V. N. KARAZIN KHARKIV NATIONAL UNIVERSITY

Educational and Research Institute “Karazin Business School”
Department of Management and Administration

**MASTER’S THESIS**

Title: **«Improvement of crisis management in potential company bankruptcy conditions»**

Completed by 2nd year student,
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specialty 073 "Management"
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October 17, 2023

**TASK**

**TO MASTER THESIS**

Ren Taoyan

(last name, name of the student)

1. Title «Improvement of crisis management in potential company bankruptcy conditions»

Supervisor: Neskorodieva Inna, PhD, Associate Professor .

(last name, name, degree, academic rank)

approved by the order of the university from February 29, 2024 № 4501-5/589.

2. The term of the student's submission of thesis on April 25, 2024

3. List of issues that need to be developed

1. To explore theoretical aspects of enterprise bankruptcy probability analysis.

2. To analyze the effectiveness of anti-crisis management at LLC 'KMP-Electro' based on the probability of its bankruptcy

3. To propose directions for improving crisis management for LLC 'KMP-Electro'

4. Work plan

| № | Stages of work |
|---|---|
| 1 | Approval of the thesis content |
| 2 | Preparation of the thesis' first section |
| 3 | Completion of the first section according to the supervisor recommendations. Writing the thesis' second section |
| 4 | Completing of the second section according to the supervisor recommendations. Preparation of the thesis' third section |
| 5 | Completing of the third section according to the supervisor recommendations. Preparation of a report for a scientific conference with a presentation of the main results of the thesis |
| 6 | Writing of the introduction, conclusions of the thesis. Making references list |
| 7 | Submission of the thesis to the Department of Management and Administration |

5. Date of assignment issue October 17, 2023

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**CONTENT**

# INTRODUCTION

In the conditions of a market economy, one of the priorities of state policy is the improvement of the economic environment. The effectiveness of state actions in this direction primarily determines the improvement of the business environment and the country's investment image. To achieve this, it is necessary to assess the probability of bankruptcy of strategic, city-forming, and socially significant enterprises in advance and to implement measures for proactive financial recovery and organizational restructuring. The main condition for further growth of the national economy is the development of production. However, practically since our state gained independence, one of the main problems has been the instability of enterprise activity. Despite some improvement in their performance results in recent years, new economic challenges require additional consideration of the systemic problem of the unprofitability of domestic enterprises.

Researchers such as E. Andrushchak, H. Lyashenko, O. Plastun, O. Tereshchenko, J. Krajewski, A. Tokarski, M. Tokarski, and others pay attention to the study of bankruptcy issues. Most of the research on bankruptcy issues conducted by Ukrainian scholars is related to diagnosing the crisis state of enterprises and legal aspects of insolvency. However, such approaches are not designed for a deep analysis of the bankruptcy institution as a component of the economic system. The lack of research on bankruptcy trends, its factors, and its consequences is largely explained by the absence of state statistics on bankrupt enterprises.

The purpose of this work is to theoretically summarize the basics of crisis management of an enterprise as the basis for restoring solvency and developing recommendations to reduce the probability of enterprise bankruptcy. To achieve this goal, the following main tasks were identified in the study:

– investigate the economic essence of enterprise bankruptcy, its types, and factors of occurrence;

– analyze methods of bankruptcy assessment and their usage peculiarities;

– determine the essence and principles of crisis financial management at the enterprise as the basis for reducing the probability of enterprise bankruptcy;

– analyze the financial and economic activities of LLC "KMP-Electro" for the years 2021-2023.

– evaluate the probability of bankruptcy for LLC "KMP-Electro" using the coefficient method and discriminant models;

– improve the assessment toolkit for enterprise bankruptcy probability considering the industry of operation;

– identify enterprise bankruptcy factors using factor analysis technology;

– propose measures to enhance the effectiveness of crisis management of the enterprise.

The study's object is the enterprise's financial and economic activities.

The study's subject is theoretical and methodological approaches to crisis management in the conditions of enterprise bankruptcy probability.

The theoretical basis for writing the paper consists of works by domestic and foreign authors on bankruptcy issues, crisis management of enterprises, and regulatory acts related to this issue.

The following methods of scientific research were used in writing the paper:

– comparative method in comparing domestic and foreign methodologies for determining bankruptcy likelihood;

– methods of analysis and synthesis in studying individual parts of the bankruptcy concept and forming a more complete and accurate definition of the essence of enterprise bankruptcy; in determining crisis management measures aimed at reducing the probability of enterprise bankruptcy;

– financial analysis method and discriminant analysis in determining the probability of enterprise bankruptcy;

– factor analysis method in determining the factors of enterprise bankruptcy.

# SECTION 1
# THEORETICAL ASPECTS OF ENTERPRISE BANKRUPTCY PROBABILITY ANALYSIS

## 1.1 Economic essence of enterprise bankruptcy and factors of its occurrence

Bankruptcy is one of the key elements of a market economy and an institution of public and commercial law. Economically, bankruptcy is the inability of a subject with significant debts to creditors and obligations to the budget to continue its entrepreneurial activity due to its economic unprofitability and lack of profitability. The consequence of the unsatisfactory financial condition of most domestic enterprises has been a catastrophic increase in their accounts payable and accounts receivable. Insolvency is the basis for declaring a company bankrupt. Under normal operating conditions, shareholders and creditors expect a reward, the level of which depends on the profitability of the firm [63].

As practice shows, one of the first signs of movement towards bankruptcy is a decrease in the profitability of the enterprise below the value of its capital. Interest on loans and dividends paid by the enterprise cease to correspond to modern market conditions, and investing in such an enterprise becomes unprofitable. Creditors (bondholders and others) receive certain amounts determined by credit agreements, but the profitability of their investments in a specific enterprise decreases, and due to the decline in the value of equity capital, the price of shares falls, increasing the risk of non-repayment of funds, and the enterprise experiences difficulties with cash flow, especially if creditors do not extend credit agreements for the next period, and the enterprise will be forced to pay not only interest but also the principal amount of the debt. The likelihood of a liquidity crisis arises, and the enterprise enters a state of "technical insolvency." This phenomenon can already be considered as

bankruptcy. A decrease in the profitability of an enterprise or an increase in the value of liabilities means a decrease in its price. The price of an enterprise is the present value of payments to creditors and shareholders. The weighted average cost of capital is used as the discount rate. The price of an enterprise may fall below the amount of liabilities to creditors. This means that shareholder equity "disappears." This is what complete bankruptcy is - shareholder bankruptcy [49].

Reduction in profitability or increase in liabilities implies a decrease in the company's value. The price of a company is the present value of payments to creditors and shareholders. Weighted average cost of capital is used as the discount rate. The price of a company may fall below the sum of liabilities to creditors. This means that shareholder equity "disappears." This constitutes full bankruptcy - shareholder bankruptcy [26].

Today, there are quite a few diverse views in the scientific literature regarding the definition of bankruptcy, but there is no single approach to its interpretation. Furthermore, there is a lack of systematic data organization of these approaches, as authors use different substantive terms such as "insolvency," "unfulfilled obligations," "crisis state," "bankruptcy" [9].

Within the research of the theoretical aspects of evaluating the probability of a company's bankruptcy, it is also necessary to examine the essence of a related category, such as "insolvency," which in most scientific works is equated with the concept of "bankruptcy."

As legal terms that have emerged under the influence of legislation and judicial practice in English-speaking countries, the concepts of "insolvency" and "bankruptcy" are used to explain the same phenomenon. However, bankruptcy as an element of insolvency has a narrower meaning and may be considered a criminal act regulated by relevant legislation. In addition, bankruptcy is the extreme form of a company's insolvency, under which it is impossible to fulfill obligations to creditors, stabilize its financial condition, and restore financial balance.

