world business and modern global trends in the formation of business structures. The prerequisites for the formation of business structures are generalized. The main prerequisites for the formation of renew business structures in the context of modern globalized space are the following: permanent changes in the external and internal economic conditions of an enterprise, caused by instability of socio-economic processes in the national economy, to which it must constantly adapt;the modern enterprise must reach the mega level, becoming a subject of international relations, joining the pegonal and economic and economic associations and transnational corporations, international corporations; by increasing the convergence process as a long-term goal of convergence between countries or regions, due to the impact of globalization and the rise in investment potential, the speed of experience and technology; implementation of new ways of organizing production and marketing of products due to the rapid development of new technologies, global processes of globalization and integration; formation of a single system of international planning and distribution of material goods, the formation of a joint world-wide government in context to transformation (or merger) into a complex integrated business structure.*

***Keywords:*** *world business, enterprise, business structure, globalized space, global problems of humanity, integration.*

***JEL Classification: F01, F02, F15, F63***

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**Introduction.** The current state of development of world business is under the influence of the process of globalization, which, as Volovich A.O. [4] has a powerful impact on all aspects of society, as a complex geopolitical, geo-economic and geocultural phenomenon. The process of globalization has a contradictory impact both on the global economy as a whole and on individual economies of states, giving impetus to the economic growth of the world economy on the basis of: accelerating the process of diffusion of new technologies; increasing the efficiency of the use of various resources by

improving the mechanism of their distribution; improving the quality of life and well-being of the population; dissemination of ideas of democracy, humanism, protection of fundamental rights and freedoms. At the same time, the process of globalization poses certain threats to the world economy, namely: widening the gap and widening inequalities in the socio-economic development of the countries of the world; loss of national uniqueness of each individual country, its subordination to international standards; growing conflicts of various scales and nature; widening the gap between financial and commodity markets; creation of international criminal cartels; the spread of international terrorism.

The main features of the world globalization process are the formation of common standards, values and principles that underpin the functioning of the world economy; accelerating and simplifying the processes of movement of goods, resources and capital; the growth of financial unity and interdependence of the financial and economic systems of the countries of the world, which led to the creation of world and interregional associations (EU, NAFTA, MECROUS, ASEAN), as well as business structures as new business entities operating on the world market (such as transnational corporations and transnational banks).

**Literature review.** Domestic and foreign scientists give considerable attention to the study of globalization factors. In study «Modern economy» by Echenko P.S. (2005) [9], globalization factors are grouped into three groups: technical and economic; political and power; socio-psychological. This classification does not take into account environmental global problems, which, in our opinion, have a dominant influence on today's world business. On the globalization factors, according to the classification of A. Urazov, I. Sauka, O. Vikarchuk (2013) «Foundations of economic theory» there are three groups of global problems: the problems of interaction between nature and society, problems of social relations, problems of human development and securing its future [12]. However, such a classification is not sufficiently disclosed as economic factors. On globalization factors according to I. Amelina, T. Popova, S. Vladimirova (2013) «International Economic Relations exacerbation of problems» that are common to all people and countries of the world and important in terms of the preservation and development of mankind should be added [1].

**Aims.** The purpose of the article is to study the prerequisites for forming business structures in the context of today's globalized space.

**Methods.** During the research, the method of analysis and synthesis was used (in the study of the concept of "business structures", the analysis of existing theoretical and methodological approaches and provisions, scientific developments on the problems of prerequisites for the formation of business structures in the context of modern globalized space); structural and logical (to systematize the factors that influence business structures in the context of today's globalized space); generalization (in the process of systematization of influence globalization factors).

**Results.** Society is facing dramatic changes, as E. Tuffler rightly points out in his book The Third Wave [11], which have been dubbed the "global problems of humanity", some of which have already come, and which influence (or affect) how the world business develops, and the functioning of the individual subject. Global problems are planetary "major problems that cover economic, energy, demographic, social, environmental and other spheres of human existence" [3]. Along with the term "global problems", researchers use the same term "globalization factors". Annually, the number and depth of humanity's global problems does not decrease, but only increases, so to simplify their understanding, we group and classify global problems into specific groups. Taking into account the different opinions of scientists, we will propose our own classification of global problems of humanity, which will help to better understand the prospects for the future development of world business and certain economic subjects, namely:

1. Global economic: formation of new business subjects – transnational corporations and transnational banks; formation of interregional associations; transition of most countries to market conditions; export expansion of countries and regional entities; periodic global financial and economic crises; economic backwardness of parts of regions and countries of the world; frequent regional and international conflicts; increased interdependence between rich and poor countries; smuggling of goods; deepening cooperation between countries; deepening the international division of labor, further developing the internationalization of production. The impact of global economic problems caused by the globalization process contributes to the formation of complex integration forms of business structures, both at macro and regional and macro levels, as a reaction and a way to adapt enterprises to complex dynamic and difficult to predict environmental conditions.

2. Global techno-technological: development and implementation of new information technologies - global computer, radio and television network; development of international infrastructure, new generations of transport and communication; the scientific and technological revolution and the acceleration of scientific and technological progress. Scientific and technological progress has become a driving force in the evolutionary development of world business, resulting in enterprises gradually moving from manual labor to machine, then automated. In today's digital economy, there is an active transition of enterprises to the use of information technology, as a result of which human labor will be replaced by artificial intelligence. This in turn will change the organizational structure of the enterprise; there will be a reduction in redundant staff who will replace machine-robot; the number of operations in the production process will decrease (for example, 3D printing technology has reduced the number of operations in the assembly of a car by 1000 times), but the management processes will be complicated, the enterprise will gradually move to network management.

3. Global societies: the expansion and dissemination of liberal-democratic values of Western society; the expansion of Western culture, which undermines the cultural values of non-Western civilizations; uneven and uncontrolled population growth in some countries and its catastrophic decline in others; illegal world population migration; trafficking in human beings; drug addiction, AIDS, Ebola and other incurable diseases and epidemics; international crime, drug trafficking, terrorism; religious extremism; democratization and protection of human rights; weakening of the role of traditions, social ties and customs, internationalization of education, cultural space. One of the dominant global social problems for the world of business, in our view, will be the problem of recruiting due to the aging of the nation. "The number of survivors under the age of 100 will increase more than 50 times by 2100 – from the current 500,000 to over 26 million. The number of countries with more people over 65 will grow in the world" [14]. The solution to this problem will be the ability to use human genetic modification technologies that can be used in the recruitment of enterprise personnel, when the advantage will be given to employees with better artificial qualities or in the near future to replace them with artificial intelligence human-robots who do not need to pay salaries. In doing so, business will face the moral and ethical problems of humanity.

4. Global natural-geographical: change of natural-geographical environment under the influence of scientific and technological progress; lack of food and drinking water; providing humanity with raw materials and energy; preservation of the environment; misuse of the oceans resources; peaceful exploration of outer space; environmental degradation; global warming. One of the most serious global natural-geographical problems facing global business in the near future, in our opinion, is climate change, accompanied by tsunamis, rising sea levels, droughts and more, which will lead to the emergence of "climate" refugees who will not be able to live in such difficult conditions and will be forced to move to better territories or other continents. Thus, according to the UN forecast by 2100 [8], 280 million people around the world can become "climate refugees" because of rising ocean levels. In addition to the shortage of human resources, business will face a shortage of raw materials and energy, which will necessitate the transfer of production to other countries, which is already reflected in the activities of world multinational corporations that transfer their production to third world countries. This, in turn, will lead to a worldwide business migration. Scientists predict that "even if greenhouse gas emissions can be reduced, ocean levels will increase by 60 centimeters over the next 80 years. If you do not take the necessary regulatory measures – 110 centimeters. However, even under the most optimistic scenario, cities near the seas and oceans will be at risk of flooding by 2050, such as Jakarta, Manila, Bangkok, Lima, Singapore, Barcelona and Sydney, as well as a number of American cities, as Los Angeles cities, Miami, Savannah, Honolulu, San Juan, Key West and San Diego. And in the next 100 years, a number of Ukrainian cities may be threatened with flooding - in particular, Odesa, Kobleve, Yuzhne

may be affected by their geographical location" [2]. Reducing human habitable areas will intensify the global struggle for access to resources (which is already happening in the energy market), which only large multinational corporations will be able to obtain. For example, "21st Century technologies and gadgets require rare earth components: an average smartphone has more than 60 "ingredients". It is estimated that in China, where 90% of rare earth metals are mined, their reserves run out in 20 years. And it will be extremely difficult to find an equivalent replacement" [14]. Consequently, small businesses will either have to close or, seeking access to exhaustive resources and (or) new technologies, access to production locations in new territories will be merged with more powerful enterprises, forming entrepreneurial structures that are responsive to today's global integration processes and globalization.

5. Global political-power: US dominant role in the world market; NATO's military and political expansion; the creation of a new US and EU doctrine of NATO; the arms race and the proliferation of weapons of mass destruction; the threat of a global fusion war and peace; disarmament and conversion.

The aforementioned global problems of humanity should be considered not separately from each other. Scientists have long proven that all global problems are interconnected and form the so-called "global syndrome" [5]. The Global Syndrome is three of humanity's major problems: obesity, hunger and climate change. It is driven by the focus of modern business on sustainable economic growth and meeting the growing needs of humanity, despite the adverse effects on all ecosystems on the planet, which are factors contributing to climate change, obesity, and population hunger. The urgent solution of the above-mentioned global problems depends not only on the functioning of world business, but also on the existence of terrestrial civilization, and this can only be achieved by the joint efforts of all countries, international organizations and world business by integrating their efforts in solving the above-mentioned problems. For further business development, as E. Tafler points out in his research [11, p.16], this means "a profound social upheaval and a creative reorganization of all time". If "the first wave of change – the agricultural revolution - has required millennia to outlive itself. The second wave – the growth of industrial civilization - took only 300 years. Today, history reveals even more acceleration, and it is likely that the Third Wave will sweep through history and end in a few decades" [11, p.17]. This period brought to the development of world business new previously unknown processes and trends, namely:

1. There is a creation of a new economy – "prosumer" economics, as a result of which the "historically formed gap between the producer and the consumer is erased, that is, the reintegration of consumers into production (production by consumers or production for oneself)" [11, p.18].

2. The previous trend is shaping the change in views on the efficiency of the enterprise, which scientists have considered to date in terms of comparing alternative methods of production of goods (providing services), which resulted

in the best option. “They (consumers) rarely compare the efficiency of production in Sector B with the efficiency of 'production for themselves' in Sector A”. In the context of globalization, consumers “realized that once they were provided with a certain level of monetary income, they may be more profitable to produce for themselves - both economically and psychologically - than to earn more money” [11, p.195].

3. The trends discussed above lead to the reorientation and transformation of mass production enterprises to small-scale or flexible production under the order of a specific consumer, which is based on various renewable energy sources; on new production methods and so on, which, according to E. Tafler, “makes most factory assembly lines unnecessary” [11, p.18].

4. Large corporations, as a typical form of organization of the world business of the industrial era, are “shocked, collapsed and transformed by the influence of the Third Wave of Change” [11, p.158]. During the period of industrial civilization (according to E. Tafler's “second wave”), a concentration of production and capital occurred, which resulted in the formation of large world corporations. So, “by the mid-1960s, the Big Three of car companies in the United States produced 94% of all American cars. In Germany, four companies – “Volkswagen”, “Daimler-Benz”, “Opel” (GM) and “Ford-Verke” – produced together 91% of all production; in France, “Renault”, “Citroen”, “Seven” and “Peugeot” - almost all 100%.In Italy only “Fiat” produces 90% of all cars In the United States, more than 80% of aluminum, beer, cigarettes and ready-made breakfasts are produced by four or five companies operating in their field. In Germany, 92% of all plasters and dyes, 98% of photographic films, and 91% of industrial sewing machines were produced by four or a little more companies in each of these categories ”[11, p.46]. Let us agree with E. Tafler's prediction only in terms of transformation of large corporations that have not yet collapsed, since their number, which has been tracked since 1995 by Fortune [6], has been decreasing annually and is only the largest 500 worldwide. The leading positions in the “Fortune Global 500” for five years in a row are held by the American corporation “Wall-Mart”. The above tendency of concentration and transformation of the world business, in our opinion, means the onset of the process of globalization and strengthening of integration processes in the world, the result of which is the formation of new subjects of the world market – business structures.

5. The transition of the world business to the active use of information technologies, namely:

– the use of artificial intelligence and machine learning to process information and data that “organizations accumulate as much as the human brain cannot process in a lifetime” [10];

– change of manual control of information network for automatic device configuration and connection establishment;

– create virtual assistant programs that can manage and anticipate all processes in the enterprise. For example, “Video conferencing equipment communicates

with your calendar and learns that the meeting should start in two minutes and dials the number you want. The room will also see that you are alone and will raise the air temperature a few degrees to make you feel comfortable" [10];
– storing large amounts of information anywhere: in the private cloud, in the public cloud of Microsoft, Amazon, Google;
– transition to the use of enterprise information security devices.

**Discussion.** The trends described above indicate a change in the modern sustainable view of the world business, in which the enterprise is an independent business subject and a leading link in the economy or an open system operating in a dynamic external environment should be expanded to take into account a new stage of the evolutionary development of the world business and modern world trends in the formation of business structures. Business structure will mean the voluntary statutory or temporary association of several enterprises and (if necessary) individual entities (freelancers) of different forms of ownership into a single integrated open system operating in a globalized environment for the purpose of development and commercialization of innovative products. (goods, works, services), which increases the efficiency of activity and accelerates the integration development of economic entities that form such a structure [13]. The main prerequisites for the formation of such structures are the following:

1. Permanent changes in the external and internal economic conditions of an enterprise, caused by instability of socio-economic processes in the national economy, to which it must constantly adapt.

2. The modern enterprise must reach the mega level, becoming a subject of international relations, joining the pegonal and economic and economic associations and transnational corporations, international corporations. The integration defines common needs for joint development csubjects of the interdependent relationship, concepts of adoption of global writings require movement from national to intergovernmental economic eco nomic regulation [7, p.8].

3. By increasing the convergence process as a long-term goal of convergence between countries or regions, due to the impact of globalization and the rise in investment potential, the speed of experience and technology. The term "convection" is used to define globalization, keeping in mind the convergence of the country rates by the industrial countries and by the developing countries and in the study through an international integration development, in which grade there are general tendencies and imperatives of the scientific and social and economic progress, which leads to the convergence (convection) of the economics of the esteemed number of countries and the preservation of their national characteristics. Similarly, the level of development of a modern enterprise, which is gradually becoming a complex integrated busines structures, should approach the level of competitiveness of leading competitive entrepreneurial structures by industry.

4. Implementation of new ways of organizing production and marketing of products due to the rapid development of new technologies, global processes of globalization and integration, which gradually transform the enterprise from an open socio-economic system functioning at the micro level to a complex integrated business structure operating at the mega level in a global world space (such as "Nestle", "Wal-Mart", etc.) or the creation of virtual networked business entities (eg, "Google", "Facebook" and more).

5. Formation of a single system of international planning and distribution of material goods (which is the goal of the globalization process), the formation of a joint world-wide government (due to the possible political and legal unity of the United Nations, etc.), which act as a means of reducing the management of international conflicts within which a modern enterprise can function, in context to transformation (or merger) into a complex integrated business structure [7].

**Conclusion.** Thus, based on the above, a modern, sustainable view of world business in which an enterprise is an independent business subject and a leading economic unit or open system operating in a dynamic external environment should be expanded to take into account a new stage of the evolutionary development of world business and modern world tendencies of formation of business structures as new subjects of globalized space. The main prerequisites for the formation of such structures are the complexity of a dynamic external environment; the need for the enterprise to enter the world globalized space; by increasing the convergence process; introduction of new ways of organizing production and marketing of products caused by the rapid development of new technologies.

**Author contributions.** The authors contributed equally.

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# CERTAIN ASPECTS OF ECONOMIC RELATIONS BETWEEN SERBIA AND GERMANY

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***Abstract.*** *Germany has been and still remains the leading European economy and one of Serbia's leading economic partners. In recent years, Germany has been Serbia's most important foreign trade partner within the European Union and one of the leading partners in the area of free zone traffic, high technology transfer, education of Serbian experts, donations and humanitarian aid. German management is known for its quality, as well as for concluding long-term jobs, which is of great importance for Serbia in establishing quality and successful economic relations with the world. With the help of Germany, Serbia can secure a greater market position in the world, especially in the fields of agriculture, textile, chemical, metas, food industry, as well as consumer goods. Stable business relations have been built between Serbia and Germany over the last few years, their progress is conditioned by a number of factors, but above all by Serbia's progress from the point of view of Germany, both economically and politically. Trust and partnership have become an important link in which the two countries confirm their commitment to common European values.*

*Despite a number of factors that drive them closer economic activity, Germany and Serbia are nowhere near the maximum level of co-operation or harnessing their full potential in the sphere of economic exchange. The coming years represent a period in which it will become clearer whether the level of cooperation will rise to a qualitatively and quantitatively higher level, or whether to abandon that ambition and continue according to established stereotypes. Serbia's membership of the European Union is a goal that has been pursued since the 2000 changes. The majority of the population agreed that change was needed for the better. Negotiations on the Stabilization and Association Agreement, which Serbia began in October 2005, were finalized in March 2012 with Serbia's candidate status for the European Union. In January 2014, the 1st Intergovernmental Conference between the European Union and Serbia was held. Candidate status is a new impetus for a more intense confrontation of Serbia with various foreign and domestic challenges and an impetus for internal reforms as an integral part of the European integration process. Modernization of the country and further resolution of the problems of Kosovo and Metohija are just some of the challenges in which Germany, with the support of Serbia, is trying to impose its views. The global economic crisis, the Eurozone crisis, the migrant crisis, as well as the economic sanctions imposed on Russia, have led to new global trends and changes both in the international environment and in the process of European integration. These changes impose a rethinking of Serbia's foreign policy and aligning its priorities with the aforementioned trends. The first is certainly the crisis in the European Union, which significantly affects the decline in support of Serbian citizens for EU integration. On the other hand, without the support of the European Union, and especially of Germany, Serbia could face new difficulties in its socio-economic development.*

*In Serbia, the prevailing view is that cooperation with Germany is crucial, especially because of the European integration process, so that Germany should be at the center of the European integration process, both because of its geopolitical importance and economic strength and due to the fact that Germany is one of the largest investors and Serbia's most important trading partner. European integration and German investment are not the only touch points in communication. There are certain obstacles, both political and historical, on the path of improving relations with Germany.*

*In recent years, antagonisms have proven to be not an insurmountable obstacle on the way to improving co-operation between the two countries and solving numerous problems, both concerning relations with one another and those concerning Serbia's European integration. Serbian-German relations have a long and turbulent history, full of ups and downs. During the 20th century, Serbo-German relations were marked by three major military conflicts. Prior to the 20th century, mutual relations did not know such difficult and complex historical experiences, on the contrary, they were marked by a long history of close cultural and economic cooperation.*

***Keywords:*** *economic relations, Serbia, Germany, foreign trade partnership, German investments, placement.*

***JEL Classification: F02, F10, F18, F30***

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**Introduction.** Serbian-German economic relations last a long time and have a history full of ups and downs. Recent decades have shown that historical contradictions have not been an insurmountable obstacle to improving economic co-operation between the two countries. However, the progress of the relationship will be conditioned by a number of factors, and above all by the progress of Serbia in aspects that are both commercially and politically relevant to Germany. The most complicated political obstacle to Belgrade-Berlin co-operation is a different view of solving the problems of Kosovo and Metohija and it can come to light at any time during Serbia's European path.

Germany has been and still remains the leading European economy and the most important economic partner of Serbia within the European Union and beyond, and one of the leading partners in general in free zone traffic, high technology transfer, education of Serbian experts, as well as donations and humanitarian aid.

German management is recognized for its quality, as well as for concluding long-term jobs, which is of great importance for Serbia in establishing quality and successful economic relations with the world. Trust and partnership have become the most important link in which the two countries confirm their friendship and commitment to the common values of European society. Serbia's European integration, tackling the migrant crisis and other challenges that Europe faces, as well as a shared interest in harnessing the huge potential of China's New Silk Road, are touching points where relations can be fostered and cooperation with Germany strengthened.

**Literature review.** The cooperation between Germany and Serbia in their works was investigated by: Avramov S. and Kreća MD (1993) in "International Public Law", Stepanov R. and Despotović Lj (2002) in "European Union, Institutions, Law", Kragulj D. and Milićević D. (2005) in "Economics, Introduction to Economic Analysis", Dašić D. (2007) in "Principles of International Economics" and other authors.

**Aims.** Aims is to highlight certain aspects of economic relations between Serbia and Germany.

**Methods.** The author used the methods of static and logical comparison, systematization and generalization, which made it possible to achieve the goal of the study.

**Results.** We consider it necessary to investigate certain aspects of economic relations between Serbia and Germany in the following areas:

- bilateral cooperation between Serbia and Germany;
- mutual points of Serbia and Germany;
- trade exchange of Serbia with Germany;
- quantitative and qualitative analysis of foreign trade of Serbia and Germany;
- German investments in Serbia.

*Bilateral cooperation between Serbia and Germany.* Economic relations between Serbia and Germany have been laid on a stable footing by the agreements of the two countries of 1952 and 1969, and trade takes place on the basis of EU law. We should also mention the gravitational model, which indicates that the smaller the distance between the two countries, the greater the volume of exchange (like Newton's law in physics), in other words, the closer the two countries are to one another, the greater the volume of their trade can be expected [1].

In the cooperation of the two economies the following are realized: compensation jobs, investments, banking and financial cooperation, transfer of high technology, cooperation in the field of transport, tourism, traffic in free zones, education of Serbian experts, donations, humanitarian aid, etc.

Serbia has notable production in the food, chemical and textile industries, as well as consumer goods. The presence of goods from Serbia in Germany and better ways of informing potential buyers should definitely increase. The situation has partly improved, with a significant number of domestic companies in previous years receiving declarations for their products, which is a necessary condition for exporting goods to all EU countries.

In order to attract more German capital, Serbia should take advantage of the following: favorable geo-strategic position, highly educated staff, relatively low labor costs, laws adapted to EU legislation, tax and other benefits. With the privatization process, capital from Germany is significantly more active in Serbia as well, with significant investments starting at millions of euros.

Despite numerous factors facilitating more fruitful business cooperation, Germany and Serbia have not reached the optimum level, the fact that not all the available potentials have been put into the function of cooperation and development, which would enable a significant increase in economic exchange. The coming years represent a period in which it will become clearer whether the level of cooperation will be increased to a qualitatively higher level or whether it will give up on that ambition and continue according to established patterns and stereotypes.

*Mutual points of Serbia and Germany.* Of the many factors, the key foreign policy framework of Germany and Serbia is the European integration process. In

foreign policy terms, this is one of the important mutual points of the two countries. Development and strengthening of democracy, peace and security, coexistence and cooperation with neighbors, overcoming conflicts and consequences of the events of the recent past, as well as economic development are the impetus for the conduct of Serbia's foreign policy towards EU countries, including Germany.

Mutual point is also the cooperation between the European Union, (certainly Germany) and the Western Balkans, in controlling and directing the effects of Middle Eastern and North African migrants to Europe. The influx of refugees, economic migrants, asylum seekers and extremists from these areas is also happening across the Western Balkans. The cooperation of Germany and Serbia in this field is inevitable.

Mutual point can also be coordination in exploiting new global routes of international trade, with China's New Silk Road (Belt and Road) first. This physical connection project of China and Western Europe is the most ambitious investment program of our time. Germany and Serbia's co-operation in relation to this initiative can be of great economic benefit to both countries [2].

Cooperation with Germany should be prioritized, both because of the geopolitical importance and strength of this country and the fact that Germany is one of Serbia's largest investors and major trading partners. In Serbia, there is an awareness that cooperation with Germany is essential, especially because of the importance of European integration, where Germany plays a key role. There are certain obstacles, both political and historical, on the path of improving relations with Germany. European integration of Serbia or German investments are not the only important touch points in mutual communication, and the past is just a stumbling block in mutual relations and a cause of mutual misunderstanding and distrust. Over the last few years, these antagonisms have proven to be not an insurmountable obstacle on the way to improving the cooperation of the two countries and solving numerous problems, both those concerning mutual relations and those concerning the European integration of Serbia.

*Trade exchange of Serbia with Germany.* Germany is extremely important to Serbia, not only as a key factor on the road to the European Union, but also as one of its main trading partners. Germany is traditionally one of Serbia's leading economic partners - the second foreign trade partner, the second export market for Serbian goods, the first import partner, one of the five first foreign investors and the largest donor of EU countries. Serbia not only needs financial resources but foreign experience - both in the social and economic spheres.

Germany's economic power is largely based on small and medium-sized enterprises. They are actually large (from the Serbian point of view) but medium in number of employees and have become an important part of the powerful German economy mainly through very close co-operation - both with one another and with co-operation between local communities, educational institutions and businesses. Their approach entails a vision and commitment to achieving competitiveness, which will ensure survival and progress, regardless

of the efficiency of competition. This should be a paradigm for the Serbian economy as well, which should support small and medium-sized enterprises in development, as well as rely on German small and medium-sized enterprises, which from the perspective of Serbia are huge because in Germany small and medium-sized enterprises are those with a turnover of 50 million, up to 12-13 billion euros. It is necessary to create a positive business climate, in order for businessmen to come in contact with people of similar interests, an important part of this chain are precisely the conditions that the state needs to provide in order to improve the business climate [3].

In order to improve the business climate, among other things, it is important for Serbia to continue its economic and structural reforms, regardless of the difficulties it faces, the reform process is not something that is completed in the short term, but needs to be accelerated as each country needs to strive for progress.

