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MULTI-CRITERIA SYSTEM OF EVALUATING THE ECONOMIC SITUATION SECTORS ENTERPRISES

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Побережець О.В. Багатокритеріальна система оцінки економічного стану галузевих підприємств.

У статті запропоновано система показників оцінки економічного стану галузевих підприємств. Запропоновано характеристику показників рентабельності, ділової активності, ліквідності, платоспроможності, фінансової стійкості в системі оцінки економічного стану галузевих підприємств. Розроблено систему безлімітних показників в системі оцінки економічного стану галузевих підприємств. Визначені основні завдання порівняльної системи оцінки економічного стану галузевих підприємств.

Ключові слова: економічний стан, рентабельність, ділова активність, ліквідність, платоспроможність, фінансова стійкість, активи, капітал, зобов'язання, управління, підприємство

Побережец О.В. Многокритериальная система оценки экономического состояния отраслевых предприятий.

В статье предложена система показателей оценки экономического состояния отраслевых предприятий. Предложена характеристика показателей рентабельности, деловой активности, ликвидности, платежеспособности, финансовой устойчивости в системе оценки экономического состояния отраслевых предприятий. Разработана система безлимитных показателей в системе оценки экономического состояния отраслевых предприятий. Определены основные задачи сравнительной системы оценки экономического состояния отраслевых предприятий.

Ключевые слова: экономическое состояние, рентабельность, деловая активность, ликвидность, платежеспособность, финансовая устойчивость, активы, капитал, обязательства, управление, предприятие

Poberezhets O.V. Multi-system evaluation of economic state sector enterprises.

The paper proposes a system of indicators to measure economic situation of industrial enterprises. A description of the profitability, business activity, liquidity, solvency, financial stability in the system of evaluation of economic state industrial enterprises. A system of unlimited performance evaluation system in the economic situation of industrial enterprises. The main task of the system of comparative evaluation of economic state sector enterprises.

Keywords: economic situation, profitability, business activity, liquidity, solvency, financial stability, assets, capital, liabilities, management company

T he influence of factors on the level of financial stability of economic subjects is one of the most important economic questions in the period of transformation of the economy, since too low a level of financial stability leads to insolvency of the enterprise and the lack of funds for operating activities, and excessively high level will hamper the development, burdening the costs of excessive inventory and reserves. Domestic and foreign science do not pay enough attention to the methodological approaches and analytical tools to assess economic and financial situation of enterprises, therefore there is a need to adapt them to modern conditions of managing in Ukraine. It is worth noting that at present not found an adequate model of the enterprise activity by main indicators. If you have a large number of performance indicators raises the question of their proper interpretation and analysis, correlation with standard indicators, the average figure for industry as a whole; adoption of decisions on further development of the enterprise. The use of indicators of financial stability of the company ensures continuous monitoring and control of cash flow, sufficiency of assets and, if necessary, their feasibility [6].

Analysis of recent researcher and publications

Development of theory and methodology of evaluating the economic situation of business entities dedicated to the work of both domestic and foreign scientists such as: E. Altman, I. Ansoff, A Blanca, Y. Safonova, L. Voloshchuk, N. Blajenkova, E. Maslennikova, G. Savitskaya, A. Parkhomenko, A. Thompson and others.

Unsolved aspects of the problem

Despite the small number of scientific studies devoted to assessing the economic status of economic entities, virtually no development on the formation of a multi-criteria system of evaluating the economic situation of enterprises in the industry in order to predict bankruptcy.

The aim of the article is disclosure of the methodology of forming a multi-criteria system of evaluating the economic situation of enterprises in the industry for interested parties.

The main part

Comparative evaluation of economic condition of industrial enterprises should be based on balatonlellei

statement, because the application of standards allows to carry out a comprehensive study of the object. According to the terminology used in the theory of management decisions, comparing the economic entities referred to as alternatives. The purpose of the research entities used multi-function indicators which are generated by relevant content: financial, economic, industrial, social, technical and other. It is necessary to note that a special moment is the fact that the system studies can be performed on the basis of the actual analytical data, and on the basis of targets.