Both Ukrainian and foreign scholars devote a significant number of works to the categories of insolvency and bankruptcy, yet many debatable issues remain

unresolved. Firstly, attention should be drawn to the fact that when investigating these concepts, on one hand, their linguistic identification is allowed, while on the other hand, different meanings are attributed to these definitions, leading to ambiguity in their theoretical content. It is precisely because of the ambiguous understanding of these concepts in economic and legal sciences that a range of problems arises in practice, related to the emergence of a crisis in enterprises or their liquidation in case of the impossibility of implementing recovery measures.

In economic literature, the problem of insolvency is most often associated with the analysis and evaluation of the financial condition of economic entities, whereas in legal literature, this definition has a somewhat broader character, associated with issues of bankruptcy and liability for obligations.

Chernichko N.V. drew attention to the unjustified identification of the concepts of insolvency and bankruptcy, explaining his point of view by stating that insolvency, alongside non-payment, serves as criteria for bankruptcy. In his scientific works, Chernichko N.V. noted that insolvency is a kind of indicator that the debtor does not have enough property to satisfy the monetary claims of creditors and is used as a basis for establishing the fact of bankruptcy [13].

According to the Ukrainian Code of Bankruptcy Procedures, insolvency is defined as the inability of a debtor to fulfill monetary obligations to creditors after the expiration of the established term [14].

In turn, Marsin V. understands "insolvency" as the inability of a subject of entrepreneurial activity to fulfill monetary obligations to creditors, including wage payments, after the established term for their payment, as well as to fulfill obligations regarding tax payments other than through the restoration of solvency [39].

In the scientific works of O. O. Tereshchenko, "insolvency" is defined as the inability of a subject of entrepreneurial activity to fulfill its obligations due to an insufficient amount of assets in liquid form when the time for payment has come [63].

The essence of the concept of "insolvency" has been examined by Baran M., Bauer K., who found that it refers to the financial condition of an enterprise wherein it experiences failures in production and economic activities, fails to fully repay its debts within the set timeframe, but can do so by liquidating all available assets [5].

According to Park S.B., Kim S.-K., Lee S. [48], "insolvency" is understood as the inability of an enterprise to repay its financial obligations within foreseeable terms.

Therefore, despite their common economic characteristics, the concepts of "insolvency" and "bankruptcy" are not identical. Bankruptcy has a narrower meaning, as it is a form of enterprise insolvency where fulfilling obligations to creditors, stabilizing its financial condition, and restoring financial balance become impossible.

Many Ukrainian and foreign scholars have studied the issue of business bankruptcy, yet despite the large number of scientific works in this field, there is no single approach to interpreting the concept of "bankruptcy." The ambiguity of the conceptual apparatus complicates the process of assessing the probability of enterprise bankruptcy and necessitates clarification of this aspect in the functioning of economic entities. Considering this, let's examine and specify this definition based on the systematization of existing approaches to defining its essence. Bankruptcy is considered a complex process that can be characterized from various perspectives: legal, managerial, organizational, financial, accounting-analytical, etc.

The interpretations of various authors regarding the essence of the concept of "enterprise bankruptcy" are presented in Table 1.1.

According to the Ukrainian Bankruptcy Code, Avci P., Sümerli Sarigül S, as well as the opinion of McMillan, who in his contemporary economics dictionary views corporate bankruptcy through the lens of liquidation proceedings [3, 14, 36].

Based on the legislatively established definition, bankruptcy has both economic and legal dimensions. The economic component of this definition lies in the insolvency of the economic entity, while the legal aspect involves the judicial confirmation of this status.

Table 1.1 - Summary of Approaches to Interpreting the Concept of "Enterprise Bankruptcy"

| Source | Definition |
|---|---|
| The Ukrainian Bankruptcy Procedures Code [14] | The recognized inability by a court for a debtor to restore its solvency and satisfy court-recognized creditor claims other than through the application of liquidation proceedings. |
| Macmillan's Dictionary [36] | The legal procedure whereby the assets of an insolvent debtor are sold, primarily for the benefit of its creditors. |
| Avci P., Sümerli Sarigül S [3] | The legal status occurring after its recognition by an arbitration court or after the official declaration of the debtor as bankrupt during voluntary liquidation. |
| Prusak B. [52] | The inability of a legal entity to satisfy creditor claims within the established time frame and to fulfill obligations to the budget. |
| Catalin C.M., Ion M.L. [11] | A condition where the actual market value of a firm's assets is less than the sum of its liabilities. |
| Park S.B., Kim S.-K., Lee S. [48] | The judicially established financial insolvency of an enterprise, meaning the enterprise's inability to satisfy creditor demands presented within the specified deadlines and to fulfill obligations to the budget. |
| Baran M., Bauer K. [5] | The recognized insolvency of an enterprise by a commercial court. |
| Tereshchenko O.O. [61] | Linked to the inadequacy of assets in liquid form, the inability of a legal entity to satisfy creditor claims within the specified time frame and fulfill obligations to the budget. |
| Krajewski J., Tokarski A., Tokarski M. [30] | The inability of an enterprise to finance its current operational activities and repay urgent obligations. |
| Lyashenko H.M. [34] | A consequence of poor enterprise management, neglecting the influence of various micro- and macro-environmental factors, is therefore legitimately viewed as the price for economic freedom in choosing the direction of economic activity, sales markets, and pricing. |
| Kanapickienė R., Kanapickas T., Nečiūnas A. [25] | Payment for the freedom to choose the enterprise's management system, strategy, and tactics of behavior in the market, payment for management mistakes in strategic planning, erroneous goals, and decisions made to achieve them, resulting in the inevitable triggering of the financial bankruptcy mechanism. |
| Blahun I. S. [9] | An integral element of a market economy that allows for the redistribution of limited resources and their efficient utilization, serving as a means of protecting property rights of owners. |

According to another group of authors, represented by Prusak B. [52], Catalin C.M., Ion M.L. [11], Park S.B., Kim S.-K., Lee S. [47], Tereshchenko O.O. [61], Krajewski J., Tokarski A., Tokarski M. [30], corporate bankruptcy should be understood as the inability of the enterprise to satisfy all demands and obligations to the budget and creditors.

Thus, as we can see, the main idea of this group of authors is insolvency, which from an economic point of view indicates the inability of the entity to continue its entrepreneurial activities due to low liquidity, unprofitability, and lack of profitability.

Another opinion regarding the essence of the concept of "enterprise bankruptcy" is held by Lyashenko G.M. and Kanapickienė R., Kanapickas T., Nečiūnas A., who attribute the cause of enterprise bankruptcy to a wrongly chosen management strategy [25, 34]. However, this factor is not the main reason leading to enterprise bankruptcy in modern conditions but rather one of the components through which this concept can be interpreted.

Blahun I.S. holds a separate opinion, considering the bankruptcy of an individual economic entity as a tool for redistributing resources to ensure their efficient use at the macro level [9].

In conducting a comprehensive analysis, it can be concluded that enterprise bankruptcy is multifaceted, which necessitated the study of various approaches by modern scholars, each of whom examines the concept of bankruptcy from only one perspective - either economic or legal, highlighting certain aspects. Therefore, let us formulate our own definition of this concept, based on the synthesis of all key points.

Therefore, enterprise bankruptcy is a state of an economic entity characterized by its inability to settle with creditors due to a low level of financial stability, solvency, and ineffective operations, resulting from inadequate management of the enterprise and leading to the application of liquidation proceedings by an arbitration court.

A problematic aspect of researching the theoretical foundations of enterprise bankruptcy, alongside the imperfections in the terminology, is the lack of a clear classification of its types.

Different authors have various views on identifying the main types of bankruptcy (Table 1.2).

