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DIAGNOSTICS OF CRISIS STATE AND THREAT OF ENTERPRISE BANKRUPTCY

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The article discusses methods for diagnosing the crisis state and bankruptcy threat of an enterprise. The relevance of this issue lies in the possibility of adapting to critical situations such as internal errors, economic crises, pandemics, martial law, and others. Every enterprise faces problems throughout its existence, and information about these problems is crucial to maintaining stability. Since the 1960s, many diagnostic methods have appeared and continue to develop. From the coefficients created by Beaver or Springate, the theory has evolved into sophisticated ranking methods that are still used today. The research aims to identify the pros and cons of diagnostic methods and their components, which should help analysts choose the appropriate tools for specific situations and enterprises. It is proposed to use the diagnostic process as a way to check the enterprise's performance and find the source of the crisis state if it is deteriorating or likely to deteriorate. It is important to adhere to the principle of cyclical repetition of diagnosis, which is determined by the nature of the crisis. Regular analysis eliminates the possibility of identifying a crisis in an uncontrolled state, and also provides space for optimizing processes, which helps reduce the level of errors in the diagnostic process itself. To speed up the process and make it clear, a diagnostic planning template is provided. The final results of the diagnostics will be qualitatively new management solutions based on raw and processed data aimed at solving the problem. The value of such an approach is in the constant control of the situation, which creates time and space for reaction and planning. Indirectly, for large and public companies, the use of the proposed analysis option can attract the attention of more investors, especially if analytical reports are published together with management reporting or as part of it.

Keywords: crisis state, bankruptcy risk, diagnostic methods, ranking methods, anti-crisis management.

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Introduction and problem statement

Effective anti-crisis management is an essential aspect of corporate management, and larger companies typically employ a wider range of tools to control and prevent crises. However, in practice, companies often fall short of theoretical standards due to resource limitations and the need to control potential consequences associated with adopting any new technology, including management technology. As a result, technologies are typically first tested on historical data before being applied in real-world conditions. The primary objective of anti-crisis management, including crisis diagnosis, is to prevent and simplify the crisis process. Selecting appropriate diagnostic methods that match the specific environment is crucial, as inaccurate methods may lead to delayed reactions and losses. Therefore, careful selection of diagnostic methods is essential to ensure timely and effective responses to crisis situations.

Analysis and research of publications

The difference in approaches lies in the fact

that the research and works of Ukrainian scientists are, as a rule, complex and cover a wide range of information. A vivid example of domestic authors is Blank I. O., Sytnyk G. V. [1], Kovalevska A. V. [2], Ivanyuta S. M. [3], Kukoba V. P. [4], Ponomarenko V. S [5] The works of these authors most fully reveal the topic of anti-crisis management, touch on both the diagnosis of the critical state of the enterprise and the threat of bankruptcy, reveal the issue of theoretical and methodological support of the research. On the other hand, foreign scientists investigate separate areas of the problem, thus the coefficients of Beaver [6], Springate [7], Altman [8] and others were created. It should be noted that all methods of research of coefficients are usually formed using the analysis of historical data, on the basis of which a model of weighted coefficients is built. Rating methods are usually published by government agencies such as the Federal Reserve. But the abstract approach to conducting the analysis is always the same: first, gathering the necessary information, then using the formulas of the method and providing a conclusion (estimate). It should be noted that the theoretical approaches to diagnosis are quite conservative, now researchers pay more attention to the adaptation of already existing methods of analysis. But this is the most rational way of using and developing the theory, since there are no global changes in the accounting of enterprises. Also, a lot of theoretical and methodological information is not sufficiently disclosed in the scientific community or is disclosed with a delay, as it is valuable as the intellectual property of the companies that developed it.

Purpose of the article

Diagnosing a state of crisis is relevant due to the difficult economic conditions caused by military aggression and the slowdown of the world economy caused by it and other factors. The purpose of the article is the presentation and analysis of diagnostic methods, as well as the identification of their weaknesses and strengths, features of their use in the Ukrainian market.