For the purpose of solving the corresponding problems are usually used quantitative indicators of activity of enterprises. Some of these indicators is subject to optimization. In scientific literature these indicators are called performance optimization, all other indicators are called constraints, which are not directly optimized, but set certain limits of their changes. Indicators-limitations allow in the initial phase to generate an initial selection of enterprises in the industry, weeding out the obviously unacceptable alternatives. In addition, the transfer of the targets in the category of restrictions, with the aim of renouncing their optimization, in the final stages of the research, allows to form the final management decision in the enterprise management system. The system of indicators to measure economic condition of industrial enterprises is formed in Fig. 1 [16]
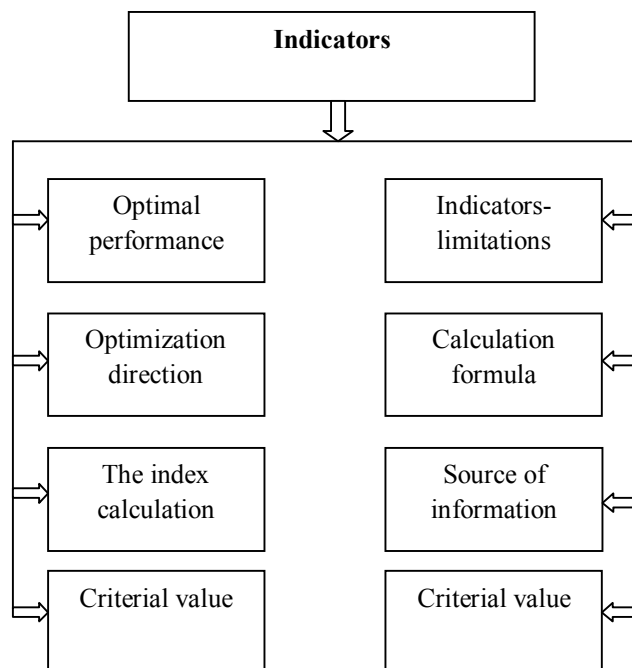

Fig. 1. System of indicators to measure economic condition of industrial enterprises

Under the direction of optimization of the corresponding indicator understand the direction in which the economic condition researched industry is becoming more positive. These directions in practical activity of enterprises are two – maximization or minimization. The formula by which is calculated the target is formed in the calculated expression. The initial tolerance range is a segment or interval, outside of which is considered to be impossible or impractical for a business entity. It is necessary to note that the relative performance constraints, the optimization direction are not regulated.

Today, a common system of financial relations has changed, she is constantly modified and supplemented by elements of financial relationships that affect cash flows are generally. There is a continuous relationship of industrial enterprises with suppliers and customers on ensuring performance of obligations; investors (shareholders, participants, owners); the state in taxes and fees to the appropriate budgets; credit agencies in the obtaining and repayment of loans, insurance premiums etc. Also it should be noted, market conditions, new subjects of these relations, functioning to address issues of bankruptcy, reorganization of companies (merger, acquisition, merger, distribution and other) [6].

For the purpose of multi-criteria system of evaluating the economic situation of enterprises in the industry will form groups of indices: business activity, liquidity, solvency, financial stability, profitability of industrial enterprises.

Indicators of business activity characterize the overall level of efficiency of use of own means of the enterprise and provide an opportunity to assess the financial condition of a business entity using qualitative and quantitative criteria (table. 1). The latter include relative indicators – turnover ratios, which indicate the speed of the turnover of capital and its individual components.

The final result of activity of the enterprise characterized by the absolute amount of profit. But to provide the assessment of the objectivity uses a system of relative indicators, which are profitability indicators that characterize the efficiency of financial-economic activity of the enterprise as a whole and the rate of return of assets and the extent of the use of capital (table. 2).

Table 1. The system of indicators of business activity of industrial enterprises

Index	Calculation formula	Source of information	Criterial value	Optimization direction
The coefficient of total asset turnover	Coef. of total as. turnover = Net income from sales / cost of property	F-2 (l.2000)/ F-1 (l.1300)	-	max
The turnover ratio working capital	Turnover r. work. capital = Net income from sales / current assets	F-2 (2000)/ F-1 (l.1195)	-	max
The turnover ratio of equity capital	Turnover r. of eq. capital = Net income from sales / Equity	F-2 (2000)/ F-1 (l.1495)	-	max

The system of indicators of profitability measures the profitability of the branch enterprises for certain items, characterize factor in this environment of formation of profit of individual enterprises.