The articles that Germany buys the most from Serbia are: raspberries, gas, car tires, iron, steel and copper products, rubber, socks and sugar. In terms of imports from Germany to Serbia, Germany ranked second most bought: cars, pharmaceuticals, tobacco, as well as mobile phones.

From December 1, 2000, the European Union and German markets are unilaterally opened to products from Serbia, and a more dynamic phase of economic exchange begins. During this period, Serbia recorded an increase in both exports and imports from Germany. In the first decade of the 21st century, the average growth rate of Serbia's total merchandise exports was 20.4% and imports 20%, expressed in euros (which was achieved from a low base). Merchandise exports to Germany grew even faster in the same period (21.2%), while imports had a slightly slower pace (18.1%). Total trade between our country and Germany has increased, e.g. in 2007 and amounted to $ 3.107,30 million. Exports to Germany compared to total exports from Serbia amounted to 10.5% percent, while imports from Germany accounted for 11.9% percent of our total imports. The recession (2008-2009) dramatically reduced Serbia's foreign trade, GDP and investment. This was also reflected in an exchange with one of three key foreign trade partners - Germany. However, exports are recovering relatively quickly and in 2011 they are more than a fifth higher than pre-crisis 2008.

Germany's assistance in reform and constant capacity building can also be considered valuable. According to a survey by the German-Serbian Economic Association, 44 percent of companies described the reform process as satisfactory, while 42 percent were dissatisfied with the reform results. If it can be concluded that the first result is definitely encouraging, it is important to point out that the second percentage points to both the shortcomings of the reform process itself and the difficulties that Serbia faces in this process. The most important thing is to be well aware of the specific causes of dissatisfaction of these respondents in order to better guide the further reform process and to achieve the desired results as soon as possible.

In what area and scope of reforms can Serbia also rely on the assistance of Germany? Greater progress in establishing the rule of law and a secure and well-defined economic policy, as well as the completion of public administration reform, will greatly contribute to Serbia's better reputation as an investment destination. Companies that are willing to invest also want to have the assurance that they will be able to participate equally in the market and profit from it. If tendering and procurement management systems generally do not operate according to rules that are very strict at EU and Member State level, then these companies did not have the necessary initiative to invest in Serbia, because, above all, this does not fit their business ethics. These are all areas where German knowledge and experience can definitely help Serbia overcome its institutional and structural deficiencies.

In the business sense, between Serbia and Germany, a strong link has been built in recent years and the overall relations between the two countries have been promising. In addition, further intensification of cooperation between the two countries in the fields of economy, politics and civil society is necessary. The progress of the relationship will be conditioned by a number of factors, and above all by our progress in aspects that are both business and political in Germany. These are, first of all, the rule of law, financial stabilization and efficient state administration. Progress in these areas will create the preconditions for improving relations not only with Germany, but also much more broadly, as investors, although often taking risks, still tend to invest where they can make the most of their business. Building a positive image after years and decades of mostly negative ones is not an easy job.

The desired reforms and progress cannot be achieved overnight. However, if there is good communication with interested partners and a good evaluation of their impressions and problems, much can be done to improve Serbia as a destination for long-term investments. Successful accession negotiations and implementation of the announced reforms will make Serbia even more attractive for investment and will attract even more German companies. Serbia has very high potential, which it should and must use now [4].

*Quantitative and qualitative analysis of foreign trade of Serbia and Germany.* Serbia's trade with Germany has been characterized by a rather imbalanced balance (unfavorable domestic export structure, with high levels of imports from Germany), but in recent years there has been a positive upward trend in exports.

As is well known, the most important place in Serbia's exports to Germany have the following: steel, copper and aluminum products, electrical appliances and equipment, chemicals, food products, especially fresh and frozen fruits, vegetables and cereals. Imports from Germany are dominated by: passenger cars, propulsion machines, electric machines, machine parts, aluminum products, medical-pharmaceutical products, perfumery preparations, plastics in primary forms, paper and pulp products. The relatively high share of capital goods in exports to Germany, just over a third, which indirectly testifies to the

importance of German companies in Serbia, which largely produce components. The same type of product accounts for just over half of total imports, which is natural given that Germany is Serbia's main supplier of machinery and transport equipment, accounting for 53.8% of total imports, of which 18% are road vehicles, and chemical products , make up another 19%. Machines and transport equipment account for almost half of Serbia's exports to Germany at 47.8%, but other products of potentially higher value added are poorly represented, e.g. chemical products account for only 6.7% of exports. A considerable proportion of exports to Germany are from vegetables and fruits (9%), non-ferrous metals (6.3%), and clothing (5.8%), which are products of a lower level of processing. Products that make up more than 1% of exports include external pneumatic tires, cars, certain drugs, motor vehicle parts, copper cathodes, hula-hop socks, cigarettes. On the import side, the aforementioned machine parts also account for 16.2%, cars with 4.2%, certain types of medicines with 2.4%, body parts with 1.2%, etc. [5].

Based on a comparison of the structure of domestic exports to Germany after 2015 with the period before 2011, some structural improvements can be observed, ie a qualitative improvement in domestic exports. By analyzing the share of individual articles in exports (lower processing stages), such as: food, animals, oils and fats, beverages reduced the share of total exports to Germany in 2015 compared to four years earlier to 12.4% from 14. 7%. The list of items from some thirty leading exporters from Serbia to Germany after 2015 points to an unfavorable export structure. The first is Siemens with as much as 13% of exports to Germany, followed by Leona (5.2%), Draxlmaier (3.9%), ImpolSeval 3.7% of exports to Germany 2015), IGB Automotive Comp 3.1%. Following are: Fiat Serbia, Fresenius Medical Care, Hemofarm, Gorenje, Contitech Fluid Serbia, PLD Serbia Ltd., Boshc, Tiger, Altiva, Falke, Philip Morris Operations (Niš). Among others, there are: NIS, Kikinda Foundry, Tetra Pak, Smederevo Ironworks, RTB Bor Cooper Standard Ltd., TF Kable (Zajecar), Henkel, Bakra Sevojno Rolling Mill, Gosa FSO.

The largest importers from Germany are largely from the automotive, mechanical and electrical industries, and pharmacy, which is expected, given the structure of imports from that country, in the first five places there are: Siemens, almost 24% of imports from Germany, Porsche SCG 2Star Import, 2.7%, Ball Packs 2%, Tetra Pak Production, 1.8%. Among the first 15 are: Grammer, IGB Automotive Comp, Henkel, Bosch, Philip Morris, Phoenix pharma, Fiat Serbia, Hemofarm, Grundfos Serbia, Tarket [6].

When looking at the type of foreign trade, in 2015 and in previous years the bulk of commodity imports accounted for the purchase and sale (83%), while the only remaining type of foreign trade with relevant share is the processing (12.3%). On the Serbian export side to Germany, buying and selling has a less dominant position with 60.3% of the value of all export operations. Waste processing accounts for 19%, turnover in free zones 9.7%, and post-processing operations 8.5%, indicating a relatively poor position of the domestic textile

industry, which mainly performs jobs that bring low added value (5% up to 10%) [7].

*German investments in Serbia.* In terms of investment projects, with 13.5% of their total, ie foreign direct investment, Germany ranks second in Serbia. In terms of funds invested since the beginning of the 21st century, when serious investment in Serbia is starting, Germany, with just over € 1.2 billion, is ranked third, behind Austria and Norway. As of the end of 2000, it is estimated that Germany has invested over € 1.5 billion, with close to 25,000 people found in these firms. German companies have employed six thousand workers and received 7.1% of total SIEPA funding, making them among the leading investors.

The largest German investments in Serbia are SHTADA (510 million euros), METRO (165 million euros), MESER TEHNOGAS (114 million euros), HENKEL (78 million euros), NORDCUKER (45 million euros). The key area of investment cooperation is the automotive sector (LEONI, DREKSLMAJER, GRAMER, NORMA GROUP, CONTINENTAL-CONTIGENT). Also important are the investments of SIMENS and WAKER NOJSON, manufacturers of light construction and agricultural machinery. Falke has invested over € 10 million in socks manufacturing, while Muehlbauer is the world leader in secure electronic identification solutions in Stara Pazova. Reum invested in an auto parts factory and Medsorg invested in a recycling plant. In the food processing sector, MEGGLE has taken over Kragujevac-based dairy Mladost. Lidl is the first German retail discount retail chain in Serbia, Lidl (part of the SCHWARC Group), while one of the largest trading companies in the world operates in our country: the German Metro.

Lidl currently operates in 30 countries and provides services to approximately 10 million customers every day. Plans for expanding the network also include expansion in Serbia, as an important market in Europe, and the first stores in the United States have been opened [8].

The importance of opening Lidl to our economy is large, more than 350 domestic products are on its shelves. This investment is worth 205 million euros, and a total of 1,553 employees are employed. Lidl also announces good working conditions as well as overtime pay. There is no doubt that Lidl will become the number one retail discount retailer in Serbia.

As a leader in economic co-operation with Serbia, Germany can encourage and withdraw other countries, especially from the European Union, to invest more in the Serbian economy. The positive effects of increased economic co-operation enable Germany to be more active in Serbia's efforts to accelerate reforms and the European integration process

**Discussion.** With merchandise imports from Germany, which is still 17% lower in 2014 than the 2007 pre-crisis year, the situation is almost identical with the aggregate imports of Serbia, which has visibly increased due to excessive public spending and capital investment.

After the strong recession hit in 2009, the recovery of the Serbian and also the economies of the Eurozone countries began, which led to an increase in exports to these countries, including to Germany. The debt crisis since 2010 with Greece, and then in other peripheral countries of the European Union, with exhalation in 2015, has had a negative impact on economic activity, foreign trade flows and the inflow of investments in less developed European economies, including Serbia. Germany has managed to maintain and even improve its economic performance during this period.

For the analysis of the post-2012 period, the period before 2011 was taken for comparison - both the dynamics of growth and the change in the structure of trade between the two countries. In 2011, domestic merchandise exports to Germany amounted to EUR 953 million (11.3% of Serbia's total exports), while imports from Germany: EUR 1.539 million or 10.8% of total country's imports. In recent years, trade with Germany has experienced strong growth, far exceeding the rate of increase in total domestic trade, but, in addition, a much larger share of Germany is present in Serbia's foreign trade, which indicates that in the longer term the dynamics of trade coincide with Europe's largest economy with the overall dynamics of exports and imports as expected.

In the four observed years (from 2011-2015), merchandise exports averaged 12%, imports 7.1%, while the dynamics of total foreign trade of Serbia was more modest (average export growth 9.4% and imports 3.5%, expressed in Euros). This has also led to an increase in the coverage of imports by exports, when it comes to Germany from 62% to 74%. Merchandise exports with Germany in the period 2015-2017 increased by 27%, imports in the same period 25%. The coverage of imports again in 2017 was 77% [9].

According to data from the Statistical Office, in 2015, the total foreign trade amounted to EUR 3.5 billion, which represents an increase of 12.1% compared to 2014. Total exports of goods to the Federal Republic of Germany in 2015 amounted to 1.5 billion euros and represented 12.5% of total exports of Serbia. In the list of export destinations, it was in second place in terms of exports, with an increase of 13.1% when compared to the period January-December 2014.

EUR 2.0 billion of goods were imported (an increase of 11.5% compared to 2014), with a share of total imports of 12.4%, therefore the coverage of imports by exports was 74.0% [9].

According to the Statistical Office, in the period January - June 2016 alone, the total foreign trade in goods with the Federal Republic of Germany amounted to EUR 1.97 billion, and a deficit in trade with Serbia amounted to EUR 218.2 million. Total exports in the first six months of 2016 amounted to EUR 877.3 million (share in total exports amounted to 13.3%,) and in the list of EU

countries to which Serbia exports, FR Germany ranked second, just behind Italy. Compared to the same period of 2015, there was an increase of 25.9% in exports. On the other hand, EUR 1,095.5 million worth of goods were imported and increased by 11.8% over the observed period. The total import share was 12.9%. In the list of countries from which Serbia imports its products, FR Germany ranks first [9].

A key factor in the constant growth of exports from Serbia to Germany is the growing number of German companies in Serbia, and these companies export their products from factories throughout Serbia to customers and their partners in the German and European Union markets. The expansion of production facilities of German companies is underway, which will only reach its production maximum in the coming years, and it is almost certain that trade with Germany will increase. In the analyzed period, 370 companies with German capital were operating in Serbia, employing 48,000 workers last year, and already in one year (2019), the number of employees increased to approximately 60,000.

**Conclusion.** Despite a number of factors that drive them closer, Germany and Serbia are nowhere near reaching the optimum level of economic co-operation. Reasons also need to be found in the weak institutional capacity of Serbia and the countries of the region, the unsatisfactory level of cultural and intellectual ties, and the even more explicit responses of Germany to European and global challenges.

The coming years represent a period in which it will become clearer whether the level of cooperation will rise to a qualitatively higher level, or will give up this ambition and continue according to established patterns and stereotypes.

Germany is the engine of the European economy and for many years it has been among the top three exporters in the world, alongside the US and China. It is the leading EU country and the largest net financier in Europe, and it is crucial for Serbia to secure its support for EBRD, EIB and IBRD funds. There is no doubt that Germany is Serbia's most important business partner in the European Union. Economic cooperation between the two countries, primarily commodity exchanges (with German investments and strong donations), has a steady upward trend over a long period of time, which is temporarily slowed down or interrupted solely by the effects of non-economic factors. Since political relations since 2000, and especially since 2013 (after the Brussels Agreement), do not hinder Belgrade-Berlin cooperation, and, first and foremost, thanks to mutual economic interests, it is expected that the economic cooperation between the two countries will continue to grow.

**Author contributions.** The authors contributed equally.

**Disclosure statement.** The authors do not have any conflict of interest.

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# COMPLEX EVALUATION OF COMPETITIVENESS OF AGRICULTURAL ENTERPRISES

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***Abstract***. *The objective of the article is to determine a complex evaluation of competitiveness of agricultural enterprises. It is established that the analysis of the activity of an enterprise regarding increasing its competitiveness involves an assessment of the achieved level of utilization of available potential (organizational, technical, production and technological, social, economic, etc.). Modern world and local methods for determining competitiveness at different levels have been considered. The competitiveness factors against the state level have been analyzed and it is stated that in relation to economic entities and agricultural enterprises, in particular for the objective evaluation of competitiveness, the evaluation should be supplemented by such indicators as profitability of production, labor productivity, conformity of prices to solvent demand of the population. The well-known approaches to evaluating competitiveness of agricultural products have been analyzed, and it has been revealed that they do not take into account such indicators as climatic conditions, location, labor, material, energy capacity, etc.*

*It has been stated about the necessity to take into account economic and technical parameters (they determine the profile of a product in terms of its falling under a certain type or class of products), including constructive ones that reflect technical and engineering solutions inherent in a certain type of products, as well as regulatory parameters (compliance with standards, norms, rules). It has been stated that the competitiveness of new goods should be outstripping. The need to consider the strategy of competitors has been identified. The basic directions of formation of a system for ensuring necessary competitiveness of production has been proposed. The complex evaluation model of competitiveness of the enterprise has been suggested. It is stated that the more successful the tasks of social, ecological and economic nature are solved in a specific organizational and production entity, the more stable its position is in the internal and external consumer markets and the higher its competitiveness is.*

***Keywords:*** *competitiveness, agricultural enterprises, indicators, profitability of production, labor productivity, demand.*

***JEL Classification: Q10, Q13, Q19***

***Formulas: 0; fig.: 1; tabl.: 0; bibl.: 9***

**Introduction.** Those enterprises where the production and marketing of goods and the effective management of finances are organized best are competitive. Financial and economic indicators of the enterprise's activities, such as fund return, profitability of sales, autonomy ratio, current liquidity ratio, working capital ratio, return on assets, profitability of production, rate of production capacity utilization, as well as investment prospects, manufacturability and environmental friendliness of production, what share of the market held by the enterprise, etc. may act as indicators of competitiveness of the enterprise.

Many agricultural enterprises produce a wide range of products, which differ in terms of economic indicators of costs, results, and thus with the return on resources over the same calendar period, especially in dynamics. Therefore, the economic performance of each enterprise is averaged and derives from the production rates of specific products. In such circumstances, along with the

traditional concept of "competitiveness of the goods" it is necessary to define the related, and, at the same time, separate concept of "competitiveness of the agricultural enterprise".

The competitiveness of the agricultural enterprise can be assessed by benchmarking the specific positions of several enterprises functioning in the same market by such parameters as technology, which ensures the capacity of equipment, knowledge and practical experience of staff, management system, marketing policy, image and communication, etc.

Its ability to adapt to changing competition conditions characterizes the competitiveness of the agricultural enterprise as well. It is a complex of intellectual, technical and economic as well as organizational and economic characteristics that drive success of the enterprise in the market, implementation of re-engineering and formation of a managerial influence on competitiveness.

One important point is to be noted, that is the competitiveness is not an inherent quality of the agricultural enterprise. This means that its competitiveness can only be identified or assessed only within a group of regional agricultural enterprises belonging to the same industry or enterprises that produce goods-substitutes. Competitiveness can only be demonstrated by a benchmarking of these firms between themselves, both nationwide and globally.

**Literature review.** The problems of management of agricultural competitiveness and the methodology of its quantitative evaluation are analysed in the works of G.M. Brashevskaya [1], A.G. Dementieva [2], I. Kononenko [3], O.O. Krasnorutsky [4], Sh.Sh. Magomedov [5], I.A. Minakov, N.I. Voronova [6], V.M. Goncharov, Yu.N. Dorechynsky, V.Yu. Pripoetn [8], M.A. Hvesik [9] and others.

**Aims.** The objective of the article is to determine a comprehensive evaluation of competitiveness of the agricultural enterprises.

**Methods.** The author used the methods of static and logical comparison, systematization and generalization, which made it possible to achieve the goal of the study.

**Results.** Our research has made it possible to establish that the analysis of the enterprise's activity aimed at increase of its competitiveness involves an evaluation of the achieved level of utilization of available potential (organizational, technical, production and technological, social, economic, etc.). It should be noted that the evaluation of competitiveness of the enterprise has much in common with the analysis of its economic activity, namely, with the indicators that characterize the stability of its position. However, a comprehensive evaluation of competitiveness of the enterprise requires consideration of systematic interaction of factors, including not only economic, but also social and environmental ones. In view of this the objective necessity to identify potential in the economic, social and environmental areas of increasing the efficiency of the organization, it is advisable to develop a methodology for assessing the competitiveness of the enterprise.

So far, a number of techniques for determining competitiveness at different levels have been tested in the world and domestic practice. For example, the competitiveness of the state involves the evaluation that is based on ten factors. Each of them, in their turn, is calculated on a number of criteria (340 criteria in total). 280 out of them are based on the UN, the OECD, the IMF and the IBRD statistics, and 60 are expertly defined. This indicates a very thorough approach of international organizations to assessing competitiveness of specifically a state [2, 8, 9].

The first factor is the "economic dynamism." It includes such criteria as the rate of economic development, the stability of the local currency, the level of industrial production, the volume of production of basic goods per capita, etc.

The second factor is the "efficiency of industrial production." It is determined by calculating direct and indirect labor costs, including costs related to material incentives, staff retraining, absenteeism, etc.

The third factor is the "market dynamism." It combines the indicators that characterize the amount of consumer spending per capita, after sales service of goods, quality level, design. It is considered that the more intense activities of the companies directly related to sales are, the higher the competitiveness is.

The fourth factor is the "development of the financial system." It includes indicators that make it possible to get an overview of the financial state of the country, activities of commercial and non-commercial banks, the stock market, etc.

The fifth factor is the "labor resources." These include the size and growth rate of the population and the workforce, the unemployment rate, the staff qualification, the level of production training, the availability of vocational training, etc.

The sixth factor is the "role of the state". These are the indicators that reflect the taxation level, the share of the public sector in the national income of the country, the content of economic policy, the level and type of state support, etc.

The seventh factor is the "resources and infrastructure." It combines the indicators that characterize the availability and use of resources, infrastructure development, etc.

The eighth factor is the "level of business development." It includes indicators, characterizes the possibility of business development, such as the percentage of economically active population engaged in small and medium-sized businesses, the creation of favorable conditions for their carrying out, etc.

The ninth factor is the "the country's policy towards innovations." It is evaluated by such criteria as the percentage of state-funding for R&D in GDP, the availability of legislative framework for innovations in sectors of the national economy, the share of high-tech products in the total industrial production of the country, and so on.

The tenth factor is the "social and political situation." It includes the indicators that determine the social and political situation and prospects for its development.

It should be noted that the system of the mentined factors for assessing competitiveness in relation to the state level is quite acceptable. However, in relation to economic entities and agricultural enterprises, in particular for objective evaluation, it should be supplemented by such indicators as profitability of production, labor productivity, conformity of prices to the solvent demand of the population, etc.

Well-known approaches to evaluating competitiveness of products include the following, namely [1, 3, 4, 7]:

- selection and analysis of the market for the sale of goods, works, services;
- analysis of competitors for the production of similar products;
- selection and justification of the most competitive analog product as a basis for comparison;
- identification of the required parameter groups to be evaluated;
- establishment of a set of single indicators for the respective parameter groups;
- selection of calculation methods, definition and analysis of aggregated indicators by product groups;
- calculation of the integral indicator of competitiveness of the goods, of the enterprise;
- development of the enterprise's commodity policy on production of the goods for a specific market, export, development of measures for increasing the competitiveness or decontinuing (withdrawing them from production) of goods.

We have found that the approaches to assessing the competitiveness of enterprises operating in different spheres of production should be complemented by indicators that take into account the specifics and features of the respective sectors of the economy. For example, when it comes to agriculture, these are soil and climatic conditions, location, labor, material and energy capacity, etc.

Based on the cost of production, as well as on the income required for profitable operation, the enterprise determines the selling price, which ensures the target production efficiency. However, this economic indicator, in all its importance, does not fully reveal the essence of the production of competitive products. Therefore, for an objective evaluation of its competitiveness, along with economic parameters technical ones are used too (based on clustering products into a particular type or class of goods). Also, for these purposes constructive parameters are utilized that reflect the technical and engineering solutions inherent in this type of products, as well as regulatory parameters (i.e., compliance with standards, rules, norms). These include the parameters of reliability, safety, durability, consumer value, etc. Regulatory parameters include ergonomic ones (like hygienic, physiological, psychological, etc.), which show the conformity of the product with the properties of the human body.

It should be taken into account that as soon as it becomes available in the market any product begins to lose its competitiveness in one way or another. This process can be slowed down, but it cannot be stopped. Therefore, the competitiveness of new products must be outstripping. Special attention should be paid to improving the quality of the product and reducing the cost of consumption. In order to achieve an effective comprehensive evaluation of competitiveness of the enterprise, it is necessary to consider the strategy of competitors in the following main directions including:

– identification of the main factors that shape the competitiveness of the proposed goods;

– the level of pre-sales training of other companies that are competitors, which determines the ability to anticipate consumer requests (advertising, sales promotion);

– the practice of other companies that are competitors regarding the names (trademarks of goods);

– the product concept that takes into account the attractive aspects of the packaging of other companies that are competitors;

– after-sale service level of competitors in both the warranty and post warranty period;

– use of the distribution network (local, corporate);

– the practice of flows of goods at competing enterprises, types of transport, volumes of stocks, distribution and types of warehouses, etc.

It is necessary to receive answers to the following questions:

- what requests of the buyer are satisfied by the product;
- to what extent the product performs its functions in comparison with products of competitors;
- how the buyer will use the product;
- what specific requirements of the market are and how well the product meets them;
- the product should be sold in combination with others or separately;
- which sales method is the most effective in this market;
- whether there are “bottlenecks” in the promotion of goods from the manufacturer to the consumer;
- what is to be done to eliminate delays.

Based on all factors, it is advisable to create a system to ensure the necessary competitiveness of products, covering the following areas:

- improvement of the system of staff training and professional development;
- improvement of technical and technological level of production, a product line expansion;
- organization of effective work of quality groups, creation of social conditions for work quality;
- creation and implementation of quality and certification management system;

- formation and implementation of the resource-saving strategy at all levels, which ensures reduction of resource consumption per unit of output [3, 4, 6].

All the said indicators are applicable to agricultural enterprises. However, they do not fully take into account the specifics of agricultural production, the effectiveness of which largely depends on the formed natural, economic, environmental and social conditions of their operations in combination with others, which determine the development of economic entities and the formation of the required level of production of competitive products (Fig. 1 ).