Table 1.2 - Main Forms of Enterprise Bankruptcy in Economic Sources

| Author/Types of bankruptcy | Real | Technical | Intentional | Fictitious | Accidental | Negligent | Concealed |
|---|---|---|---|---|---|---|---|
| Podolska O. Ya. [50] | + | + | + | + | - | - | - |
| Shmorgun N. P., Holovko I. V. [59] | - | - | + | - | + | + | - |
| Bazylinska O. Ya. [7] | - | - | + | + | - | - | + |
| Park S.B., Kim S.-K., Lee S. [48] | + | + | + | + | - | - | - |
| Rudenko L.P. [54] | + | + | + | + | - | - | - |
| Prusak B. [52] | + | + | + | + | - | - | - |
| Krajewski J., Tokarski A., Tokarski M. [30] | + | + | + | + | - | - | - |
| Grebennikova O.V., Solomyanova-Kyrilchuk K.O. [17] | - | - | + | + | - | - | + |

A common type among all authors is deliberate bankruptcy, which indicates the intentional bringing of the economic entity to a state of enduring financial insolvency through the implementation of unlawful actions by the manager or owner of the enterprise, causing economic damage to the enterprise in personal interests or in the interests of others, thereby causing significant harm to state or public interests or the legitimate rights of owners and creditors.

Scientists Podolska O. Ya. [50], Bazilinska O. Ya. [7], Park S.B., Kim S.-K., Lee S. [48], Rudenko L.P. [54], Prusak B. [52], Krajewski J., Tokarski A., Tokarski M. [30] highlight fictitious bankruptcy, which should be considered as a situation where the enterprise is not actually bankrupt but spreads knowingly false information about its insolvency, thereby deceiving creditors to obtain a postponement of fulfilling its obligations or a discount on creditor debt.

A separate type of bankruptcy distinguished in the works of Podolska O.Ya. [50], Rudenko L.P. [54], is real bankruptcy, which is characterized by the inability of the economic entity to restore its financial stability and solvency in the future period due to real losses of capital utilization. The author also distinguishes the concept of technical bankruptcy, which characterizes the state of insolvency of an enterprise caused by significant overdue accounts receivable and the exceeding of its amount over the amount of accounts payable. In this case,

technical bankruptcy, with effective crisis management of the enterprise, does not lead to its liquidation.

N. Shmorgun [59] identifies two more types of bankruptcy: accidental and negligent. Accidental bankruptcy is associated with extraordinary circumstances, political instability, and economic crisis, which ultimately leads to the insolvency of the enterprise. Negligent bankruptcy is the result of ineffective work, conducting risky operations. In turn, O. Bazilinska adds concealed bankruptcy, which is implemented through intentional concealment of the fact of persistent financial insolvency by providing unreliable data in the hope of improving the financial situation, obtaining a favorable order, or attempting to obtain a loan [7].

Other classifications of bankruptcy are also possible. For example, Rukinov M.V. [55] notes types of bankruptcy that can be determined based on their causes (see Figure 1.1).

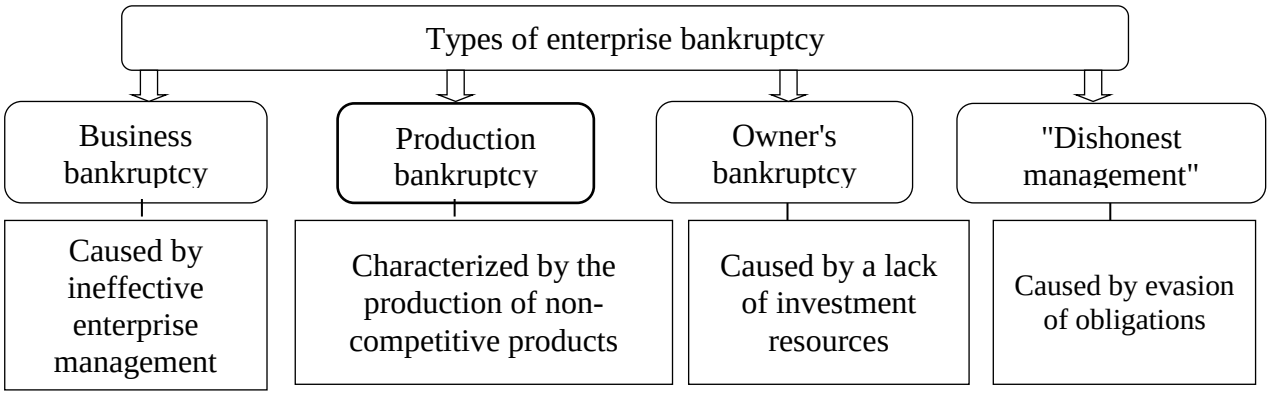


Figure 1.1 - Types of enterprise bankruptcy by causes of occurrence

*Source: Constructed by the author based on [55]*

The first type of bankruptcy is business bankruptcy, or bankruptcy associated with ineffective enterprise management, marketing strategy, or utilization of available resources.

The second type of bankruptcy is owner's bankruptcy or bankruptcy primarily caused by a lack of investment resources by the owner necessary for both expansion and sometimes basic reproduction when normal fixed assets and labor resources, rational marketing policies, and demand for the produced goods exist.

The third type of bankruptcy is production bankruptcy, where under the influence of the first two factors or due to obsolete equipment, or due to stiff competition from domestic and foreign producers, the enterprise produces non-competitive products. This condition of the enterprise is practically insurmountable without changing the manager or making investment injections without partial or complete restructuring of production.

The fourth type of bankruptcy, very characteristic of modern enterprises, is called "dishonest management." This category includes actions of enterprise management associated with deliberate evasion of obligations.

Another classification of bankruptcy types is proposed by O.B. Andrushko [2]. The author distinguishes economic insolvency, business insolvency, formal-legal insolvency, insolvency transitioning to bankruptcy, and bankruptcy itself. This classification can be characterized as the most detailed and comprehensive, as it presents a logical connection between the two classifications proposed above. Here, the list of bankruptcy types is correlated with the stages of bankruptcy as follows: economic insolvency is a hidden stage of bankruptcy, business and formal-legal insolvency are characteristic of technical and fictitious bankruptcy, accidental and negligent bankruptcy tend towards the third stage - insolvency transitioning to bankruptcy, and real bankruptcy is typical for enterprises at the stage of overt bankruptcy.

Thus, by analyzing the possible types of enterprise bankruptcy, we can conclude that the type of bankruptcy directly depends on the true cause of its occurrence, and accordingly, one or another type of bankruptcy is identified. Determining the type of bankruptcy is important not only for its economic assessment but also has legal significance, as the concepts of "fictitious bankruptcy" and "intentional bankruptcy" are applied in the criminal law of Ukraine, and it is for these types of bankruptcy that the owner of the enterprise bears criminal responsibility [17].

As for the factors causing enterprise bankruptcy, they can be quite diverse. Generally, they can be divided into two groups [2, 17, 20].

1. External factors, which are practically always very difficult to consider:

– economic: economic crisis in the country, general decline in production, inflation, financial system instability, rising prices of resources, market conditions change, partners' insolvency and bankruptcy. One of the reasons for business insolvency can be incorrect fiscal policies of the state. High taxation levels may become burdensome for enterprises;

– political: political instability in society, foreign economic policy of the state, disruptions in economic ties, loss of markets, changes in export and import conditions, imperfection of legislation in the field of economic law, antimonopoly policy, entrepreneurial activity, and other manifestations of the state's regulatory function;

– demographic: population size, demographic structure, people's welfare level, cultural level of society, determining the size and structure of needs and the purchasing power demand of the population for certain goods and services.

2. Internal factors that directly depend on the forms, methods, and organization of work within the enterprise:

– lack of own working capital due to ineffective production and commercial activities or ineffective investment policies;

– low level of technology, production organization, and technology;

– decreased efficiency of using enterprise production resources, its production capacity, and as a result - high cost, losses, depletion of own capital;

– creation of excessive unfinished construction, unfinished production, production inventories, finished products, resulting in overstocking, slowing down capital turnover, and creating a deficit;

– poor customer base, which pays late or does not pay at all due to bankruptcy;

– lack of sales due to low level of marketing activities in market research, order portfolio formation, product quality improvement, and competitiveness;

– attraction of borrowed funds into enterprise circulation on unfavorable

terms, leading to increased financial costs, decreased business profitability, and self-financing ability;

– rapid and uncontrolled expansion of business activities, resulting in faster growth of inventories, expenses, and accounts receivable compared to sales volume. This necessitates the attraction of short-term borrowed funds that may exceed net current assets (own working capital). As a result, the enterprise falls under the control of banks and other creditors and may face bankruptcy.

