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MODERN METHODS OF ANALYSIS OF ECONOMIC INDICATORS OF THE ENTERPRISE

СУЧАСНІ МЕТОДИ АНАЛІЗУ ЕКОНОМІЧНИХ ПОКАЗНИКІВ ПІДПРИЄМСТВА

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Ковтуненко Ю.В., Качанова Н.С., Попович К.Ф. Сучасні методи аналізу економічних показників підприємства. Оглядова стаття.

У статті висвітлено значення економічного аналізу фінансово-господарського стану підприємства у розрізі застосування сучасних методів аналізу з різних його позицій. Основна увага сконцентрована на методах та їх прийомах аналізу фінансового стану підприємств. Досліджено провідні підходи до тлумачення сутності сучасних методів аналізу, їх призначення та застосування у різних сферах аналізу, розкрито їх основні поняття та елементи, висвітлено їх особливості, мету аналізу та результати, які можна отримати, визначено їх алгоритми, моделі та етапи проведення. Продемонстровано характеристику основних моделей, які застосовуються в процесі аналізу фінансового стану підприємства. Створено зведену порівняльну матрицю сучасних методів аналізу економічних показників підприємства.

Ключові слова: метод, методика, аналіз, показники, модель, алгоритм

Kovtunenکو Yu.V., Kachanova N.S., Popovych K.F. Modern methods of analysis of economic indicators of the enterprise. Review article.

The article highlights the importance of economic analysis of the financial and economic state of the enterprise in terms of applying modern methods of analysis from its various positions. The main focus is on methods and their methods of analysis of the financial state of enterprises. The main approaches to the interpretation of the essence of modern methods of analysis, their purpose and application in different spheres of analysis are investigated, their basic concepts and elements are revealed, their features, the purpose of the analysis and the results which can be obtained, their algorithms, models and stages of carrying out are determined. The characteristics of the main models that are used in the process of analyzing the financial condition of the enterprise are demonstrated. A consolidated comparative table of modern methods of analysis of economic indicators of the enterprise was created.

Keywords: method, methodology, analysis, indicators, model, algorithm

Undoubtedly entrepreneurship is an important indicator of the country's development. Therefore, it is necessary to pay attention to studying the economic activity of the enterprise and its economic indicators. It is possible to make a real assessment of the financial status and economic activity of the enterprise through economic analysis, by developing an information base for further strategic and tactical decisions. Currently, there are many traditional mathematical, statistical and logical methods that help to assess the financial efficiency of an enterprise. One or another method has its own peculiarities and disadvantages, the problem situation of many organizations is the choice of the correct method that meets the goals and objectives of this organization. However, the world does not stand still, there are more and more new methods for analyzing the economic situation of the enterprise. Therefore, the allocation of fundamentally important aspects regarding the application of one or another method of economic analysis, their disadvantages and advantages, is the main objective of this study.

Analysis of recent researches and publications

The following scientists paid attention to the study and research of modern methods of economic analysis: Savitskaya G.V., Metz V.O., Bilyk M.D., Davidenko N.M., Brigham Yu., Stepanova I.G., Sheremeta A.D. and other.

In conditions of scientific and technological progress, modern methods of analyzing the state of the enterprise is an actual object of research, therefore, it is necessary to pay attention to the study of this issue from the scientific point of view. Innovative progress leads to the creation of more and more new methods, so there are many questions for further research on this topic.

The aim of the article is to study the main modern methods of analysis of economic indicators of the enterprise.

The main part

Today, economic analysis is an important tool for optimizing investment, taxation, registration, lending, and marketing policy of enterprises. But practical experience suggests that all opportunities of economic analysis to solve these problems are not fully realized by enterprises [1].

The current unstable economic situation generates the latest synthesized methods, techniques, methods, tools and algorithms from different sciences that allow for taking into account more factors of influence on business entities and provide a comprehensive assessment of indicators. Features that determine the use of special tools are the goals that are set at the beginning of the study, the scope in which it is necessary to consider the object of analysis and the choice of the form of implementation of the study result.

New problems generate new methods and solutions, more advanced and effective.

Among modern methods of economic analysis one can distinguish:

- strategic due diligence;
- diagnostic benchmarking;
- fuzzy-plural method;
- method of economic normals;
- simulation modeling;
- pest analysis;
- the McKinsey/GE Matrix;
- the theory of games;

- cluster analysis;
- Franschon-Romana matrix.

Strategic Due-Diligence is a modern method of assessing the economic situation of an enterprise in situations before the acquisition or sale of a firm, cooperation with new partners, the ordering of significant bank loans, in case of merger and acquisition of the firm, or in all other cases related to risky money deposits.

The main tasks of "Due Diligence" are the definition of management approaches to solving problems, key business issues and decision making; confirmation of the coincidence of the image of the enterprise being presented with the perception of investors regarding the technological process and market opportunities; definition of key risks and their assessment; Achieving a deep understanding of the specifics of the company's operations and functioning of the market in order to provide the investor with the possibility of further guidance from the management to anticipate and manage change [2].

The term comes from English Diligence, which means thoroughness, accuracy, diligence and Due – due, neat, relevant. Thus, the concept of Due Diligence can be translated as "with the necessary (proper) diligence." Economists under this concept understand thorough analysis, verification and evaluation of the enterprise.

During the Due Diligence should be identified so-called Deal Breakers – the circumstances that characterize the high risk of investing in the target company, for the impossibility of eliminating the transaction, should be discarded.