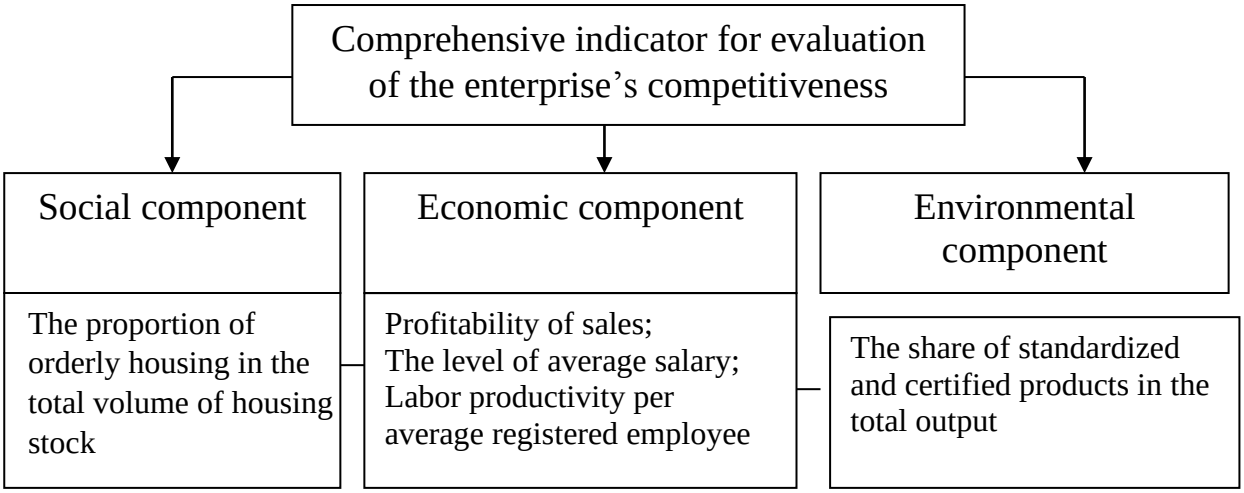


**Figure 1. Model of complex evaluation of the enterprise's competitiveness**
*Sourse: development by author*

**Discussion.** The results of the study show that the more successful the tasks of social, ecological and economic nature are solved in a particular organizational and production structure, the more stable its position is in the domestic and foreign consumer markets and the higher its competitiveness is. Such enterprises are located in all regions of Ukraine, and they usually operate on a completed cycle, i.e., they produce agricultural raw materials, process them and enter the market with a wide range of high value-added products. This approach ensures a high level of economic efficiency and allows them to solve social and environmental problems on this basis.

**Conclusions.** The developed method of complex evaluation of competitiveness of the enterprise includes accounting of economic, social and environmental components. The selection of evaluation indicators for each component (when it comes to the economic component it is profitability of sales, the level of average salary and labor productivity per average registered employee; when it comes to the environmental component it is the share of standardized and certified products in the total output; regarding the social component it is the proportion of orderly housing in the total volume of housing stock) has been explained and reasoned. The implementation of the model is intended to determine the real potential of increasing competitiveness of the

enterprise not only taking into account the economic component, but also equally important social and environmental ones.

The novelty of the method boils down to proposing the system of evaluation indicators, which determine the accounting of economic, social and environmental parameters of competitiveness for evaluating competitiveness of the enterprise. The result of the assessment allows to determine the position of the company in relation to its competitors, identify competitive advantages and potentials in the economic, environmental and social directions of strengthening its competitiveness.

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# Chapter 2
# Development of Finance, Accounting and Auditing

## ISLAMIC CONCEPT OF FINANCING AS PROJECT AND SAFE FOR THE DEVELOPMENT OF SOCIAL SUPER-SYSTEM

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***Abstract.*** *This article solves the problem of variation of efficiency of the state's economic security system, which provides stability and security of banking activities. The functioning of banks is one of the most important priorities on which the investment attractiveness, sustainability, solvency, reliability and further development of the state economy depend. Both traditional banks and Islamic banks function in the world. The Islamic concept of financing is based on the Islamic doctrine of usury and interest and prohibits interest rate and loan capital as a basis for usury. A more modern name for this type of banking is partnership banking. There are around 300 Islamic banks in 80 countries in the world and only 40% of them are in Arab countries. Interest in Islamic banking increases interest-free financing by more than 20% annually. The banking system of the state should include not only traditional banks, but also banks that use the partner financing system. This will contribute to the development of competition, increase the quality of banking services and expand the range of banking products offered. The banking system of the state should be an ensemble of various stakeholders. It can be described as Application of cenology approach to the development of theory and methodology of economic security of state on the basis of the theory of systems, trans-disciplinary approach of the law of structural harmony of system.*

***Keywords****: economic security system, Islamic (partnership) banking, interest of rate, stability, cenology approach, self-organization*

***JEL Classification: E22, E41, E51, E59, G15, G21***

***Formulas: 0; fig.: 1; tabl.: 1; bibl.: 31***

**Introduction.** Due to the processes of financial globalization and internationalization, which is today an attribute of modern development of the world economy, modern traditional and especially modern Islamic banks require improvement and development of new approaches to the organization of their activity and assessment of their effectiveness and influence on the economic security system of the state.

Studies by AD Panov and GD Snox, which revealed the singularity phenomenon and substantiation of the process acceleration coefficient, (2.67), allow us to conclude that, starting from 2016, the crisis phenomena will become

almost continuous, and without leaving one crisis Humanity will enter another [7].

Changing worldviews, applying methodologies based on natural and ethical principles is the main means of solving the problem of singularity. The lending rate generates inflation and is beneficial only to those who carry out the credit issue, not the money supply. The increase in the money supply in the economic sphere should correspond to the projects of development of specific enterprises.

Project management implies interest of the parties involved in the project, minimization of risks and competitiveness of the project product. For example, the initial stage of a logical and structural approach to project management is to analyze the stakeholders in the project results. Traditional banking services, when financing a project, complete their interest at the stage of the loan. Credit risks to the project are a problem for the borrower.

The main tasks of the Islamic economy in accordance with the works of MN Siddiqi: meeting the basic needs for food, clothing, blood, medical care and education for all people; ensuring equality of opportunity; prevention of concentration of wealth and elimination of inequality in distribution of income and wealth; providing all opportunities for spiritual self-improvement; ensuring stability and economic growth in order to achieve the aforementioned goals.

The Islamic concept of economics justifies neither economic development nor the expansion of consumption, if these processes run counter to social justice, weaken the country politically and economically, and all the more threaten its independence. Economic growth and development in the Islamic economy are not a goal but a means, and the state can slow down economic growth or abandon it altogether in the sense that it understands the public good and the public interest.

The Islamic concept of financing prohibits to use of loan interest and is a content project, offering partnership in solving problems of financing a bank customer.

The earnings of Islamic banks are provided by the products they offer to the client, for example:

The main products offered by Islamic banks:

Musharakah (Regular Partnership) assumes that all participants act as business partners who share profits and losses in proportion to the initial investment and agree terms and conditions.

Mudharaba - a special partnership - is a trust financing, when the bank alternately acts as a trustee, when working with depositors, then a client, when financing a project. Part of the income from the project is the profit of the bank, part - the depositors.

Murabaha (trade financing) is an agreement between a bank and a customer to purchase and resell a special price at which. bank profits are pledged.

Ijara - a lease is a contract in which the bank leases the equipment needed to the customer with the possibility of subsequent redemption.

Istisna is a contract according to which the manufacturer (or contractor) agrees to produce (or build) and deliver at the set price at a specified date in the future a sufficiently fully described product (or building) according to the technical characteristics, which fully corresponds to the characteristics of the design activity activities.

Sukuk - Islamic securities for project financing. Sukuk is backed by certain assets, which partially minimizes risks.

Malaysia is an international Islamic finance center. In 2014, Malaysia was the leader in the production of sukuk, with more than 60% of the share of world market . Between 2000 and 2016, the capital of Islamic banks increased from $ 200 billion to $ 3 trillion, and it is expected that by 2020 it will reach 4 trillion. Currently, the growth of the Islamic capital market is 19.7% per year, which is much faster than the growth rate of traditional banks [6;13].

Islamic banking proposed:

1) a ban on the payment of interest (riba - riba);
2) a ban on gambling or speculation (maysir - masir);
3) a ban on excessive risk (garar —gharar);
4) the ban on unfair advantage (jaljahl);
5) a ban on corruption (rishwah - rishwah) [28; 29; 30; 31].

Bearing in mind the invariant's-structure of system of economic security of state as the main point of research, the authors of the present article have formulated that banking is invariant but its components are of a variation nature.

**Literature review.** The Islamic concept of financing is project-based and secure for the development of the social super-system in content. An analysis of recent studies and publications gives grounds to conclude that the topic of managing economic systems, including the economic security of the state from the point of view of cenological and transdisciplinary approaches, is fragmented and, in some cases, comprehensively considered by many authors, including such domestic and foreign scientists like Afontsev S. (2020) in "Jungle of transnational business", Bekkin R. I. (2010) in "Islamic economic model and modernity", Budanov V. G. (2006) in "On the methodology of synergetics", Fufaev V. (2006) in "Economic coenoses of organizations", Chan C. (2020) in "Malaysia: the Islamic financial capital of the world", Iskakov S. (2010) in "World market of Islamic securities sukuk", Hetagurov J. A. (2009) in "Ensuring the national security of real-time systems", Khitsenko V. E. (2020) in "A few steps to the new system methodology", Kryuchkova I. V. (2005) in "Macrostructural factors of economic development of Ukraine and the law of the golden section", Kosinov N. V. (2020) in "Report: Connection of three important constants", Kudrin B. I. (2005) "Self-sufficiency of general and applied cenology. Technogenic self-organization and mathematical apparatus of cenological research", Prangishvili I. V. (2000) in "A systematic approach and system-wide patterns", Murtazina M. F. (2003) in "Resolutions and recommendations of the Council of the Islamic Academy of law (fiqh) – fatwas", Soroko E. M. (1984, 2018) in "Structural harmony of systems" and

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**Aims.** The previously unresolved part of the general problem concerns the development of the theory and methodology of designing a state economic security system based on the application of systems theory, a holistic approach, a cenological approach, the law of structural harmony of systems, a transdisciplinary approach etc. The formation of economic cenosis of banks represented by traditional and Islamic banking for ensuring sustainability state economic security systems is main direction of this article.

The objectives of the article are to substantiate the theoretical and methodological principles for designing a state economic security system based on a cenological approach.

The holistic system of economic security is characterized by the properties of openness, nonlinearity, dissipativity, emergence, purposefulness and operational closure, etc. Such a system operates on the principles of self-organization and self-harmonization. Designing an economic security system under these conditions also implies the use of a cenological approach and principles of invariant-variation approach. Stability of the economic security system of state and the prospects for economic growth depends of phenomena of banking. Formation of economic cenose in bankingis as cooperation of traditional and Islamic banking is the main goal of the study, which is presented in this article.

**Methods.** The article uses methods of scientific knowledge, which are determined by the purpose and objectives of the study, namely: logical generalization in determining the role and place of banking as a type of economic activity in ensuring economic security at different levels. The theoretical and methodological basis of the article are the position of economic theory, theory of banking, theory of management, theory of self-organization, scientific works of domestic and foreign economists on traditional and Islam (partner) conception of banking.

The analytical data and information materials obtained during the preparation of the article are properly summarized and structured in terms of

general requirements for the development of scientific and methodological foundations for the research topic.

**Results.** The authors of this article have focused on the structure constant or invariants (attractors) of system of economic security of state such as banking. The system of state economic security is a holistic complex system. Structurally, it can be represented as subsystems. A large complex holistic system with many internal connections between its objects is a cenosis [11].

"Economic cenosis is a self-organizing multi-species community of organizations (individuals) of various industries (populations) of a separate territorial-administrative entity, characterized by connections of varying strengths (strong, medium and mostly weak), combined by the joint use of natural (ecocenoses), technological (technocenoses), social (sociocenosis) resources and economic niches of demand for products, goods and services, with the action of intraspecific and interspecific selection" [11].

The cenological theory is transdisciplinary because it uses universal principles. Open complex system, incl. the system of economic security has the property of self-organization, self-harmonization, operational isolation and focus.

Let us dwell in more detail on the property of operational isolation, as the most important and multidimensional for the economic security system. The property of operational closure is most closely associated with the property of purposefulness of the system. "The complexity of the system can be manifested in the impossibility of localizing it at the input and output. The point is not only the difficulty of drawing a boundary between the system and the environment, and not so much the mismatch of the cognitive regions of the observer and the system, but the fact that the output reaction is not necessarily related to the input signal and itself affects in many respects its subsequent change. The output is often determined by an internal state inaccessible to observation, and is not a reaction to an input stimulus. This property is called operational closure. The system perceives and enhances something insignificant from our point of view and ignores what we considered to be an input signal, exhibits internal determination, follows its own laws. An input push can trigger a chain of recursive changes, but their outcome does not depend on the input, but on the internal connections and properties of the system, which can also change. And external influences, the environment only modulate this recursion. In such a recursive way "from the achieved", self-organizing systems are apparently realized. Such is the mechanism of the emergence of crystals, living things, prices, social formations, laws, etc. This is more than autonomy in the mathematical sense, as the absence of input signals in the equations of system dynamics. This is a selective perception of the environment. Some signals are ignored, others are perceived and amplified in the contours of positive feedbacks, but the behavior of the system cannot be called a reaction to the input. Behavior determines mainly self-reversal and the current internal structure, which a complex system changes in order to survive. " In a truly

complex system, self-reversal is so great that the output signal becomes, as it were, an internal affair, the result of the circulation of the perceived input push according to the specific configuration of the subsystem connections. The reaction of the system will be characteristic of this structure of connections, will be its own function" [8].

**Discussion.** The presence of the operational closedness [11] of the state's economic security system is interconnected with such economic phenomena as private and state capital, private and state property, public spending, the domestic market, vertical integration, added value, external debt, resistance to crisis disturbances, and crisis transfer. Obviously, there must also exist indicators characterizing the qualitative state of the system, the assessment of which corresponds to threshold values will allow us to draw conclusions about the stability and reliability of the system.

Accordance to reproductive approach, the necessary level of economic security in the economy should provide opportunities for expanded reproduction. The essence of the disorganizing effect of loan interest on the state of economic security can be defined as the appearance of undesirable properties of the system and the appearance of dysfunctions. Disorganizing influence on the system leads to an increase in entropy, ie, a necessary tool may be to test the entropy of systems or to calculate relative information entropy. Also, the concept of the Bayesian ensemble of neural networks can be used as a direction for developing a mechanism for detecting disorganizing actions on the economic security system. With the introduction of certain filtering criteria and the development of the noise distribution algorithm and determining the possibility of managing these criteria, it can be assumed that it will be possible to solve the problem of excitation of dysfunctions of the system.

The use of the Bayes theorem can be applied to studies of all types of models, provided that they are represented by many parameters by which one can make assumptions about the distribution. The validation of the neural network training technique is possible using the "reverse error" algorithm [20].

We can look the effect of disorganization of the economic security via transaction costs mechanism - the disorganizing effect can be measured and expressed in increasing transaction costs in the shadow economy that can be achieved by regulatory action by the state: reduction of interest rates or their cancellation under the specific features of the project, which funded or in the Islamic concept of financing.

The expertise of developed market economies indicates an inverse relationship between the size of M2 and the interest rate on the loan. This is evidenced by the practice of functioning of banks operating on the basis of the Islamic concept of financing - interest-free lending for development projects [21].

List of countries with the lowest rates of interests (fig. 1).

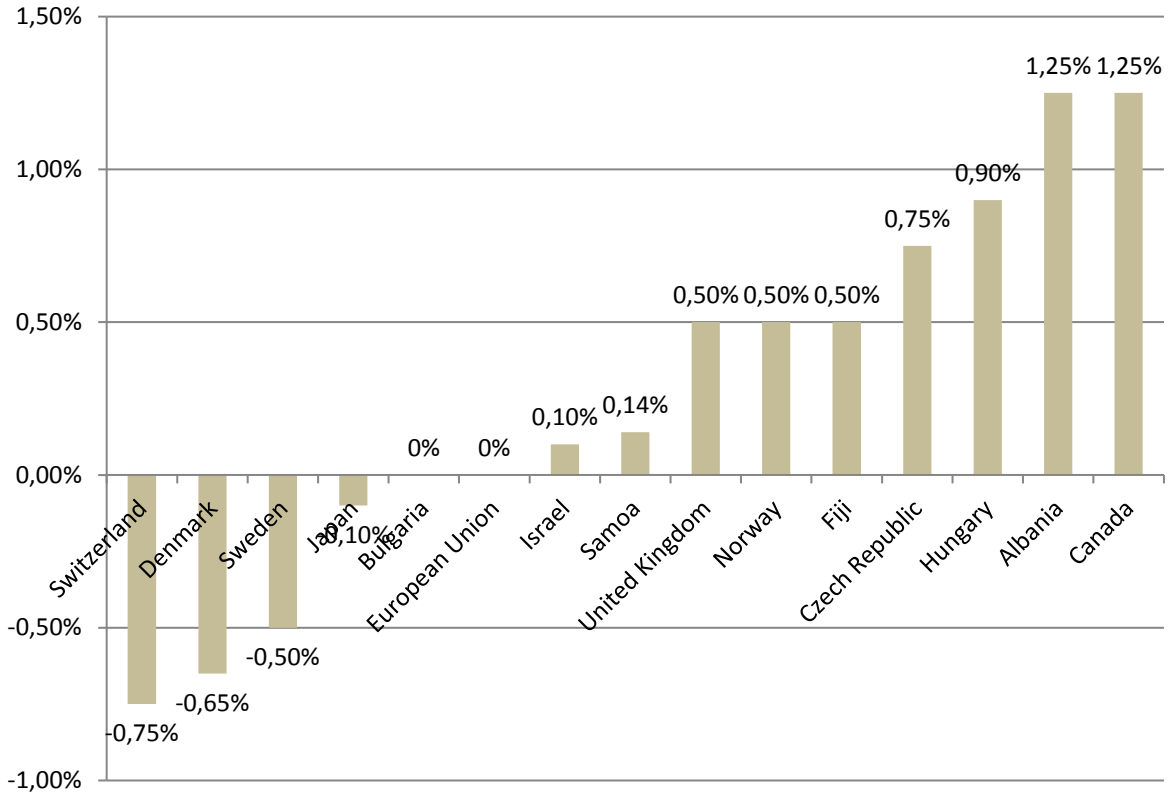


**Figure 1. List of countries with the lowest rates of interests (since 2016)**
*Sourse: https://www.thebanker.com*

According to experts, the assets of Islamic banks are about 3 trillion US dollars. More than 400 Islamic financial institutions are registered in 75 countries of the world [22]. The leaders in terms of financial assets are the financial institutions of Iran (with assets of about $ 200 billion), Saudi Arabia ($ 100 billion) and Malaysia (80 billion dollars), followed by banks in the Persian Gulf and Turkey. Leading financial the center in Western countries is the United Kingdom (over $ 15 billion.) [24; 25].

Also, these conditions contribute to a non-inflationary development of the economy. An obstacle is the lack of a legislative framework that would facilitate.

**Table 1. Ranking of countries in terms of Shariah compliant assets, November, 2018**

| Place in the ranking Country | Assets in billion USD according to the principles of the Sharia | Assets total, billion USD | Shariat Bank Asset, billion USD | Share,% |
|---|---|---|---|---|
| 1--st | Iran | 315 | 315 | 100 |
| 2-d | Saudi Arabia | 133 | 225 | 61,3 |
| 3-d | Malaysia | 108 | 358 | 28,8 |
| 4-th | UAE | 86 | 201 | 42.7 |
| 8-s | Turkey | 22 | 520 | 4,3 |
| 12-e | Egypt | 7 | 144 | 4,9 |
| 20-s | Algeria | 1 | 90 | 1.1 |
| 23-d | Tunisia | 0,8 | 36 | 2,2 |

*Sourse: https://www.thebanker.com*

**Conclusion.** The system of economic security should be structurally functional stable and develop proportionally, possess the properties of harmony and self-harmonization. . "The structural harmonization of a complex whole, carried out self-organizing and therefore taking the form of self-organization, is directly related to its restructuring - the redistribution of the weights of structural elements, subunits, units, their relative contributions, values, roles, functional responsibilities, positions, intra-acquired organizational statuses, etc. To carry out such transformations and preserve the newly acquired state - to maintain a stationary regime of self-reproduction of integral quality It requires an additional influx of resource, material costs, intensification of energy exchange" [14, p.30]. The law of structural harmony of systems "there are two groups of system characteristics such as invariants and variations". "When developing a management strategy or adjustment setting, when a complex self-organizing system is the object of control or correction, it is important to distinguish what should be changed, transformed (variations), and what should remain unchanged, not subject to transformations, refined, strengthened (invariants). [13, 14]. An invariant aspect of any system is its structure, which always has a certain level of diversity. Through its harmonization, the system receives a nonequilibrium state, necessary for its effective life. Thus, it acquires an optimal mode of existence, characterized by functional quality.

Generalized golden sections are invariants, on the basis of and through which, in the process of self-organization, natural systems acquire a harmonious structure, a stationary mode of existence, structural-functional ... stability "[15, p.132]. The design of a stable self-organizing economic system of economic security should be based on the law of structural harmony of systems, Attractors or nodes of the measure to which the self-organizing system seeks is a recursive series of golden sections.

Also, the design of economic cenoses should comply with the law of structural harmony of the systems, the attractor of the golden ratio or be carried out on the basis of a recursive series of golden sections: 0.618...; 0.682...; 0.725...; 0.755... 1.0 as the nodes of the measure and involves the transitions of integrated measures of cenoses from one node to another.

The methodology for analyzing patterns for various business forms as applied to economic cenoses was developed by prof. V.V. Fufaev The essence of the methodology can be represented as follows:

1. A list of all types of activities for a sample of organizations of the selected economic coenosis is compiled.

2. According to the list, organizations with the same main activity are recounted.

3. The types of activities represented in this sample by the same number of organizations are combined in castes.

4. Castes are arranged in order of decreasing the number of types of activity in them, as a result of which the distribution of types of activity by repeatability is obtained [4, p.10].

To diagnose the state of economic cenoses (as well as other types of formations) on the subject of "norm-pathology" by BI. Kudrin [9, p. 97]. The author adheres to the point of view that the diagnosis of "norm - pathology" can be performed using a recurrent series of golden sections - nodes of the measure characterizing the norm and anti-nodes - characterizing the pathology. It is necessary to change the paradigm of forming a system of economic security as the main condition for economic growth. The transition to a market and the weakening of state regulation of the economy, the priority of private capital without taking into account the social responsibility of capital, and ignoring the principles of vertical integration pose threats to the state's economic security system and to the resilience of the economy to crisis disturbances, both internal and external.

The indicator confirms the above is the level of the shadow economy, as a complex of different types of economic activities carried out outside the legislative environment, which causes both asymmetry in economic development and deep violations in the economy in terms of ensuring the integrity, operational closure and focus of the economy as system. According to various estimates, the share of the shadow economy in Ukraine is 45.4% of official GDP [19]. The basis of this phenomenon is the asymmetry of the price of legality and illegality of using the market mechanism, which is realized through the mechanism of transaction costs. The minimization of asymmetry is also due to the law of structural and functional harmony of systems with attractors of a recursive series of golden sections and can be achieved with:

- balancing and harmonizing the ratio of public and private capital in the economy;
- harmonization of tax rates and the taxation system as a whole;
- harmonization of banking and creation new competitive form of banking – Islamic as safe for social super-system,
- balanced distribution of income between regions;
- a harmonious ratio of external debt to GDP;
- harmonious correlation of state and private property, expanded reproduction of state property and increase in government spending;
- proportional correlation of spheres and sectors of the economy based on the principles of vertical integration and designing the creation of value chains, returning to balance planning methods taking into account harmonious proportions;
- ensuring a proportionate ratio of export-import operations;
- minimization of commodity exports and ensuring the priority of exports of goods with high added value.

In this regard, "... the importance of economic architectonics, as well as the institutional possibility of its harmonization after external and internal shocks, should be emphasized again. If the freedom of entrepreneurship has "built" a hierarchy of enterprises with the closest possible approach to the gold row, then developed institutions in a market economy bring the actual structure of gross

disposable income closer to the “golden” one. If the principle of the golden ratio optimizes energy consumption in living organisms, then in the economy it helps optimize the "energy" of growth, and not according to the principle of "growth for the sake of accumulation" but growth for the sake of stable social progress "[6].

Since the law of the golden section is objective and in various forms finds its manifestation in all natural systems without exception, when designing an artificial - economic system in accordance with this law, we will strive to correspond and resemble natural systems and thereby - comply with the principle of Noospherism V.I. . Vernadsky.

The components of the design methodology for a holistic, sustainable and self-organizing economic system of economic security based on a cenological approach can be represented in the form of the following algorithm:

1. Assessment of the status of the economic system (for example, the state economic security system).
2. Assessment of the structural and functional state of the system.
3. Assessment of the level of vertical business integration by industry and economic sectors.
4. Assessment of the level of banking.
5. Assessment of the share of value added in GDP.
6. Comparison of the evaluation results with attractors representing a recursive series of golden sections: 0.500 ...; 0.618 ...; 0.682 ...; 0.725.
7. Monitoring the reliability and viability of the system.
8. Investigation of the problem of system redundancy.
9. Entropy testing of the system (calculation of information entropy).
10. Formulation of the project restructuring (reengineering) system.
11. Implementation of the project.
12. Assessment of the designed system for structural and functional correspondence to the golden section attractors [18; 19;20].

The imperfection of the existing methodological approach and the limited use of the cenological approach in designing the economic security system as an integrated distributed system with complex dynamics, the inefficiency of institutional intervention from the point of view of legislative stimulation of partner’s banking are the main reason for the inability to minimize the structural and functional instability of the state economic security system.

The result is systemic violations and imbalances in the economy, risks associated with the occurrence of asymmetry, shadow economy, the transfer of the crisis to Ukraine and a drop in economic growth.

