THE PECULIARITIES OF THE RESEARCH TOOLS IN THE ANALYSIS OF ENTERPRISE ECONOMICS IN A STATE OF UNCERTAINTY

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The issue of researching the risks in the activities of an enterprise caused by economic uncertainty is in the center of attention of researchers from different countries. The most cited in this area are the works of F. Knight [1], J. Kallman [2], M. Crouhy, D. Galai, R. Mark [3], T. Flynn, M. McCarthy [4]. The authors of these works focus on the following topics while investigating the uncertainty in enterprise activities: risk interpretation and measurement, risk management, project loss control, risk classification, and risk prediction method.

Many Ukrainian researchers considered the issue of risk identification and assessment in the Ukrainian economy. A special place in these studies belongs to the Ukrainian scientist and practitioner of the Ukrainian diaspora M. Paslavskyi [5]. The mentioned researcher looked at the risks of the Ukrainian business from the standpoint of deep knowledge of the Ukrainian reality, combined with an understanding of the general laws of doing business in developed countries.

Despite the fact that there is currently a substantial quantity of scientific research in the field of analysis of uncertainty (risks) in company economic activity, the question of proper (relevant) analysis remains important.

Classifying the tools of uncertainty analysis, we distinguish, according to different classification features, the following groups of tools (Fig. 1). Such classification features may be: 1) the frequency (prevalence) of the tools used, which is usually related to the complexity of their application and results interpretation: traditional and new; 2) the purpose of application of uncertainty analysis tools: to assess internal and external factors of influence; 3) the orientation of the analysis, which can focus on assessing either future events or the past: Ex post та Ex ante.

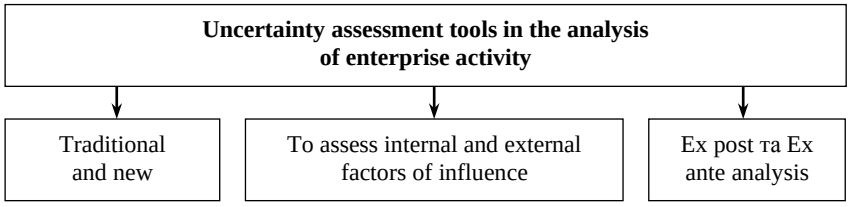

Fig. 1. The classification of tools for estimating uncertainty in the enterprise

Source: authors' own

The revelation of the peculiarities of traditional and new tools, in our opinion, deserves the most attention when analyzing the uncertainty in an enterprise's activities. After all, traditional tools can only answer a limited number of questions about what the effect of uncertainty was or is. Instead, newer tools provide a deeper analysis of uncertainty, but require larger databases and more sophisticated tools. Therefore, we assume that traditional and modern tools should be used simultaneously.

In our opinion, the traditional tools for estimating uncertainty include its estimation due to changes in the indicators of enterprise efficiency, labor productivity, etc. The onset of rapid and unpredictable changes in these indicators can be interpreted as a manifestation of uncertainty.

The category of «efficiency» is multifaceted and has a long history of use in scientific circulation. Almost every scientific school, since the eighteenth century, has tried to define it. It is believed that the first who tried to reveal its essence were W. Petty and F. Quesnay. But they regarded efficiency as effectiveness and used it to evaluate individual governmental or private activities [6]. This category gained relative independence in the works of D. Ricardo, who considered it as «the ratio of the received result to a certain type of expenditures». He made an attempt to assess the capital efficiency [7]. According to K. Marx, production is efficient if with a minimum of advanced capital to create the maximum amount of product with possible lower expenditures of labor and resources [8]. Representatives of the neoclassical school of economics of the twentieth century defined efficiency as the ratio of results and costs.

The world-renowned textbook on economics of C. McConnell and S. Brue provides the following explanation of economical efficiency: «More products from a given cost mean more efficiency». [9].

The American economist H. Leibenstein introduced the concept of X-efficiency in economics into scientific circulation. An enterprise is considered X-efficient if it produces (sells) the maximum possible volume of production with the available resources and the best of the available technologies [10].

Very often efficiency is regarded as effectiveness. In Western dictionaries there is a semantic difference between the concepts of efficiency and effectiveness. In particular, «efficiency» in its translation from English means productivity, useful work [11]. Instead, «effectiveness», translated from English, means the degree of success that gives the desired result [12]. Peter Drucker also emphasized this difference in concepts, namely «effectiveness» means «doing the right things» and «efficiency» means «doing things right». He notes that «to be successful in the long run, to survive and achieve its goals, an organization must be both efficient and effective» [13].

The distinction between the concepts (phenomena) of «efficiency» and «effectiveness» is approved in DSTU (the State Standard of Ukraine) ISO 9000: 2007 «Quality management systems: basic provisions and glossary». According to this standard, efficiency is the ratio between the achieved result and the resources used,

and effectiveness is the degree of the planned activity implementation and the planned results achievement [14].

In our opinion, the efficiency of the enterprise is its ability to achieve the goal, provided that it is close to the optimal ratio between the results obtained and the resources spent on their achievement.