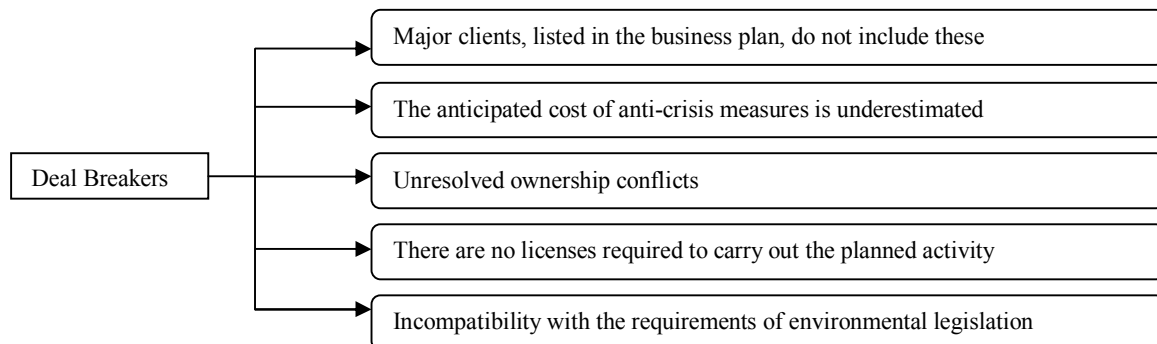


Fig. 1. Typical examples of Deal Breakers

Source: compiled by the authors on the materials [3]

Benchmarking is the technology of studying and implementing the best methods of conducting business operations, which helps to improve business processes relatively quickly and at a lower cost, which greatly facilitates the formulation of the tasks of commercial and economic activity of the enterprise, search for weaknesses, and also makes it possible to effectively use in its activities experience and the practical results of partners and competitors.

Basic steps in benchmarking:

- Determining the appropriateness of innovation-regional changes;
- Determination of the main criteria of evaluation;
- Selection of firms or technologies for comparison;
- Collection of information;
- Analysis of indicators and determining the possibilities of using the data obtained;
- Adaptation and use of best practical developments [4].

The fuzzy-multiple method, also called matrix, is carried out in this order.

Stage 1 (Indicator Selection). It is necessary to select only those values that have the most significant impact on the level of financial security of the enterprise.

Stage 2 (Significance). The selected X_i should be matched to the appropriate level of significance r_i for analysis.

Table 1. Characteristics of benchmarking by the specified parameters

Parameters	Characteristics of benchmarking
General purpose	An analysis of the advantages of competitors and other industry leaders
Subject of study	Methods of doing business that meet the needs of customers
Major constraints	Not limited
Task for making decisions	Very big
The main sources of information	Leading enterprises in the industry, outside the industry, competitors, internal divisions, etc.

Source: compiled by the authors on the materials [5]

Stage 3 (Linguistic Variables and Fuzzy Sets). Linguistic variable E The state of the enterprise has five meanings:

1. E1 – fuzzy subset of states of "extreme trouble";
2. E2 – fuzzy subset of states of "trouble";
3. E3 – fuzzy subset of states of "average quality";
4. E4 – fuzzy subset of states of "relative well-being";
5. E5 – fuzzy subset of states of "boundary well-being" [6].

Stage 4 (Classification of risk). There is a construction of the classification of operational value g , which determines the degree of risk. It is by this indicator that a set can be broken into fuzzy subsets.

Stage 5 (Classification of metric values). The following actions allow us to classify the current

values x of the X indicators, which serves as a sign of the distribution of a complete set on fuzzy subsets of type B.

Stage 6 (Estimation of the level of indicators). The next step is to assess the operational level of indicators that need to be systematized in the table of form 2.

Stage 7 (Classification of the level of indicators). Next, it is necessary to classify the current values of x according to the criterion of the table constructed in step 5.

Stage 8 (Risk Assessment). This step allows you to calculate the degree of risk of bankruptcy at the enterprise.

Stage 9 (Linguistic Recognition). Concluding phase of formulation of conclusions about financial safety of the investigated enterprise.

Table 2. Current level of indicators

Indicator	Current value
X_1	x_1
...	...
X_i	x_i
...	...
X_N	x_N

Source: compiled by the authors on the materials [6]

The method of economic normals can be realized in practice to a greater extent due to the application of the ratio of the rates of change in the main indicators of enterprise development and the increase in production, while it generates normal profit, there are various variations of economic norms that can reflect changes in the cost of production, the growth rate of labour productivity, and others.

It is logical to use in models non-financial indicators that reflect the social, environmental performance of the activity and lead to certain economic consequences. The consideration of their comparative dynamics is necessary for the continuation of the chain of successive relations of economic normals [7].

The process of analyzing the economic condition of an enterprise by the method of economic norms is in the following stages:

- study of the production process;
- the choice of the normal and object of observation;

- conducting a specific type of observation;
- designing technically sound norms;
- verification of the designed norms in the production conditions [8].

The simulation model is a program that allows you to explore the process of functioning of the system by running experiments on a computer. The structure of the simulation model largely depends on the choice of the simulation approach, which corresponds to the chosen level of abstraction at the stage of the statement of the simulation problem. To date, there are three most common approaches to simulation: system dynamics, discrete-event simulation (process-oriented), agent modeling.

For each of the approaches their imitation modeling packages are developed:

- Agent modeling – a relatively new method, which received widespread practical spread only after 2000, but already managed to gain momentum. This approach is from the bottom up: the creator of

- the model focuses on the behaviour of individual objects;
- System dynamics involves a high level of abstraction and is used mainly for tasks at the strategic level;
- Process-oriented (discrete) approach is used mainly on the operational and tactical level.

Optimization model is a model that can include one (one-criterion model) or several (multi-criterion model) of target functions, which allow to find the optimal solution from the considered alternatives. The optimization simulation model consists of two models: simulation and optimization, the interdependence of which is presented in figure 2.