Presentation of the main material

Business activity is related to decision-making, which is caused by the nature of the company and the market. Every decision affects the company and leads to profits or losses. Negative consequences can cause the phenomenon of enterprise crisis. Ukrainian authors define the crisis of an enterprise as follows:

– exacerbation of contradictions in the socio-economic system of the organization, which threaten the existence of the company and require qualitatively new solutions [2, p. 19];

– the form of violation of the parameters of the enterprise's viability, which manifests itself during a certain period, appears cyclically at different stages of the enterprise's life cycle [5, p. 112];

– a situation with high danger, accompanied by a state of uncertainty; an unexpected event that potentially leads to a negative outcome [3, p. 4].

Therefore, the crisis of the enterprise is a certain state caused by internal factors of the company or the market in which it is located, which, in the absence of a reaction, is almost guaranteed to lead to losses. Crisis states are often classified by place of occurrence, economic level, breadth of coverage, causes of occurrence, and sources of origin [3, p. 5]. The classification of types of enterprise crisis is extensive, which shows how complex a process it is. From this follows the need to carry out diagnostics

Table 1

Methodological and theoretical bases used during the diagnosis of the crisis state of the enterprise

Theoretical bases	Methodological bases
Theories of economic cycles; Theory of capital circulation; Theory of transaction costs; Concepts of marginalism; Theory of marginal costs.	Theory of management; The concept of process management in the system; Understanding diagnostics as a component of management.
Logic; Structural and functional approach.	Theory of transformational management; Theory of decision-making; Life cycle models of organizations.
Management theory; The principle of direct and reverse communication in management; A systematic approach in the organization of business structures.	The concept of maximum profit in a liberal economic organization.
Theory of reflexive properties of social systems; Modeling during the description of complex systems.	Methods of financial and economic analysis of the state of the enterprise; Methods and models of forecasting the bankruptcy of an enterprise.

Source: [4, p. 46]

of the crisis state of the enterprise, that is, the absence of diagnostics puts the enterprise in a vulnerable position. We will also note theoretical and methodological research methods that are also used during diagnosis (Tabl. 1).

From the table, we can see that different types of approaches are used: economic, management, general scientific (logic). Among the methods, there is also a division into scientific and commercial ones. Scientific ones are described in detail in the literature, used during scientific research works. Commercial, or as they are also called, author's methods are often the secret of consulting companies, their intangible asset.

In his 1966 work [6], William Beaver analyzed 30 ratios of a group of companies, most of which went bankrupt. The coefficients reflecting the ratio of the growth of monetary funds and attracted capital showed the greatest importance. Beaver's coefficient is calculated by the formula:

$$C_B=(NP-D)/(L_{1t}-L_c), \quad (1)$$

where, C_B – Beaver's coefficient; NP – net profit; D – depreciation; L_{lt} – long-term liabilities; L_c – current liabilities.

If this indicator does not exceed the value of 0.2 for a period of 1-2 years, then the structure of the balance sheet has an unsatisfactory structure. International standards recognize the value of the coefficient from 0.17 to 0.40 as recommended. At the same time, indicators from 0.4 to 0.45 are normal. Approximately 5 years before bankruptcy is a coefficient of 0.17.

The next model was developed in 1978 by Gordon Springate, who conducted a study of manufacturing companies and classified them into problem and non-problem. For the analysis, the scientist used 19 different indicators and statistical multi-discriminant analysis. Initial formula of the model

$$S=1.03\cdot X_1+3.07\cdot X_2+0.66\cdot X_3+0.4\cdot X_4, \quad (2)$$

where, S is the Springate model; X_1 – (current assets – current liabilities) / all assets; X_2 – profit before taxation / all assets; X_3 – profit before taxation / current liabilities; X_4 – sales / all assets.

Previously, the Springate method was considered very accurate (about 90 percent). But new research shows that its accuracy is actually low. [7, p. 77] The results of the method could change due to changes in external conditions.

Also worth considering is the method named after Professor Tuffler, who proposed it in 1983. Sometimes this model is also called a Z-score. The formula of this model consists of four coefficients:

$$Z=0.53\cdot X_1+0.13\cdot X_2+0.18\cdot X_3+0.16\cdot X_4, \quad (3)$$

where, Z is the Z-score; X_1 – profit before taxation / current liabilities; X_2 – current assets / all liabilities; X_3 –current liabilities / all assets; X_4 – (quick assets – current liabilities) / (operating costs – depreciation).