Economic uncertainty can be described as a phenomenon that can exhibit itself in the following ways, according to our definition of «enterprise efficiency»:

– failure to achieve a certain goal or significant deviations from it;

– reducing the amount of material and financial results of an enterprise;

– growth of material and financial costs to achieve the same, other things being equal, i.e. comparable, results.

When assessing the efficiency of the enterprise it is necessary to consider different approaches to determining the expenditures that can be used to calculate efficiency:

1) resource: the result is compared with resources;

2) expendable: the result is compared with current expenditures;

3) resource-expendable: a combination of the two previous approaches.

It is expedient to carry out the analysis of enterprise activity efficiency according to three groups of indicators: productivity, efficiency of additional investments in the capital, and profitability.

Productivity indicators represent the number of hryvnias of gross output per unit (one hryvnia of value) of enterprise resources and characterize their productivity. The ratio of output to the value of individual resources is used to compute it.

In developed countries, *productivity* is the subject of statistical research. In foreign practice, the most common indicator of productivity is the indicator of labor productivity. The only difference is that in Eastern Europe this indicator is calculated by output, and in Western European countries, the United States and Australia added value is used to calculate labor productivity. Capital productivity indicators refer to the national statistics indicators of the United States and Australia. National statistics of foreign countries calculates and publishes indicators of both single-factor and multi-factor productivity. Multifactor labor and capital productivity (by output and added value) is widely calculated in most market economies. And only in Canada and the USA productivity indicators of the whole set of resources (labor, fixed and working capital) are defined. [15].

The second group of indicators – **the efficiency of additional capital investments** – is used to determine the economic feasibility of additional capital growth. Relevant indicators are calculated by the formula [16]:

$$Kef = \frac{\mathrm{Prod}_1 - \mathrm{Prod}_0}{C_1 - C_0}, \quad (1)$$

where Prod_1 і Prod_0 – the value of marketable products of the enterprise in the reporting and base periods, respectively; C_1 і C_0 – the average annual cost of capital, respectively, in the reporting and base periods.

When calculating the efficiency of additional involvement of sources of capital formation and additional investments in fixed and working capital, the denominator of the formula changes taking into account these capital components.

It should be noted that the economic nature of this indicator is complex. When calculating this indicator, four variants of results can be obtained:

$$1.\ Kef = \frac{\text{Prod}_1 - \text{Prod}_0}{C_1 - C_0} = \frac{\Delta\text{Prod}}{\Delta C}, \qquad (2)$$

$$2.\ Kef = \frac{\text{Prod}_1 - \text{Prod}_0}{C_1 - C_0} = \frac{-\Delta\text{Prod}}{\Delta C}, \qquad (3)$$

$$3.\ Kef = \frac{\text{Prod}_1 - \text{Prod}_0}{C_1 - C_0} = \frac{\Delta\text{Prod}}{-\Delta C}, \qquad (4)$$

$$4.\ Kef = \frac{\text{Prod}_1 - \text{Prod}_0}{C_1 - C_0} = \frac{-\Delta\text{Prod}}{-\Delta C}. \qquad (5)$$

The first variant shows that as the enterprise's capital develops, so does commodity output. In such circumstances, it is critical that this indicator has a value larger than one, indicating that additional capital investments are very efficient. The result in the second alternative will be negative since capital expansion is accompanied by a decline in marketable products, which characterizes inefficient extra capital investment. It's critical to keep the negative repercussions to a minimum, hence this indicator's value should be close to zero. The third variation depicts a situation in which an increase in production is achieved by lowering capital. The outcome will also include a minus sign. The increase in the value of this indicator usually suggests a gain in capital usage efficiency. Keep in mind, however, that this option is not suitable for underfunded businesses. Finally, the fourth alternative is obtained if the drop in capital size results in a reduction in marketable products. The least adverse position is when the outcome is less than one, because in such circumstances, marketable products are not lowered as much as the enterprise's capital.

Profitability indicators are important for the analysis of the enterprise. They reflect the level of profitability of the enterprise, as well as the possibility of forming funds for the enterprise current activities. Fig. 2. presents the main indicators of the enterprise economics analysis for each of the three groups.

A multifactor model created by DuPont in the 1920s is used for a detailed investigation of capital efficiency. It entails breaking down the return on capital into individual indicators that are all tied together in a single system. Each of the criteria is a valuable financial indicator. This analysis allows you to establish the specific influence of each component on management performance, as well as identify and eradicate their negative impacts in a timely manner. In addition, untapped internal reserves for increasing enterprise efficiency are estimated using appropriate formulas.