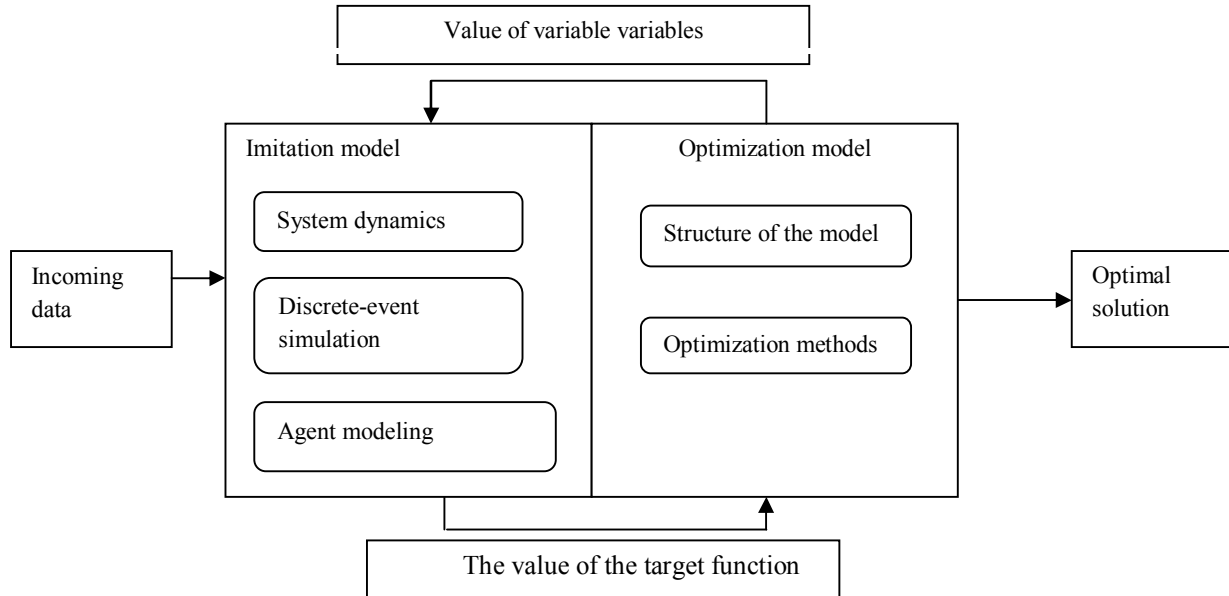


Fig. 2. Interconnection of simulation and optimization models
 Source: compiled by the authors on the materials [9]

Influence of environmental factors on financial and economic activity of the enterprise can be estimated using the model (marketing tool) PEST-analysis. Each letter of this abbreviation denotes the factor: P – political (study of the influence of the political climate and the intentions of the public authorities for business development); E – economic (research on the impact of economic factors); S – social (analysis of the influence of socio-cultural environment); T – technological (technological factors of influence on business development). The PEST analysis model is common in countries with underdeveloped or transition economies, where policy and economic influences are in the first place. The form of STEP analysis is used in countries with a developed

economy and a stable political situation, where social and technological factors are priorities [10].

In the future, the development of PEST analysis is due to the introduction of the fifth environmental factor – legal (L – legal), resulting in a strategic analysis of the macro environment changed into SLEPT analysis. Another variation of the model is supplemented by several factors and turned into a STEEPLE analysis consisting of seven factors of influence and includes, among other things, the former: E – Educational (trends in education, training, employment and personnel skills); E – Environmental protection (environmental protection, the impact of economic entities on the environment).

Table 3. Model of PEST-analysis

Political		Economic	
Factor	Specific weight	Factor	Specific weight
Factor 1		Factor 1	
Factor 2		Factor 2	
Factor 3		Factor 3	
...		...	
Socio-cultural		Technological	
Factor	Specific weight	Factor	Specific weight
Factor 1		Factor 1	
Factor 2		Factor 2	
Factor 3		Factor 3	
...		...	

Source: compiled by the authors on the materials [10]

The results of the analysis are presented in a matrix form, the matrix consists essentially of the factors (that is, the list of external factors is determined) and the forces of their influence, which is evaluated in points (i.e., an assessment of the degree of influence). According to the results of the analysis, a number of the most influential factors of the environment are revealed and the dynamics of their subsequent influence on the development of the enterprise is predicted.

Another strategic grounding model is the McKinsey/GE matrix, also called "attractiveness – competitiveness", proposed by the McKinsey consulting company and General Electric in USA. This multifactor matrix is more detailed, supplemented and has a wider range of applications than the two-factor matrix BCG (Boston Consulting Group).

The McKinsey / DE matrix contains nine cells located in a two-dimensional coordinate system – industry-specific attractiveness and strength / position in the competition of a particular business. Both elements of its vertical and horizontal division are characterized by a set of values, but not determined by one indicator. The criterion for determining long-term industry appeal is [11]:

- capacity of the market and its growth rate;
- intensity of competition;
- entrance and exit barriers;
- seasonality and cyclical fluctuations;
- need for investment;
- threats and opportunities of emerging industries;
- the influence of social and environmental factors, as well as state regulation.

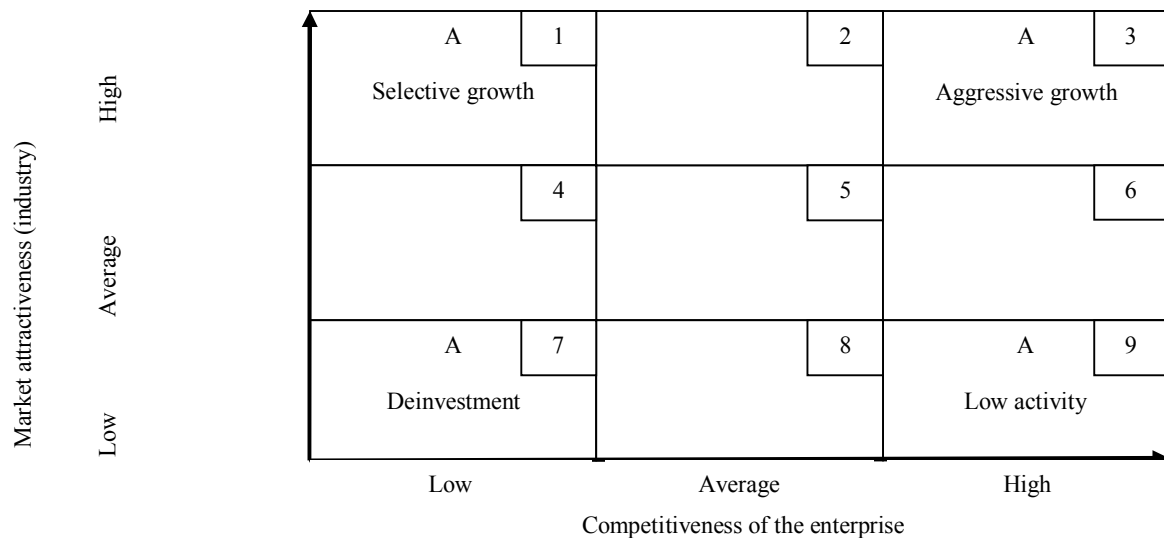


Fig. 3. The McKinsey / DE Matrix

Source: compiled by the authors on the materials [11]