Table 2. The system of indicators of profitability of industrial enterprises

Index	Calculation formula	Source of information	Criterial value	Optimization direction
Return on assets	R. on as. = Net financial result / Cost of property	F-2 (l.2350)/ F-1 (l.1300)	>0,14	max
Return on equity	R. on eq. = Net financial result / Equity	F-2 (l.2350)/ F-1 (l.1495)	>0,2	max
Return on investments	R.on.inv. =Equity income / Long-term financial investments: which is accounted for under the equity method in the capital of other enterprises	F-2 (l.2220)/ F-1 (l.1030)	>0,3	max
Return on invested capital	R. on inv.capital = Net financial result / Own and long term capital employed	F-2 (l.2350)/ F-1 (l.1495+1595)	> 0,14	max
Net profit ratio of products	N.pr.r. of products = Profit on sales / Cost of goods sold	F-2 (l.2090)/ F-2 (l.2050)	>0,3	max
Net profit ratio of sales	N.pr.r. of sales = Profit on sales / Net income from sales	F-2 (l.2090)/ F-2 (l.2000)	>0,3	max
Economic profitability	P.e. = Financial result before taxation / Invested capital	F-2 (l. 2290)/ F-1 (l. 1300)	>0,15	max

The system of indicators of liquidity of the branch enterprises is a financial indicators that are calculated on the basis of the financial statements to determine the ability of the company to repay current debt at the expense of current (circulating) assets (table 3). The essence of these indicators is to compare the magnitude of the current debts of the enterprise and its working capital, which should ensure the repayment of these debts.

It is important to highlight that exploring the liquidity of the company, is often identified is the notion of solvency. However, these concepts are different. Liquidity is one of the characteristics of the company's solvency. Solvency in the economic literature as the company has funds available in the asset balance to cover all external debt short-term and long-term obligations, while respecting the uninterrupted process of production and sales where the date of calculation of solvency of the enterprise is the specific date of the balance [6].

Table 3. The system of indicators of liquidity of branch enterprises

Index	Calculation formula	Source of information	Criterial value	Optimization direction
Total liquidity indicator	T.liq.indicator = Current assets / Current engagements	F-1 (l.1195)/ F-1 (l.1695)	1,5-2,5	max
Current liquidity ratio	C.liq. ratio = Circulating funds / Current engagements	F-1(l.1195-l.1100)/ F-1 (p.1695)	1,0-2,0	max
Absolute liquidity ratio	A.liq. ratio = Cash resources / Current engagements	F-1 (l.1160+l.1165)/ F-1 (l.1695)	>0,2	max
Acid test ratio	A.t. ratio = Cash resources + short-term financial investments + debt / Current engagements	F-1 (l.1160+l.1165 +l.1125)/ F-1 (l.1695)	>0,7	max
Liquidity in the mobilization of funds	L.in the mob.of founds = Inventories / Current liabilities	F-1(l.1100)/ F-1 (l.1695)	0,5-1,0	max

In scientific research, the actual average values of liquidity ratios mainly below, therefore, based only on these indicators was not appropriate to draw conclusions about the inability to repay the obligations of the company, the more unlikely is the fact that all creditors will present their claim at the same time [5].

The ability of business entities to meet their long-term and current liabilities at the expense of economic resources reflects its solvency (table 4).

Using indicators of solvency assesses the likelihood of bankruptcy and financial risk. If household assets exceed the long-term and current liabilities, the entity is considered to be solvent. environment of formation of profit of individual enterprises.

The degree of solvency of the enterprise directly depends on the ratio of external assets and liabilities.

Table 4. The system of indicators of the solvency of the industrial enterprises

Index	Calculation formula	Source of information	Criterial value	Optimization direction
Absolute solvency ratio	Ab.solv. ratio = Cash resources / Current liabilities	F-1 (l.1165)/ F-1 (l.1695)	0,1-0,2	min
Total solvency indicator	T.solv. indicator = Current and long term liabilities / Net income from sales of products	F-1 (l.1595+l.1695) / F-2 (l. 2000)	0,2-0,4	min
Solvency ratio current liabilities	S.r.cur. liabilities = Current engagements / Net income from sales of products	F-1 (l.1595)/ F-2 (l. 2000)	0,3-0,5	min
Ratio of debt on bank credits	R.of d. On bank cr. = Long-term and short-term loans / Net income from sales of products	F-1 (l.1510+1600)/ F-2 (l. 2000)	0,3-0,5	min
The ratio of indebtedness to contractors	The r. of ind. to contractors = payables / Net income from sales of products	F-1 (l.1615)/ F-2 (l. 2000)	0,4-0,6	min
Budget debt ratio	Budgwt d. r. = current payables / Net income from sales of products	F-1 (l.1620+1625)/ F-2 (l. 2000)	0,1-0,2	min

Scientists distinguish three levels of solvency, the assessment of which is calculated on the basis of three ratios: cash, payment and liquidity. For each level of solvency of the individual methods determine the coefficients [6].