In the model, each of the elements is responsible for a certain part of the analysis, X_1 reflects profitability, X_2 is an indicator of the state of working capital, X_3 is a measure of financial risk, and finally X_4 describes the number of lending intervals.

The results of the model can be easily distinguished by the result, negative values mean that the financial profile of the company is similar to previously bankrupt enterprises. Positive values on the contrary, indicate that the company is protected from the risk of insolvency.

In the banking sector, such methods as ranking assessments (ranking analysis) are very common. This type of method is based on a ranking procedure. The ranking, in turn, is a process of analysis, as a result of which the object receives a certain assessment of its financial condition and activity forecast. Ranking methods are also divided into two subgroups: internal and external. The difference is that internal methods are used to assess financial stability internally, while external methods assess the bank based on open financial information. The most popular internal methods are BOPEC, CAMEO, ROCA, UBSS. Among the external methods are: CAMELS, PATROL and ORAP. The main advantages of ranking methods are [9]:

a) to take into account external factors;

b) to take into account qualitative indicators;

c) the absence of too complex calculations;

d) the absence of the need for periodic data updating;

e) no need for additional analysis to obtain conclusions.

On the other hand, the disadvantages are:

a) no possibility to perform any interpolation of the results;

b) the specifics of the enterprise being analyzed are not taken into calculations;

c) subjective assessment of the weighting coefficients is also allowed.

In this study, most of the attention will be devoted to external ranking methods, as CAMELS (Tabl. 2).

Table 2

Coefficients calculated under CAMEL model

Capital adequacy	Asset quality	Management	Earnings	Liquidity
Capital Adequacy Ratio (CAR)	Net NPA*/Net Ratio (NPAR)	Asset Utilization Ratio (AUR)	Return on Assets (ROA)	Current Ratio (CR)
Capital Adequacy tier I Ratio (CAR I)	Net NPA (NPA)	Return on equity Ratio (ROE)	Spread Ratio (SR)	Investment Deposit Ratio (Investment DR)
Capital Adequacy tier II Ratio (CAR II)	Gross NPA Ratio (GNPAR)	Profit per employee	Net Interest Margin (NIM)	Cash deposit ratio (Cash DR)
		Business per employee	Net profit ratio (NPR)	Credit deposit Ratio (Credit DR)
		Income to expense Ratio (E/I Ratio)		

Source: [12, p. 72]

Consideration of remote methods should begin with the CAMEL or CAMELS method, it is the most widely used in Ukraine and is used by the National Bank [10], as well as other regulators to evaluate banking institutions around the world. The method was created in the USA and has been successfully used since the 1970s. The name of the method is an acronym from the first letters of the components: C (Capital adequacy), A (Asset quality), M (Management), E (Earnings), L (Liquidity), S (Sensitivity to market risk) [11].

This method is considered one of the most popular and complex, but not too difficult to perform. For each of the constituent groups, it is necessary to collect relevant data and perform their analysis according to the method, as well as make calculations that will be used during the presentation of the final rating result (Tabl. 3).

Michael Porter's method of analyzing industries and business strategy deserves special attention. It consists of five steps of analysis:

– analysis of the threat of the appearance of substitute products;

– analysis of the threat of the emergence of new market players;

– analysis of market dependence on suppliers;

– analysis of market dependence on consumers;

– analysis of the competitive environment.

This technique should be used as a starting point for research, as the technique itself does not have complex multifactorial calculations. But it will nicely reflect the company's position on the market and possible flaws in its strategy, which can later be used to interpret the results of assessment methods and predict the threat of bankruptcy.

Among such strategic methods, it is also quite appropriate to use SWOT tools, PEST analysis due to their universality and adaptability to any market, although there is a certain subjectivity, since the factors are selected by the analyst independently.

Strategic methods will become a starting point for other methods and information gathering, possibly narrowing down the circle of suspect parts of the business and speeding up further analysis. To summarize the presented material, a comparative table of methods with information about advantages and disadvantages, which are present in the opinion of the author, is offered.

The most relevant at the moment are rating methods, but the results of such methods cannot be extrapolated. Also, almost all such methods are used in banking or financial institutions to establish ranks. Thus, the best option for enterprise research will be the creation of a certain set of methods that will work in a specific situation and at a specific enterprise. Also, this approach eliminates errors due to cross-estimation of the same indicators from different methods.