An assessment of the position in competition determines the position of the enterprise horizontally, namely: it has reached a strong, medium or weak position. In accordance with the quadrant of the matrix, one or the other product is selected, choose the following strategies for it [11]:

- Quadrant A (high market attractiveness – weak competitiveness) is consistent with the "question marks" on the BCG matrix. That is, it refers to companies entering the market with a new product. Apply a strategy of selective i.e. selective growth. In other words – investing in a prospective business, or leaving the market if a new product has no future in terms of competitiveness.
- Quadrant B (high attractiveness – high competitiveness) the most advantageous situation, according to its features corresponds to the "stars" on the matrix BCG. Strategy – aggressive growth, i.e. investing and optimizing business.

— Quadrant B (low attractiveness – high competitiveness) is consistent with "dairy cows" and means that it is necessary to choose a strategy of low activity, "harvesting", protecting its position at no additional cost.

- Quadrant G (low attractiveness – low competitiveness) the most unprofitable zone, according to its characteristics, corresponds to "dogs". Accordingly, they choose the strategy of deinvestment, that is, the continuation of activities in the form of "harvesting" without investment or the elimination of business, if it becomes loss-making.

One of the sections of applied mathematics, more precisely, is the study of operations, is the theory of games. Often methods of game theory are used in the economy, a little less often in other social sciences – sociology, political science, psychology, ethics, and others. The theory of games is a theory of

mathematical models for making optimal solutions in conflict situations [12].

The theory of games is used in the economy not only to model the tasks of the organization of industry, which have become already classical, but in general practically to every task that has an economic context. Thus, today it is [13]:

- mathematical models of bidding and auctions (micro level);
- production behaviour of firms at the level of the product, and at the level of its production, including the behaviour of the domestic entities for the firm (at the intermediate level of the economy);
- models of competition of countries and trade policy of states, monetary policy (macro level).

The collision of the interests of two or more parties (players) who pursue various goals in a conflict situation is called a game. Each player has his goal, which he wants to implement, so the key concept is the player's strategy, it understands the selected actions (moves) by the player, provided by the rules, depending on the conflict situation. Moves can be chosen deliberately by a conscious player, these are called personal moves, or randomly – a random move. The game is divided into stages – the periods between which moves are carried out. At the end of the game, the winnings or losses of each player that is called a

payment is determined by the amount of money. The game theory helps to choose the most optimal event scenario, so that the solution leads to a win (the result of the conflict).

So, the construction of the model of the game in the initial stage is carried out using the method of payment matrix, which is the fundamental basis for decision making.

Let's consider a strategic game with two players A and B. Let Player A have m strategies (A_1, A_2, \dots, A_m), and player B (opponent) – n strategies (B_1, B_2, \dots, B_n). The natural numbers m and n are not connected in any way. If each of the players A and B in a definite manner chooses the strategies A_i and B_j respectively, then the situation that has developed is uniquely determined the gain (the result of the game) of player A, which is expressed by a real number of a_{ij} , which simultaneously characterizes the loss of player B. And the number $(-a_{ij})$ determines the player's A loss and the gain of player B. The winning $a_{ij}(i=1, \dots, m; j=1, \dots, n)$ can be placed in the form of a matrix whose line numbers correspond to the player strategy numbers A, and column numbers – the numbers of B player strategies, they are called net strategies. This matrix is called the matrix of winnings (payment matrix, game matrix) of player A [12]:

	B_1	B_2	...	B_n
A_1	a_{11}	a_{12}	...	a_{1n}
A_2	a_{21}	a_{22}	...	a_{2n}
...
A_m	a_{m1}	a_{m2}	...	a_{mn}

Fig. 4. Payment matrix

Source: compiled by the authors on the materials [12]

After constructing the matrix of the game, you must choose the optimal (effective) strategy, that is, to solve the game. Analyze the strategies that exist with player A. Each of them can lead to different results depending on the behaviour of the opponent. For each strategy, you can determine the worst result for player A – the minimum winnings: $\alpha_i = \min a_{ij}$. Player A tries to improve his result – to maximize his winnings: $\alpha = \max(\min a_{ij})$. The number α is called the lower price of the game (or maximin), and the corresponding strategy is maximizing. For player B, the elements of the payment matrix determine the losers, so when analyzing its strategies it is advisable to pay attention to the greatest losses that can be attributed to each of its strategies: $\beta_j = \max a_{ij}$. Improving the result for player B – minimizing the loss: $\beta = \min(\max a_{ij})$. The number β is called the upper price of the game (or minimax), and the corresponding strategy is minimax. Note that always $\alpha \leq \beta$. The principle that dictates the

players the choice of the most careful minimax and maximizing strategies, called the principle of minimax [12].

The method of cluster analysis is used to divide the set of investigated features and objects into clusters or homogeneous groups in the corresponding sense. This means that the task of data classification is solved and the corresponding structure in it [14] is found.

That is, it is a certain way of grouping objects, in which the objects of the same cluster are similar, but differ from the objects of another cluster. This method is used in many industries and in the economy has also found its application. It is the best to use it when classifying a certain set of information into groups for further analysis and processing.

Cluster analysis has a certain sequence of stages. The analysis begins with setting the goal, for which the analysis will be conducted. Then a set of investigated objects is selected for further

classification (sampling). Such and distinctive features of investigated objects are determined and clusters formed on the basis of these indicators. In the future, the assessment of the objects under study and the results of the analysis are determined.