The indicator that describes the financial condition of a business entity is financial stability, which reflects the structure of sources of formation in the composition of economic means of the subject (table 5).

The calculation of an indicator of financial stability carried out on the basis of the ratio of source elements for the formation and composition of economic means. It should be noted that the assessment of economic resources and obligations of a business entity form an indicator of solvency.

A significant influence on the level of financial stability conduct separate factors, which define the system of indicators of financial stability of enterprises in the industry.

Table 5 The system of indicators of financial stability sector enterprises

Index	Calculation formula	Source of information	Criterial value	Optimization direction
Equity Ratio	Equity rat. = Equity / Cost of property	F-1 (l.1495)/ F-1 (l. 1900)	>0,6	max
The ratio of borrowed and own capital	The r. of bor. and own cap. = Borrowings / Equity	F-1 (l.1595+l.1695) / F-1 (l.1495)	0,7-1,0	max
The coefficient of maneuverability	The coef. of man. = Working capital / Equity	F-1(l.1495- l.1095)/ F-1 (l.1495)	-	max
Non-current assets coverage ratio	N-c. as. cov. ratio = Non-current assets / Equity	F-1(l.1095)/ F-1 (l.1495)	>1,0	-
The ratio of current and non-current capital	Ко./н. = Current assets / Non-current assets	F-1 (l.1195)/ F-1 (l.1095)	-	max
financial stability index	Кф.с. = Equity / Called-up capital	F-1(l.1495)/F-1 (l.1595+l.1695)	>1,0	-

The optimization of multi-criteria indicators system for the evaluation of the economic condition of sector enterprises: business activity, liquidity, financial stability and profitability is maximization

magnification, and minimization – the predominant direction of change of indicators of solvency.

In financial and economic activity to indicate the directions of optimization are used terms: effective and cost indicators. In the first case, mean that the

predominant direction is maximization increase in the second – minimization. Cost indicators include: cost of sales (goods, works, services), administrative costs, distribution costs, other operating expenses, finance costs, capital investment. Effective indicators are: net financial result, profitability, total revenue, margin, etc.

Exploring the calculation expression, it is necessary to note some characteristic features. In scientific works the formula for the calculation of certain indicators may differ. The same indicators can be calculated on the basis of various analytical information. So, for example, return all assets and return on equity is justified to rely on the net financial result and comprehensive income and retained earnings. Depending on the purpose of the study is possible to calculate the planned, actual and forecasted values of the indicators multi-criteria system of evaluating the economic situation of industrial enterprises.

The information value of the indicators multi-criteria system of evaluating the economic situation of industrial enterprises depends significantly on the availability and reliability of accounting and analytical system of business entities. So, if you have relevant analytical information, solvency ratio current liabilities should be correct to not count on income from sales of products (goods, works, services), and on cash flow resulting from operating activities that would make it possible to influence receivables for sold products (goods, works, services). For the calculation of liquidity indicators that the receivable is valued at net realizable value, which is determined by reducing the receivables in the amount of provisions for doubtful debts of the company. You must carefully approach the evaluation liquidity current financial investments, short-term notes receivable, etc.

The study proposed indicators multi-criteria system of evaluating the economic situation of industrial enterprises is not exhaustive. Depending on the objectives of the study it is possible to calculate the relative performance multipurpose:

Performance evaluation based on qualitative criteria is calculated by the following formula:

$$S = \frac{S_n}{S_{tn}} \qquad (1)$$

where S_n – the metric actual value multi-criteria system of evaluating the economic situation of industrial enterprises;

S_{tn} – initial value of the multi-criteria indicator system of assessing the economic condition of industrial enterprises.

Relative multi-purpose indicators multi-criteria systems of evaluating the economic situation of industrial enterprises of this type characterize the change of the metric actual value compared to its value at some initial time.