Diagnostics of a crisis state is only a part of anti-crisis management, the components of which are much more [13]:

– diagnosis of financial condition;

– monitoring of the external and internal environment;

– assessment of the enterprise's business;

– marketing and benchmarking;

– organizational and production management;

– personnel management and motivation;

– financial management;

– anti-crisis innovation policy;

– internal audit;

– anti-crisis controlling system.

Additionally, it's important to note that anti-crisis management should not be viewed as a one-time process. Instead, it should be implemented as an ongoing strategy to prevent future crises and to

Table 3

Comparison of methods of assessing and forecasting the bankruptcy threat of the enterprise

Method	Advantages	Disadvantages
Beaver's method	Quick and simple formula, easy to extrapolate and use with big datasets	Necessary to adapt the coefficients in the calculations
Springate method	High accuracy of forecasts, about 90 percent but disputed by new research	It was created and tested at companies in the US and Canada. Specialize on assess solvency
Altman's method	Sequential analysis that makes calculations easier	Tested only at large US enterprises. During calculations, the difference between the development of stock markets and accounting should be taken into calculations
CAMELS	It has been successfully used in the banking sector since its introduction in the 1970s. It is used and legislated in Ukraine	It is a banking method, for use at other enterprises it is necessary to adapt to the specifics of the enterprise
Michael Porter's model	The simplest, universal and generalized among those presented. Widely used in Ukraine and the world	The general model does not assess the risks of bankruptcy, but may point to certain causes or strategic weaknesses
SWOT	Allows you to quickly assess the situation, internal and external weaknesses and threats	Does not use numbers and calculations, absolutely no extrapolation, subjective approach
PEST	Understanding the processes that occur within the company and affect its development, Understanding the factors that create risks for the development of the company	Subjective method, completely dependent on the analyst, high cost of error

Source: summarized from a paragraph

continuously improve the company's ability to handle unexpected situations. To achieve this, regular evaluations and updates of the anti-crisis management plan should be conducted. Furthermore, the plan should be integrated with the overall corporate strategy to ensure that the management team is aligned and prepared to respond to any crisis that may arise. Finally, it's worth mentioning that crisis management should not only focus on addressing the immediate effects of a crisis but also on developing long-term strategies to prevent similar crises from occurring in the future.

At this stage of the research, we understand that the selection of methods is a very important part of diagnostics equal to others. To confirm this, consider the role of crisis diagnosis in the activities of enterprises.

O. Moroz and O. Smetaniuk in their study draw attention to the place and role of diagnostics in anti-crisis management of the enterprise as a multifactorial category, which includes [14, p. 30]:

– research of the basic indicators of economic activity of the socio-economic system;

– a comprehensive analysis of the influence of internal and external factors on the financial, economic and technical and technological state of the enterprise;

– expert evaluation of developed measures, prospects of financial recovery.

During the research, the authors put the main emphasis on collecting the information base for decision-making using a set of research procedures. Such procedures are aimed at identifying the dominant factors of the crisis state, symptoms and causes of occurrence or possible complications, assessing the current capabilities of the enterprise to implement strategic and tactical goals, preparing the necessary information base for decision-making [14, p. 38].

Therefore, the role of diagnosing the crisis state of the enterprise is to prevent the appearance of such a state of the enterprise by using certain tools:

a) data collection;

b) analysis;

c) selected research methods.

Important thing at the moment when the diagnosis has already been carried out and the analyst understands the state of the enterprise, it is also necessary to identify the phase of the crisis. There are three of them:

– there is no threat to the enterprise with the immediate introduction of anti-crisis solutions;

– there is a threat to the enterprise, financial rehabilitation is necessary;

– the enterprise is no longer able to exist and will be liquidated

Based on the data obtained from the methods, a list of problems and weaknesses that led (or not)

to a state of crisis is formed. Formed problems provide time space for risk avoidance and management decision-making in order to prevent further deepening into a crisis state and optimal problem solving. Diagnostics of the crisis state allows you to perform both preventive checks and prevent crises, as well as lead the company out of already formed crisis situations. Such tools make the enterprise more stable and attractive for investments.