Cluster analysis is also used for two-level and three-level gradations of enterprise economic security [15].

Methodology: Let X be the set of objects, Y is the set of numbers (names, labels) of clusters. The function of the distance between the objects $p(x, x')$ is specified. There is a finite sample of objects $X^m = \{x_1, \dots, x_m\} \in X$. It is necessary to divide the sample into non-disjoint subsets, called clusters, so that each cluster consists of objects close to the metric p , and the objects of different clusters differ significantly. In this case, each object $x_i \in X^m$ is assigned a cluster number y_i . The clustering algorithm is the function $a: X \rightarrow Y$, which assigns any cluster number $y \in Y$ to any

object $x \in X$. The Y set is known in some cases in advance, but more often, the task is to determine the optimal number of clusters in terms of some criterion for clustering quality [14].

The most effective evaluation of the financial condition of the business entity and its future development prospects is the well-known matrix of French scientists G. Franschon and I. Romana, sometimes referred as a matrix of financial strategies (financial equilibrium). This method allows you to evaluate not only the current or final position of the results of activity, but also allows you to trace the indicators in the dynamics, determine the strategy for the future, to predict the further adoption of managerial decisions.

At the heart of the calculation are three indicators: the result of economic activity (REA), the result of financial activity (RFA), the result of financial and economic activity (RFEA).

Table 4. Method of calculation of indicators of the Franschon-Romana matrix

Indicator	Formula	Value
The result of economic activity	$REA = GR - \Delta FON - \Delta FA + OI$ where, GR – the gross result of the operation of investments; ΔFON – change of financial and operational needs; ΔFA – change in the initial cost of fixed assets for the reporting period; OI – other income.	REA is the amount of money that remains at the disposal of the enterprise after the financing of industrial development. If the REA is positive, then the company ensures the implementation of the principle of self-financing of its development, and the negative – the company attracts borrowed resources to finance its production needs, since its own resources are not enough for this.
The result of financial activity	$RFA = \Delta BC - Ef - PT - D + Ipc - Le - Fil + If$ where, ΔBC – change of borrowed capital for the reporting period; Ef – financial expenses; PT – profit tax from ordinary activities; D – paid dividends; Ipc – income from participation in capital; Le – Loss from Equity and Other Expenses; Fil – long-term financial investments; If – other financial income.	The RFA is a change in the amount of debt of the enterprise, adjusted for the amount of financial expenses (interest on a loan), dividend and tax payments. The actual value of the RFA indicates the attraction of additional sources of financial resources, despite their payment, the negative – the company reduces the amount of borrowed sources of funding, while reducing the effectiveness of the policy on the formation of enterprise capital structure, if the level of borrowing resources is excessive or credit resources are not available.
The result of financial and economic activity	$RFEA = REA + RFA$ where, REA is the result of economic activity; The RFA is the result of financial activity.	RFEA is calculated as the sum of the results of the economic and financial activities of the enterprise. RFEA gives an opportunity to estimate the amount of "free" cash of an enterprise after financing of all expenses and industrial development. The comparative value of the RFEA indicates that the company has available free cash to finance other activities, and negative – the lack of available cash, which may lead to liquidity complications or reduced opportunities for the enterprise.

Source: compiled by the authors on the materials [16]

On the basis of these indicators, the company's financial strategy is further assessed by constructing the Franschon-Romana matrix.

The main diagonal of the matrix is presented on the table – the line of financial equilibrium of the enterprise, which has a recessive character, i.e. moves in the direction of decline from quadrant 1 to quadrant 3. This means that the most favourable for the enterprise will be the position in quadrant 1, respectively, the least favourable – quadrant 3 (at maintaining financial equilibrium). Quadrant 2 is an intermediate cell characterized by a balanced

financially stable situation, which allows for a different scenario of the development of events, that is, changes in the financial state of the enterprise in any of the parties. Quadrants that are above the diagonal of the matrix characterize the zone of success, under the diagonal – a zone of deficits [16].

The methods described above should be systematized for the convenience of making managerial decisions. The revealed principal differences between modern methods were recorded by the authors in tab. 6.

Table 5. Matrix of financial strategies of Franschon-Romana

Indicator value	RFA <0 (braking)	RFA = 0 (stabilization)	RFA > 0 (growth)
REA > 0 (slow growth)	1. RFEA = 0 "Father of the Family" Effective economic activity, availability of conditions for self-financing and development, debt reduction due to positive financial results from economic activity	4. RFEA > 0 "Rentier" There are free funds for projects with the use of loan capital	6. RFEA > 0 "Holding" Funding not only for own development, but also for the creation of subsidiaries, promotion of additional loans. All opportunities for further effective development are available
REA = 0 (optimal growth)	7. RFEA < 0 "Episodic deficit" Liquidity shortage due to the gap between the timing of receipt and spending of funds	2. RFEA = 0 "Stable Equilibrium" The financial stability of the enterprise became. Own funds are sufficient for production financing of development. The amount of debt practically does not change or change only in the amount of financial. The structure of funding sources is optimal, the planned activities are fully backed by financial resources	5. RFEA > 0 "Attack" Increasing opportunities for active expansion, production needs are fully provided by their own financial resources
REA < 0 (forced growth)	9. RFEA < 0 "Crisis" Crisis condition of the enterprise, the need to curtail investment, the need for financial support	8. RFEA < 0 "Dilemma" The shortage of funds is associated with a decrease in the level of economic profitability	3. RFEA = 0 "Unstable equilibrium" Ensuring that solvency is maintained only by increasing debt, there are prerequisites for the emergence of a crisis

Source: compiled by the authors on the materials [16]

Table 6. The matrix of comparison of modern methods of analysis of the economic condition of enterprises