In general, the characteristics of crisis factors are provided in Table 1.3.

Table 1.3 - Main Crisis Factors Leading to Enterprise Bankruptcy

| Category of Factor | List of factors |
|---|---|
| Internal | Choice of enterprise mission |
| | Significant portion of borrowed capital |
| | Cost increase |
| | Low entrepreneurial abilities |
| | Low qualification of management personnel |
| | Inadequate marketing |
| | Inadequacy of expenses |
| | Inadequacy of working capital |
| | Loss of management flexibility |
| External | Activities of government authorities |
| | Parameters of related and supporting industries |
| | Demand parameters |
| | Parameters of competitive forces in the industry |
| | Parameters of production factors |

*Source: Constructed by the author based on [2, 17, 20]*

Thus, external factors in the conditions of an economic crisis are primary concerning internal threats of bankruptcy. However, internal factors become factors that "deepen" the impact of external business conditions. Specifically, unjustified economic policies of the government, uncontrolled inflationary processes, total economic crisis, political instability in society, and decline in business activity in the

economy mostly affect enterprise performance, primarily due to legislative imperfections. At the current stage, the development of science and technology has significantly slowed down due to a deep crisis in the investment sphere. The low level of integration of the domestic economy, inefficient use of foreign capital, and a sharp deterioration in the situation on domestic and foreign markets cause noticeable signs of bankruptcy in many enterprises in Ukraine.

Thus, enterprise bankruptcy is one of the legal mechanisms for restoring and reforming enterprises; it is a powerful incentive for the effective operation of economic entities, while also guaranteeing the interests of creditors, the state as a whole, and market participants. Its significance lies in the fact that, on the one hand, insolvent entities are excluded from economic turnover upon liquidation, which contributes to market recovery, and on the other hand, this institution allows enterprises and organizations to achieve financial stability and prosperity.

## 1.2 Modern methodological approaches to assessing enterprise bankruptcy

In modern scientific literature, there are various methodological approaches to diagnosing and forecasting the bankruptcy of enterprises. Bankruptcy indicators are divided into two groups. The first group includes indicators that indicate possible financial difficulties and the likelihood of bankruptcy in the near future [20, 38]:

– Repeated significant losses in core activities, expressed in chronic production declines, reduced sales volumes, and chronic losses.

– Presence of chronically overdue creditor and debtor arrears.

– Low liquidity coefficient values and a tendency for them to decrease.

– Increase in the risky share of borrowed capital in its total amount.

– Deficit of own working capital.

– Systematic increase in capital turnover duration.

– Presence of excessive reserves of raw materials and finished products.

– Use of new sources of financial resources on unfavorable terms.

– Adverse changes in the order portfolio.

– Decline in the market value of the company's shares.

– Decrease in production potential.

The second group includes indicators whose unfavorable values do not provide grounds for considering the current financial condition as critical but signal the possibility of its rapid deterioration in the future without effective measures. These include [40, 46]:

– Excessive dependence of the enterprise on any one specific project, type of equipment, type of asset, or market.

– Loss of key counterparties.

– Underestimation of technology and equipment renewal.

– Loss of experienced management staff.

– Forced downtime, irregular work.

– Ineffective long-term agreements.

– Insufficient capital investments, etc.

Among the advantages of this system of potential bankruptcy indicators, one can attribute systemic and comprehensive approaches. Among the disadvantages are a higher level of decision-making complexity in the conditions of a multi-criteria problem, the informative nature of calculated indicators, and the subjectivity of predictive decisions [42].

The advantages of this system of potential bankruptcy indicators include systematic and comprehensive approaches, while the disadvantages include a higher level of complexity in decision-making under conditions of a multi-criteria problem, the informative nature of calculated indicators, and the subjectivity of predictive decisions.

The summary of methodological approaches discussed in economic literature is presented in Fig. 1.2.

There are three main approaches to assessing and forecasting the probability

of enterprise bankruptcy [56, 61]:

- Expert methods;
- Econometric methods;
- Artificial intelligence systems.
- The most well-known techniques belonging to the first approach are:
- The Altman method (Z-score), or probability of failure assessment;

The Scoring method.

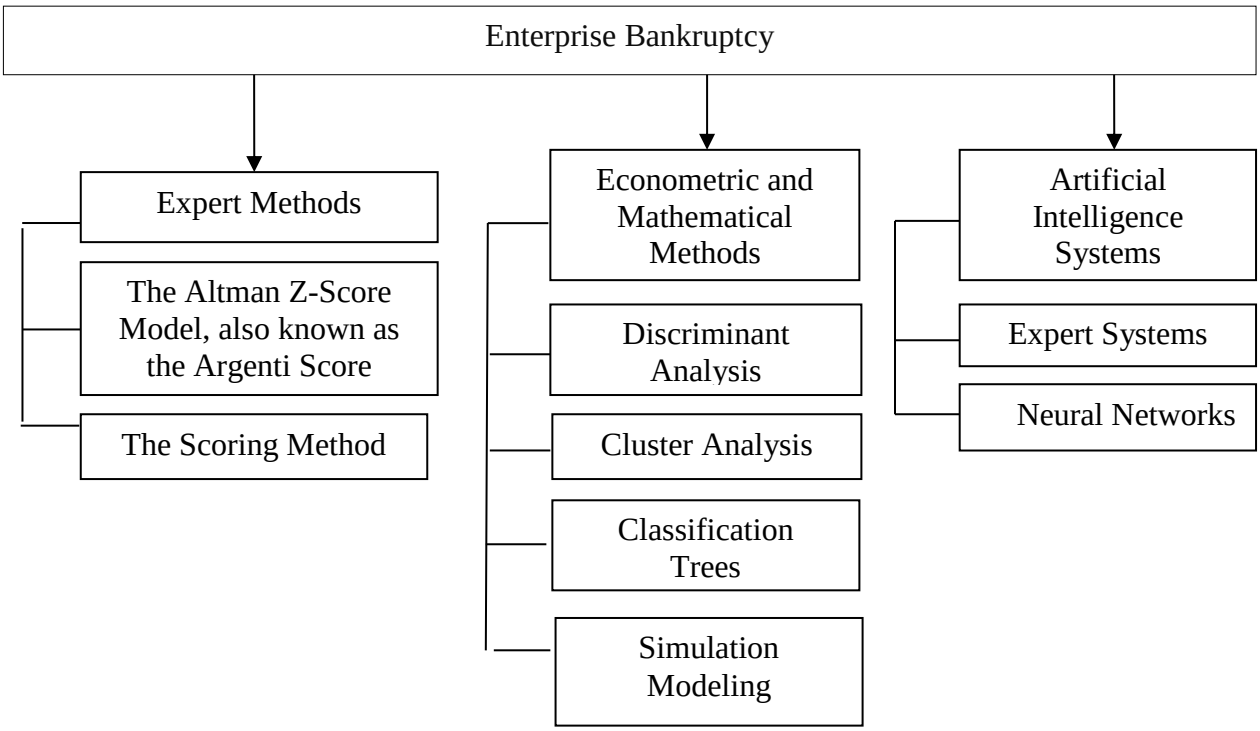


Figure 1.2 - Methodological Approaches to Diagnosing and Forecasting Enterprise Bankruptcy

*Source: Constructed by the author based on [20, 38, 40, 46]*

These methods are based on qualitative assessment of the probability of enterprise bankruptcy [67].

The second approach includes methods for forecasting the probability of bankruptcy based on the construction of economic-mathematical models. These include discriminant analysis, cluster analysis, classification trees, and simulation modeling.