Conclusions

A better understanding of the process of diagnosing a crisis and the threat of bankruptcy of an enterprise should help analysts to create their own sets of tools for each individual situation. Sometimes new methods may appear as modifications of old ones with small changes, but the effectiveness of such methods will be much greater. Similar opinions of the authors on the topic of diagnostics confirm the complex nature of crisis states, as well as a modern approach to their detection, analysis and correction. It is also necessary to remember the nature of the crisis state and its cycles, which can also be used with any diagnostic method. Since the main thing that changes is not the reporting of companies, but the market in which they operate, it is necessary to continue the development of modern methods of diagnosing the crisis situation, which will include the latest technologies, for example, artificial intelligence, which can process much more data than humans and learn solve business problems. As mentioned earlier, in the opinion of the author, the best way to develop a theory is to change, update and adapt it.

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ДІАГНОСТИКА КРИЗОВОГО СТАНУ ТА ЗАГРОЗИ БАНКРУТСТВА ПІДПРИЄМСТВА

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У статті розглянуто методи діагностики кризового стану та загрози банкрутства підприємства. Актуальність питання діагностики полягає в можливості адаптації підприємства в критичних ситуаціях, таких як внутрішні помилки, економічна криза, пандемія, воєнний стан тощо. Будь-яке підприємство стикається з проблемами протягом усього свого існування, а інформація про проблеми завжди була ключем до стабільності. З 1960-х років з'явилося і продовжує розвиватися багато методів діагностики. Від коефіцієнтів, створених Бівером або Спрінгейтом, теорія розвинулася до складних рангових методів, які використовуються й сьогодні. Дослідження спрямоване на виявлення позитивних і негативних рис методів діагностики та їх частин, які повинні допомогти аналітику вибрати інструменти для конкретної ситуації та підприємства. Запропоновано використовувати процес діагностики як спосіб перевірки діяльності підприємства та, якщо вона погіршується або може погіршитися, знайти джерело кризового стану. Помічено важливе правило: дотримуватись принципу циклічного повторення діагностики, що визначається характером кризи. Регулярний аналіз усуває можливість виявлення кризи в неконтрольованому стані, а також дає простір для оптимізації процесів, додатково допомагаючи знизити рівень помилок у самому процесі діагностики. Щоб прискорити процес і зробити його зрозумілим, пропонується шаблон планування діагностики. Кінцевими результатами діагностики мають бути якісно нові управлінські рішення на основі вхідних і оброблених даних, спрямовані на вирішення проблеми. Цінність такого підходу в постійному контролі ситуації, що створює часовий простір для реакції та планування. Побічно для великих і публічних компаній використання запропонованого варіанту аналізу може привернути увагу більшої кількості інвесторів, особливо якщо аналітичні звіти будуть публікуватися разом з управлінською звітністю або як її частина.

Ключові слова: кризовий стан, ризик банкрутства, методи діагностики, рейтингові методи, антикризове управління.

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The article discusses methods of diagnosing crisis state and the bankruptcy threat of the enterprise. The relevance of issue of diagnostics lies in the possibility of enterprise adaptation in critical situations, such as internal errors, economic crisis, pandemic, martial law, etc. Any enterprise faces problems throughout its existence, and information about problems has always been the key to stability. Since the 1960s, many diagnostic methods have appeared and continue to develop. From the coefficients created by Beaver or Springate, the theory evolved into the sophisticated ranking methods that are still used today. The research is aimed at identifying the pros and cons of diagnostic methods and their parts, which should help the analyst choose tools for a specific situation and enterprise. It is proposed to use the diagnostic process as a way to check the performance of the enterprise and if it is deteriorating or may deteriorate, to find the source of the crisis state. It is important to adhere to the principle of cyclical repetition of diagnosis, which is determined by the nature of the crisis. Regular analysis eliminates the possibility of identifying a crisis in an uncontrolled state, and also provides space for optimizing processes, additionally helping to reduce the level of errors in the diagnostic process itself. To speed up the process and make it clear, a diagnostic planning template is offered. The final results of the diagnostics will be qualitatively new management solutions based on raw and processed data aimed at solving the problem. The value of such an approach is in the constant control of the situation, which creates a time space for reaction and planning. Indirectly, for large and public companies, the use of the proposed analysis option can attract the attention of more investors, especially if analytical reports will be published together with management reporting or as part of it.

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