Method	Differences	Method
1	2	3
M1	Prerequisites for conducting M1 are risky investments, and M2 – reducing the firm's competitiveness in the market	M2
	The evaluation of the results in M1 depends on the experience of the expert, and in the M3 this function is performed by the linguistic scale	M3
	Latitude of the object of research in M1 – the enterprise and all its links, in M4 – a separate production process	M4
	In M1 there is a single system of indicators, while in M5, depending on the terms (tactics, strategy), separate packages of imitation modeling are developed.	M5
	In M1, Deal Breakers are considered (factors that maximally negatively affect the state of the enterprise), and in M6 – the proportion of the impact of all factors	M6
	In M1 the analysis takes place within the internal environment of the enterprise, and in the M7 – the boundary of the external environment (near, long range)	M7
	Adoption of managerial decisions occurs with the accumulation of the maximum full information, in M8 – in conditions of uncertainty	M8
	The purpose of M1 is to identify as many factors as possible, and the M9 is preceded by the definition of the factors whose impact will be investigated.	M9
	Due to the use of the scenario approach in M10, the results of the analysis have a large number of alternative solutions, and in M1 – the result of a dichotomous nature	M10
	M2	Direction M2 – the definition of the appropriateness of innovation-regional changes, and M3 - assessment of financial security of the enterprise
The economic norms selected in M4 are considered in dynamics, and in M2 – the market situation in the current period		M4
The simulation model created in the M5 makes it possible to design it once, carry out research, and M2 requires constant market monitoring, changes in the vector of development		M5
In M6 the analysis is based on the method of "sustainable development", and in M2 there is no aspect of corporate social responsibility		M6
"Attractiveness-competitiveness" for M7 serves as a criterion for evaluation, and M2 – a whole set of measures to enhance it		M7
In M8 managerial decisions are made in a conflict situation, in M2 it is absent		M8
Clusters formed with M9 can serve as a basis for further research in M2		M9
The field of study in M2 is an external competitive environment, and in the M10 micro environment with an analysis of types of activity		M10

Continuation of the table 6

1	2	3
M3	If in M3 both numerical and non-numeric data are used, in M4 they are only numerical	M4
	In terms of reach, the M5 is wider, because in M3 only an individual object is studied, and in M5 it is considered by agent simulation, while there is still system dynamics and discrete-case approach	M5
	M3 reveals the influence of factors contributing to bankruptcy, and in M6 the influence of political, economic, social, technological factors	M6
	The evaluation of the results in M3 occurs by comparison with the scale of the variable E "State of the enterprise", and in M7 – with the matrix "McKinsey / DE"	M7
	In M8 the principle of minimax is laid down, which means minimization of the loss, and in M3 it is necessary to minimize the consequences of bankruptcy, or its prediction	M8
	In M9 Z-standardization, which does not depend on industry features, is used, while on the M3 norms this factor significantly influences	M9
	M3 allows the analysis to investigate the probability of achieving the indicators of the "crisis" in the financial strategy matrix, and the M10 offers a solution to this problem.	M10
M4	The process of forecasting in M4 takes place through approved norms, in M5 – by the experimental method, taking into account the maximum of alternatives	M5
	M6 requires more significant resources to collect, process and prepare the basis for analysis than M4	M6
	In M7 the focus is on the general market state of development, and in M4 – on the correspondence of the projected norms to the real	M7
	In M8 the analysis is stochastic, and M4 is perspective	M8
	The object of analysis in the M9 is a sample that needs to be classified, and in M4 - a sample of norms, the conformity of which must be checked	M9
	A compulsory requirement for M4 is to follow the comparative dynamics of all indicators, that is, comparison with similar periods, and M10 relates to strategic management (the process of forecasting future periods)	M10
M5	To create an imitation model, the M5 uses modern programming methods, while the M6 does not require special security.	M6
	M7 acts as an open-source model, and M5 is a black-box type model	M7
	M8 is used as the organization of the process of making managerial decisions, and M5 is the process of their adoption	M8
	Requirements for tools in M5 include the ability to translate data into a programming language, and in M9 this is not provided	M9
	During M5 there is a complexity of reflection in the quantitative measure of the behaviour of the input information, while in the M10 output information – the results of the enterprise's business, necessarily in quantitative terms	M10
M6	Such disadvantages as "ambiguity, one-time, superficiality" arise in M6 at the stage of selection of factors whose impact will be investigated, and in M7-obtaining results	M7
	M8 is used at the macro level (models for different parts of the economy), but at the macro level (the choice of optimal solutions for the enterprise), and M6 is used only at the macro level (but takes into account some factors at the macro level)	M8
	M9 refers to the methods of studying the stochastic connection, and M6 – to special methods	M9
	M10 allows you to determine not only the current state of the enterprise, but its dynamic development, to predict, and M6 can not be considered in the dynamics, because the factors taken into account can change within an hour	M10
M7	These methods pursue different goals and therefore relate to different types of methods, M7 refers to specific methods and models of strategic analysis, and M8 is considered as a section of applied mathematics	M8
	M9 plays an important role in conducting analytical research, and M7-strategic ones	M9
	M7 has bottlenecks, one of which is the static nature of the matrix, while as the M10 allows you to analyze the dynamics of financial risk	M10
M8	If the purpose of M8 is to find the similarity of the objects under study, and to create homogeneous clusters, then M9, on the contrary, seeks a difference in the interests of objects, explores the conflict between them	M9
	M10 has a subjective character, because the financial analyst makes a decision according to his own opinion, and M8 – because in the course of a mathematical study, a personal move is envisaged (conscious choice of the player by one of the possible actions)	M10
M9	Using M10 it is necessary to analyze the formation of a financial strategy in several directions in order to prevent inaccuracies, that is, to take into account sector specificity, and in M9 it is taken into account at the stage of selection of the main indicators	M10

Source: own elaboration

Note: M1 – strategic due-diligence; M2 – diagnostic benchmarking; M3 – fuzzy-plural method; M4 – method of economic norms; M5 – simulation modeling; M6 – PEST analysis; M7 – Mc Kinsey / GE Matrix; M8 – the theory of games method; M9 – cluster analysis; M10 is the Franschon-Romana matrix

According to the results of the comparison matrix of the methods of financial and economic analysis, we can weigh their differences in choosing the method of conducting the analysis based on the source information of the method, its purpose, algorithm and

practical application in accordance with the purpose of the analysis. After all, each method has its advantages and disadvantages, some apply at all economic levels and for all enterprises, some can not be applied in certain situations. From the matrix, we

can see that matrix-type models are the most versatile and applicable, they are simpler in calculations and use than mathematical models, which entail considerable costs and complex mathematical tools. Despite the infinite number of research methods, neither traditional nor the most advanced methods can provide full and comprehensive consideration of certain factors. At the moment, given the rapid progress in improving methods under turbulence, there is no universal, single method that would allow for in-depth analysis of various areas of its orientation, taking into account the specifics and size of the enterprise, therefore, it is necessary to be able to combine the methods and models appropriately, taking into account their fundamental differences.