Among the economic-mathematical methods commonly used in bankruptcy prediction, discriminant analysis is the most frequently applied in practice. During the analysis, significant financial indicators are selected, and for each, a weighting coefficient of the discriminant function is determined, defining the value of the integral indicator characterizing the financial condition of the enterprise, using the following equation (Formula 1.1) [4]:

$$I = a_0 + a_1 x_1 + a_2 x_2 + \ldots + a_n x_n, \quad (1.1)$$

Where I is the integral indicator of the financial condition of the enterprise.

$a_1 \ldots a_n$ is the parameters of the discriminant model determine the degree of significance of the respective financial coefficient

$x_1 \ldots x_n$ is the indicators of the discriminant function, financial coefficients.

$a_0$ is the intercept of the discriminant function, which may have a zero value.

Further, using the developed scale, a qualitative description of the financial situation at the enterprise is given based on the significance of the calculated indicators. Another approach to predicting the bankruptcy of an enterprise based on econometric methods is simulation modeling. Methods for calculating the probability of bankruptcy based on simulation modeling can be applicable in the conditions of the domestic economy. The analyzed group of methods is based on calculating the probability of bankruptcy of the analyzed enterprise by analyzing the results, which allows assessing the propensity of the enterprise to bankruptcy in the future. Thus, less financially stable enterprises are more likely to go bankrupt in the near future than more stable ones [15].

Another direction for assessing and predicting the probability of enterprise bankruptcy is methods based on the application of cluster analysis. The application of cluster analysis in forecasting bankruptcy probability is based on determining clusters that characterize the financial stability of the enterprise and its propensity for bankruptcy.

Cluster analysis allows for the classification of objects, in this case,

enterprises, for which the financial condition is evaluated, based on the presentation of results expressed by financial coefficients - points in the corresponding geometric space, followed by the identification of groups as "clusters" of these points [22].

Methods of automatic classification without learning, based on determining the concept of distance between objects and not requiring prior information about the distribution of the general population, are attributed to cluster analysis [7].

When forecasting the probability of enterprise bankruptcy, a certain number of indicators characterizing its financial position are distinguished. Moreover, the analysis may include data for relevant indicators and for several years, allowing to assess the propensity of the enterprise to bankruptcy taking into account the factor of time.

The method of classification trees has gained wide popularity in foreign practice. The main advantages of the method of constructing classification trees in forecasting the probability of enterprise bankruptcy are its high degree of visibility (graphical presentation), ease of interpretation of the results obtained, and the hierarchical nature of calculations in the classification process (questions are asked sequentially, and the final decision depends on the answer to all previous questions) [43].

Methods based on the use of expert systems and aimed at forecasting the probability of enterprise bankruptcy can conditionally be subdivided into two groups: diagnostic expert systems; systems of neural network computations. Diagnostic expert systems are designed to identify the causes that led to the unsatisfactory state of the enterprise. In addition, diagnostic expert systems allow modeling the mechanism of human thinking in solving tasks in the relevant subject area. In addition to calculations, expert systems draw conclusions based on the available information, relying on heuristic approaches to obtaining results.

In general, it can be noted that diagnostic expert systems in economics have only recently begun to spread and have not yet found wide application, which does not allow us to speak about a sufficient degree of accuracy of interpreting the results obtained, since they are primarily based on the knowledge and experience of experts.

Thus, it can be said that economic diagnostic expert systems are currently limited by the level of expertise of specialists (financiers, economists, accountants), which is not always high. Another direction of application for economic systems is the use of neural network computations to identify the probability of enterprise bankruptcy.

Neural networks represent a new and promising computational technology that provides new approaches to studying dynamic tasks in the financial field. Initially, neural networks opened up new possibilities in image recognition, then statistical and artificial intelligence-based decision support methods were added for financial tasks, including diagnosing enterprise bankruptcy.

One of the main directions in diagnosing enterprise bankruptcy is an approach based on calculating various financial ratios based on financial statements. Domestic and foreign authors propose various procedures for analyzing financial statements, based on the goals and objectives of the analysis, the information base, technical support, and the experience and qualifications of specialists [27].

Thus, it can be said that the most acceptable methods for assessing and forecasting the probability of enterprise bankruptcy are econometric models. To make the forecast more grounded, it is necessary to simultaneously use several forecasting methods for bankruptcy. This will increase the credibility of the results obtained.

There are a significant number of diagnostic methods using bankruptcy probability models: the two-factor model by E. Altman, the five-factor model by E. Altman, the adapted five-factor model by E. Altman, the discriminant model by R. Lise, the discriminant model by J. Taffler, the solvency diagnostic index by J. Conan and M. Holder, the coefficient by W. Beaver, the model by G. Springate, the discriminant model by O. Tereshchenko, etc. [4, 17, 63]. Bankruptcy prediction systems developed by foreign and domestic researchers include several key indicators characterizing the financial condition of the enterprise. Based on these indicators, a comprehensive bankruptcy probability indicator is calculated with weighting coefficients for the indicators in most of the named methodologies.

The most widely used method for bankruptcy prediction is the "Z-score" model by E. Altman, the calculation method of which is provided in Figure 1.3. If Z < 1.23, it indicates a high probability of bankruptcy, while Z > 1.23 signifies a low probability [4].