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# Chapter 3
# Modern management technologies

## APPLICATION OF INNOVATIVE SMART TECHNOLOGIES OF VIRTUAL REALITY IN BUSINESS EDUCATION AS THE BASIS OF QUALIFIED PROFESSIONAL PREPARATION OF FUTURE MANAGERS

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***Abstract.*** *The article describes the possibilities of using one of the promising educational methods offered by modern informational technologies – virtual reality, which is modeled with special computer equipment. The authors of the article substantiate the possibility of using virtual reality technologies in the educational process to improve the quality of professional preparation of future managers. In the era of information and communications technology one of the modern needs is to create a virtual learning environment. Virtual learning environment is created and developed for effective communication of all participants in the educational process. Information and communication technologies now make it possible to use electronic versions of printed books, textbooks and manuals, or a new type of (multimedia tools that use a computer, a multimedia projector and sensor board) for the educational environment. The definition of the essence and classification of types of innovations in education are given. The notion of "smart-learning" is defined and the prospects of its application are described. The experience in using the virtual reality technologies in the educational process is systematized and generalized. In addition, the views of various scholars on the essence and characteristics of the virtual educational environment are analyzed in the article. The application of methods of modeling and management of business processes at practical classes of students-managers is substantiated. The author's definition of the concept of manager's readiness for professional activity is offered. The pedagogical model of application of smart technologies of virtual reality in the educational process is developed. The authors describe the main results of their pedagogical experiment on the possibilities of using smart-technologies of virtual reality in the educational process of professional preparation of students-managers. The results of the experiment are substantiated by statistical calculations, formulas, tables. It is proved that the usage of smart technology of virtual reality helps to increase the level of quality of future managers' professional preparation and their readiness to professional work.*

***Keywords:*** *educational innovation; virtual reality; smart-learning; pedagogical technology; teaching method; student-manager.*

***JEL Classification: A20, B40, C40***

***Formulas: 4; fig.: 1; tabl.: 3; bibl.: 25***

**Introduction.** Reforming of the education field requires the reconsideration of classical pedagogical technology and the transition to the realization of smart-education ideology aimed at gaining professional competencies among young professionals.

Outdated pedagogical technologies do not allow developing professional skills, creativity skills, non-standard approaches to solving problems and professional issues of future specialists of economic specialties. It is necessary to teach future managers to model economic processes of production, marketing and logistics, to make management decisions in the conditions of choice of options of development of events.

To solve this problem it is proposed to apply one of the promising directions of modern innovative learning tools – creation of a new educational environment – virtual reality, which is modeled by special computer equipment and is considered as an informational environment in which all the objects are presented in three dimensions, and the user can interact with them. Virtual reality in studying simulates both the impact and the reaction to the impact of different phenomena, objects, processes that can be modeled and modified.

The usage of smart-technologies of virtual reality in business education will make practical lessons more engaging, visual for students and improve the quality of professional preparation of future managers.

**Literature review.** The problems of development of innovative processes and e-learning in the educational field are devoted to a considerable number of scientific works of domestic scientists: V.H. Kremen, V.I. Zahviazynskyi, M.V. Klarin, I.P. Pidlasyi, S.D. Poliakov, A.I. Pryhozhin, V.O. Slastionin, S.O. Sysoieva, P.I. Shchedrovytskyi and others.

The peculiarities of application of virtual education are considered in the works: S.V. Aksionova, N.M. Hnedko, A.A. Zasiekina, R.O. Pavliuk, A.N. Petrytsia, S.H. Lytvynova and others.

Opportunities for virtual educational technologies are being explored by foreign scientists as well: Abulrub A., Billinghurst M., Bricken M., Chee Y., Hsieh M. C., Mantovani F., McLellan H., Virvou M. and others.

McLellan H. [1] provides comprehensive and in-depth reviews of the literature related to the research and use of virtual reality for education and training in editions.

Mantovani F. [2] discusses these potential benefits of the use of VR in education and training: visualization and reification, an alternate method for presentation of material; learning in contexts impossible or difficult to experience in real life.

However, we have not found any scientific papers on the features of the usage of smart-technologies in the teaching of managers or virtual and augmented reality technologies in business education.

**Aims.** The aim of our research is to substantiate the possibilities of applying of innovative smart-technologies of virtual reality in business

education as means of improving the quality of professional preparation of future managers.

**Methods.** Methods of scientific researches which were used in the given work: general scientific – analysis, synthesis – to explore the problem of using virtual educational technologies; empirical – pedagogical experiment; modeling to build a model of virtual educational technologies in the training of student-managers; mathematical – graph-analytical and mathematical-statistical – to analyze the results of a pedagogical experiment, to evaluate the quality of teaching.

**Results.** Education and science are becoming the priority factors of the development of the socio-economic, spiritual and political life of any country. Today, the determining factor of the country's wealth is knowledge. Due to these conditions, the problem of innovation in the field of knowledge becomes especially important [3].

What is new in pedagogy is not only ideas, approaches, methods, technologies that have not been promoted or used in such combinations yet, but also that complex of elements or individual elements of the pedagogical process that have a progressive beginning that enables to solve the problems of upbringing and education effectively in the course of changing conditions and situations [4].

Innovation, in the context of pedagogical process, means the introduction of something new in goals, content, methods and forms of education and upbringing, organization of common activities of teacher and student.

Pedagogical innovation – innovations in pedagogical activity, changes in the content and technology of teaching and upbringing, aimed at increasing of their effectiveness [5].

Innovation in learning means new teaching methods, new ways of organizing of lessons, innovations in the organization of educational content (integration (cross-curricular) programs), methods of assessing of educational results.

There are eight ranks (orders) of innovations in education [3]:

- zero-order innovations that divine the practical regeneration of the primary character of the system (reproduction of the traditional educational system or its element);
- first-order innovations characterized by quantitative changes in the system with constant quality;
- second-order innovations, which are the regrouping of system elements and organizational changes (for example, a new combination of well-known pedagogical tools, changing of the sequence, rules of their usage, etc.);
- third-order innovations characterized by adaptive changes of the educational system in new conditions without going beyond the old model of education;
- fourth-order innovations that contain a new solution (these are often simple qualitative changes in individual components of the educational system, which provide some expansion of its functional possibilities);

– fifth-order innovations that initiate the creation of "new generation" educational systems (changing of all or the majority of the primary character of the system);
– sixth-order innovations that result in the creation of new-look educational systems with a qualitative change of the functional character of the system while maintaining the system-functional principle;
– Seventh-order innovation, which is a major, fundamental change in educational systems, during which the basic functional principle of the system changes [3].

Among the most famous innovations in education are the following: smart-education with the help of virtual and augmented reality technologies.

Let's consider the features of smart-education and its opportunities.

Smart-education is flexible learning in an interactive educational environment with the help of content from all over the world that is freely available. Therefore, knowledge is becoming widely available [6].

The purpose of smart-education is to make the learning process effective by transferring the learning process into the electronic environment, which in its turn provides the opportunity for everyone to access, expand the number of students from anywhere and at any time. With this aim, it is necessary to move from book to electronic content by placing it in the repository, to make it active [6].

As one of the promising educational methods, modern informational technologies offer a new educational environment – virtual reality (VR), which is modeled by computer and regarded as special informational environment in which all the objects are presented in three dimensions. A distinctive feature of this environment is the change of images in real time and the experience of the effect of presence. VR simulates both the impact and the response to that effect [7].

Education with the use of virtual reality enables you to give lectures and seminars, trainings, demonstrate to learners all the aspects of a real object or process, which in general has a tremendous effect, improves the quality and speed of educational processes and reduces their cost. Virtual reality technologies give the opportunity to use fully that a person receives 80% of information from the outside world through vision, herewith people remember 20% of what they see, 40% of what they see and hear, and 70% of what they see, hear and do. As a result, students are fully involved in the learning process that increases motivation and success in gaining knowledge [7].

Extensive opportunities also offer possibilities for self-education on-line, among which webinars – seminars, meetings, trainings online, the choice of a specific direction or topic; YouTube Business and Enterprise Video Channels (BigMoney) specialized free online courses on educational platforms [8].

Advantages of using computer informational technology at universities:

- increase of interest and general motivation for learning via new forms of work and involvement in the priority direction of scientific and technological progress;
- individualization of learning: everyone works in a mode that satisfies him/her;
- objectivity of control;
- forming of skills for creative activity;
- mastery of decision-making skills in some difficult situation;
- students' access to information banks, possibility to receive the necessary information promptly;
- the growth of completed tasks [9].

It is advisable to introduce methods of modeling and management of business processes at practical classes in the educational process of professional preparation of managers, which will allow to apply the acquired knowledge on real-life examples from the practice of entrepreneurial activity.

Modeling of business process is the process of graphically-analytical displaying of the flow of work, actions or situations in the form of a built model that consists of interrelated operations and reflects the real existing or future activity of the enterprise.

In the educational process, with the help of modeling, students-managers can analyze not only how the production of the product is organized, but how it interacts with customers and suppliers, how staff is managed in each workplace.

Modeling of business processes allows to show creativity, scientific approach, to systematize knowledge about the enterprise and existing business processes in a graphical visual form so that in the future these processes can be analyzed and improved.

Complex measures of modeling and managing of business processes are used in BPMS (Business Process Model System), including the following standards and programming tools [10]:

BPMN (Business Process Model and Notation) is a visual notation for business process modeling. Business process diagrams are the basis of BPMN. They are built approximately at the same principles as traditional flowcharts. In the process of execution, the business process model in BPMN notation is translated into the process description on BPEL, which is then loaded into the "engine" of the BPM system.

BPEL (Business Process Execution Language) is the XML language for executing of business processes. It describes the business process as a related sequence of web services [8].

IDEF0 – methodology of description of business processes (Business Process Modeling). The models in the IDEF0 notation are intended for a high-level description of the company's business [10].

IDEF3 – methodology of description of work flows (Work Flow Modeling). It is designed to describe work processes or, in other words, workflows.

DFD (Data Flow Diagramming) is designed to describe data flows. They allow you to display the sequence of work performed during the process and the flow of information that circulates between these works.

XPDL (XML Process Definition Language) is the format for communication between BPM systems. XPDL is offered as a standard for importing / exporting business process descriptions [10].

The main advantages of using BPM-systems in business process management are: efficiency of use, visualization and productivity; business and IT reconciliation, process improvement and rapid development; optimizing of the use of resources; rapid adaptation to changing conditions, compliance with requirements [11].

Therefore, the implementation of modern BPM-systems allows to meet the basic requirements of the business: rapid process deployment, decision making, adaptation to constant changing conditions, increasing productivity through efficient use of resources, minimizing of project risks, improving of service levels [11].

Immersive learning methods – virtual and augmented reality technologies are such interactive tools [12].

Bricken M. Identified three challenges by comparing VR to pedagogical practice and theories: cost, usability and fear of technology [13].

Augmented Reality (AR) technologies are capable to project digital information (images, videos, text, graphics) beyond the screens of devices and integrate virtual objects with the real world [12].

Virtual educational technologies are used in the education of students.

There are studies in the scientific literature linking virtual technologies with improvements in students' academic performance and motivation, students' social and collaborative skills. Augmented Reality (AR) superposes synthetic elements like 3D objects, multimedia contents or text information onto real-world images (Holley, Hobbs, & Menown [14]),

Five facts in favor of immersive technologies [12]:

Clearness. In virtual space, you can explore any process or object in a seamless way, which is much more interesting than looking at the pictures in the book. For example, through the Anatomyuo application you can study the structure of the body in the smallest detail, and Operation Apex will show all the wealth of the underwater world.

Concentration. In the virtual environment, a person will not be distracted by external stimuli, which will allow you to fully focus on the material.

Maximum engagement. Immersive technologies provide the ability to completely control and change the scenario of events. A student can witness historical events, conduct a physics or chemistry experiment on his own, or solve a problem in a playful and comprehensible form.

Security. With VR and AR technologies, it is possible to perform a complex operation, run a sports car or even a space shuttle, conduct experiments with hazardous chemicals without harming yourself or the environment.

Performance. Scientists at the University of Maryland conducted a study asking two groups of people to remember the location of the images. During the experiment, one of the groups used virtual reality helmets, the other used regular computers. In this case, the group that studied the image using VR helmets, showed a result 10% higher than participants in the other group [12].

In our opinion, promising application of virtual and augmented reality technologies can be in business education, which allows students to: model the processes of organization of production at a factory, develop advertising of goods, plan and design routes of delivery of goods to shops, build organizational structures of personnel management, etc.

Having analyzed the number of scientific works [1], [2], [4], [6], [7], [8], [9], [11], [12], [13], [22], [23], [24], [25] we believe that the quality of professional training of future managers at universities is determined by their level of readiness to work in their profession.

The future manager's readiness for professional activity should be understood as the system of values, attitudes and motivations that he has formed for his professional activity in the trade-production industry, as well as the developed personal capacity for managerial work.

The readiness of a young manager to work is determined by the ratio of the level of professional knowledge he / she has acquired, the skills with the level of his / her initial professional competence, the ability to solve managerial tasks, set and achieve goals, manage staff.

The readiness for professional activity indicates the ability of a young manager to make meaningful actions of the work, despite the influence of external (social, organizational, economic) and internal (psychological, motivational) factors of the working environment of the organization.

Young managers' readiness for professional activity is shaped by their preparation at higher educational institution.

However, the study of higher education standards (OKH and OPP, educational programs and plans) for the professional preparation of managers has shown that the modern pedagogical technologies and teaching methods of future managers used in domestic universities are outdated.

In particular, we identified the following weaknesses in the management training system: firstly, their knowledge and skills are detached from the business practice; secondly, you need to be able to make a forecast of the situation and make the right management decision, choosing the best from several possible developments; thirdly, the manager must learn how to manage the staff, warming up different situations; fourthly, the manager must be able to model real business processes in the enterprise (production technology, logistics supply channels, distribution of goods across trading networks).

Higher educational institutions in the countries of the European Union make extensive use of interactive teaching methods, multimedia computer technologies and, in recent years, virtual and augmented reality technologies in the process of training of business workers.

However, domestic higher educational institutions that prepare business workers are significantly inferior to European ones in terms of the quality of their graduates' vocational preparation, and therefore existing pedagogical technologies and teaching methods for students-managers need to be improved.

**Discussion.** The hypothesis of our study was the following assumption: it is possible to improve the quality of professional training of students-managers by introducing smart-virtual technologies into the educational process.

In order to test this hypothesis, we changed the pedagogical technology of teaching professionally oriented disciplines "Personnel Management", "Marketing", "Production Organization", introducing virtual and augmented reality into the educational process of students-managers.

We have developed the pedagogical model of the use of smart virtual technology in the educational process, which we implemented in 2018-2019 (see Figure 1).

To study qualitative changes in the educational process using smart-virtual technology in business education, we have selected students of the third course 073 "Management", who study at the following universities: Central Pedagogical University named after V. Vynnychenko, Central Ukrainian National Technical University, Kirovohrad Flight Academy of National Aviation University, Kirovohrad Human Development Institute.

The 78 respondents participated in the experiment. The students were selected so that their current learning results were approximately the same. For the sake of objectivity of scientific data, all the respondents were in equal conditions, all negative factors were eliminated as much as possible.

For mathematical processing of the results of the conducted pedagogical experiment among students-managers we used the following statistical indicators [15]:

$\bar{x}$ – arithmetic average;

$\sigma$ – standard deviation;

$m$ – the magnitude of standard error;

$t$ – Student's t-test.

Arithmetic average mean $\bar{x}$, was determined by the formula 1:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i \qquad (1)$$

*where $x_i$ – corresponds to the means of the studied values; n – the sample volume.*

Standard deviation $\sigma$ was determined by the formula 2:

$$\sigma = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n}} \qquad (2)$$

*where $\bar{x}$ – arithmetic average means of the sample; $x_i$ – i-th element of the sample; n – the sample volume.*

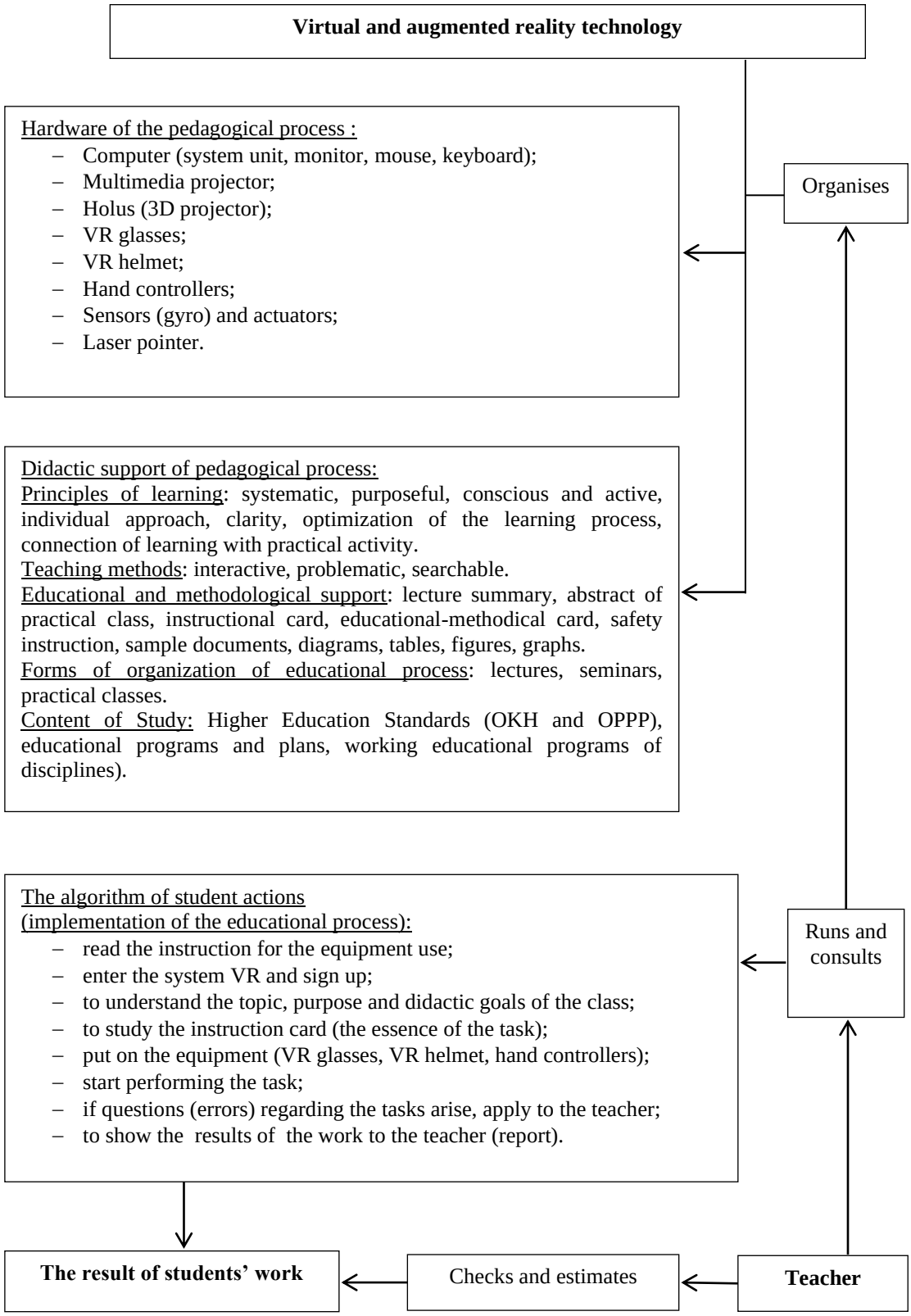


**Figure 1. Pedagogical model of applying of smart virtual technology in the educational process**

*Source: developed by authors*

The size of standard error *m* of the sample was determined by the formula 3:

$$m = \frac{\sigma}{\sqrt{n}} \qquad (3)$$

*where σ – standard deviation; n – the sample volume.*

The accuracy of the results of the pedagogical study was determined via Student's t-test.

We must note that in mathematical statistics Student's t-test is the method of statistical verification of the reliability of hypotheses (statistical criteria).

The Student's t-test is aimed at estimating the discrepancies between the values of the average two samples, which are distributed according to normal law [15].

If $t_{emp}$ falls within the area of significance, it means that there are differences between the two samples.

If $t_{emp}$ falls into the insignificance zone, it means that there are no differences between the two samples.

In the control group of students the teaching of professional disciplines was conducted according to the traditional pedagogical technology and methodology. The curriculum included lectures and practical classes in the fields of "Personnel Management", "Marketing" and "Production Organization".

The teaching process in the experimental group was carried out according to the new pedagogical technology, which was different from the usual (traditional) technology and methodology used by the teachers in the control group. The use of new smart virtual reality technology meant solving situational problems based on the analysis of managerial errors of managers; solving cases and marketing tasks; construction of models of organization of production process, sales management, theory of queues, logistical problems on planning and development of routes of transportation of goods to shops, that is especially important for the formation of students-managers' trade organization skills, consolidation of knowledge in specialty subjects.

A comprehensive test was compiled to assess respondents' knowledge. Table 1 presents the results of the assessment of knowledge of students-managers in the control modules of the professional disciplines "Personnel Management", "Marketing" and "Production Organization".

As can be seen from Table 1, the obtained results on the section of knowledge (test) allow to establish slight differences in the levels of knowledge of students of control and experimental groups in the professional-oriented disciplines "Personnel Management", "Marketing", "Production Organization".

Labs in engineering education are designed to improve the practical knowledge of the students and their ability to solve problems independently [16]

Chee Y. [17] Believes that virtual reality can be used to achieve this goal, "providing a foundation for students' conceptual and higher-order learning".

Educational software for smartphones benefits the education process and makes it more interesting for students. Especially if it follows the computer

game technology to render 3D graphics for the software and make it more amusing for the students while still deliver the necessary information [18].

**Table 1. Analysis of knowledge of students of the 3rd year according to the results of testing in the disciplines "Personnel management", "Marketing", "Organization of production" (at the beginning of the forming experiment)**

| Students' grades | | Experimental group | | Control group | |
|---|---|---|---|---|---|
| National Scale | Scale ECTS | The number of students | % from quantity | The number of students | % from quantity |
| 5 | A | 6 | 15,8 | 5 | 12,5 |
| 4 | B; C | 8 | 21 | 10 | 25 |
| 3 | D; E | 19 | 50 | 18 | 45 |
| 2 | FX; F | 5 | 13,2 | 7 | 17,5 |
| Total: | | 38 | 100% | 40 | 100% |

*Source: developed by authors*

Billinghurst and Dunser [19] surveyed user studies concerning elementary and high school students to determine if AR enhances the learning experience.

From Table 2 we can see that the number of students in the experimental group studying for "excellent" and "good" is 14 people (the overall success rate is 36.8%), and the number of students in the control group is, respectively, 15 people (total 37.5% success rate).

The PIP indicator (see formula 4) characterizes the quality of students' learning and is 49.4% (low level) in the experimental group and 47.5% (low level) in the control group.

The degree of students' learning was determined by the formula of the scientist V.P. Simonov (formula 4):

$$PIP = \frac{100\% \times n_v + 64\% \times n_d + 36\% \times n_c + 16\% \times n_p}{N} \qquad (4)$$

Where PIP is the indicator of students' learning; $n_v$ – the number of students who have high grades; $n_d$ – number of students who have sufficient grades; $n_c$ – number of students who have average grade; $n_p$ – number of students who have beginner-level assessments; $N$ – is the number of students evaluated [20].

The data obtained (according to formula 4) indicate the degree of education of a certain level: 0-44% – critical level; 45-49% – low; 50-74% is acceptable; 75% or more is optimal.

Consequently, the experimental and control groups of students in the professional-oriented disciplines of "Personnel Management", "Marketing", "Production Organization" are low. Such results testify the low quality of student's preparation.

Knowledge assessment in both groups of students was conducted before and after the introduction of smart virtual technology. We compared each

respondent of the experimental and control groups at the beginning and after the experiment.

Table 2 shows the results of the testing of students-managers of the third year from the control modules of professional disciplines.

**Table 2. Analysis of knowledge of students of the third year on the results of testing in the disciplines "Personnel management", "Marketing" and "Organization of production"(before and after the forming experiment)**

| **Student's grades** | | **Number of student managers** | | | |
|---|---|---|---|---|---|
| | | Experimental group (38 people) | | Control group (40 people) | |
| **National scale** | **Scale ECTS** | Before the experiment | After the experiment | Before the experiment | After the experiment |
| 5 | A | 6 | 10 | 5 | 4 |
| 4 | B; C | 8 | 17 | 10 | 13 |
| 3 | D; E | 19 | 9 | 18 | 18 |
| 2 | FX; F | 5 | 2 | 7 | 5 |

*Source: developed by authors*

From Table 2 we can see that after the virtual reality smart technology, the grades of the experimental group in the professional disciplines have improved. In the control group of students, the learning results were almost unchanged.

The reliability of quantitative indicators was determined via the Student's t-test. The results are shown in Table 3.

**Table 3. Analysis of academic achievement of students in experimental and control groups in professional disciplines (before and after the forming experiment)**

| **Groups of students** | **Indicators** | Mathematical indicators | | | |
|---|---|---|---|---|---|
| | | $\bar{x}$ | $\sigma$ | $m$ | $t_{emp}$ |
| Experimental | Before the experiment | 3,39 | 0,9 | 0,15 | 2,7 |
| | After the experiment | 3,92 | 0,84 | 0,14 | |
| Control | Before the experiment | 3,33 | 0,91 | 0,14 | 0,4 |
| | After the experiment | 3,4 | 0,83 | 0,13 | |

*Source: developed by authors*

As can be seen from Table 3, the empirical value of $t_{emp}$= 2.7 ($t_{kr}$, at $r \leq 0.05$ is 1.99 and at $r \leq 0.01$ is 2.64) is in the area of significance, which indicates the improvement in students' level of knowledge of the experimental group on professional disciplines after the experiment. The empirical value of temp = 0.4 ($t_{kr}$, at $r \leq 0.05$ is 1.99 and at $r \leq 0.01$ is 2.64) is in the insignificance zone, which indicates that there is no significant change in the level of knowledge of the students of the control group on professional disciplines after the forming experiment.

In the process of studying the attention of students of economic specialties should be directed to their further professional preparation, which involves the formation of:

– self-determination – the ability to develop their positions in life; to form their own outlook, ability to set and fulfill their tasks;
– self-realization – asserting oneself as a person; development of creative abilities (scientific, artistic, organizational and communicative);
– self-organization – the skills of elementary mental self-regulation; organization of student's lifestyle; ability to achieve this goal [21].