Conclusions

The main theoretical principles of using modern methods of analysis of financial and economic activity of the enterprise and the feasibility of their practical application were investigated.

Modern unstable economic processes require systematic monitoring and analysis, so one of the most important aspects of the enterprise's analysis of the enterprise is the choice of the method of analysis according to its specifics and objectives. Such modern methods as strategic due-diligence, diagnostic benchmarking, fuzzy-plural method, method of economic norms, simulation modeling, pest-analysis, McKinsey / GE matrix, game theory, cluster analysis, Frascion-Romana matrix were highlighted. For a more comprehensive study of the financial condition of an enterprise, a variety of methods and models should be used. A consolidated comparative matrix will facilitate the choice of a particular method, in accordance with the needs of the enterprise, since it makes it possible to visually identify the fundamental differences between methods. Having made the right choice and conducted a qualitative analysis, you can take the optimal management solution for further development of the enterprise.

Abstract

Modern economic phenomena in conditions of turbulence require enterprises to react instantly and adapt to its specification and dynamic changes. In order to ensure the financial equilibrium and economic growth of economic activity, comprehensive and comprehensive studies of the financial and economic state of the enterprise are required. The research can be done through economic analysis, using different methods and models. First of all, there are a number of methods, both traditional and modern. Our research was focused on modern methods that are considered more effective and appropriate in conducting and making managerial decisions, since they have been modified and refined under present conditions. In the course of the study, the following modern methods were considered: strategic debugging, diagnostic benchmarking, fuzzy-plural method, method of economic norms, simulation modeling, pest-analysis, McKinsey / GE matrix, game theory theory, cluster analysis, Frascion-Roman The basic theoretical aspects and approaches to the interpretation of the results of these methods are determined. Of course, each method has its own characteristics, advantages and disadvantages, so the question that needs to be put at the beginning of the study is the correctness of choosing a method of economic analysis that meets the goals and needs of the enterprise.

For the convenience of making managerial decisions, the methods described above were systematized and presented in the form of a consolidated comparative matrix of modern methods of analysis of economic indicators of the enterprise. The principal differences between modern methods have been identified. In the study, it was determined that some methods are applied at all economic levels and for all enterprises, some can not be applied in certain situations. It was also determined that matrix-type models are the most versatile and applicable, they are simpler in calculations and use than mathematical models, which entail significant costs and complex mathematical tools. Using the created comparative matrix, you can greatly simplify the process of selecting a method, since they were compared with each other, so you can see the fundamental differences between methods and choose the most optimal. At the end of the study, it was concluded that there is no universal, single method that would allow for in-depth analysis of various areas of its orientation, taking into account the specifics and size of the enterprise. Therefore, a comprehensive analysis should be carried out, using a variety of methods and models to determine the most accurate picture of the financial and economic situation of the enterprise.

Список літератури:

1. Kovtunenکو Yu.V. Economic analysis and its importance in the management of enterprise *[Електронний ресурс]* / Yu.V. Kovtunenکو, A.O. Valyanskaya, K.O. Mirosnyukova // Економіка: реалії часу. Науковий журнал. – 2017. – № 1 (29). – С. 80-85. – Режим доступу до журн.: <http://economics.opu.ua/files/archive/2017/No1/80.pdf>.
2. Бирка М.І. Застосування процедури «дью ділідженс» в процесі залучення прямих іноземних інвестицій на підприємства / М.І. Бирка // Бізнес Інформ. – 2013. – № 1. – С. 81-85.
3. Безус А.М. Застосування процедури Дью Ділідженс як важеля зменшення інформаційних ризиків при здійсненні емісії цінних паперів / А.М. Безус, К.В. Шафранова, М.Б. Шевчун // Інвестиції: практика та досвід. – 2018. – №9. – С. 50-53.