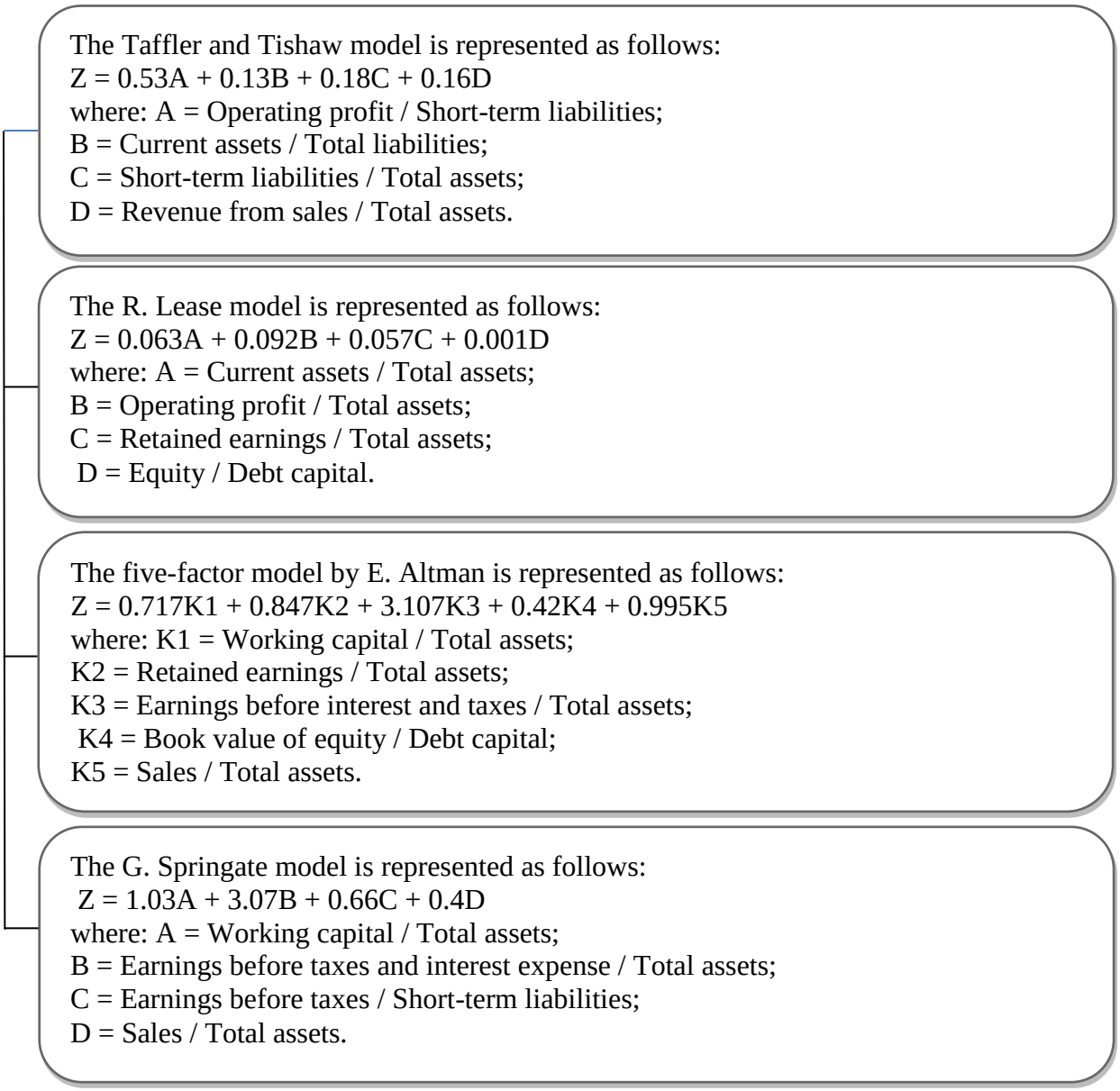


Figure 1.3 - Modern Models for Diagnosing and Predicting Enterprise Bankruptcy Probability

*Source: Constructed by the author based on [4, 17]*

The advantages of the Altman model include maximum accuracy. However, the question of applying the model to the economy of Ukraine remains open, as its

use is complicated by the lack of information, especially in the analytical block.

Weight coefficients of the model are not reliable for assessing the financial condition of domestic enterprises. The multifactor models by E. Altman served as the basis for further research on bankruptcy prediction and financial condition assessment [4].

J. Taffler and G. Tishaw developed a four-factor solvency assessment model (the calculation method of the model is provided in Figure 1.3). For $Z > 0.3$, the financial condition level is considered high, and the probability of bankruptcy is low. For $Z < 0.3$, the financial condition level is considered low, and the probability of bankruptcy is high. However, for the model by J. Taffler and G. Tishaw, the question of the reliability of the weight coefficients for assessing the financial condition in the conditions of the domestic economy remains open [4].

A fundamentally different class of models belongs to the scoring analysis. One of them is the five-factor model by W. Beaver for assessing the financial condition of an enterprise for bankruptcy diagnostics based on the following indicators [21]:

- return on assets;
- share of debt capital in liabilities;
- current liquidity ratio;
- share of net working capital in assets;
- Beaver coefficient (KB = net income - depreciation / debt capital).

Weight coefficients for indicators in the Beaver model are not provided, and the overall financial condition indicator is not calculated. The obtained values of indicators are compared with their normative values calculated by W. Beaver for three types of firms: for healthy companies; for companies bankrupt within a year; for firms bankrupt within five years [4].

The W. Beaver indicator system and their values for bankruptcy diagnosis are provided in Table 1.4.

The forecasting methodologies considered by foreign authors have several significant limitations for their application in Ukrainian enterprises:

– foreign bankruptcy probability diagnostic methodologies are built using

weighted coefficient indicators calculated based on American analytical data from past years. Therefore, they do not correspond to the current economic situation;

– models' data are not adapted to the Ukrainian economy and do not account for the specifics of Ukrainian enterprises' activities, namely: peculiarities in the accounting system and tax legislation, the influence of inflation on the formation of enterprise performance indicators, the industry affiliation of the enterprise, and others.

Table 1.4 - W. Beaver Indicator System for Bankruptcy Diagnosis

| Indicator | Indicator Value | | |
|---|---|---|---|
| | Favorable | 5 years before bankruptcy | 1 year before bankruptcy |
| Beaver coefficient | 0,4 - 0,45 | 0,17 | -0,15 |
| Return on assets, % | 6 - 8 | 4 | -22 |
| Financial leverage, % | < 37 | < 50 | < 80 |
| Ratio of current assets covered by own current capital | 0,4 | < 0,3 | < 0,06 |
| Current liquidity ratio | < 3,2 | < 2 | < 1 |

*Source: Constructed by the author based on [4]*

Other significant drawbacks include the lack of statistical data on bankrupt enterprises, which prevents adjusting the methodology for calculating the weight coefficients considering economic conditions; the analyzed methodologies do not consider other important indicators of enterprise performance (the methodologies are based on balance sheet and financial statement indicators); the models do not answer questions about which factors influenced changes in financial stability; the results of using the models do not provide information on the possible further development of the enterprise; the threshold values of indicators proposed by foreign scientists are often unattainable for Ukrainian enterprises. However, these methodologies allow approximating the bankruptcy of the enterprise (crisis stages) and do not allow predicting the transition of the enterprise from one stage of the life

cycle to another.

Taking into account all these limitations of foreign bankruptcy prediction models, domestic scientists have developed methodologies adapted to the domestic economy.

An attempt to address the problem of the impossibility of using foreign methodologies in the practice of assessing the financial condition of Ukrainian enterprises was made by the Ukrainian economist O. Tereshchenko. He developed a discriminant function with 6 variables (formula 1.2) [4].

$$Z = a1X1+ a2X2+ a3X3+ a4X4+ a5X5+ a6X6, \quad (1.2)$$

where a1,...,a6 are the parameters of the discriminant function, representing the specific weight of the indicators;

X1 - coverage ratio;

X2 - financial autonomy ratio;

X3 - capital turnover ratio (assets);

X4 - profitability coefficient of operating sales based on Cash-flow;

X5 - profitability coefficient of assets based on Cash-flow;

X6 - turnover ratio of borrowed capital.

The discriminant model developed by O. Tereshchenko has significant advantages over traditional methods [63]:

- It is user-friendly in application;
- Developed using domestic statistical data;
- Incorporates modern international practices;
- By utilizing various modifications of the basic model tailored to different types of enterprises, it addresses the issue of critical indicator values.

Takes into account industry-specific characteristics of the enterprise. However, this method is not flawless and has its drawbacks:

lack of a detailed classification of financial stability (only satisfactory and unsatisfactory financial states are considered);

obtaining values within the range of -0.9 to 0.9 requires additional analysis to identify financial stability. Based on the above, it can be concluded that among the existing bankruptcy prediction models, there is currently no methodology that can provide reliable results regarding the bankruptcy of domestic enterprises. When using various prediction methods and techniques, conflicting conclusions about the financial condition of the enterprise in terms of bankruptcy risk may arise.

## 1.3 Crisis financial management and global experience in enterprise bankruptcy probability analysis

During the operation of any enterprise, there is always a likelihood of a crisis situation arising, which can occur for many reasons, including: a downturn in the overall economy, a decrease in purchasing power, significant inflation rates, instability in tax legislation, increased competition in the industry, and so on. This necessitates a systematic examination of problems and tasks to lead enterprises out of crisis situations, adapt their activities to market conditions, further their production development, and develop methods for their resolution. Under such conditions, the development of enterprise crisis management systems becomes crucial, which, based on an analysis of the current state of the enterprise and the specifics of its activities, will prevent the occurrence of crisis phenomena within the enterprise, develop methods to improve its functioning, and devise a plan to lead the enterprise out of crisis situations [61].

Crisis management is management in which there is a certain anticipation of the crisis danger, analysis of its symptoms, measures to reduce the negative consequences of the crisis, and the use of its factors for further development [50].

The goal of implementing crisis financial management by the enterprise is to restore its financial balance and minimize losses of its market value caused by financial crises. To achieve this goal, financial managers, who are the subjects of

this process, need to accomplish the following tasks: prevent a financial crisis, eliminate insolvency, restore financial stability, prevent bankruptcy and liquidation, and minimize the negative consequences of the financial crisis for the enterprise.

The stages of crisis management are presented in Fig. 1.4.