Thus, after the introduction of the new smart-technology of virtual reality, the level of knowledge in the professional disciplines of the students of the experimental group has significantly improved than the level of knowledge of the students of the control group.

Taking into account the above mentioned and the results of the pedagogical experiment, it is recommended that the teachers of higher educational establishments introduce into the educational process smart-technology of virtual reality when performing practical tasks by students-managers.

**Conclusions.** The basis for the construction of a qualitatively new system of economic education in Ukraine is the restructuring of the educational process by means of information-telecommunication technologies; in particular, it is advisable to introduce smart-technologies of virtual reality.

The readiness of the manager for professional activity is the ability of the manager to perform managerial functions (planning, organizing, motivating, regulating and controlling), making decisions and leading actions on the basis of their professional knowledge, skills and professional qualities.

It is found that improving of the quality of learning results contributes to increasing of the level of readiness of the manager for professional activity in a commercial organization. This can be achieved with the help of smart-technology of virtual reality.

Smart Education is flexible, adapted to the student's learning needs in an online learning environment with online content from all around the globe.

Virtual reality technology is an intangible educational environment designed on special computer equipment – digital information (images, videos, text, graphics) outside the screens of devices and integrate virtual objects with real objects, creating in the human mind an artificial world with which you can interact with the senses.

Five facts in favor of immersive technologies are highlighted: material clarity, focus on learning, maximum student engagement, safety of use, learning effectiveness.

The results of the pedagogical experiment of the students of the third course of specialty 073 Management showed that after the introduction into the educational process the smart-technology of virtual reality, the level of success in the professional-oriented disciplines "Personnel Management", "Marketing" and "Organization of Production" has significantly increased in the experimental group rather than the level of knowledge of students in the control group, as evidenced by the data temp 2,7> temp 0,4.

The accumulated experience of using smart-technologies of virtual reality in the professional training of students-managers, showed the effectiveness of their application in modeling the processes of organization of production of products at the factory, for the development of adverts of goods, in the design of routes of transportation of goods from the warehouse to the store, in the construction of organizational structures of personnel management, risk management and more.

**Author contributions.** The authors contributed equally.

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# THEORETICAL AND METHODOLOGICAL ASPECTS OF INTEGRATION RATIONAL APPROACH TO BUSINESS PROCESS MANAGEMENT

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***Abstract.*** *The author explores the possibilities of using risk-oriented approach to business process management to ensure the economic security of enterprises. The purpose of this work is to study the theoretical and methodological aspects of risk management and, on their basis, to build a risk-oriented approach to management with subsequent integration into all business processes of the enterprise to ensure the economic security of the enterprise. During the research of problems of formation and integration of risk-oriented approach to management in the process of ensuring the economic security of the enterprise, and the method of synthesis was used - in the formation of individual elements of the structure of risk-oriented approach to manage in the process of ensuring the economic security of the enterprise; peer review method - to determine the priority of the identified risks of enterprises, to determine the weight of the selected methods and techniques during the identification, analysis and assessment of risks in the process of ensuring economic security. To provide a systematic approach to risk management an algorithm for processing risk using the recommendations ISO / IEC 27005 is proposed. A Risk acceptance scheme was created. Directions for improving EBITDA through risk management measures have been identified. The level of maturity of risk management systems is interrelated with the level of maturity of information technology. The necessity to increase the level of knowledge and competencies of specialists who provide economic security at enterprises is confirmed by studying the risk oriented approaches to business process management.*

***Keywords:*** *risk-oriented approach, risk registry, risk card, residual risk, risk management, risk acceptability, maturity levels, stakeholders*

***JEL Classification: M20, M21***

***Formulas: 1; fig.: 3; tabl.: 1; bibl.: 7***

**Introduction.** In the system of economic security, one of the central concepts is increasingly the concept of risk. Foreign scientists use this concept of risk management. For domestic companies, the problem of building effective mechanisms for ensuring economic security at the micro level has become increasingly urgent in recent years, especially in connection with the development and implementation of corporate governance principles. In order to solve this problem, it is advisable to study more deeply the experience in the field of enterprise risk management, which is an integral part of the system of economic security management in the practice of leading foreign companies.

It can be stated that the system of economic security management of the enterprise, especially in the financial sphere, has been developed quite well both in methodology and in practice and accordingly has developed tools for solving a certain range of problems. However, at the same time, there is no comprehensive risk management methodology that can be successfully used in the practice of non-financial sector entities, where the main risks are not material flows, but financial risks. At present, there is no scientific and

conceptual approach to managing the economic security system in terms of risks, and accordingly there are no paradigms for solving management problems associated with certain risks. The top management of manufacturing enterprises has always had an urgent need to build the effectiveness of a risk-oriented economic security system. This is the right direction because not only financial risks but also all the variety of risks that threaten an enterprise need to be managed. Until that time, companies have used two tools in risk management - insurance and regulatory standards (at the enterprise level - safety standards, regulations, instructions). Today, these measures are not enough: they are constantly changing, complicating business conditions, increasing reputation risk, increasing corporate responsibility of management for decision making. All of these are the consequences of an ill-considered risk management policy that threatens companies as a whole. In addition, if the security company chooses insurance protection, the cost of which is sufficiently significant, then the enterprise is limited only by the risk transfer policy.

**Literature review.** Among foreign scientists, in the field of scientific interests of which were the issues of effective management of economic entities using risk management, including various aspects of ensuring their economic security, such scientists as: Astakhov A., Girs K., D Walis, Jean-Paul Louis, Ketch K., Koutsky M., Rasmussen M., Nesterov S., Robert M. Lee, Moore A., Keynes J. Maynard. Knight K., Schwab K., Chlarden K. and others.

Paying tribute to the scientists whose research results have helped to establish the economic security of the enterprise as a science, it is worth noting that there is no risk-oriented approach to implementing the economic security of enterprises. In general, in the studies and publications of domestic scientists, the economic and managerial aspect of ensuring the economic security of enterprises is underdeveloped. Predominantly, the research focuses on the technical, informational, and power-related aspects that have traditionally been considered by enterprise security services.

**Aims.** The purpose of this work is to study the theoretical and methodological aspects of risk management and, on their basis, to build a risk-oriented approach to management with subsequent integration into all business processes of the enterprise to ensure the economic security of the enterprise.

**Methods.** During the research of the problems of formation and integration of risk-oriented approach to management in the process of ensuring the economic security of the enterprise, a method of synthesis was used - in the formation of individual elements of the structure of risk-oriented approach to management in the process of ensuring the economic security of the enterprise; peer review method - to determine the priority of the identified risks of enterprises, to determine the weight of the selected methods and techniques during the identification, analysis and assessment of risks in the process of ensuring economic security.

**Results.** To ensure the economic security of the enterprise risk-oriented approach to management, it is proposed to use a modern risk management tool,

which is formed on the basis of a set of methodological and technical techniques, methods and principles in their close relationship, which meet the needs of the modern enterprise.

One of the methods proposed to apply the risk-oriented management method to ensure the economic security of the enterprise is to use a risk register and a risk map. The registry identifies the risk factors that may arise, the possible risk events and the consequences of their occurrence that the company may face, information risk management measures. As a rule, the risk management system is developed in a sufficiently detailed manner for all types of risks, including causal relationships between them. Next, each risk listed in the registry must be ranked based on the likelihood of a risk event and possible loss. This ranking serves as the basis for creating an information risk map. In general, the risk map is a powerful tool for analyzing and prioritizing them. The risk map, including information risks, plays an important role in assessing the strategic actions of the company, in forecasting and planning its activities. The process of creating it is complex and often requires the involvement of external consultants.

**Discussion.** To provide a systematic approach to risk management, a set of documents is required such as [1]: 1. Risk management policy; 2. Corporate standard of risk management; 3. Risk management methodologies (regulations, report formats); 4. Risk **register**; 5. Regulations on the risk management unit; 6. Job descriptions including risk management functions; 7. Risk map.

The risk register is one of the most important documents managed by the risk management unit or risk manager. Therefore, it is necessary to find out what this document is. The risk register is a document containing the results of qualitative and quantitative risk analysis, risk response planning. The Risk Registry thoroughly considers all known risks and includes a description, category, cause, likelihood, impact on goals, anticipated response, owners and current status. The risk register is an element of the company's risk management plan.

Risk identification and having a real, objective view of the risks involved are one of the foundations of effective risk management that contributes to the achievement of the company's goals. The result of the risk identification shall be a risk register containing a list of identified risks; potential reactions to them by the enterprise; the main factors that determine the identified risks; and additional categories entered during the identification process. Risk identification provides a tool for recording and reporting potential adverse events that may adversely affect the achievement of the goals and objectives set by the company and each employee, as well as determining the direction and need to improve the risk management process. Risk identification helps to increase the level of confidence in achieving the tasks by obtaining a review of the risks and their main characteristics, determining the relationship of risks with each other, ranking the level of company risks, raising awareness about risks and methods of managing them, as well as focusing on the most critical risks .

Risks that have been assessed as catastrophic are considered urgent. Deciding on a particular method of treatment as the most accepted means balancing the costs of implementing each activity with the benefits. Thus, we formulate the formula: the expediency of the risk management method is the cost of risk management = the benefits received from risk management.

Once the risk assessment has been carried out, one or more appropriate means of changing the likelihood and / or impact of the risks should be selected and agreed upon during the risk management and implemented. We then go through a cyclical process of reassessing a new level of risk in order to determine its acceptability as compared to a previous risk level result. It should also be noted that there are two ways to handle risk: the first is to reduce the risk, that is, to reduce the level of potential loss from its realization, and the second is to reduce the likelihood of risk.

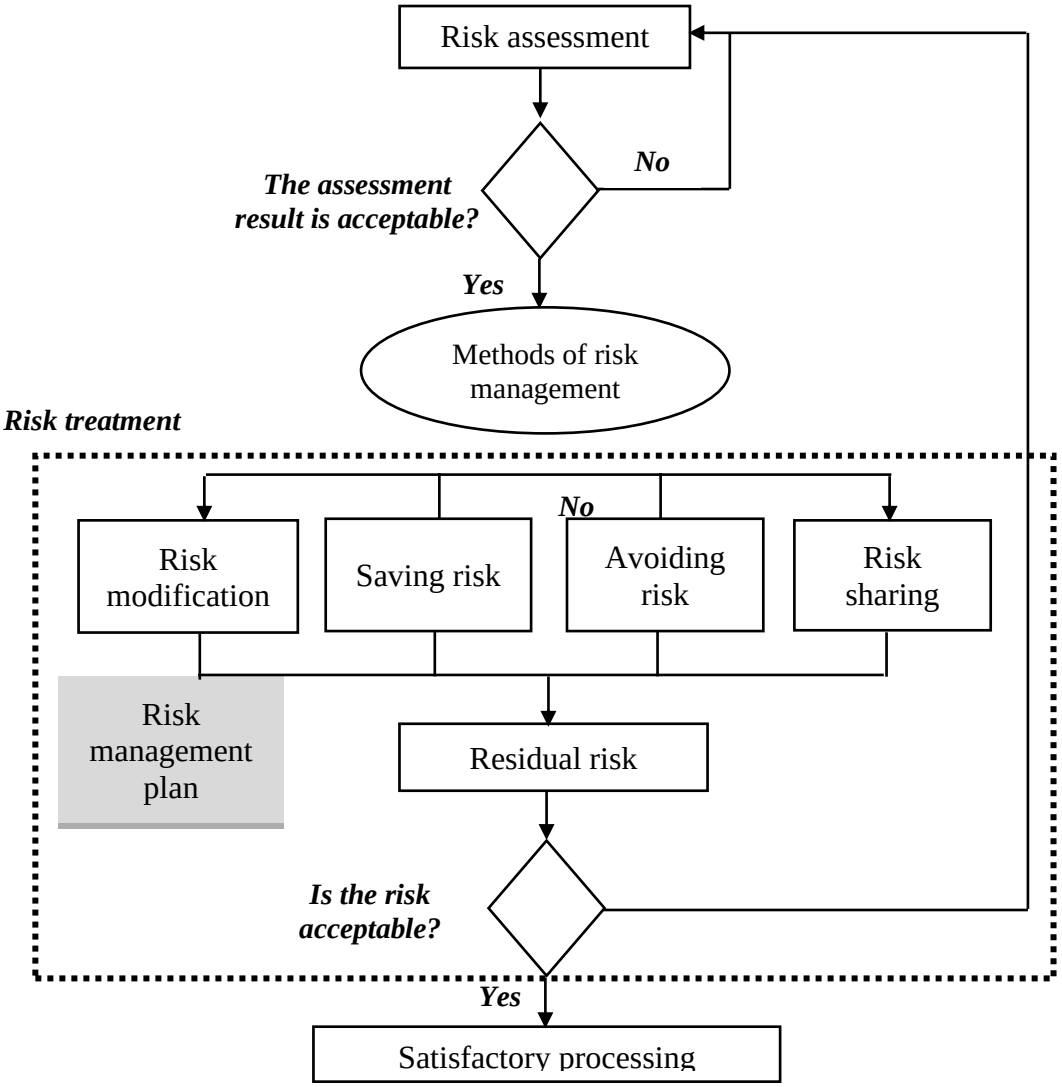


**Figure 1. Algorithm for processing risk using recommendations ISO/IEC 27005**

*Source: developed by author [2]*

Marked on fig. 1 the four methods of risk management are not mutually exclusive, some of them may be effective for more than one risk.

Risk management methods may include one or more actions:

- avoidance of risk by deciding not to start or continue activities that give rise to risk;
- accepting or increasing the risk in order to take advantage of the opportunities;
- removal of the source of risk;
- change in probability;
- change of consequences;
- risk sharing (diversification);
- risk retention based on sound decision.

According to the algorithm for processing risk using the recommendations of ISO / IEC 27005 [2] and ISO 31000 [3], it is necessary that the risk assessment method allows to manage the risk in the following ways:

1. Risk modification: the level of risk should be managed through the introduction, exclusion or modification of control measures so that residual risk could be overestimated as acceptable. Appropriate and sound control measures must be selected to meet the requirements established in the risk assessment and management. The selection should take into account the risk criteria, regulatory, legislative and contractual requirements. The costs and timing of the control measures or the technical, environmental and cultural aspects should also be considered when making the choice.

2. Contingency Risk: There may be specific risks for which the entity cannot establish clear control measures or the costs of these control measures will outweigh the potential losses from the materialization of the risks. In this case, the enterprise may accept the consequences of the risk, if it is realized. The enterprise documents this decision.

3. Risk avoidance: if the identified risks are found to be too high or the costs of processing the risk outweigh the benefits, then a decision can be made to eliminate the risk completely by eliminating it from the intended type or entity, or by modifying the conditions under which the activity is carried out.

4. Risk Sharing: Risk Sharing involves the decision to share identified risks with external stakeholders. Risk sharing can create new risks or change already identified risks, so there is a need for additional risk management.

After the risk has been processed, there may be residual risk, which we define as the risk remaining after the implementation of the treatment measures, should be documented and remain subject to monitoring, analysis and, if necessary, further processing. This risk may involve another, not identified risk. It should be noted that risk should be identified and assessed in accordance with management requirements and at a satisfactory level for management. We define the residual risk as:

*Residual risk = Existing risk - Processed risk through control measures* *(1)*

When a risk management plan is implemented, there are always residual risks. After the risk has been processed, the magnitude of the risk reduction must be estimated, calculated and documented. It can be difficult to assess residual risk, but it must be brought into line with the enterprise's risk acceptance criteria. If the residual risk remains unacceptable after the implementation of the control measures, make a decision on how to handle it.

The next step after risk management is the risk acceptance process. Risk-taking is a function that differs across industries, businesses and departments, such as operating activities. Acceptable risk is the risk that an enterprise may accept in the face of current social and organizational values (Fig. 2).

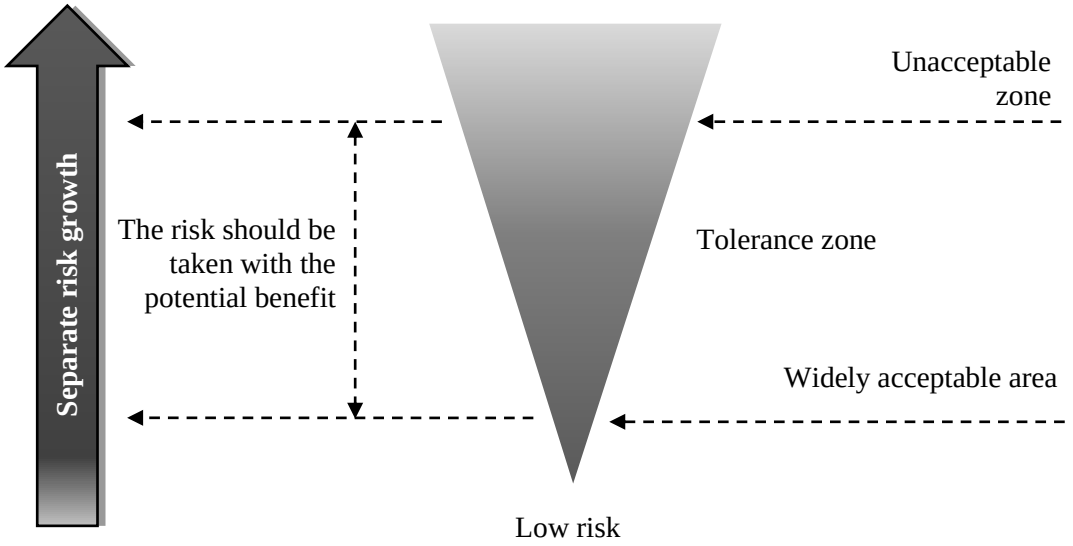


**Figure 2. Risk acceptance scheme**

*Source: developed by author*

An unacceptable zone is an area where the risk is too high and risk mitigation measures must be taken to take it. ALARP Zone (Risk Tolerance Zone) - The risk in the area is below the level of ineligibility, but it may remain unacceptable if no risk mitigation measures are taken. Widely Acceptable Zone - An area in which the risk is acceptable, there is no need for additional risk management measures. Risk acceptance criteria are the criteria used as a basis for making risk acceptance decisions.

The ALARP method is based on an assessment of the cost of risk and the cost of mitigation. The principle of ALARP is that the risk should be kept to some low level. For this assessment, the ALARP principle relies on a global risk analysis system as described in European EN 50126 [4] and international CEI 61508 [5]. This approach implies the greatest possible reduction in the risk that is achieved by virtually limited resources available. That is, only those measures that are considered reasonable and affordable from a practical point of view are taken. The implementation of these measures should not require unreasonably high material or labor costs.

It is proposed to improve the overall economic and economic performance of the enterprise in the three main areas, which are interacting. Some companies have the opportunity to pay greater attention to risk reduction throughout the enterprise, others to improve efficiency by optimizing the costs of control measures, and third - to improve financial results both by reducing the level of risk and by reducing costs (Fig. 3).

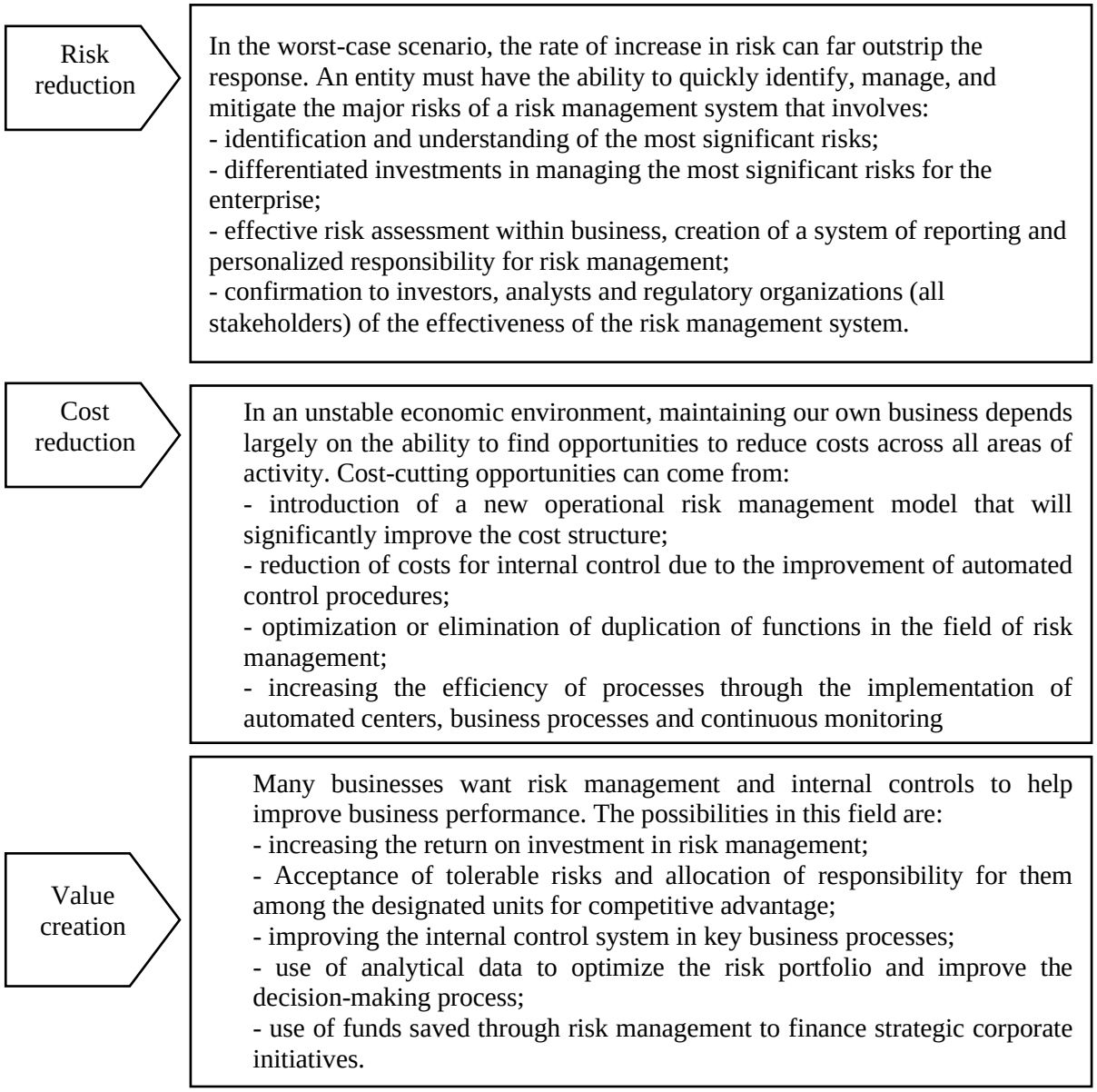


**Figure 3. Directions for improving EBITDA through risk management measures**

*Source: developed by author*

The criteria for an ideal risk management system depend on many factors. First of all, it is important to consider who assesses what its goals are, what the risk management professionals are guided by. For example, a number of domestic banks are guided only by Basel II requirements, not by shareholders' opinion, but only by supervisory authorities.

Each of the international standards of risk management requires continuous monitoring and control of risks, which depends on the level of management of information technology. Information technology in risk management processes, on the one hand, is a management tool and, on the other, a source of operational risk. The level of maturity of risk management systems is interrelated with the level of maturity of information technology.

**Table 1. Levels of maturity of the risk management system**

| The level of maturity | Level name | Status of the risk management process |
|---|---|---|
| 0 | zero | are not used |
| 1 | educational | specialized and unorganized, beyond the general approach |
| 2 | repetitive | repeated regularly and not an element of corporate knowledge |
| 3 | determined | documented and interconnected, monitoring and control rests with the contractors |
| 4 | controlled | controlled, verified, measured, but reflecting the practice of that particular entity only |
| 5 | optimized | are in line with best practice in the world and are automated |

*Source: developed by author*

Due to the wide application of the principles, the risk of management significantly increases the effectiveness of the key approach in system management, which is based on the closed management cycle of Schuhart-Deming P-D-C-A (plan - execute - check - actions).

The application of this approach has become a classic and is present in all systems of management without exception. A major factor in this increase in the effectiveness of the classic P-D-C-A management cycle is the preliminary analysis and consideration of the most important threats and opportunities that are fulfilled within the management risk methodology applied to all stages of the organization's activities. In view of this fact, in all three standards, much more emphasis is placed on the next generation management systems to continually improve them and look for opportunities for such improvements.

The profession of risk-manager requires not only mastering economic, mathematical engineering methods, but also such general theoretical knowledge in management, probability theory, social psychology, economic analysis and audit, marketing, law, fundamentals of insurance and many more specific skills without knowledge, business, etc. It should be noted that a risk management professional must have global, associative, imaginative thinking, constantly develop experience and be able to use intuition.

The market for qualified specialists with experience in risk management in companies in the real sector of the economy is currently quite limited. The risk management company has the ability to do this with low-budget methods: to hire a qualified and experienced risk manager, giving him the opportunity to select a team. This method is quite effective, low-budget, but it is almost

impossible for the Ukrainian labor market due to the very small number of specialists in this field. Due to the fact that finding a qualified risk manager for domestic companies is almost impossible today, the majority should assign to this position inexperienced employees with insufficient qualification. Yes, we expect that the experience will be gained in the process of implementing the corporate risk management system.