4. Тараєвська Л.С. Бенчмаркінг як інструмент відбору найбільш конкурентних проектів природоохоронного призначення / Л.С. Тараєвська // Економіка та управління підприємствами. – 2018. – Вип. 26(2). – С. 39-42.
5. Воробйова Н.П. Бенчмаркінг як інструмент підвищення конкурентоспроможності організації / Н.П. Воробйова // Проблеми інноваційно-інвестиційного розвитку. – 2018. – № 14. – С. 13-20.
6. Ісаєва Т.М. Нечітко-множинний підхід до оцінки ризику банкрутства підприємства / Т.М. Ісаєва // Економіка та управління підприємствами. – 2012. – № 1 (17). – С. 108-113.
7. Петренко А.О. Сучасні методи оцінювання фінансовоекономічного стану підприємства: теоретичні та практичні аспекти. – [Електронний ресурс]. – Режим доступу: <https://core.ac.uk/download/pdf/32612621.pdf>.
8. Губар Л.С. Економіка будівництва. – [Електронний ресурс]. – Режим доступу: <http://nmcbook.com.ua/wp-content/uploads/2017/11/%D0%9D%D0%9F-%D0%95%D0%BA%D0%BE%D0%BD%D0%BE%D0%BC%D0%B8%D0%BA%D0%B0-%D0%B1%D1%83%D0%B4%D0%B8%D0%B2%D0%BD%D0%B8%D1%86%D1%82%D0%B2%D0%B0.pdf>.
9. Тараненко Ю. Імітаційне моделювання логістичних процесів / Ю. Тараненко, І. Федоренко // Вісник КНУ ім. Т. Шевченка. Економіка. – 2016. – Вип. 8(185). – С. 38-44.
10. Лук'яненко О.Д. Моделі аналізу середовища бізнес-діяльності ТНК / О.Д. Лук'яненко, О.М. Пісна // Науковий вісник Полісся. – 2016. – № 4(8). – С. 323-328.
11. Саєнко М.Г. Стратегія підприємства: Підручник / М.Г. Саєнко. – Тернопіль: «Економічна думка», 2006. – 390 с.
12. Гладкова Л.А. Застосування теорії ігор в економіці / Л.А. Гладкова, М.А. Наумова // Наукові записки. Проблеми методики фізико-математичної і технологічної освіти. – 2013. – Вип. 4. – С. 16-21.
13. Шиян А.А. Теорія ігор: основи та застосування в економіці та менеджменті: Навчальний посібник / А.А. Шиян. – Вінниця: ВНТУ, 2009. – 164 с.
14. Мандель И.Д. Кластерный анализ / И.Д. Мандель. – М.: Финансы и статистика, 1988. – 176 с.
15. Волощук Л.О. Класифікація підходів та методів формування аналітичних інструментів оцінювання економічної безпеки промислового підприємства. [Електронний ресурс] / Л.О. Волощук // Економіка: реалії часу. Науковий журнал. – 2014. – № 5 (15). – С. 224-231. – Режим доступу: <http://economics.opu.ua/files/archive/2014/n5.html>.
16. Забаріна К.Ф. Особливості використання інструментів стратегічного менеджменту з метою комплексної оцінки фінансової діяльності підприємства / К.Ф. Забаріна, І.А. Нечаєва // Економічний аналіз: збірник наукових праць. – 2014. – Том 15. – № 3. – С. 37-43.
17. Філіппова С.В. Оцінювання економічних показників діяльності організації на засадах врахування поглядів груп економічного впливу [Електронний ресурс] / С.В. Філіппова // Економіка: реалії часу. Науковий журнал. – 2013. – № 2 (7). – С. 235-240. – Режим доступу до журн.: <http://economics.opu.ua/files/archive/2013/n2.html>.

References:

1. Kovtunenکو, Yu.V., Valyanskaya, A.O., Miroshnykova, K.O. (2017). Economic analysis and its importance in the management of enterprise. Economics: time realities. Scientific journal, 1(29), 80-85. Retrieved from <http://economics.opu.ua/files/archive/2017/No1/80.pdf> [in English].
2. Byrka, M.I. (2013). Application of the "Due Diligence" procedure in the process of attracting foreign direct investment to enterprises. Business Inform, 1, 81-85 [in Ukrainian].
3. Bezus, A.M., Shafranova, K.V., Shevchun, M.B. (2018). Applying the procedure of Due Diligence as a leverage to reduce information risks in the implementation of the issue of securities. Investments: practice and experience, 9, 50-53 [in Ukrainian].
4. Tarayevska, L.S. (2018). Benchmarking as a tool for selecting the most competitive environmental projects. Economics and Enterprise Management, 26(2), 39-42 [in Ukrainian].
5. Vorobyova, N.P. (2018). Benchmarking as an instrument for improving the competitiveness of the organization. Problems of innovation and investment development, 14, 13-20 [in Ukrainian].
6. Isayeva T.M. (2012). Fuzzy-multiple approach to risk assessment of enterprise bankruptcy. Economics and Enterprise Management, 1(17), 108-113 [in Ukrainian].
7. Petrenko, A.O. Modern methods of estimating the financial and economic state of the enterprise: theoretical and practical aspects. Retrieved from <https://core.ac.uk/download/pdf/32612621.pdf> [in Ukrainian].
8. Gubar, L.S. (2014). Construction Economics. Retrieved from <http://nmcbook.com.ua/wp-content/uploads/2017/11/%D0%9D%D0%9F-%D0%95%D0%BA%D0%BE%D0%BD%D0%BE%D0%BC%D0%B8%D0%BA%D0%B0-%D0%B1%D1%83%D0%B4%D0%B8%D0%B2%D0%BD%D0%B8%D1%86%D1%82%D0%B2%D0%B0.pdf> [in Ukrainian].

9. Taranenکو, Yu., Fedorenکو, I. (2016). Imitation modeling of logistic processes. Bulletin of the T. Shevchenکو National University of Kyiv. Economy, 8(185), 38-44 [in Ukrainian].
10. Lukyanenko, O.D., Pisma, O.M. (2016). Models of analysis of the business environment of TNCs. Scientific bulletin Polesie, 4(8), 323-328 [in Ukrainian].
11. Sayenko, M.H. (2006). Enterprise strategy. Ternopil: "Economic Thought" [in Ukrainian].
12. Hladkova, L.A., Naumova, M.A. (2013). Application of the theory of games in the economy. Scientific notes. Problems of the method of physical and mathematical and technological education, 4, 16-21 [in Ukrainian].
13. Shyyan, A.A. (2009). Theory of games: the basis and application in economics and management. Vinnitsa: VNTU [in Ukrainian].
14. Mandel, I.D. (1988). Cluster analysis. M.: Finance and Statistics [in Russian].
15. Voloshchuk, L.O. (2014). Classification of approaches and methods for the formation of analytical tools for assessing the economic security of an industrial enterprise. Economics: time realities. Scientific journal, 5(15), 224-231 [in Ukrainian].
16. Zabarina, K.F., Nechayeva, I.A. (2014). Features of the use of strategic management tools in order to comprehensively assess the financial activity of the enterprise. Economic analysis: a collection of scientific works, 3, 37-43 [in Ukrainian].
17. Filyppova S.V. (2013). Estimation of economic performance of the organization on the basis of taking into account the views of groups of economic influence. Ekonomika: realiyi chasu. Naukovyy zhurnal, 2 (7), 235-240. – Retrieved from: <http://economics.opu.ua/files/archive/2013/n2.html> [in Ukrainian].

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