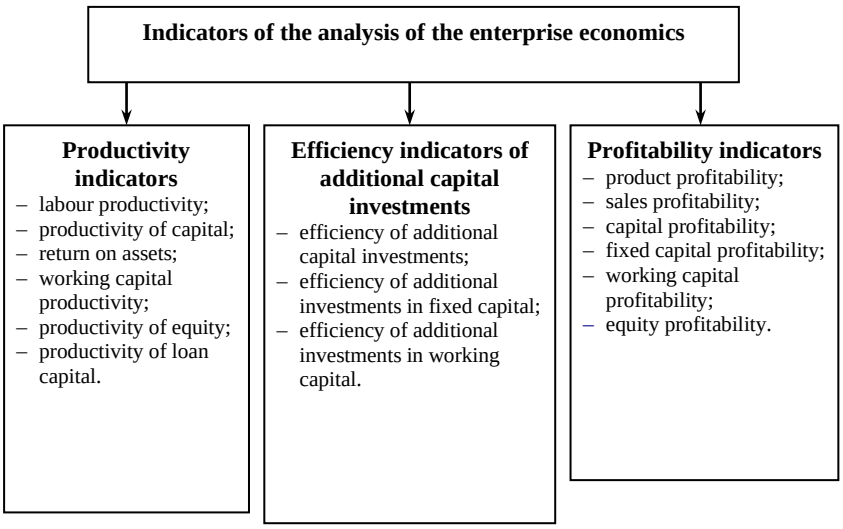

Fig. 2 The main indicators of the enterprise economics analysis

Source: authors' own

Return on capital (ROC) according to this model is calculated by the following formula [17]:

$$ROC = ROS \times Koc, \qquad (6)$$

$$\frac{P}{C} = \frac{P}{SAL} \times \frac{SAL}{C}, \qquad (7)$$

where *ROS* – profitability of sales; *Koc* – capital turnover coefficient; *P* – operating profit of the enterprise; *SAL* – revenue from sales.

This model shows the impact of sales profitability and capital turnover coefficient on return on capital. Analyzing the indicators, it is possible to determine the reserves for further improvement of capital efficiency. The reasons for the decrease in return on capital can be both a decrease in return on sales and a slowdown in capital turnover. If the decrease in profitability is more influenced by the first factor, it is necessary to pay more attention to marketing, pricing, and assortment policy. This indicator's growth can be influenced by both internal and external factors that the organization has no influence on. As a result, it is vital to consider the influence of all possible factors when analyzing the indicator. Capital turnover can be accelerated by lowering fixed or working capital. The focus should then be on selling or writing off fixed assets that aren't being used or are being used inefficiently; reducing raw material stocks, work in progress, and finished products; and reducing receivables.

This model is simplified, but it can be transformed into a multifactor model which will fully determine the impact of individual factors on the efficiency of capital use of enterprises. In our opinion, the multifactor model of capital efficiency can be represented as follows [18]:

$$ROC = ROS \times CP \times Kr \times Kd \times Kfl \times Ke, \quad (8)$$

$$\frac{P}{C} = \frac{P}{SAL} \times \frac{SAL}{FC} \times \frac{FC}{WC} \times \frac{WC}{D} \times \frac{D}{E} \times \frac{E}{C}, \quad (9)$$

where *ROC* – return on capital; *P* – operating profit of an enterprise, thousand UAH; *C* – cost of total capital, thousand UAH; *SAL* – revenue from sales of products, thousand UAH; *FC* – cost of fixed capital, thousand UAH; *WC* – cost of working capital, thousand UAH; *D* – loan capital, thousand UAH; *E* – equity, thousand UAH.

According to the proposed model, the return on capital is influenced by the following factors: return on sales (*ROS*), productivity of fixed capital (*PC*), the coefficient of fixed to working capital (*Kr*), the coefficient of working capital to loan capital (*Kd*), financial leverage (*Kfl*), coefficient of autonomy (*Ke*).

To determine the impact of individual factors on return on capital, we propose such a calculation algorithm based on the use of index (*Ir*) research method:

$$\begin{aligned} Ir = \frac{ROS_1 \times PC_1 \times Kr_1 \times Kd_1 \times Kfl_1 \times Ke_1}{ROS_0 \times PC_0 \times Kr_0 \times Kd_0 \times Kfl_0 \times Ke_0} = \frac{ROS_1 \times PC_0 \times Kr_0 \times Kd_0 \times Kfl_0 \times Ke_0}{ROS_0 \times PC_0 \times Kr_0 \times Kd_0 \times Kfl_0 \times Ke_0} \times \\ \times \frac{ROS_1 \times PC_1 \times Kr_0 \times Kd_0 \times Kfl_0 \times Ke_0}{ROS_1 \times PC_0 \times Kr_0 \times Kd_0 \times Kfl_0 \times Ke_0} \times \frac{ROS_1 \times PC_1 \times Kr_1 \times Kd_0 \times Kfl_0 \times Ke_0}{ROS_1 \times PC_1 \times Kr_0 \times Kd_0 \times Kfl_0 \times Ke_0} \times \\ \times \frac{ROS_1 \times PC_1 \times Kr_1 \times Kd_1 \times Kfl_0 \times Ke_0}{ROS_1 \times PC_1 \times Kr_1 \times Kd_0 \times Kfl_0 \times Ke_0} \times \frac{ROS_1 \times PC_1 \times Kr_1 \times Kd_1 \times Kfl_1 \times Ke_0}{ROS_1 \times PC_1 \times Kr_1 \times Kd_1 \times Kfl_0 \times Ke_0} \times \\ \times \frac{ROS_1 \times PC_1 \times Kr_1 \times Kd_1 \times Kfl_1 \times Ke_1}{ROS_1 \times PC_1 \times Kr_1 \times Kd_1 \times Kfl_1 \times Ke_0}. \end{aligned} \quad (10$$

The first partial index reflects the impact of return on sales on return on capital, the second – the productivity of fixed capital, the third – the coefficient of fixed and working capital ratio, the fourth – the coefficient of working capital to loan capital, the fifth – the coefficient of financial leverage, the sixth – the coefficient of autonomy.