**Conclusion.** As a whole, it can be concluded that when successful companies seek to manage individual risks, future success will be attributable to those who take risk management to the next level. That is, those who implement the risk management method of the entire enterprise, covering the company as a whole. With complete and systematic information about the key business risks of their company, risk managers will be able to develop risk management plans and programs using coordinated, comprehensive and sophisticated methods. Effective risk management for the entire company is an indispensable element of its management in the 21st century. When successful companies attempt to manage individual identified risks, future success will be attributed to those who are taking risk management to the next level, that is, those who take a risk-based management approach to ensure the economic security of the entire company.

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# DIGITALIZATION OF THE EMPLOYMENT PROCESS IN COMPANIES

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***Abstract.*** *From the First industrial revolution, it became clear that the work of humans would replace machines. In today's digital world, where human and artificial intelligence coexist, finding and retaining good workers is an increasingly challenging task for human resource manager. Jobseekers and jobseekers have digitized the recruitment process, through recruitment tools (social networks) and selection (software), with the goal of accelerating and wanting to be ahead of the competition. Digitization has led to the development of new for both candidates and HR professionals. Aims is a to investigate the impact of digitization of the employment process in companies on their works. The author used the methods of static and logical comparison, systematization and generalization, which made it possible to achieve the goal of the study.*

*Technological advances have shut down some jobs, but new, less labor-intensive jobs hve emrged that require creativity and critical thinking. In supoort of this is the fact total number of unemployed has not increased.*

***Keywords:*** *candidate recruitment, selection, digital platforms.*
***JEL Classification: J01, J20, J32***
***Formulas: 0; fig.: 0; tabl.: 1; bibl.: 11***

**Introduction.** The First industrial revolution was marked by the invention of the steam engine, thanks to it the mechanization of production. The Second industrial revolution massaged production thanks to the invention of electricity. Electronic and information technology automated production in the Third industrial revolution. The Fourth, which is a continuation of the Third, is in fact a synthesis of all previous technologies, the Internet, artificial intelligence and humans. It leads to changes in lifestyle, work and relationships between people, i.e., to the transformation of humanity [1]. Members of Generation Z (population born since 1997), as well as generations to be born, will read about many things in books, more specifically, on the screens of future IT devices.

The number of smart devices, such as computers and phones, connected to the Internet is increasing every day. This radically results in changes in the way information and communication are being implemented, which has a transformative impact on production, distribution and consumption, i.e., from the primary to the tertiary economic sector. Technologies have simplified and accelerated business. The application of artificial intelligence through various algorithms in software programs used by computers in business has replaced the work of humans. This is partly true of the human resources sector, because artificial intelligence, as a substitute for human intelligence, implemented through computer systems, has led companies to change, for the better, ways of attracting, vetting and selecting candidates, as well as hiring them, development, fees and additional benefits. Increasingly, technology is of importance in human resource management processes in companies.

**Literature review.** The digitalization of the employment process in companies in their works was research by: Agnvall E. (2007) in "Job Fairs Go Virtual", Dessler G. (2015) in "Human Resources Management", Kovacevic I. (2013) in "Users of efficeincy, effectiveness, cognitive style and emotional reactions to computer interface based on different data models", Moroko L. and Uncles MD (2008) in "Characteristics of successful employer brands", Ruiz G. (2007) in "Firms Tapping Web Videos to Lure Jobseekers", Schwab K. (2016) in "The Fourth Industrial Revolution" and other authors.

**Aims.** Aims is a to investigate the impact of digitization of the employment process in companies on their works.

**Methods.** The author used the methods of static and logical comparison, systematization and generalization, which made it possible to achieve the goal of the study.

**Results.** In a time of intense competition in the labor market (Genertion X, Y and Z), attracting, selecting and retaining the best talent is an increasingly complex task for human resource managers. The coexistence of human and artificial intelligence in the world of work complicates this further, but it is obvious that digitalization has transformed the employment process.

**Candidate recruitment through social networks.** Some day-to-day jobs in the human resources sector are automated and streamlined, so recruiters have more time to find the best candidates. The original opportunity, the digital revolution, job vacancies on their own company websites and databases were replaced by networking on social networks like Monster Networking (www.monster.com), LinkedIn (www.linkedin.com) and WeChat (www.wechat.com). These networks establish contacts, exchange experiences and recommendations. Companies make video contributions with their employees about their experiences with the company. These video attachments are integrated into job advertisements and thus show a work atmosphere with the aim of attracting candidates. Facebook and Instagram are also used to recruit candidates, as well as search CV databases where more candidates can be found than just by posting ads.

Advertising, by companies, and reviewing job vacancies by candidates is also done "form the armchair", ie Through virtual job fairs. It is an environment on the Internet portal, which is similar to an ordinary job fair in a physical space, only meetings and conversations are made using a computer, tablet or phone . In the region of the former SFRY it. in Serbia, Croatia and Bosnia and Herzegovina, since 2010, a virtual fair "Days of Careers and Knowledge"[2] has been organized. Since 2019, the Republic of Northern Macedonia has also joined. It shows companies and educational institutions. Internet visitors listen to presentations, visit booths, chat via chat, leave their CVs, collect contacts and the like. These recruitment fairs very quickly collect application with minimal cost. Estimates say that about nine times as many candidates are recruited, eliminating geographical barriers and connecting people around the world.

**Table 1. "Career and Knowledge Days" – Postfestum 2017**

| | | | |
|---|---|---|---|
| Total number of visits<br>255737<br>Visit from Serbia<br>105800<br>Visits from other countries<br>104 | | Attendance by gender<br>Men 38%<br>Women 62% | |
| Access from platforms:<br>Computers 63% | Phones 35% | Tablet 2% | |
| Published ads 566 | | Sign up for ads 25000 | |
| Chat session 291 | | The total duration of all sessions 837h | |
| Published employee experiences 221 | | Picture in the gallery 1005 | |
| Of published videos 94 | | Visit to the most visited booth 29639 | |

*Source: www.dankarijera.com, date of access 04/30/2018*

**Digital technology benefits in candidate selection.** As companies use digital platforms to recruit candidates, artificial intelligence-based software helps to select the best candidates faster and cheaper, starting with scanning and sorting a large number of applications. Jonhson and Jonhson annually receives about one million job applications[3] and uses the Shine digital platform to recruit, review and select job candidates' CVs, as well as provide feedback to candidates. Candidates can keep track of their CV in one place ie. What level of recruitment process they are at. In this way, more CVs are processed more adequately and more quickly and they show respect to the candidates through feedback, which makes the overall experience of finding a job, that is, candidates more interesting and attractive. With a few clicks through the software, candidates receive feedback, which significantly affects the reduced percentage of 45% of candidates who lack feedback.

Hire Vue [4] is startup that combines artificial intelligence and video interviews in the process of attracting and hiring candidates. Through this platform, videos of interviews with candidates are analysed, using artificial intelligence to assess their verbal abilities, intonation and non/verbal gestures. This is very significant for candidates who come from different speaking areas and cultures. Candidates who undergo video screening are invited to the office for a final interview. Telephone and group interviews were skipped this way. The percentage of those who dropped out of the final interview decreased. Reducing the number of steps in the selection process also reduced the time to recruitment. For example, at Cathai Pacific, which receives more than 300 applications per week, the 3 months to 2 to 3 weeks, and at Hilton, the 42 day recruitment time as been reduced to 5 days. Experience shows that final interviews with higher quality candidates are faster, as well as that candidate experience with companies is better and more positive.

In the modern world, the demographic mobility of the workforce is very pronounced and the selection of candidates according to similarity by origin, nationality, age, gender, education, etc. does not lead to the selection of the best. Classical CV screening puts women and ethnic minorities at a disadvantage (50% to 60%). The Pymetrics [5] digital platform offers game/based candidate assessment tools based on scientific research into people's cognitive and emotional traits. They test the candidates' behaviour in the initial stages of selectin, ignoring facts such as gender, age, education level, ethnicity, etc. In this way, more objective information about the candidate is collected, on the basis of which his profile is defined more precisely his eligbility to do same work and build a career. These tools are used by: Unilever, Mastercard, Mc Donald's, Hyatt, Swarovski.

HR managers in multinational companies, with a large number of employees worldwide, cannot know all their employess regardless of having all the statistics on them. For internal selectin processes i.e. improvements to internal employee mobility, companies such as Segment, MapBok, Credit Karma, … use Twine Labs [6] startup algorithms to track employuess' performance, progress, initiatives, salaries, career, ambitions, ets. Based on the budget of the digital platform Twine Labs, internal candidates for new business roles are selected, selected according to employs data and job requirements, taking into account hundreds of variables. About 50% of the candidates proposed are selected and selected for promotion. This tool is useful for successor planning ie. filling key jobs in the future (top managers).

**Disadvantages of digitalization employment.** The fear of the impact of technology on jobs is not new. Digitalization the recruitment process in the future will require constant innovation of recruitment and selection platforms to avoid any discrimination. The number of people doing recruitment jobs will decrease as technology solves and performs the daily tasks they once did.

Automation, robotics and artificial intelligence are changing job descriptions and specification, replacing some parts of one's business. Some types of jobs have already disappeared and the further disappearance of certain jobs in the future certain. Research shows that administrative jobs and manufacturing jobs will disappear the most as digital technology takes over all routine jobs. Today, in the car industry, 40% of jobs are done by robots.

Excessive application of modern technology in business processes can lead to changes in the nature of work, .i.e. loss of humanity in business as a social activity.

**Discussion.** The question today is increasingly being found to find a purpose for the workforce whose work has been replaced by technology? These same people have designed algorithms that better accomplish tasks, monitor and provide feedback on work done. Technology has increased labor productivity and economic growth, but also created the need for many new jobs and new skills. This means that there will be a deterioration in desproportion in the qualifications of employees. New ways of working require new skills, which

leads to a mismatch between the requirement in terms world and education providers. Digital skills are important for the people who live and work today and especially will become so for those in the future. That is why it is important for companies to invest in their employees, through appropriate training. This will prepare them to respond to the demands of new jobs at the right time by applying modern technological solutions.

According to OECD research published in 2017 in the book "Computers and the future of skills demand", a survey of employees' skills was analysed in order to compare the performance of computers, ie. artificial intelligence with the work of humans. Literacy, numeracy and computer-assisted problem solving were analysed. These are the three skills that 13% of employees in OECD countries use every day. Computer have been shown to be close to replicating these skills with a tendency to use more over the net few decades. The question arises as to whether the employees and at what speed can acquire the new skills they need to meet the demands of the modern labour market and in what direction education for the future will be developed [7].

The automation of daily routine tasks has created a space for constant learning, improvement and development of communication, adaptation, organization, collaboration, flexibility, creativity, etc. skills. All those who are constantly investing in themselves create a potential that sets them apart from others and therefore machines. Knowledge is that which cannot be subtracted and which can be transferred from industry to industry.

**Conclusion.** Digitalization the recruitment process in companies reduces problems in the effect of blindness on a candidate's positive or negative characteristics. Computers do not have emotions and in that sense they do not even have a subjective opinion. It must be remembered that sometimes intuition does a great job for which the algorithm would not give a passing grade. An experienced HR manager knows how to recognize significant talent.

Also, videos about companies where they show jobs, employess, their work experiences, messages from HR managers are opportunities through which companies build their employer brand in order to retain existing emlpoyees and attract new candidates. Those interested though social networks can follow the HR balance of a particular company. They can also create the algorithm themselves and see how many employees at that company are retained, at what jobs and the like. In the digital age, the center on the employee. An employer brand, like other brands, is in fact the perception of employees or potential employees about what a particular company is, not what employers think of their company themselves.

Selection of candidates according to predefined variables using digital platforms provide further passage only to those candidates who fully meet the requirements of the job. Access to candidates is easier, more candidates can be attracted, engagement time is shorter and therefore the cost of the whole process is lower.

Digitalization, brought about by the Fourth industrial revolution, is in fact a business tool that has transformed jobs and as such should be viewed. Digital technology is no substitute for people. Its implementation and proper use require knowledge of digital resources. That is why HR managers need to be aware of modern systems based on artificial intelligence, virtual reality, tools for data collection, processing and management. By applying technology, employees will get rid of routine jobs, thus creating time for creative work and new ideas.

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# SCHOOL RANKINGS: THE US EXPERIENCE AND OPPORTUNITIES FOR UKRAINE

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***Abstract***. *Ukrainian education continues to take a way of reforms that covers all its levels, and on this way we are approaching the stage of improving the national ranking system of higher educational institutions and creating a ranking methodology for those types of educational institutions that are not currently covered by it. This is especially important today when the issues of financing the educational system are under recononsideration. This implies primarily to higher educational institutions, which must prove their need for existence in order to ensure the labor market, competitiveness and efficiency. As the global practice shows, ranking is a strong indicator of the future forecast for an educational institution as those institutions, that take a serious approach to it and the place they take in those ratings, do not consider consolidated lists merely as a PR tool, but systematically evaluate how they meet the modern requirements, analyze the factors that affect the rating, improve the level of academic quality and academic reputation, have all the opportunities for stable economic development, which gives them the opportunity to confidently look into the future.*

*In our view, research, analysis and, in the long term, the introduction of elements of world experience are important for improving the national rating system. The objective of our article is to study the rating experience in the United States based on the ranking system example of U.S. News and World Report "America's Best Colleges." This system has a time-tested methodology that is being constantly updated to respond to changes in the society, the needs of the economy and the labor market. The article analyzes and summarizes the main approaches of the methodology and the latest data released on October 15, 2019. The study is of practical importance, since the results of the systematization of the basic methodology principles of the U.S. news regarding rating of higher educational institutions rating may be effectively used in national practice.*

***Keywords:*** *rating of educational institutions, ranking methods, categories of higher education institutions, stages of classification, academic reputation, academic quality.*

***JEL Classification: A20, A21, C43***

***Formulas: 0; fig.: 1; tabl.: 2; bibl.: 13***

**Introduction**. Currently there are many educational institutions in Ukraine with a wide range of educational services, qualifications, specialties and specializations that coexist on the principles of healthy competition. Some of them are more prestigious, others are less, which is an important factor that affects the economic stability of their development. That is why educational institutions have to constantly work at moving up their place in national and world ranking lists, their level of accreditation, improving in technologies. One of the most effective tools in addressing these challenges is the use of criteria for assigning places in the ratings. It should be noted that the national rating systems require improvement and do not cover all levels of education. Therefore, it is important to study international experience and the principles set out in recognized world ranking systems, as their experience may perhaps be used in national practice. One such method is a method of editorial board of U.S. News and World Report that was one of the first in the world to create a ranking system of educational institutions and has an extensive experience in this field.

**Literature review.** Formation of ratings of educational institutions is a subject of research that is of interest to scientists. Among those who studied the world methodology are as follows: Kurbatov S. (2008) "University rankings as an indicator of the state of education", Ilnitsky D.O. and Sakharov V.E. (2011) "Methodological foundations for assessing international competitiveness of world-class research universities", Andreis Rauhvargers (2011) "Global university rankings and their impact", Gorpinich O.V. (2012) "Special features of the rating of higher educational institutions in Europe", Tatarinov I.E. and Gerasimov O.V. (2013) "World practice of university rating formation: defining the most objective criteria and evaluation indicators", Shostak A.V. (2017) "European Chamber rated universities" and others. Researchers pay great attention to improving the national rating system, using world-leading best practices: Gorpinich O.V. (2012) "Methodology of rating of higher educational institutions of Ukraine", Pavlova O.Yu. (2012) "Cultural integration of domestic higher educational institutions into the European educational environment", Prykhodko V.V. (2014) "Strategy of reform of the national higher education", Tsyuk O.A. (2016) "Special features of world and Ukrainian ratings of higher educational institutions" and other researchers.

**Aims.** The objective of our study is to systematize the main approaches of the methodology of the editorial board of U.S. News and World Report [2] to the school rankings and analysis of the changes therein that were introduced to create the 2020 rating as well as the reasons for the editing; identification of the main motivational reason for the creation of such ratings according to the said editorial board.

**Methods.** The methodological basis of the article is a method of logical generalization to find out the basics of the ranking methodology of the editorial board of U.S. News and World Report [2], an analytical method for analyzing and classifying innovations when making up the 2020 ranking. The information base of the study was the data posted on the web site of the U.S. News and World Report [2].

**Results.** Openness, transparency of higher education is now a challenge to the society, a reputation and a need. A step towards solving the problem of improving the quality of higher education is the implementation of external and internal monitoring of the quality of higher education and presentation of the monitoring results in the format of ratings of higher education institutions [9, c. 271–272].

Ranking and attempts to evaluate higher education institutions began in 1983 by the magazine named the *U.S. News and World Report*, which first published its ranking of America's Best Colleges [10, p. 123]. It stressed the undeniable importance of receiving a multi-level education in general, as it makes citizens economically protected. As evidence of the relevance of such a rationale today, the latest research materials contain data from the Bureau of Labor Statistics of the United States (Figure 1) [1].

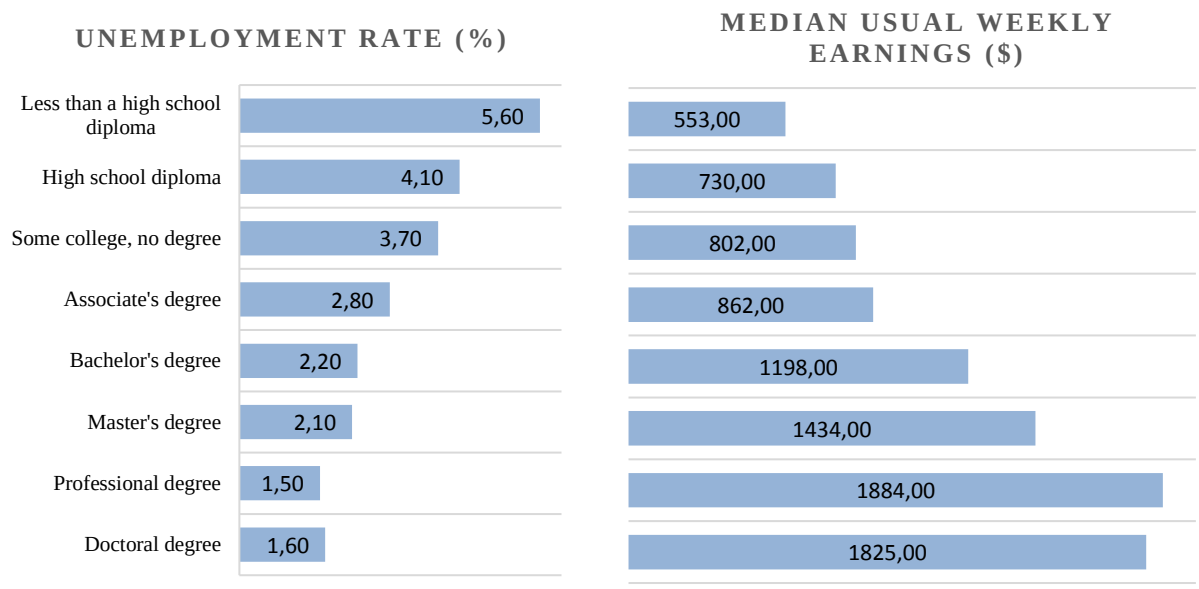


**Figure 1. Unemployment rates and earnings by educational attainment, 2018**

*Note: Data are for persons age 25 and over. Earnings are for full-time wage and salary workers*
*Source: Current Population Survey, U.S. Department of Labor, U.S. Bureau of Labor Statistics*

The need to start a description of the activities of the educational institutions in the form of rating was explained by the importance of making a reasonable choice by the applicants of a qualitative place for education, so that the funds invested in education bring decent pay and stable professional success in the future.

The rating of American higher educational institutions was based on the criteria as follows: evaluations by representatives of the administration of other universities; the ratio of the number of graduates to the number of first-year students; the results of standardized admission tests; the proportion between the number of documents submitted for admission and the number of students enrolled; quality of teaching and academis staff and teachers' salaries; financial costs for the preparation of one student; evaluation of the quality of education by graduates [8, c. 312–313].

The latest data discussed in this article were collected in the spring of 2019 for the Best Colleges 2020 edition and published on October 15, 2019.

US News starts ranking by placing educational institutions by categories according to the mission they perform, and in some cases, even according to their location. The ranking is carried out within a group of one-level educational institutions based on the same set of quality indicators.

**Discussion.** The purpose of creating such groups is an ambition to carry out an objective comparison of educational institutions with similar missions. As an example, the editorial board cites the institutions that focus on research activities and those that focus solely on student teaching. Such educational establishments differ from each other and have different structures. The rating categories for Best Colleges 2020 were created by the editorial board of US News in accordance with the updated Carnegie Higher Education Classification Database 2018. US News has formed the following categories, namely national

universities, national colleges of liberal arts, regional universities, regional colleges. National universities are ranked separately from National Colleges because they offer several doctoral programs, and regional colleges are in a different group and are included in different subgroups depending on the region of location.

After the classification stage, the collection of information begins according to indicators, each of which has its own weight, which is expressed as percentage.

The ratios of the main indicators based on which the ranking of higher educational institutions is made are presented in Table 1.

**Table 1. The ratios of the main indicators based on which the ranking of higher educational institutions is made**

| 80% | 20% |
|---|---|
| Formula in which such statistical indicators of quality of education are used including level of graduates, social mobility, information about teachers, data on enrollment, etc. | Academic reputation as determined by external expert peer review provided by representatives of educational institutions belonging to the same group |

*Source: developed by author*

At the same time, the management of educational institutions is required to ensure maximum accuracy of the presented indicators and reconciliation of potential problems with the answers, which are marked by the US News data system. Then analysis of the ratings by indicators compared to previous data, data from other educational institutions and external sources is made. During the summarization process specialists repeatedly contact the management of the institutions for further clarification on the information provided.

When determining a rating of the academic reputation through the formation of an external peer review, the magazine's editorial board gets in touch with the presidents, pro-rectors, heads of admissions committees with a request to evaluate the quality of the academic programs of their own educational institution and the institutions of the group, their educational institution belongs to. If the institution is unfamiliar to them, a special mark is put.

The third step is to create a rating based on the total score. US News publishes the results, and a rating scale is built according to the rating, consisting of 3/4 of participants of the ranking process. Other educational institutions that failed to get shortlisted are arranged alphabetically. It should be noted that only accredited educational institutions, which prepare bachelors based on four-year programs and have at least 200 students are evaluated. Thus, 213 out of 1,600 educational institutions were not ranked in the last rating campaign.

The magazine's editorial board is constantly updating information about American school rankings, refining the methodology and making their best to ensure that it is as objective and fair as possible. Discussions are constantly underway on how to best measure the quality of education. To achieve this goal,

advisory groups are created, the magazine's analysts attend conferences, research the literature on special features of the modern education, and they do not miss opportunities to take into account the comments and wishes of users and study the contemporary trends. If new visions or suggestions emerge in the process, they are thoroughly researched and accepted as they improve the quality of the rating.

Thus, due to the increased attention of researchers, educators, employers to performance-related indicators, far less attention to quality indicators that take into account the characteristics of students, teachers and other resources is paid to in the ranking model [2].

The methodology for calculating the 2020 rating has also been modified. Table 2 shows the most significant changes in the ranking methodology of higher educational institutions in 2020.

**Table 2. Changes in the ranking methodology of higher educational institutions in 2020**

| Changes | Justification of changes |
|---|---|
| The management of the educational institution must confirm the accuracy of the statistic data provided | The requirement should encourage a more thorough review of the data before submission |
| The list of institutions that can participate in the rating has changed | The need to meet the updated Carnegie Classifiers called "The 2018 Update" |
| Evaluation of curators of senior students from the rating formula of National Universities and National Colleges of liberal arts has been excluded | Such an evaluation has never been a rating indicator in the methodology of calculations for regional universities and regional colleges. |
| The percentage of first-year students has been added to the calculations of success rates | This gives schools more recognition for graduation-year students vs to the percentage of those admitted to colleges |
| Two indicators of social mobility are calculated using the two-year average of autumn 2011 and autumn 2012 | A two-year average value over two periods was used to reduce the statistical error |
| New indicators of teachers' salaries | It has been adjusted using the data of open resources of the Bureau of Economic Analysis for 2017 published in May 2019 |
| Increased use of external data to rank such factors as financial resources, social mobility and teachers' salaries | The schools did not provide data directly to US News |
| In addition to the overall rating, for the first time since 2003 US News has created a separate rating that evaluates educational institutions in the areas such as first-year experience, internships, educational associations, higher education, service for the educational process, studies abroad, research / creative projects of students, written works in disciplines | It has been proven that the said parameters enhance the learning outcomes and academic experience of students |

*Source: developed by author*

Since 1990 US News has been working with some American schools that have no ratings because it finds it incorrect to include them in comparative statistics. These are specialized institutions, most of which offer specialties such as fine arts, vocal art, business and others. In 2019 they totaled 322 educational institutions out of 1,922 polled and grouped into specific categories.

The rating of the best educational institutions evaluates the academic quality, and the non-academic indicators are not taken into account. The statistic indicators US News takes into consideration include the following: social mobility, a ratio of students enrolled to those finished the first year of studies, expert opinion, faculty resources, students' success, financial resources, alumni evaluation, success rate determined by comparing the number of alumni expected and alumni actual.

**Conclusions.** Rankings of higher educational institutions are required for applicants to choose a higher educational establishment, for the administration of higher educational institution - for effective administration, for employers - for selecting an adequate workforce, for government and politicians - for forming a stable legal framework and ensuring the adequacy of the educational services and labour market. Therefore, the rating system should satisfy all consumers of educational services and organizers of higher education [12, p. 58]. In our opinion, this is the right way to create the national ratings of educational institutions, produce and improve existing ranking methods. The world rankings in this matter are a good foundation, as they have a long history and invaluable time-tested experience. The methodology of editorial board of US News is particularly noteworthy.