Multipurpose relative indicators can be obtained also by transforming a linear transformation:

$$\hbar \c{S} = an S_n + b_n S_n \qquad (2)$$

The value of the constant coefficients an and bn are determined depending on, minimized or

maximized investigated the multicriteria indicator system of assessing the economic condition of industrial enterprises.

When you minimize the multicriteria indicator system of assessing the economic condition of industrial enterprises:

$$an = \frac{1}{S_{nmax} - S_{nmin}}; \quad bn = \frac{S_{nmax}}{S_{nmax} - S_{nmin}} \qquad (3)$$

In order to maximize the multi-criteria indicator system of assessing the economic condition of industrial enterprises:

$$an = \frac{1}{S_{nmax} - S_{nmin}}; \quad bn = \frac{S_{nmin}}{S_{nmax} - S_{nmin}} \qquad (4)$$

As proposed, after substitutions, relative multi-purpose indicators multi-criteria systems of evaluating the economic situation of enterprises in the industry are as follows:
— minimizing input indicators:

$$S = \frac{S_n - S_{nmin}}{S_{nmax} - S_{nmin}} \qquad (5)$$

— maximizing input indicators:

$$S = \frac{S_{nmax} - S_n}{S_{nmax} - S_{nmin}} \qquad (6)$$

At the same time there is no need to count a large number of indicators system for the evaluation of the economic condition of industrial enterprises, since some of them have a functional dependence, and other strongly correlated.

In the study, you must define a valid criterion measure. The criterion of the indicator it is necessary economically justify. Some of the indicators multi-criteria system of evaluating the economic situation of industrial enterprises cannot be negative, because they are part of the whole, therefore, varied from one to zero. For indicators of financial stability and liquidity of a multicriteria system for the evaluation of the economic condition of sector enterprises proposed certain normative values. The initial values of coefficients of solvency and profitability are established on the basis of available accounting and analytical information and independent of the subject, its line of business, other factors and systems of management. The initial range of allowable values in the future can vary venture your current circumstances.

The list of indicators multi-criteria system of evaluating the economic situation of industrial enterprises depends on the specifics of proposed solution to the problem. For example, the person concerned carries out research on the basis of indicators of financial and economic state of a business entity. In his opinion, important indicators multi-criteria evaluation system are: the profitability of the invested capital and payback period of financial investment, other indicators are taken into account, but not optimized. In particular, the limit set of the boundaries of financial stability and liquidity of the entity. Then, when assessing the financial-economic status, the interested person will consider the many economic entities that have satisfactory indicators of liquidity and financial stability and to choose options that characterize quick payback and return on invested capital. Depending on the final result of the research

problem a multi-criteria system of evaluating the economic situation of industrial enterprises can be classified as follows (Fig. 2).

The first type of task is the streamlining of the branch enterprises. In General, the requirement of sequencing means determining the relative value of each of the alternatives in the study. The proposed formulation appears to be quite justified, because the management personnel of industrial enterprises organize their business units for profitability of investment objects, activities, performance indicators, etc.

The second type of task – ranking industrial enterprises. This task is the development of alternative objects of study. This situation in particular occurs when the selection of a particular investment is not feasible and you want to distribute financial resources among alternative business entities.

The problem of multi-criteria system of evaluating the economic situation of industrial enterprises
1. Streamlining branch enterprises
2. Ranking branch enterprises
3. The selection of a single branch of the enterprise

Figure 2 – Classification of objectives of the study a multi-criteria system of evaluating the economic situation of industrial enterprises.

The last task type – select a single industry, with no alternative for a multi-criteria system of evaluating the economic situation of the enterprise industry. This task is common in industry enterprises, for example, choosing the direction of expansion of production, the choice of direction of technical re-equipment, etc.

Conclusions

Thus, the proposed group of indicators multi-criteria system of evaluating the economic situation of enterprises in the industry will allow you to determine interested parties in the comparative evaluation of the financial and economic condition of industrial enterprises. In this case, the analysis will need to determine the objectives of the study a multi-criteria system of evaluating the economic situation of industrial enterprises. The study proposed indicators multi-criteria system of evaluating the economic situation of industrial enterprises is not exhaustive. Depending on the objectives of the research proposed to calculate multi-purpose ratios are set constant coefficients which are determined depending upon, minimized or maximized investigated the multicriteria indicator system of assessing the economic condition of industrial enterprises.

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