The DuPont model can also determine the impact of individual factors on return on equity [19]:

$$ROE = ROS \times Koc \times Kd; \quad (11)$$

$$\frac{NP}{E} = \frac{NP}{SAL} \times \frac{SAL}{C} \times \frac{C}{E}; \quad (12)$$

where *ROE* – return on equity; *Kd* – debt burden coefficient; *Np* – net profit of the enterprise.

Return on equity, according to this model, is influenced by three factors: return on sales (*ROS*); capital turnover coefficient (*Koc*); debt burden coefficient (*Kd*). The specifics of the impact of the first two factors are considered in the analysis of the return on total capital of the enterprise. The debt burden coefficient reflects the financial structure of the capital chosen by the enterprise. Its growth, on the one hand, can increase the return on equity and on the other – increase the risk of bankruptcy.

Rising uncertainty is usually associated with deteriorating conditions in leading sectors of national economies. The Ukrainian economy was and still is industrial-agrarian. Therefore, the dynamics of industrial production in it is a crucial marker of change. For each individual Ukrainian enterprise, the dynamics of industrial

production can be considered as an external factor of certainty or, conversely, uncertainty of the state. The current state of Ukrainian industry does not meet the requirements dictated by the conditions of global changes. Industrial production has ceased to be a major factor in the growth of the national economy.

The decline in industrial production in general, and especially the production of investment products, causes negative consequences of lagging behind and weakening the national economy, the loss of Ukraine's competitive position in world markets. The military aggression of Ukraine's eastern neighbor, the occupation and annexation of the industrial-intensive regions of Donbass and Crimea, the looting of enterprise property, and the curtailment of production in territories beyond its control, have caused irreparable losses to Ukraine and its industrial potential. The trade war against Ukrainian exports resulted in the destruction of industrial capacity, the severing of historic internal and external economic links, and a precipitous drop in output.

Expanding ties with European partners has a significant positive impact on the development of the country's industrial potential. This is facilitated by the Association Agreement between Ukraine and the EU, especially the existence of a free trade area. Ukrainian exporters partially compensated for the loss of markets of the former partner due to the intensification of trade relations with the EU, which has become Ukraine's main trading partner and key foreign investor [20].

Table 1 shows indicators from the analysis of enterprise economics for each of the three groupings we proposed, based on data from Ukrainian industrial enterprises.

Table 1. The main indicators of productivity of industrial enterprises of Ukraine for 2013 – 2018

Productivity indicators	2013	2014	2015	2016	2017	2018	The relative deviation of 2018 to 2013, %
Labor productivity, thousand UAH / person	418,64	532,19	694,05	851,74	1097,38	1255,76	299,96
Capital productivity	0,70	0,69	0,73	0,75	0,84	0,91	129,87
Return on assets	0,75	0,72	0,56	0,56	0,89	0,98	129,57
Working capital productivity	1,56	1,51	1,51	1,44	1,51	1,67	107,53
Equity productivity	1,80	2,05	3,04	3,82	4,57	4,17	231,36
Loan capital productivity	1,14	1,04	0,96	0,93	1,02	1,16	101,64

Source: calculated by the authors according to the data of the State Statistics Service of Ukraine

Based on the data in Table 1, it can be concluded that the labor productivity indicator at industrial enterprises in Ukraine has been steadily increasing from 2013 to 2018. The average annual increase of this indicator is 167,4 thousand UAH per employee. In 2018, this indicator increased almost 3 times compared to 2013. However, it should be noted that Ukraine lags behind Western European countries in terms of labor productivity in industry.

The main reasons for low productivity are:

– worn-out and obsolete fixed assets;

– outdated technologies;

– insufficiently efficient organization of operating systems and production processes;

– inefficient organization of labor;

– low-efficient management;

– practical lack of incentives to build innovative production, associated with a high level of monopolization;

– weak investment infrastructure;

– insufficient informatization and automation of production.

The capital productivity indicator measures the efficiency with which capital is used, and it has been trending upwards from 2013 to 2018, which is a positive trend. The data in Table 1 show, however, that capital productivity is low. Thus, in 2013, only 70 kopecks of manufactured goods were obtained for every hryvnia spent in manufacturing, 84 kopecks in 2017, and 91 kopecks in 2018.