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# ACADEMIC INTEGRITY IS AN EXTENSION OF YOUR OWN PERSONAL INTEGRITY

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***Abstract.*** *The aim of this research is Investigation in role universities in building and enhancing the integrity of students, especially university students, And merge it with the activities and ideas of social responsibility, In order for integrity and responsibility to become a personal culture adopted by students, and not just laws and regulations that limited in the period of study. and reflection that on society as a whole. The researcher used descriptive analytical approach in focus on previous studies that focused on the important role of educational institutions in building and improving student behavior by promoting programs of academic integrity. The results have indicated that develop programs of integrity and merge it with social responsibility ideas will have a prominent role in shaping and support the Honest and responsible personality of students the future.*

***Keywords:*** *integrity, personality, culture, educational institutions.*
***JEL Classification: A20, M59, Z12***
***Formulas: 0; fig.: 1; tabl.: 0; bibl.: 8***

**Introduction.** "*Integrity*" is ethical value in the first place, and it is - undoubtedly - linked to the trust That all heavenly religions carried, It is based on a basis of transparency, fighting corruption in all its forms.

"*Integrity*" is a high moral behaviour that life isn't right except with it, and it is a complementary ethics to attributes of the human, and his positive behaviours, the life has no value without moral standards that prevail in society and protect individual rights as well as protect the common good. And integrity is one of the important elements or characteristics that make up the human personality, which a person acquires through his interaction with the surrounding environment, and therefore it has a great impact on human life, which will be reflected on society as a whole.

On this basis, the distinctive value of universities appears through the role that it plays in building an integrated and objective personality of the human being, and developing this personality within an ethical system based on honesty, responsibility, transparency, caring for the rights of the individual and the community in which he lives.

Wasting rights and violating integrity is a sign of personal weakness, the absence of social control, and the low level of education, which certainly indicates widespread corruption.

Consequently, a culture of academic trust must be spread in the educational field as a means of ensuring the integrity of students and the care of their interests.

**Literature review.** Numerous studies and research have emphasized the importance of the university's role in various societies in promoting the values of integrity, transparency and prevention of corruption, and recommended the

necessity of including programs of integrity that it becomes an essential part of the educational curriculum, And from these studies was :

*Nafiaa* (2012) explained that societies as long as achieve a high level of integrity values, the greater their ability to combat corruption, as there is an inverse correlation between them, the greater the integrity values, the less and the lower the level of corruption within society, *Muhaimid* (2009) believes that the promoting the values of integrity contributes to protecting society from slipping towards corruption, and that universities must spread the values of integrity as institutions that are responsible for the advancement, progress and development of society, in study by *Al Hayali* (2013) confirmed that in order to address the problem of corruption in general, and corruption in education in particular, it is necessary to establish the concept of integrity through advanced, scientific and planned university programs.

*Definition of Academic integrity:* academic integrity has several definitions, we mention some of them as follows:

*Academic integrity* "is a moral system for professors, students and all those working in educational institutions that organizes their lives and provides them principles that control their behaviour" (Sufyan, 2008).

*Academic integrity* means "intellectual honesty" and scientific integrity in the use, transmission, documentation, and dissemination of information, research production, and project management" (Malik, 2014).

*Personality is* personality is a set of thinking and decision-making methods and unique feelings of a particular person.

and The personality consists of several aspects, such as physical aspects, mental aspects, and moral aspects which are the moral qualities that the individual acquires as a result of what affects him from the external environment, and social aspects that are the external factors that affect a person since the beginning of his growth.

**Aims.** In general, an individual is born by nature without any traits, for example he is not born an honest or dishonest, but he will acquire that trait during his growth, and through the environment surrounding him. This research paper aims clarify the effect programs of the academic integrity and social responsibility in support personality integrity. Through asking and discussing the following questions:

1. Are the academic integrity laws and regulations sufficient to publishing the culture of integrity?
2. Is academic integrity enough without social responsibility?
3. What are the other important roles of the university and university teacher in relation to the student?
4. What about the student?

**Methods.** The researcher used descriptive analytical approach, by focus on previous studies that related the integrity and responsibility in educational institutions and its role in building and improving student behavior by promoting a culture of integrity among them.

**Results.** Noting that there are a lot of studies and research related to this research, but it is not possible to mention all of them in this paper. The researcher has tried to find enough to reach satisfactory and acceptable results.

Firstly, Comment on previous studies and research. Most of the previous studies and research have dealt with the topic of academic integrity in terms of (concept, importance, application, fraud prevention, penalties, etc.). Consequently, these studies and research are limited to the period which the individual will be in the different educational stages, especially the academic stage, Consequently, the major focus was on the role of educational institutions and not the role of the student, and also the focus was on how to implement, and not work on establish a culture of integrity to be part of the student's personality throughout his life span, and not only limited in educational stages.

Also, any one of the previous studies did not try to link academic integrity with social responsibility, while in fact, social responsibility is important as much as the importance of integrity.

Why social responsibility and academic integrity?

Imagine, how can a person be honest and not described by responsibility towards his community.

In fact, there is no such thing as absolute integrity, because we are human beings, but we must aspire and strive for the best and highest levels of integrity to build a successful and respectable personality who is able to live with people, fight corruption and build an perfect society. But integrity alone is certainly not enough to complete building the human personality. simply, because integrity will not cover all events and variables of life, so social responsibility appears as one of the most important features of personality besides integrity, and The current events in the world (Coruna Virus era) are the biggest proof of the importance of social responsibility. Now we may need a culture of responsibility much more than a culture of integrity. Below is a figure 1 showing the union of features in the human personality.

**Discussion.** It is known that there are several main aspects in the human personality, including the knowledge side, the moral side, and the social side, in addition to the physical side, and all these aspects of the human personality should be built in side by side in parallel , continuous and complementary, so that we can create an integrated and balanced human personality. Because any defect in any of these aspects will create a human personality who is not balanced and Incomplete growth in a correct way, and thus not be active and influential in the construction of society.

Ericsson believes that human development passes through sequential stages, and each stage has its goals and tasks And its risks, and believes that these stages are integrated, and that success at any stage depends on success in The stage that precedes it (Al-Bailey, 1997).

And as the student acquires the knowledge side (scientific) which relates to the amount of information and knowledge as a result of his studies at university, he is therefore creates his educated personality, and that will qualify him for the

right job opportunities, and in the same stages, the student's personality is formed which relates to the moral and social aspect that the student acquires through what he is exposed to in his life and contribute to changing his behaviour.

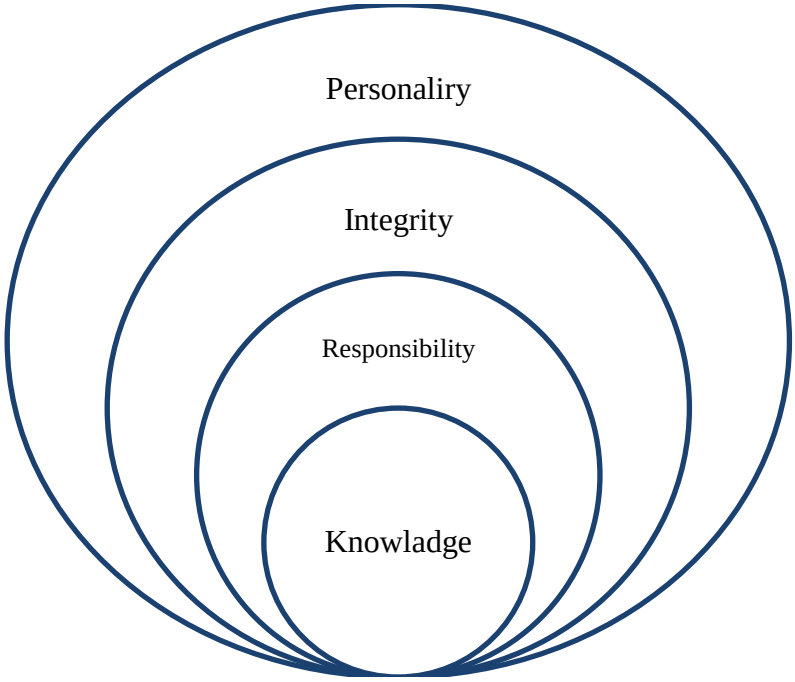


**Figure 1. The union of features in the human personality**

*Source: developed by author*

Here, it is important to integrate a culture of integrity with a culture of social responsibility, because Social responsibility such as integrity is the most important features of a person, it has a great importance to building social relationships in order to participate in activities and establish relationships. And also it makes the individual takes responsibility for his relationships with others. This aspect is very important in the student's personality, because it is through him that he can be a good citizen and a committed and virtuous person or be the opposite of this. The bulk of building this aspect and directing it in a positive direction rests with the university and the university professor with its various programs.

Therefore, just as the university has an important role in developing the scientific aspect of the student, its role in promoting and consolidating the culture of integrity and social responsibility of the student for the purpose of creating an honest and responsible personality may be more importance. and Society whether (the university community or society as a whole) can deal and coexist with an honest and responsible personality, but societies will face difficulties and obstacles in dealing and coexistence with non-honest, immoral personality and irresponsible, regardless of their educational level.

The promotion the values of integrity and a culture of social responsibility is of great importance to preserve societies, universities must work to establish

and develop them among students to be a part of their personality, and help them to face the phenomenon of corruption, which is the problem of the current era, where corruption has become a negative social phenomenon that threatens humanity and life, as it represents A serious threat to the economic, social and educational systems. Integrity and responsibility must be viewed as an important, continuous and necessary moral, human and social value for building society in every time and place. Day after day, the difficulty of life becomes clear without the values of integrity and responsibility, especially as it is one of the contemporary civilization tools for building a human personality capable of advancing societies *(Al-Hayali, 2013).*

As for the student, the university is distinguished by being a large academic institution that has many activities and responsibilities and has many and varied opportunities in which to build the student's integrated personality, the student must makes good use of these opportunities and capabilities in the correct and appropriate way for him and not to waste time in its corridors without real benefit.

Accordingly, the university is a full-fledged life experience experienced by the student during his years of study in all its details, and he must take advantage of its position, interact with it and transfer it to its larger community when it engages in practical life after graduation or while studying. The university is a factory for preparing competent and righteous citizens, a site for science, culture, life-making, and building a student's personality, not just for give of awarding hanging certificates on the walls.

**Conclusion.** The role of the university should not be limited to receiving the student and providing him with the knowledge and information Through educational curricula, and show to him rules and laws of integrity, and penalties that are expected in case of Cheating or plagiarism, And his responsibilities towards the university and its properties through a published Blog or hung on bulletin board , while the university can bring up the topic of responsibility and integrity in general or academic integrity in particular as a culture within educational curricula, and implanted as one of the important aspects of the student's personality so that integrity becomes a part of the student's personality that continues with him even after moving to other stages in his life, and personal integrity Become extension of academic integrity.

Among the basic elements to achieve this purpose is the university teacher, who has a great and distinctive role in forming the student's personality and developing his scientific and cultural talents in a significant and influential way, because the student especially in the youth stage, he is greatly influenced by the personality of the university teacher. A student considers that university teacher as a good example to follow and care about what he says and may even imitate his features to build his personality. Here comes the role of the university professor in achieving this goal through the use of teaching methods, effective and interesting, and taking advantage of modern technologies and current events.

So the universities must take into consideration the necessity of building the student's personality in all aspects with the same degree of interest, and not focusing on a specific aspect and neglecting the other aspects, and The integrity and responsibility programs should not be established in a way that indicates to the student that he is only obligated by it in the educational stages, and that breaking these standards will face by the penalties, and that will constitute a clear imbalance in the human personality and we mean the student's personality, and that the student may adhere to integrity not because it is a positive culture in his personality, but for fear only punishment Thus, this imbalance may be devastating to the student's personality, and it will reflect negatively on the student's behavior and reflects on society in the long term.

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# MANAGEMENT OF CONSTRUCTION ENTERPRISES IN THE LEADING COUNTRIES OF THE WORLD: MACROLEVEL

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***Abstract***. *The article identifies the peculiarities of managing the activity of enterprises of the construction industry at the macro level in the leading countries of the world, such as: USA, Canada, Great Britain, Germany, France and other EU countries. The main directions of macro-regulation of activity of the enterprises of the construction industry are the bodies of state regulation of activity of the enterprises of the construction industry; legal support (licensing of construction activities; documenting the start of construction works; commissioning of a construction site, etc.), as well as technical regulation (requirements for the construction process, qualification requirements for workers, requirements for technical supervision, etc.). The common features, which are characteristic of most countries of the world regarding the macro-regulation of the activity of the construction industry enterprises are established: stable balance of economic and social interests of the participants of the construction market; refusal of the state from the established historical monopoly on the technical regulation of the construction market and the gradual transition to a system of technical self-regulation; high degree of economic and creative freedom of the objects of regulation; developed social and economic institutes of the construction industry; deep integration of the institutions of the construction industry of a particular state into a single world socio-economic system due to the harmonization of the principles of technical regulation, with the diversity of forms of implementation of these principles, taking into account national peculiarities; high level of building culture. The main differences in the macro-regulation of the activity of construction industry enterprises are identified, which are the technical regulation and legal support in different countries of the world, which depend on the individual conditions of development and activity of each individual state.*

***Keywords:*** *enterprises of the construction industry, macro level, management, state regulation, legal support, technical regulation.*

***JEL Classification: H49, H70, L70, L74***

***Formulas: 0; fig.: 0; tabl.: 1; bibl.: 6***

**Introduction.** State policy plays a crucial role in the development of construction around the world, because it is the state that controls the main and most limited resource without which construction is impossible - land. The experience of developed countries shows that effective performance of the state by its state gives a powerful impetus to the development of construction. At the same time, the state is often criticized for creating various barriers to its development. Administrative barriers, bureaucratic red tape, corruption, and transparency in the performance of major government functions directly affect the volume of the construction market and the cost of properties, as developers shift all the costs of overcoming state barriers to the end-buyer. Recently, overseas attention has been given to the issues of construction industry management as one of the important sectors of the economy. Experts believe, and it is confirmed in practice, that the costs of improving management ultimately pay for themselves repeatedly.

**Literature review.** Peculiarities of managing the activity of enterprises of the construction industry at the macro level were research by: Ofori, G. (2006) in "Challenges of construction industries in developing countries: lessons from various countries" and "Research on construction industry development at the crossroads"; Drewer S. (1990) in "The international construction system"; Loraine R. K. (1992) in "Construction management in developing countries"; Mark A. Hall and David M. Jaggar in "Should construction enterprises, working internationally, take account of cultural differences in culture?"; Bourdeau L. (1999) in "Sustainable development and the future of construction: a comparison of visions from various countries" and and other authors.

**Aims.** Aims is a to establish the features of managing the activity of construction industry enterprises at the macro level in the leading countries of the world.

**Methods.** The author used the methods of static and logical comparison, systematization and generalization, which made it possible to achieve the goal of the study.

**Results.** Most authors in their works usually identify two groups of countries by the degree of development of state regulation of the economy:

- countries with developed mechanism of state regulation of economy - Western European countries (Germany, France, Netherlands, Scandinavian countries, Austria), as well as developing countries of Asia (Japan, South Korea, China) use macroeconomic planning mechanism in the medium term. Moreover, the states of Western Europe use a comprehensive approach to state regulation, including state programming, which is related to their orientation to the so-called normal socialism (Swedish, Austrian), given the strong positions and great influence of the social-democratic parties of these states;

- countries with less developed mechanism of state intervention in the economy (Canada, Australia, USA), with developed corporate capital, the size and capabilities of which often exceed the state ones. However, in these countries, the role of the state is very important, especially in times of worsening economic conditions, rising inflation and unemployment. Most countries do not have a single building management system, and regulation is based on numerous building codes approved by state, state, county, county, department, or local governments [1-6].

**United States.** In the US construction industry, the role of the statewide regulatory body is primarily created in 1965 by the Department of Housing and Urban Development, whose task is to coordinate the construction of federal-funded facilities as well as the construction of privately-funded residential homes. budget. The Civil Engineer Corps, building associations and societies such as the Association of American General Contractors, the Association of American Subcontractors, the Association of American Architects, and the American Society of Civil Engineers play a major role in regulating the construction industry. These associations exist at the expense of deductions from construction firms. They develop and issue regulatory documents,

instructions and regulations, promote best practices, organize seminars, symposia and conferences, schools and refresher courses, act as government consultants, and issue special journals [1-6].

**Canada.** The leading role in the state regulation of construction in Canada is played by the Federal Ministry of State Construction, the Central Corporation for Real Estate, Buildings and Construction, the Construction Industry Development Board, the Canadian State Council for Specifications, the Standards and Design Council, and more. Local governments in the provinces of the country have, in addition, local agencies specializing in safety, environmental protection while conducting construction work, etc. A key role in the development of scientific and technological progress in construction is played by the National Center for Construction Research. An integral part of the progress development network in construction is the vocational training system, as well as academic institutions, universities [1-6].

**Japan.** Currently, there are more than 500,000 construction firms and enterprises in Japan, led by the Ministry of Construction. The function of the Ministry is the development of projects, laws and regulations in capital construction, licensing. Japan's construction firms are part of two of the largest construction associations. The first of these - Atkenren - coordinates the activities of small and medium-sized companies representing various construction organizations and enterprises of the country, the second association - Zenken - unites construction firms that conduct the construction of urban and municipal facilities. An extremely important role in the governing hierarchy of Japan at the intersection of interests of public institutions and private business is played by the Federation of Economic Organizations, established in 1946. The Federation is the advisory body on the most important economic problems for government agencies and coordinating - for private business. Contractors and other construction firms in Japan are characterized by constant work to find new technical and organizational solutions. A significant role in the development of scientific and technological progress in the construction industry in Japan belongs to the system of construction societies and associations, headed by the Japan Federation of Construction Contractors (Japan Federation of Construction Constructors). Among the professional agencies and associations that are part of the public construction sector, the largest association is the Japanese Society of Civil Engineers, which, like a similar American society, is engaged in the development of construction science, promoting its recent achievements, developing various standards, standards used by most public sector organizations [1-6].

Japan's construction law has a strong tradition, built on regulations and acts of the 40's. However, they define only the general line of construction legislation. Practical work is largely confirmed by the impact of recommendations developed by influential professional associations and organizations in Japan.

**Great Britain.** The UK's Construction Authority is the Ministry of Construction and Public Works. The main functions of the Ministry are to regulate the activities of construction firms and to issue government-financed budget orders. Construction associations and federations have a major influence on the development of the construction industry, among which the largest are:

- Federation of Civil Contractors representing the interests of construction firms engaged in the construction of ground structures;
- National Federation of Entrepreneurs in Construction, representing the interests of firms engaged in the construction of ground structures;
- Federation of foreign construction, which unites construction companies that conduct construction abroad;
- Federation of Builders, bringing together mainly small-scale construction firms engaged in land-based construction, including repair and reconstruction work.

The regulatory role in construction is played by a system of so-called Codes of Practice developed by the British Standards Institute. The codes of practice contain requirements for different types of activity in construction design, construction work, etc. In 1981, the Civil Engineering Standards Board prepared a standard, known as the "Standards Standards".

**Germany.** The system of state construction management in Germany has a centralized structure, which includes, in addition to the federal authorities, also the bodies of land, local self-government, which, along with other problems and issues of construction. The federal bodies involved in the regulation of construction include the Interagency Committee on Construction in Lands, the Ministry of Construction, Planning, Housing and Urban Affairs.

Most firms in Germany are members of voluntary manufacturing and trade associations. The main functions of such associations are to protect the interests of the company and to promote the manufactured products market, to exchange technologies, to prepare standards for building materials and their advertising, to develop methods of examinations of building materials, to provide information to the industry. An important role is played by business associations, closely linked to government agencies, and representing the interests of entrepreneurs. In the construction of such unions there are several dozen. The leading union of the Wiesbaden Construction Industry Union is a leading player, which has a major impact on public policy making in the construction sector. The recommendations of business associations are the basis for developing a strategy for private business in the construction sector. The control over the observance of the technical norms in construction is entrusted to the construction authorities of the lands, acting in a general respect of the norms and standards [1-6].

**France.** The main government body in France that manages the development of the construction industry is the Ministry of Construction, Transport and Tourism. It studies the situation, develops forecasts, consults local authorities, subsidizes and credits firms with the aim of implementing

construction programs. The active role of the Ministry in the development, planning and regulation of construction production, well-established statistical accounting make it possible to solve problems that are impossible and unprofitable for monopolies. Firms belonging to the National Federation of Public Works and the National Building Federation have a major influence on the development of the construction industry. Construction companies in France, mostly large, have the opportunity to obtain profitable contracts through a system of well-established contacts with government agencies. These operations are jointly managed by research, information and other institutions [1-6].

**Finland.** The positions of the state and municipalities in Finland are very strong as they make the main distribution of finances. Compliance with building codes, laws and regulations is controlled by the apparatus. The main focus of construction planning is the formation of the urban environment. The law provides for drawing up regional, city plans, development plans, detailed city plans, plans for the construction of rural settlements and plans for the coastal strip (resorts). The Ministry of the Environment, on behalf of the state, issues national directives for regional planning, formulated in the national development plan for 5 years. Regional development plans are developed by the Regional Planning Association at the provincial level [1-6].

**Poland.** The experience of the Republic of Poland testifies to the obligation of active participation of the public in the process of urban planning. The most commonly used forms of involving residents in discussing town planning documents (including the master plan) and building individual sites in Poland are informing and discussing with residents plans for future construction and draft regulations. This does not mean that there are no urban conflicts in Poland. However, all disputes are resolved through a court order by applying the local community to an administrative court. According to the research, the Ukrainian model of coordination with the public of construction projects is quite different from the Polish one. Unfortunately, such legal mechanisms are rarely used by Ukrainian citizens to protect their legitimate interests [1-6].

According to the results of the study, a comparative analysis of the impact of management at the macro level on the activities of construction industry enterprises in different countries, including in the neighboring countries of Ukraine, was performed, which allowed to establish common and distinct features of such regulation, their advantages and disadvantages (Table 1).

The legal framework of all countries in the world contains restrictions of a different nature regarding construction activities. The main source of such differences is technical regulation and their legal support in different countries of the world. The peculiarities of such technical regulation are the product of the individual conditions of development and activity of each individual state.

**Table 1. Common and distinguishing features of managing the activity of construction enterprises at the macro level**

| Countries | Common features | Excellent features |
|---|---|---|
| United States | The Ministry of Housing and Urban Development coordinates the construction of facilities funded by the federal budget, as well as the construction of private homes that are credited with this budget | Transfer of part of the state's powers to self-regulatory organizations, which develop and issue various regulatory documents, instructions and regulations, as well as carry out training and licensing in construction specialties |
| Canada | The Federal Ministry of State Construction exercises only general control | The National Center for Research in Construction plays a key role in the development of scientific and technological progress in construction |
| Japan | Ministry of Construction develops projects, laws and regulations in capital construction, conducts licensed work | Associations of building societies and associations providing guidance on construction play a leading role |
| Great Britain | Ministry of Construction and Public Works. carries out regulation of activity of construction firms and issuance of state orders financed from the budget | Building associations and federations have a major influence on the development of the construction industry. The system of so-called codes of practice plays a regulatory role in construction |
| Germany | The system of state construction management has a centralized structure, which includes, in addition to the federal authorities, the land authorities | Entrepreneurial unions influence the formation of state policy in the construction sphere |
| France | The Ministry of Construction, Transport and Tourism studies the situation, develops forecasts, consults local authorities, subsidizes and lends to companies to implement construction programs | Only large construction firms get government contracts |
| Finland | General management in the field of construction is exercised by the state and the municipalities | The Ministry of the Environment issues national directives for regional planning of territories on behalf of the state |
| Poland | Public administration in the field of construction is carried out by the relevant ministry | The obligation of public participation in the process of urban planning |

*Source: developed by author base on [1-6]*

A study of the national technical regulation system in the context of these conditions helps to understand why the national technical regulation system of a country has taken some form.

Thus, the ability to perform construction work is inextricably linked to existing requirements for the implementation of this type of work. Such requirements are usually clearly regulated by the requirements of the applicable law of the country where the construction work will be carried out. World practice does not have common approaches and requirements for construction and licensing, which is why it is difficult to make comparisons and sometimes impossible.

**Discussion.** To date, the most ambitious and ambitious is the European Union's program to create a single market on the European continent, which would allow harmonization of the national construction legislation of the Member States of the European Union. More than 30 years of requirements for the creation of uniform building codes for the European Union have been implemented in the development of Eurocodes, a set of model standards for construction applications that are intended to replace the national rules of the Member States of the Union.

In general, for all developed countries, parts of Europe and Southeast Asia that are developing are characterized by a number of features that may be relevant to the economy in general and the construction industry in particular:

- stable balance of economic and social interests of participants in the construction market, which is achieved through technical and licensing regulation;
- refusal of the state from the established historical monopoly on technical regulation of the construction market and gradual transition to the system of technical self-regulation;
- a high degree of economic and creative freedom, which is underpinned by a high degree of social awareness of the objects of regulation and favorable conditions that encourage the observance of professional ethics;
- developed social and economic institutes of the construction industry;
- deep integration of the institutions of the construction industry of a particular state into a single world socio-economic system due to the harmonization of the principles of technical regulation with the diversity of forms of implementation of these principles, taking into account national peculiarities;
- a high level of building culture, which is manifested in the presence of a viable and effective system of technical regulation, availability of safe and high-quality material resources and qualified human resources;
- the efficiency and effectiveness of mechanisms to ensure the high quality and safety of construction products and construction sites for living beings and the environment.