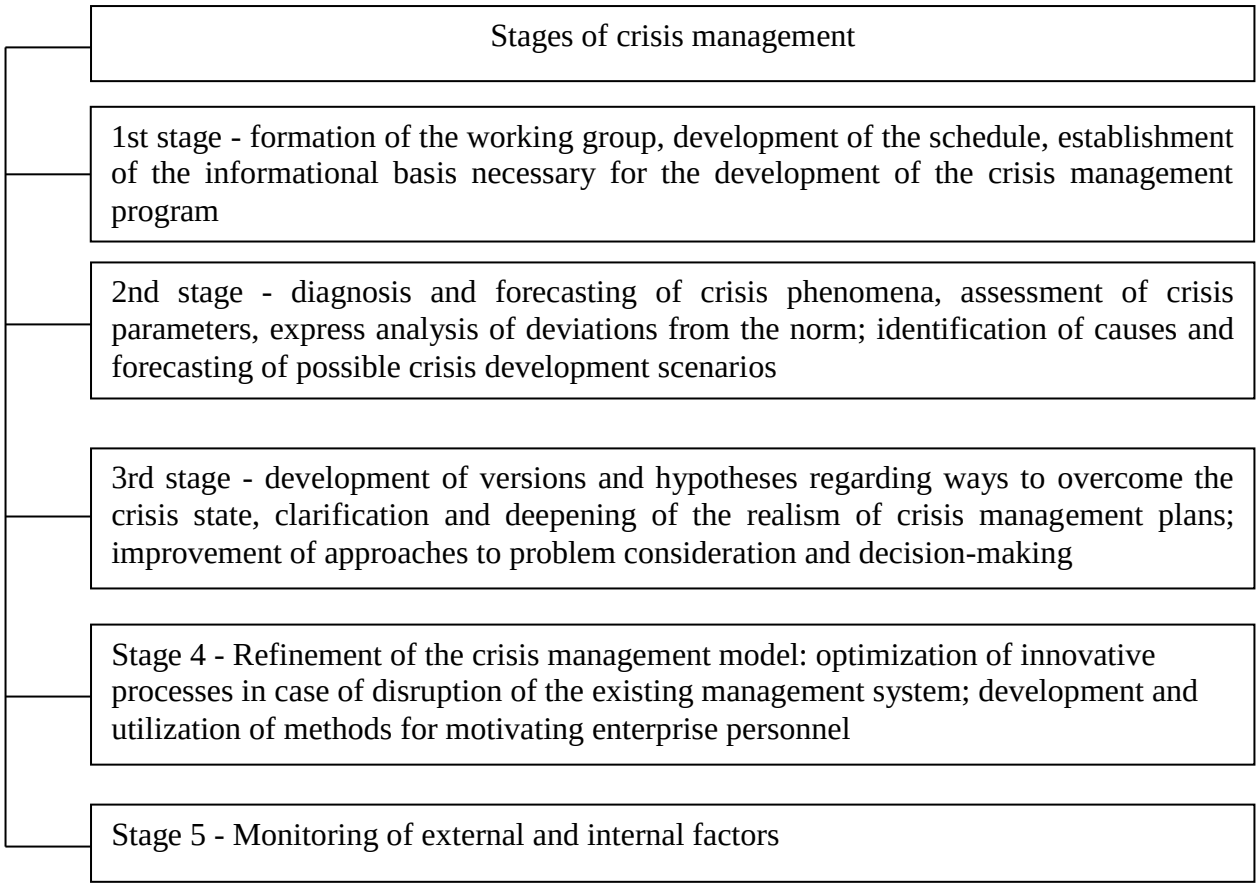


Figure 1.4 - Stages of Crisis Management in an Enterprise

*Source: Constructed by the author based on [31, 46]*

Crisis management includes measures that depend on the phases of the crisis, which, in turn, are characterized by factors, content, and consequences of manifestation (Table 1.5).

When forming and developing a strategy for crisis management, the main criterion is the orientation of the enterprise towards stable production and economic activities in the strategic perspective.

It represents a restructuring aimed at increasing production efficiency, the practical results of which are always aimed at suspending the deterioration of its

economic performance, and is achieved through changes in resource utilization and work directions to achieve the enterprise's set goal.

Table 1.5 - Measures of Crisis Management at Different Phases of Enterprise Crisis

| Crisis phase | Characteristics | Possible Consequences | Anti-crisis Management Measures |
|---|---|---|---|
| I | Decrease in profitability and profit volumes | Deterioration of the financial position of the enterprise, reduction of sources and reserves for development | Changes in strategic management (strategy review, enterprise restructuring) or tactical (cost reduction, productivity improvement) |
| II | Loss-making production | Decrease in the enterprise's reserve funds | Changes in strategic management implemented through enterprise restructuring |
| III | Depletion or absence of reserve funds | Part of the working capital is directed to cover losses, leading to production cuts; lack of funds for restructuring | Operational measures to stabilize the financial position of the enterprise and search for funds for restructuring |
| IV | Insolvency | Critical condition, lack of funds for financing reduced production and/or settlements for previous obligations; threat of production stoppage and/or bankruptcy | Emergency measures to restore the solvency of the enterprise and support the production process |

*Source: Constructed by the author based on [48, 67]*

The system of crisis financial management by the enterprise is based on certain principles, i.e., rules of managerial behavior that ensure the diagnosis, prevention, neutralization, and elimination of the crisis. Among the principles of crisis financial management by the enterprise, the following are distinguished: the principle of constant readiness for response, the principle of preventive actions, the principle of urgency of response, the principle of adequacy of response, the principle of comprehensiveness of decisions made, the principle of maximizing favorable opportunities, the principle of alternative actions, the principle of adaptability of management, the principle of priority use of internal resources, the principle of

optimality of external sanitation, the principle of effectiveness, the principle of objectivity and realism, the principle of the main link [67].

At the same time, the entire set of principles is systematized into three groups depending on the type of crisis financial management by the enterprise within which they are implemented: general principles (used within both preventive crisis and crisis financial management), principles of preventive crisis financial management, principles of crisis financial management by the enterprise. The content of the enumerated principles is presented in Table 1.6.

Table 1.6 - Essence of Principles of Crisis Financial Management by the Enterprise

| Principle | Essence |
|---|---|
| 1 | 2 |
| General principles | |
| Principle of continuous readiness for response | The necessity of maintaining constant readiness of financial managers for potential disruption of financial equilibrium at any stage of its economic development |
| Principle of adequacy of response | Inclusion of specific mechanisms to neutralize the threat of financial crisis and its overcoming should correspond to the actual level of such threat |
| Principle of management adaptability | High level of flexibility in anti-crisis financial management, its rapid adaptation to changing conditions in both internal and external financial environments |
| Principle of effectiveness | Correspondence of the effect of anti-crisis financial management to the volume of financial resources required for its implementation |
| Principle of alternative actions | Each of the anti-crisis financial decisions should be based on consideration of the maximum possible number of their alternative projects with determination of their effectiveness level and cost assessment |
| Principle of comprehensive decision-making | The system of anti-crisis measures should have a comprehensive nature, as financial crises, which the system is aimed at neutralizing, are also complex phenomena in their forms of manifestation |
| Principle of maximizing favorable opportunities | Achieving the effectiveness of anti-crisis measures not by solving problems, but by utilizing favorable opportunities through minimizing labor, material, and financial costs |
| Principles of preventive anti-crisis financial management by the enterprise | |
| Principle of preventive action | Ensures early diagnosis of the pre-crisis financial state of the enterprise and timely utilization of opportunities to neutralize the financial crisis |
| Principles of crisis financial management by the enterprise | |
| Principle of prioritizing the use of internal resources | In the process of crisis management, the enterprise should primarily rely on internal financial capabilities to neutralize crisis manifestations, aiming to avoid external control and financial activity oversight procedures |

Continuation of Table 1.6

| 1 | 2 |
|---|---|
| Principle of optimal external restructuring | When choosing forms of external restructuring and the composition of sanatoriums, criteria developed in the process of crisis financial management should be taken into account |
| Principle of timely response | The earlier anti-crisis financial mechanisms are activated for each diagnosed crisis symptom, the more opportunities the enterprise will have to restore financial balance |
| Principle of objectivity and realism | Evaluation of the situation and possibilities to overcome the crisis based on objective reality |
| Principle of leadership role | Identification of the main problem (catalyst of the crisis), determination of the root cause of the crisis, focus on its resolution |

*Source: Constructed by the author based on [30, 34]*

Crisis financial management possesses the same functions as regular management, but each undergoes significant changes [30]:

– Planning: the process of defining the organization's goals and their modifications, strategies and programs of preventive measures and crisis stabilization, as well as the allocation of resources to achieve them.