The increase in the indicator of return on assets in the dynamics is positive for Ukrainian industrial enterprises. As shown in Table 1, the indicator of return on assets declined by 22,22 percent in 2015 compared to 2014. The level of return on assets is influenced by various factors, such as changes in output, efficiency of fixed assets use. The growth of this indicator is observed in 2017 and is 0,89. In 2018, it increased compared to 2013 by 29,57%.

Working capital productivity coefficient characterizes the efficiency of the enterprise working capital use. The continuity of the process of production and sale of products, and as a consequence – its solvency and profitability, depends on the quality of working capital management. Working capital efficiency refers to achieving the greatest possible gain in output for each unit of working capital. There is a trend of insignificant change in this indicator over the analyzed time. Thus, the productivity of working capital in 2018 increased by only 7,53% compared to 2013.

The equity productivity indicator has been trending upwards during the research period, which is good news for industrial businesses. In comparison to 2013, equity productivity increased by 2.31 times in 2018. Such achievements were attained at the expense of an increase in the amount of manufactured goods.

Attracting loan capital to the company's turnover is a common occurrence. The enterprise's financial state improves as a result of this attractiveness, but only if debts are paid on time. The indicator of loan capital productivity reflects the loan capital's efficiency of usage. The data in the table show a decrease in this indicator during 2014 – 2016, and only in 2017 it increased compared to 2016 by 9,68%. It is possible to conclude about the loan capital inefficient use.

In general, all the analyzed indicators are growing, which is quite positive for the industry. For a more detailed analysis, we turn to the indicators of efficiency of additional investments in the capital (Table 2).

The indicator of efficiency of additional capital investments demonstrates that as the size of capital in industrial companies increased in 2017 – 2018, so did the volume of output. However, the study of the data in Table 2 shows that further capital investments were inefficient in 2014 and 2016, as production growth was lower than capital value growth rate.

Table 2. Indicators of efficiency of additional investments in the capital of industrial enterprises of Ukraine for 2014 – 2018

Indicators of efficiency of additional investments in the capital	2014	2015	2016	2017	2018
The efficiency of additional investments in the capital	0,547	1,047	0,841	1,445	2,463
The efficiency of additional investments in the fixed capital	0,419	0,260	0,553	-0,781	3,375
The efficiency of additional investments in the working capital	0,964	1,501	1,160	1,870	7,432
The efficiency of additional investments in the equity	-1,384	-2,250	-11,999	15,397	2,539
The efficiency of additional investments in the loan capital	0,392	0,714	0,786	1,594	82,279

Source: calculated by the authors according to the data of the State Statistics Service of Ukraine

The indicator of efficiency of extra fixed capital investments has a negative trend. As a result, the value of this indicator is less than one, indicating a significant inefficiency of further fixed capital investments. And it wasn't until 2018 when such extra investments looked to be cost-effective.

In 2014 – 2016, the efficiency coefficient of extra equity investments was negative, indicating inefficient additional equity investments. This indicator depicts a circumstance in which an increase in output was achieved while lowering equity. This indicator's results are increasing gradually, and its absolute value has been increasing since 2017. However, it is critical to keep in mind the importance of providing funds to the enterprise.

When looking at the indicator of the efficiency of extra loan capital investments, there is a trend for the indicator to rise. This means that both the loan capital and output have increased. In 2018, the efficiency of extra loan capital borrowings was very high.

Table 3 discloses the third group of indicators for assessing the efficiency of industrial enterprises.

The indicator of production profitability reflects the profit received by the enterprise from each hryvnia invested in production. As a consequence of the analysis of these indicators and their dynamics, it is required to conclude that the level of production profitability for the investigated period is low enough to be described by high prime cost. Between 2015 and 2018, this indication hardly changed.

The efficiency of an industrial enterprise's finished product sale processes is measured by the return on sales. These tables illustrate the sales of industrial products that were not profitable from 2014 to 2016. The return on sales of industrial items has been defined by a positive value of the indicator since 2017. In 2018, the indicator of return on sales increased significantly compared to 2014 and makes 3,31%.

Table 3. The assessment of profitability indicators of industrial enterprises of Ukraine for 2013 – 2018

Profitability indicators	2014	2015	2016	2017	2018
Production profitability, %	-87,39	24,09	24,52	25,91	24,27
Sales profitability at net profit, %	-114,01	-9,82	-1,06	1,96	3,31
Return on capital on net income, %	-9,23	-8,57	-0,96	1,91	3,55
Return on equity, %	-27,49	-35,58	-4,92	10,43	16,31
Return on loan capital, %	-13,91	-11,30	-1,20	2,33	4,54

Source: calculated by the authors according to the data of the State Statistics Service of Ukraine

The amount of net income per hryvnia of capital is shown by the return on equity in terms of net income. These indicators were calculated using net profit and are negative from 2014 to 2016, owing to the fact that the consequence of economic entities' activity in industry is a loss. Since 2017, the net profit indicator has been in growth mode. Thus, in 2017, one hryvnia of capital accounted for only UAH 0.019 of net profit and in 2018 – UAH 0,035.