A significant factor in the effective development of the construction industry in economically developed countries is the close cooperation of public authorities and private sector professionals. Namely, construction sector reforms are usually initiated from the bottom - by construction market professionals, and carried out - by public authorities, with the direct

involvement of all interested public bodies, businesses and private sector organizations representing the professional and consumer interests of the construction industry.

Any tools and mechanisms for certification, accreditation and licensing of construction business entities have a dual purpose. That is, all these tools allow you to ensure the quality and safety of construction sites, without the need to create unnecessary barriers to activity in the construction market. That is, all countries in the world are trying to find a balance that would ensure the adequate quality and safety of operation of construction sites, and at the same time, they would not be an additional source of obstacles for the subjects of the construction market.

Quality assurance of construction work in most countries of the world is achieved through licensing and / or registration of specialists in the specified field - architects, engineers and builders, who allow to perform professional activities, including: examination of educational level, completion of internships, identification of the level of theoretical and practical knowledge on the basis of the agreed programs of continuous education and self-training in order to support and enhance professional qualification during the professional activity of a specialist.

It should be noted that in EU countries there are no approvals for land allotment, approval of projects for construction and reconstruction, permits for commissioning of new and reconstructed objects.

In addition, the EU applies a directive on Integrated Issuance of Permit Documents, which includes environmental impact assessments prior to the process of obtaining a permit for the construction of an object whose construction requires such an assessment. The European Union proposes to issue one permit at one permit center instead of separate permits. According to EU regulations, building permits are compulsory for both residential and non-residential buildings [6]. The permits must be issued by the regional authorities, which coordinate the process of processing individual specialized certificates for environmental protection and human health.

There are also countries where construction activities are not licensed. In particular, in Germany, there is a requirement for individuals who carry out construction work to be members of professional non-governmental organizations certifying their qualifications. And for the construction of particularly complex objects, construction companies must join the associations of industrial builders and have the necessary technology, which is certified by a state certificate.

Countries with a very liberalized attitude to construction activities include Georgia, where there is virtually no control by state authorities over market actors. The peculiarity of the construction activity in Georgia is that this type of activity has the right to carry out any economic entities that have been registered by the state authorities in accordance with the general rules.

In most developed countries, in order to reduce administrative barriers, or eliminate them altogether, for certain types of entrepreneurial activity, part of the non-state functions was transferred to the competitive environment. This process should be carried out only after a detailed analysis of the possible risks in the area of interests of both individual consumers and the state as a whole. It is precisely the number and level of risks identified that should determine the degree of government involvement in such regulation.

The licensing of construction activities carried out by state authorities as an element of market regulation addresses the question of the possibility of carrying out entrepreneurial activity by separate entities of admission on the selected market. This type of regulation allows to identify organizations that will perform the types of construction work envisaged by the licensing conditions, with acceptable levels of risk of property damage, life, human health, and the environment.

**Conclusion.** A detailed analysis of the construction activity in selected countries of the world revealed the organizational methods of state regulation of construction activities, including those related to licensing, which can be carried out in several directions:

- creation of conditions for access of business entities to the market (registration, licensing);
- technical regulation;
- admission to the product market of the enterprise (confirmation of conformity, certification, accreditation);
- control over the activity of business entities and turnover of products.

The main task of this set of organizational methods of state regulation, in a market economy, is to create prerequisites for construction, which, on the one hand, would ensure minimal state intervention in the conduct of business activities, and on the other - would help meet the requirements of the state-represented society. In our opinion, the basic requirements put forward by society for construction products should include the prevention of harm to the life or health of citizens, their property and the environment.

In our opinion, the formation of organizational levers of influence on the process of licensing in construction should be based on the following basic principles:

- expediency of regulation;
- transparency of permitting procedures and qualification requirements;
- overcoming the maximum number of administrative barriers to construction activities;
- promoting self-regulation of construction activities, in particular through self-regulatory organizations;
- interaction of public authorities with entrepreneurs and their associations;
- compliance with the requirements of the public regarding the quality and safety of the construction process and its results;
- optimization of the permit system.

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# THEORY-METHODICAL ESTIMATION OF EFFICIENCY PRINCIPLES FOR MECHANICAL ENGINEERING ENTERPRISES ON THE INTEGRAL INDICATOR BASIS

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***Abstract.*** *Nowadays, the work of enterprises occurs in conditions of negative impact of factors of the market environment, which affects the results of functioning. Therefore, there is a need to evaluate the effectiveness of enterprises, which will allow to identify the first manifestations of deterioration in the results of activities in time, the downturn dynamics of indicators, to make effective managerial decisions, to determine the directions of activity. The paper proposes a methodical approach of assessing the effectiveness of the activities for mechanical engineering enterprises. Estimation is based on the integral indicator due to the weighted average cost of capital, which approbation was carried out using the example of the factual enterprise. A number of measures for the researched enterprise have been formed, including: flexible system of criteria and components in accordance with the requirements of the evaluation subject in analytical data, taking into account the interests of interested parties that act as donors and beneficiaries in the activities of enterprises; structure of indicators identifying problems and their potential solutions has been formed. It was established that the implementation of the formed measures will increase the efficiency of the economic activity, will allow to determine areas of activity in priority, to develop measures to improve the work. It is also important to take into account the influence of factors of the internal environment, implementation of suggested steps allows to respond to the influence of factors of the internal environment using the proposed methodological approach and form an effective development strategy.*

***Keywords:*** *performance, integral indicator, weighted average capital value, internal environment, multi-vector valuation.*

***JEL Classification: A10, C18, D29***

***Formulas: 17; fig.: 0; tabl.: 4; bibl.: 9***

**Introduction.** The functioning of enterprises takes place in conditions of constant influence of factors of the internal environment, which affects the results of activity. Therefore, there is a need to evaluate the effectiveness of enterprises by taking into account the factors of the internal environment. All this will allow to develop measures to restore performance indicators, form directions of development, make effective decisions and contribute to the achievement of expected results.

**Literature review.** The issue of evaluating the effectiveness of enterprises was investigated in the works of the following scientists: Maslak O., Grishko N., Ishchenko S., Maslak M. [2]; Babmindra D.I., Skull O.G. [3]; Lepyohina O.V. [5]; Nazarov E. [6]; Rasulova U.S. [7]; Tarasenko N.V. [8]; Shiyan A.A. [9].

**Aims.** The purpose of the article is to develop a methodological approach to the effectiveness evaluation for the mechanical engineering enterprises on the basis of the integral indicator due to the weighted average cost of capital, with its approbation on the example of the factual enterprise.

**Methods.** in the process of research the methods of correlation analysis and multiple regression are used, which make it possible to calculate the dependence of the integrated indicator of the efficiency of the production process on individual efficiency indicators. Also used a statistical method of data processing, a method of grouping to analyze performance indicators. The method of observation is used to study the state of financial accounting and control of enterprises.

**Results.** The efficiency of the enterprise, taking into account the use of labor and material resources, through the production process is a general indicator of the efficiency of the enterprise. However, the values of indicators are absolute characteristics of the enterprise. Correct interpretation by the performance indicator of the enterprise according to the evaluation of effectiveness can be carried out only in tight links with other indicators reflecting the funds invested in the enterprise.

Due to that fact the company sets itself the task of determining the degree of economic efficiency of activity in a specific period on which the need for further assessment depends. The result of the evaluation is a conclusion about the efficiency of activities and the adoption of an appropriate managerial decision. Appeal to specialized bodies for scientific and technical expertise, at this stage of evaluation is impractical from the point of view of additional costs allowed. Therefore, there is a need to develop an indicator on the basis of which the enterprise will be able to determine independently the degree of efficiency of the production process.

Methods of correlation analysis and multiple regression, which is offered by modern economic cybernetics, make it possible to calculate the dependence of the integral indicator of evaluating the effectiveness of the production process $I_{prod}$ on individual performance indicators. The multiple regression method allows to determine which economic indicators have the greatest impact on the integral performance indicator. The equation representing dependence of the integral indicator $I_{prod}$ is calculated by the formula:

$$I_{prod} = \sum_{i=1}^{i=n} wi * x_i \ , \qquad (1)$$

*where $I_{prod}$ – index of efficiency of production process; $w_i$ – influence coefficient of individual indicators on the integral indicator of efficiency; $x_i$ –characteristics of economic activity by i; n – number of characteristics of economic activity.*

The proposed indicator reflects the degree of effectiveness of all characteristics of partial indicators of economic activity, taking into account their impact on the integral performance indicator. The highlighted characteristics are proposed to be used as the basic features of the economic activity of the enterprise. However, the composition of each group may vary depending on the object of evaluation of activities and the characteristics of the market in which it operates. Due to the heterogeneity of the selected characteristics in their essence and practical significance, the main task is the formation of a single indicator of the effectiveness of economic activity.

The multi-vector nature of the evaluation also causes flexibility of composition and content filling of criteria with indicators for each of the areas of determination, in accordance with the sphere of influence on a certain interested party. This study developed a system of indicators according to the composition of criteria, the value of which varies from 0 to 1. It is established that achieving the maximum possible value is almost impossible, but each of the indicators should strive for it.

Thus, from the position of the enterprise, the assessment is carried out according to the criteria of economic efficiency, which reveals such basis the signs of the enterprise's activity as profitability and optimality of the production cycle in terms of cost optimization. As stated earlier, the most common indicator of the effectiveness of economic activity is its profitability, which is the ratio of profits from the activities of the enterprise to the costs of its implementation [3, c. 223].

Assessing the effectiveness of economic activity, it is advisable to determine the degree of its growth compared to the change in profitability level:

$$I_n^{\text{change}} = 1 - \frac{R_{n-1}^{basic}}{R_n^{change}}, \qquad (2)$$

*where $I_n^{change}$– index of profitability of activity after changes; $R_{n-1}^{basic}$ – profitability of the enterprise in the period before the introduction of the change (n-1); $R_n^{change}$– profitability of the enterprise in the n-th period.*

In case of changes within the industry, it is advisable to determine the profitability of the enterprise. It is noted that in order to ensure a single dimension of the evaluation results on the principle of formality, the traditional profitability formula was transformed as follows:

$$I_{\text{ech}} = 1 - \frac{\text{Bch}}{\text{Pch} - \text{Ech}}, \qquad (3)$$

*$I_{ech}$ – index of profitability of changes; $B_{ch}$ – costs for achieving a change in production activities; $P_{ch}$ – income from the implementation of changes in the production activities of the enterprise; $E_{ch}$ – development and implementation costs of the change.*

In the case when the implementation of changes is reflected in the internal processes of the enterprise, it is advisable to calculate an additional cost savings indicator:

$$I_{ec} = \frac{\sum Bu * Ru}{Ew}, \qquad (4)$$

*where $Bu$ – expenses for resource unit; $Ru$ – the amount of freed resources as a result of the implementation of the change; $Ew$ – total mass of direct costs; $u$ – type of resource.*

Basing on the fact that the company under consideration is a joint stock company in the state of sale consider the indicator calculated as the ratio of the market value of the company's assets according to their renewable value. At the same time, the market value of the enterprise will be seen as the price at which

this enterprise can be sold on the market. The revolving cost is considered as the cost that this enterprise would have provided that its entire capital (cars, buildings, equipment, etc.) was replaced by new capital equipment at the prices that have developed at the current time on the market. Thus, if the market value of the company's assets exceeds the renewable value, i.e. K>1, it means that the company has received a positive economic profit, or expects it to [2]. The market value of the enterprise is presented through the formula (5):

$$K_{mark} = 1 - \frac{Pbas}{Pch} = 1 - \frac{Pbas * Q_{bas}^{pwh}}{Pin * Q_{ch}^{pwh}}, \quad (5)$$

*where $P_{ch}$– profit from the sale of products after the introduction of the change; $P_{bas}$ – profit from the sale of products in common conditions; $Pin * Q_{ch}^{pwh}$ – the volume of products sold subject to changes in the market; $Pbas * Q_{bas}^{pwh}$ – volume of products sold.*

Thus, if this coefficient has a value of 1 or seeks it, this will indicate the possibility of the enterprise receiving super profits and monopolizing the specified market segment. Accordingly, if its value is reduced from 1 to 0, this probability will be proportionally reduced.

To find out how much innovations will change the degree of competitiveness of the market and market power of a particular enterprise, we will apply a coefficient that determines the ratio of the monopoly price difference (PM) and marginal costs (MC) of products and monopoly price [9]. This coefficient, known in economic literature as the Lerner coefficient, is as follows:

$$L = \frac{Pm - MC}{Pm}. \quad (6)$$

The Lerner coefficient acquires a value from 0 (in the market of perfect competition) to 1 (net monopoly). The value of the coefficient is directly proportional to the market authorities and inversely proportional to competition. Having adapted the value of this coefficient to determine the effectiveness of economic activity, it can be argued that the monopoly price is the price of change, or rather, an increase in this price in accordance with the basic level of the price of ordinary products. The marginal costs will reflect the costs of developing and implementing changes, or rather their increase compared to the basic level of costs. Thus, the Lerner coefficient (formula 6) when determining the monopoly power of the enterprise will look like:

$$L' = \frac{\Delta P - \Delta B}{\Delta P}, \quad (7)$$

*where L'– modified Lerner coefficient; $\Delta P$ – increase of the price on products with changes compared to the usual (%); $\Delta B$ – increase in the cost of changes in activities compared to the usual (%).*

If the Lerner coefficient increases from 0 to 1, the company's power will also increase in proportion to the full monopoly position in the market and, as a result, increase the possibility of obtaining super profits [9]. The obtained data (formulas 2; 3; 5; 7) are synthesized into a single indicator of economic efficiency $I_{ef}$:

$$I_{ef} = I_r * I_{ech} * K_{mark} * L' , \quad (8)$$

*where* $I_{ef} \to 1$.

From the investor's point of view, the criteria for assessing the effectiveness of the economic activity of the enterprise are due to the economic nature of the essence of economic activity, namely, profit from the implementation of the production process and optimization of the term of return on investment. That is, the basis of quantitative substantiation of the process of making a management decision of an investment nature is the anticipation of monetary [5].

Thus, using the method of multiple regression under conditions of interest in the investment attractiveness of enterprises, it makes sense to supplement the existing formula of the integral performance indicator with a parameter that takes into account the degree of profitability of investments made in the enterprise, taking into account the position of determining the mass of additional profit from investing in innovation activities in comparison with alternative activities; assessment of the level of losses associated with a lack of profit due to risk; ensuring timely return of invested capital.

Weighted Average Cost of Capital responds necessary set of requirements (Weighted Average Cost of Capital = WACC).

The investment process is carried out continuously, and in order to ensure the minimum cost of resources and the optimal capital structure, the enterprise must finance both share and leveraged capital. That is why when making financial plans and assessing future investments, managers of the enterprise use mainly weighted average capital value in calculations, but not the cost of individual sources of financing.

Under the unchanged capital structure, for some time the company can raise funds at the average price, which is determined by the available weighted average cost of capital. At the same time, each new currency of the attracted funds will have the same structure as the entire capital of the enterprise. However, attracting new sources of financing in large volumes can lead to increasing in the financial risk of the enterprise, and therefore to increasing of the weighted average cost of capital. The average cost of capital also increases as a result of rising market interest rates and a corresponding increase in the value of equity and borrowing capital [1].

The use of formula offered by the CFA Institute determines this indicator for “Motor Sich” JSC. The purpose of this study will be to consider the requirement to invest funds in support of products and activities of the enterprise. The source of funds can find itself in form of shareholders as initial

public offers, or taking loan from banks or financial institutions. Of course, capital has its own value, due to the large number of sources of loans, it's valuable to determine the weighted average cost of capital (Weighted Average Cost of Capital = WACC).

The calculation formula used according to the CFA Institute version [1]:

$$\text{WACC Formula} = (E/V * Ke) + (D/V) * Kd * (1 - \text{Tax rate}), \quad (9)$$

*where E – market value of equity; V – market value of equity and debt; Ke – tax percentage; D – market value of debt amount of equity; Kd – cost of debt.*

Formula of calculations takes into account the tax and interest rates with the attraction of the market value of equity. The algorithm of calculating the weighted average cost of capital (WACC) of "Motor Sich" JSC is presented on Table. 1.

**Table 1. WACC (Weighted Average Cost of Capital) Calculation Algorithm**

| Options | Engagement Price | Cost, $ | Calculation formula |
|---|---|---|---|
| Market value of equity | | 346285000 $ | |
| The total market value of own capital and debt | | 346650260 $ | |
| Market value of debt | | 383230$ | = C[(1 – (1/((1 + Kd)^t)))/Kd] + [FV/((1 + Kd)^t)] |
| Interest expense (C) | | 3951$ | |
| Total due (FV) | | 365260$ | |
| The cost of debt (Kd) | 5,2% | | = Interest rate *(1-Tax rate) |
| Corporate tax rate | 18% | | |
| Weighted Average Cost of Capital (WACC) | 11,01% | | WACC Formula = (E/V * Ke) + (D/V) * Kd * (1 – Tax rate) |

*Source: developed by the author on the basis of the source of [1]*

Thus, according to the results of calculations, it was found that the weighted average cost of capital of "Motor Sich" JSC is 11%, which is satisfactory level for the value of the indicator in question. This level of indicator provides for a satisfactory opportunity to be a source of funds, because the capital structure is protected from negative changes under the conditions of stability, otherwise other variable factors should be supported in the coming years.

For a more accurate and correct answer to the question of whether to invest in the company or not, potential investors should also check other coefficients for assessing the level of efficiency of the economic activity of the enterprise in order to make a final decision. So, in an outfit with a calculated indicator of the weighted average cost of capital and depending on the level of profitability of the company, it is possible to understand whether it is advisable to invest in an enterprise, according to the results of which an analysis of the effectiveness of the economic condition of the enterprise is carried out.

Therefore, conclusion is that the risk quantitatively reflects the degree of short-level of profit.

To determine the objective quantitative measurement of risk, rely on the statement that risk-forming factors in today's extremely unstable economic environment can be many factors of influence of external and internal financial, economic, political, social, environmental environment, so it is advisable to determine the risk dimension in proportion to the index of changes introduction (3). For clear gradation of the risk of the change index scale, the Stegers formula was used:

$$k = 1+3.322*\lg(N), \quad (10)$$

*where k – number of metric groups; N – input data.*

For our case, the total amount of data is 11, having made the necessary calculations we have:

$$k= 1+3.322*\lg(11) = 4.6 \sim 5 \text{ groups}. \quad (11)$$

The next step is to determine the step of the interval h, which is equal to:

$$h= \frac{\max(x)-\min(x)}{k}, \quad (12)$$

*where x – variable value.*

If the maximum value is 1 and the minimum 0 step definition of the interval h is:

$$h = \frac{1-0}{5}= 0.2 . \quad (13)$$

On the basis of the obtained data, formation of a risk gradation from the minimum to the maximum will proportionally increase the value of the fundamental change index with an increase in the possibility of costs. If there is information about possible costs, the risk factor is determined:

$$k_r= (1-p_i), \quad (14)$$

*where $p_i$ –opportunity of expenses.*

To assess the justification of investment activity, it is advisable to enter an index of expectations, which should limit the riskiness of investments. This index should determine whether there will be sufficient profit, additional profit to cover increased risk. Its value ranges from 0, which does not justify investments, to 1, which makes investing a priority task.

$$I_h=1 - \frac{WACCbas}{WACC\ ch * kr}, \quad (15)$$

*where $I_h$ – index of expectations in return on investment; $WACC_{ch}$ – weighted average cost of capital in economic activity, subject to changes, taking into account the level of investment risk determined on the scale, UAH; $WACC_{bas}$ – weighted average cost of capital in normal activities of the enterprise.*

It should be noted that the effectiveness of investment activity is based on such a conceptual basis of investment activity as justification of costs and return of invested capital in the shortest possible time. Therefore, the feasibility of assessing economic efficiency from the investor's point of position in cost-effectiveness is obvious, since one of the target directions of economic activity is to optimize it.

Therefore, among the indicators of the effectiveness of investment activity, we will highlight an indicator of cost effectiveness. The advantage of this indicator in comparison with the payback period is taking into account the time factor, provided that all the positive aspects of the second are maintained.

In view of this, in order to assess the impact of performance from the point of view of payback of expenses, it is advisable to determine the cost optimization index:

$$I_{oe} = 1- \frac{Рв\ ch}{Рв\ bas}, \quad (16)$$

*where $I_{oe}$ – expenses optimization index; Рв ch – modified cost-effectiveness; Рв bas – basic cost-effectiveness.*

In order to evaluate the effectiveness of the economic activity of the enterprise from different positions of interest of the parties, it is advisable to summarize the indicators considered, useful to us, in the form of a single index of the effectiveness of investments in the enterprise:

$$I_{inv.ef.} = I_{oe} * I_h \quad , \text{де } I_{ef} \rightarrow 1, \quad (17)$$

*where $I_{inv.ef}$ – index of investments in the enterprise.*

In order to unambiguously interpret the results, it is necessary to establish clear limits of the values of all integral indicators of this direction. We set the limits of integral indicators by the number of constituent indicators in the criteria. Thus, for our case, the evaluation of the effectiveness of investment activity by cost optimization indices and expected returns on investment is 0.25.

The final stage of evaluating the effectiveness of enterprises is the formation of conclusions on the effectiveness of its activities in each direction or criterion. In order to interpret the results of evaluating the effectiveness of the enterprise in the target areas and criteria (Table 2).

**Table 2. Interpretation of the results of evaluation of the effectiveness of the enterprise by criteria and subject of evaluation**

| Subject of evaluation | Conclusion | |
|---|---|---|
| | Activity is effective | Activity is not effective |
| Enterprise | $I_{ec\ ef} \in (0,01;1)$ | $I_{ec\ ef} \in (0;0,01)$ |
| Investor | $I_{inv.ef.} \in (0,25;1)$ | $I_{inv.ef.} \in (0;0,25)$ |
| Evaluation criterion | Activity is effective | Activity is not effective |
| Cost-effectiveness | $I_{ec\ ef} \in (0,06;1)$ | $I_{ec\ ef} \in (0;0,06)$ |
| Investment efficiency | $I_{inv.ef.} \in (0,25;1)$ | $I_{inv.ef.} \in (0;0,25)$ |

*Source: developed by the author on the basis of the source of [8]*

For practical implementation of the model for improving the efficiency of the economic mechanism, the "Motor Sich" JSC enterprise has been chosen. The company was the most successful enterprise of the sample, and its economic activity - the most effective. But, since 2018, shares of "Motor Sich" JSC sold to Chinese investors have been under arrest at the request of the SSU investigators in order to preserve material evidence in the criminal case initiated in 2017. [6].

This is the event that takes role of a change, the impact of which will be determined in terms of economic and investment efficiency. In accordance with the content of the economic activity of the enterprise and its fundamental features the criteria of economic and investment efficiency will be evaluated.

System for assessing the effectiveness of the economic mechanism consists of indicators representing the source data of the results of evaluation of the efficiency of "Motor Sich" JSC (Table 3).

**Table 3. Initial data for calculating the effectiveness of activities "Motor Sich" JSC**

| Indicator | Meaning |
|---|---|
| Profitability of the enterprise in the basic 2017 year, % | 20 |
| Profitability after changes in 2018 year, % | 10 |
| The costs due to the change that took place, thous. UAH | 5388396 |
| Income (loss) due to the change that took place, thous. UAH | (1851981) |
| Implementing a change | 0 |
| Profit from the sale of products after the change (2018), thous. UAH | 12239687 |
| Profit from sales to change (2017), thous. UAH | 15150429 |
| Increase in prices for products with changes, % | 109 |
| Increase in costs on condition of change, % | 74 |
| Risk factor of short-term investment profit | 0,7 |
| Weighted average cost of capital in the base year (2017), % | 11 |
| Weighted average cost of capital in 2018, % * | 6 |
| Cost profitability in basic 2017, % | 15 |
| Cost profitability in 2018, % | 8 |

*Source: developed by the author on the basis of the source of [4]*

The evaluation of the effectiveness system for the economic mechanism consists of indicators of the initial data, which is summarized in Table. 4.

**Table 4. Evaluation Results "Motor Sich" JSC**

| Criterion | Indicator | Meaning |
|---|---|---|
| Economic effectiveness | Activity Profitability Index | 0,79 |
| | Market share ratio | -0,24 |
| | Monopoly coefficient | 0,32 |
| | Index of Economic Efficiency of Activities | 0,15 |
| Investment effectiveness | Investment Profit Expectations Index | -0,83 |
| | Cost Recoupability Index | 0,46 |
| | Investment Performance Index | -0,38 |

*Source: developed by the author on the basis of the source of [7]*

Basing on the data obtained, with taking into account the adopted change, which took place in 2018, it is noted that "Motor Sich" JSC has suffered a decrease in market share, a decrease in the expectation of investment returns and, as an investigation, a decrease in investment efficiency. However, the strong economic base of the enterprise allowed it to remain profitable with satisfactory indicators of economic efficiency and cost recoupability.

Regarding the model developed for assessing the effectiveness of the economic mechanism, it is important to note its usefulness in the effectiveness of the organization of economic activity and the ability to respond in a timely manner to changes in the internal and external environment.

**Discussion.** The proposed model for evaluating the effectiveness of the economic mechanism of the enterprise performs a number of useful functions, such as: it offers a flexible system of criteria and components in accordance with the requirements of the assessment subject in analytical data; it takes into account the interests of donors and beneficiaries in the activities of enterprises; it offers a structure of indicators which are capable to identify the problems and their potential solutions.

**Conclusions.** The article proposes a methodical approach to assessing the effectiveness of the activities of mechanical engineering enterprises on the basis of the integral indicator due to the weighted average cost of capital, which also considers changes in the internal environment of the enterprise. The use of this approach makes it possible to assess the level of efficiency for enterprise's activity as well as to form proposals for improving the work of enterprise.

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