The return on equity indicator stands out among profitability indicators because it demonstrates the efficiency with which an enterprise's own resources are used. The value of this indicator represents the attractiveness of the company as a place to invest. The amount of return on equity for the analyzed period is relatively low; in 2018, one hryvnia of equity accounted for roughly 0,16 UAH of net profit, and this is the highest level of the indicator. Through the efforts of management personnel, the amount of return on equity in industry can be enhanced.

A similar trend is observed in the analysis of the return on loan capital. The positive value of the indicator is observed in 2017 and one hryvnia of loan capital accounts for only UAH 0.02 profit and in 2018 – UAH 0,04.

Thus, according to the analysis, the situation at Ukrainian industrial enterprises in 2014 was particularly difficult due to Russia's military aggression.

Our detailed analysis of traditional and more up-to-date performance indicators of the enterprise in its various manifestations is important for assessing uncertainty, because it provides an opportunity to find out the following. Having a sufficient database for various performance indicators, we can compose a measure of deviation estimation, for example, by variance or by so-called gaps. Then the minimization of deviations can be interpreted as a decrease in uncertainty, instead, an increase in deviations over a period of time – as an increase in uncertainty. When assessing uncertainty in terms of profitability, for example, the rationale of calculating uncertainty using this traditional indicator from the arsenal of analysis tools would look something like this:

$$\sum_{i=1}^{n} gaps\left(\text{Prof}_i^* - \text{Prof}_{trend}^*\right) \to 0, \qquad (13)$$

where $(\text{Prof}_i^* - \text{Prof}_{trend}^*)$ – deviation of the actual value of return in a particular year from the values of the trend.

To assess the efficiency of enterprises under the conditions of uncertainty, taking into account the impacts of competitive national and global environment, it is advisable to use the indicator *EVA* (Economic Value Added) – economic added value and a balanced system of other indicators.

The Economic Value Added (*EVA*) model was developed by B. Stewart and D. Stern and registered by Stern Stewart & Co. in the early 1990s. This model is used by such well-known companies as: «Coca-Cola», «Siemens», «IBM». Unlike traditional efficiency indicators, *EVA* reflects the close relationship to stock value and takes into account the risk factor. This indicator allows to assess the efficiency of the enterprise from the standpoint of converting profits into its market value [21].

The indicator of economic value added in terms of content is an economic profit which takes into account not only accounting costs but also the alternative costs of invested capital. That is, when calculating the *EVA* from the amount of profit not only the cost of loan capital is deducted, but also the cost of equity.

The *EVA* indicator can be used to assess the efficiency of both the enterprise as a whole and its individual units. It is also used to evaluate the performance of managers and their remuneration.

To calculate the «Economic value added» indicator the following basic formula is used [22]:

$$EVA = NOPAT - (WACC \times IC), \qquad (14)$$

where *NOPAT* – net operating profit after tax; *WACC* – weighted average cost of capital; *IC* – invested capital.

The weighted average cost of capital is calculated by the formula:

$$WACC = \frac{E}{C} \times r_e + \frac{D}{C} \times r_d \times (1-t), \qquad (15)$$

where E – equity of the enterprise; C – the total amount of capital of the enterprise; D – loan capital of the enterprise; r_e and r_d – respectively, the cost of equity and loan capital, $; t – income tax rate.

To calculate *EVA*, the developers have made about 160 amendments to the balance sheet items and the statement of financial performance, but in each case only individual amendments are used. In particular, the amendments concern the definition of invested capital. Advertising, personnel training, research and development, and corporate restructuring should all be included in the latter. In addition, the difficulties in computing this indicator stem from the requirement to determine extra data not included in the financial statements when calculating the weighted average cost of capital.

The results of the calculation of economic value added can be interpreted as follows:

– $EVA = 0$. The market value of the enterprise is equal to the book value of net assets. In this case, the owners have no significant interest in investing capital in the enterprise. The profitability of investing in the enterprise is equated to the profitability of investments in bank deposits.

– $EVA > 0$. The enterprise's market value exceeds its net asset book value. High efficiency of investment in the company also encourages the owner to invest more in the business.

– $EVA < 0$. The market value of the enterprise is less than the book value of net assets. Owners are beginning to lose the capital invested in the enterprise. Further investment in the company is inefficient [23].

In general, the use of economic value added indicators in enterprise economics analysis appears to be quite promising. In comparison to net income, it allows for a more objective assessment of the company's results. However, its application in domestic companies necessitates particular organizational, informational, and personnel modifications. In particular, this concerns the establishment of high-quality management accounting at the enterprise, and training of personnel for the implementation of the appropriate management model.

It's important to remember that the indicator of economic value added measures a company's efficiency in terms of its owners. However, other stakeholders, like as employees, managers, purchasers, creditors, and the government, have an impact on the company's operations. When only the EVA indicator is used, their interests may be overlooked, resulting in a decrease in the enterprise's worth. In these circumstances, combining the usage of the economic value added model with a balanced scorecard is a good idea. The EVA indicator, in particular, should be used as one of the basic evaluation indicators in the «Finance» perspective.

The Balanced Scorecard is a new approach to efficiency management and business analysis. It was developed by R. Kaplan, a professor of leadership development at Harvard Business School, and D. Norton, founder and president of Balansed Scorecard Collaborative Inc. The Balansed Scorecard method is used in enterprises to increase management efficiency through an optimal set of performance indicators. The use of the balanced scores system is unique in that it consists of four perspectives from which the enterprise's efficiency is assessed:

– The Learning and Growth perspective;

– The Business Process Perspective (intra-firm processes, internal business processes);

– The Customer Perspective (consumer orientation, consumer aspect);

– The Financial Perspective.

A balanced scorecard has the advantage of including not just financial but also non-financial factors.

Fig. 3 presents the algorithm for constructing a balanced scorecard.

In practice, enterprises choose the indicators which best meet their strategic goal. Enterprises can also add a fifth vector to the four listed above or replace it with one that best reflects the strategy of a particular enterprise.

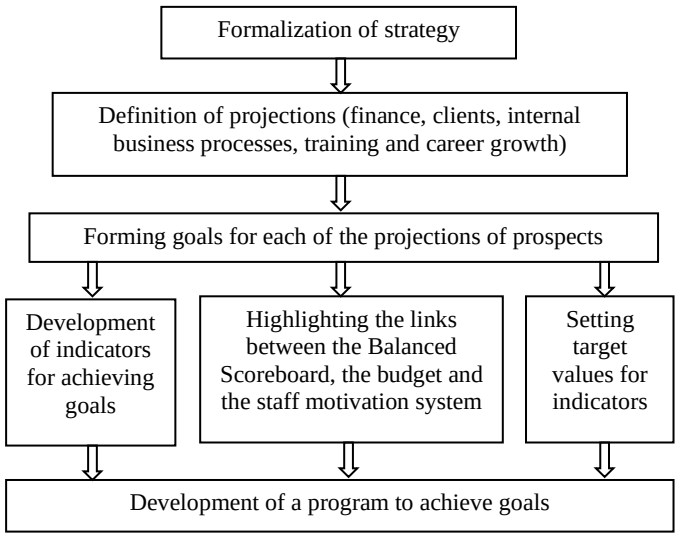

Fig. 3. Algorithm for developing a balanced scorecard

Source: developed by the authors based on [24]

As we can see, the specificity of a balanced scorecard is that there is no single universal list of indicators which could be used to analyze the activities of a particular enterprise. They are formed individually for each enterprise, based on its goals. Therefore, in Fig. 4 we have proposed a list of indicators for each of the four perspectives that can be used by industrial enterprises in building a balanced scorecard.

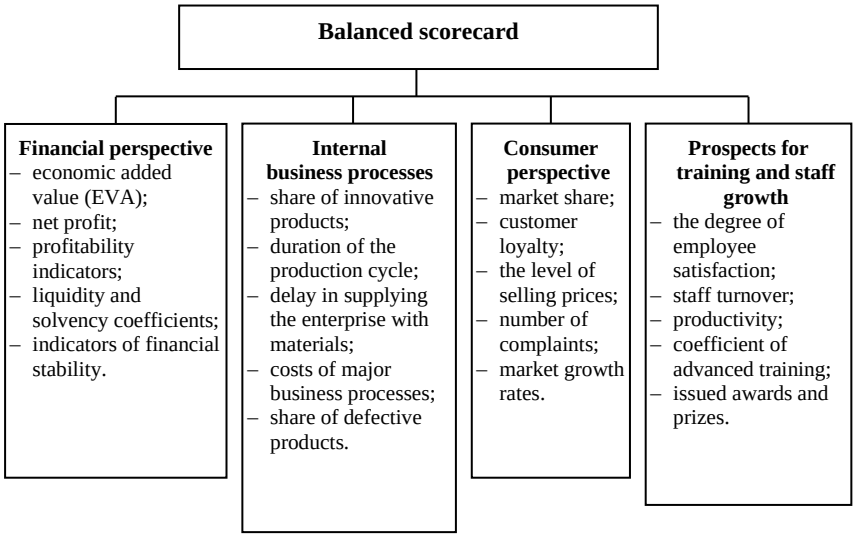

Fig. 4. Indicators that can be used in Balanced scorecard construction for industrial enterprises

Source: authors' own

The practical value of a balanced scorecard lies in solving the problem of achieving strategic goals, which is important for any enterprise, regardless of the field of operation. The optimal set of indicators which each enterprise can choose independently in accordance with its strategic goal will increase the value of forecast

information for management. It will allow to swiftly alter management decisions; it will allow to measure the efficiency and competitiveness of business using non-financial indicators; and it will make the actions of Ukrainian companies more transparent to potential investors.

Important tools for assessing the uncertainty of the enterprise should include methods of risk identification. Modern methods of risk assessment should be divided into two groups: qualitative and quantitative.

Qualitative methods are used at the initial stage of analysis. Their main task is to identify the main risks which arise in the process of financial and economic activities of the enterprise. Most scientists note the difficulty of using qualitative methods. The point is that for their application, specialists must have a thorough knowledge of economics, finance, and significant practical experience in the relevant field.

Quantitative risk analysis must be a continuation of the qualitative analysis. Its results provide information on the quantitative value of individual risks, rather than the total risk of the enterprise [25].

Further on we consider the most common methods of assessing the risks of the enterprise.

The expert method is considered more subjective, as it is based on the opinions of experts. It is advisable to use it with insufficient information, which is its significant advantage over other methods of assessing the risks of the enterprise. The expert assessment is most often carried out using the Delphi method. It is based on a series of successive surveys of experts without personal debate between them. Experts might review their judgements and study the information offered by other experts by repeating the survey method. This results in more accurate data. Additionally, while using this strategy, differentiated estimates are used, where individual expert judgment is given more weight. When using the «Delphi» method, however, it is vital to approach the construction of the questionnaire questions with attention so that they are clearly worded and reveal the problem to the fullest extent possible. In general, the expert method deserves consideration, but only in the early phases of assessing the enterprise's risks. [26].

Based on the use of the method of expert assessments, the method of the Swiss Banking Corporation is used [27]. This method consists of four stages: determining the direction of analysis; collection, grouping of source data; determining the degree of risk; determination of the total degree of risk. We can draw conclusions regarding the economy's financial soundness, and thus the degree of business activity of economic entities, using this method. It also has the advantage of allowing the optimum enterprise activity development variation to be chosen.

To determine the degree of risk a method developed by BERI firm (Germany) is used [28]. According to this method, a special index is calculated (based on a survey of 100 independent experts), which allows to assess the degree of risk.

Method of analogies. Its essence is based on risk assessment by analyzing information on similar risk level projects. The tricky part of using this strategy is

deciding on an analog. Finding such a project that will still be implemented under identical environmental conditions is difficult. This strategy should be used when the company has recently completed a similar project and has all of the required information.

Cost-effectiveness analysis. This method is based on different levels of cost risk for each activity. To do this, each cost element is analyzed. Depending on the actual state of each of them conclusions are drawn regarding the possible cost area. As a result, the cost-effectiveness method allows for the identification of «bottlenecks» in the enterprise's activities from the aspect of riskiness. [29].

The statistical method allows you to assess the risk of the enterprise on the basis of statistical data for the past period. If there is enough information about the main risks of the enterprise in the past, you can assess the likelihood of their occurrence in the future.

The main indicators that are calculated in the statistical method are: mathematical expectation, variance, standard deviation, and coefficient of variation [30].

The mathematical expectation $M(x)$ allows determining the most probable result which can be obtained in the future:

$$M(x) = \sum_{i=1}^{n} x_i \times p_i, \qquad (16)$$

where x_i – values of a random variable depending on specific conditions; p_i – the probability of possible values of a random variable.

Variance $D(x)$:

$$D(x) = \sum_{i=1}^{n} p_i \times (x_i - M(x))^2. \qquad (17)$$

Standard deviation σ:

$$\sigma = \sqrt{D(x)}. \qquad (18)$$

A higher value of the standard deviation indicates a higher risk of the enterprise.

Coefficient of variation V:

$$V = \frac{\sigma}{M(x)}. \qquad (19)$$

The coefficient of variation might range between 0 and 100%. The higher its value, the higher the risk of entrepreneurial activity.

The statistical method is quite simple in calculations. It is used to determine the possibility of losses and the level of risk, but it requires a significant amount of initial information. This can cause difficulties of its use. And due to the fact that in the future it may be possible to observe the influence of factors which were absent in the past, the statistical method does not allow to reliably estimate the level of costs in the future. In addition, it is not advisable to use the statistical method if a new enterprise is being investigated.

The Monte Carlo method is a simulation modeling method which provides modeling of random variables. This method assumes that a set of random values which are different from each other is first generated for the target random variable. Next, this set of random values is processed using the methods of mathematical statistics.

The Monte Carlo method involves a clear sequence of actions in assessing risks. The evaluation algorithm involves the following steps:

1. Formation of a forecast model.
2. Identification of key risk factors.
3. Establishing the conditions for correlation between the performance indicator and variables.
4. Choosing the nature of the probability distribution.
5. Simulation modeling of random implementation scenarios.
6. Analysis of the results with statistical evaluation [31].

The Monte Carlo method is considered to be quite accurate in risk assessment, as scenario modeling is performed automatically, which eliminates subjective assessments. But this method requires significant time and information resources. The advantages of this method in estimating economic uncertainty are obvious and undeniable.

According to the results of the study, the following ***conclusions*** can be drawn:

– traditional uncertainty assessment tools are simple enough to implement, but provide a «superficial» result, giving a rather limited answer to the question of what was or is the impact of uncertainty on the activities of the enterprise;

– the «deeper», in the sense of more accurate, result is provided by the use of the latest analysis tools, including EVA, as well as by using a balanced scorecard, the method of expert assessments, the method of analogies, cost-benefit analysis, etc.;

– in the analysis it is not advisable to be limited to only one method, as higher accuracy and objectivity of risk assessment results is achieved by using several methods.

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