– Organization: forming an optimal structure and scope of used funds, management apparatus, and personnel for efficient utilization of financial resources.

– Motivation: a system of incentives and sanctions that stimulates the interest of the entire team and each individual employee in increasing the efficiency of the enterprise's activities to quickly overcome the crisis and prevent the occurrence of crisis phenomena in the future periods.

– Control: forecasting deviations from the set goals for timely adjustments aimed at enhancing the effectiveness of crisis management measures.

– In addition to the traditional management functions listed above, accounting and control functions also acquire great importance in crisis management:

– Accounting: a system that provides observation, measurement, documentation, registration, processing, storage, and presentation of primary, current, financial, and tax information. Accounting enables the timely acquisition of information necessary for making management decisions.

– Analysis: the process that, through information processing techniques, allows predicting the possibilities of crisis threats due to negative dynamics of external or internal factors generating it.

Thus, the mechanism of crisis financial management by the enterprise, which represents a system of purposeful influence on the financial activities of the enterprise, can be likened to a black box containing specific elements at the input, output, and transformation process of input elements into outputs using specific methods and means of influence, which are carried out under the conditions of adhering to certain principles for performing defined functions. The selection of specific elements of the mechanism depends on the stage of the enterprise's life cycle, its financial condition, the purpose, and the scale of implementation of crisis financial management by the enterprise.

In the Middle Ages, issues of insolvency of individuals and legal entities were regulated quite strictly. The debtor's property was usually completely confiscated for the most equitable and equal satisfaction of creditors' claims.

The institution of bankruptcy exists in the legislation of practically all countries with a market economy. Its origin and further development are due to the evolution of entrepreneurship and free competition, under which the subject of economic activity bears all risks associated with this activity. The institution of bankruptcy began to develop in the Middle Ages, primarily as an institution of commercial law [34].

Early sources of law in various states provided for the personal liability of the debtor for their obligations until death. Later, the institution of bankruptcy underwent significant transformation; however, despite this, it can convincingly be argued that it continues to remain an integral attribute of the market economy. For a long time, the bankruptcy procedure has been used to cleanse the economy of inefficient economic entities [50].

A comparative characteristic of the bankruptcy procedure in different countries of the world is presented in Table 1.7.

Table 1.7 - Comparative Characteristics of Bankruptcy Procedures in Different Countries of the World

| Country | Cause of Action | Criteria for insolvency | Features of Sanitation Procedures |
|---|---|---|---|
| Ukraine | Creditor or debtor application | Failure to satisfy creditors' demands for a period of 3 months, totaling at least 300 times the minimum wage | Measures to prevent the recognition of the debtor as bankrupt, partial satisfaction of creditors' claims |
| Bulgaria | Voluntary or compulsory liquidation | Failure to fulfill obligations within 60 days | Sanitation procedures |
| Romania | Creditor application | Exceeding payment deadlines by more than 30 days | Establishment of administrative boards of the enterprise with creditors |
| Poland | Creditor or debtor application | Persistent non-payment of debt obligations | Amicable agreement as a result of a conciliation procedure as a sanitation method |
| Italy | Creditor application | Inability of the enterprise to meet its obligations | Agreement with creditors under the guarantee of property |
| Germany | Creditor or debtor application | Enterprise insolvency in the forecasted period | Creditors waive their claims and provide new loans |

*Source: Constructed by the author based on [25, 48, 52]*

In global practice, bankruptcy legislation has developed along two fundamentally different directions. One of them was based on the principles of the British model, which considered bankruptcy as a means of debt repayment to creditors, accompanied by the liquidation of the debtor. The opposite principles were laid down in the American model, the main goal of which was the rehabilitation of the enterprise and the restoration of its solvency.

In recent times, in the legislation of developed countries of the world, there is a tendency towards convergence and combination of both mentioned models. The peculiarity of this area of legislation lies in the fact that it is one of the most dynamic areas of legal regulation. The task that bankruptcy law must solve is either the restoration of the debtor's solvency or the fair distribution of property losses among all legal subjects [48].

In global practice, there are many approaches used to define the goals of the

bankruptcy process. Let's delve into the approaches [25] commonly used to define the goals of the bankruptcy process:

1. Stimulating business development and economic growth efficiency. The threat of bankruptcy significantly influences the behavior of market participants, compelling entrepreneurs to cautiously make business decisions and maintain a level of profitability sufficient to service debt.

2. Controlling economic relations between individual market participants. Bankruptcy should have a general character, applying to all market participants without exception, regardless of their organizational and legal forms of operation, sizes, or ownership forms of creditors.

3. Cleansing the market from inefficient participants. The institution of bankruptcy is one of the regulatory instruments of market development, providing completeness to the mechanism. The market continually forces some owners to yield their place to others, stronger competitors.

4. Fair distribution of funds obtained from the sale of the bankrupt's assets among creditors. This contributes to ranking creditors, determining priorities for satisfying their claims in case of insufficient debtor's assets.

5. Creating conditions for business restoration if deemed appropriate. The situation of bankruptcy may result from a combination of negative external and internal factors, managerial errors. In such a situation, it is advisable to give a chance to survive and restore operations.

In the practice of developed countries (such as Australia, the United Kingdom, Canada, the Netherlands, the United States, Sweden, Japan), special governmental institutions with specific responsibilities are established to control the use and changes in legislation, develop proposals to improve bankruptcy policies, license, and regulate the activities of professionals involved in bankruptcy proceedings [66].

Economic transformations in Ukraine since the early 1990s have contributed to the revival of the institution of bankruptcy. The establishment and development of a market economy in Ukraine at the end of the 20th century led to significant qualitative changes in almost all spheres of life. This fundamentally changed the

economic sphere: the existing command-administrative system no longer met the requirements, and the new system required the development and transition to new principles of existence.

The emergence of the bankruptcy institution in Ukraine began with the adoption of the Law of Ukraine dated May 14, 1992, "On the restoration of the solvency of the debtor or recognition of its bankruptcy". It defined the conditions and procedure for recognizing legal entities - subjects of entrepreneurial activity - as bankrupt in order to satisfy creditors' claims.

The bankruptcy institution is a remedial economic and legal tool of civil liability for inefficient organization of enterprise work, allowing for the transfer of capital from ineffective, unprofitable productions to profitable sectors of economic activity. However, the usefulness of bankruptcy is absent when insolvency arises not from economic regularities, but due to unlawful actions of individuals. The imperfection of the Law of Ukraine "On the restoration of the solvency of the debtor or the recognition of its bankruptcy" manifested itself in the fact that during the first years of its use, a significant portion of the cases filed did not reach completion, the number of bankrupt enterprises increased rapidly, and the activities of liquidation commissions continued for years. In such conditions, the bankruptcy institution should regulate the activities of insolvent enterprises that have broad prospects [48].

Taking into account global practice and the legislation of many countries, a working group consisting of government officials, deputies, foreign specialists was formed, which developed the concept of a new law. This concept fundamentally differed from the practice of applying bankruptcy procedures based on outdated legislation. The main purpose of the new law was to restore the solvency of the debtor. At the core of the regulatory framework governing bankruptcy procedures lies the Code of Ukraine on Bankruptcy Procedures dated October 18, 2018, No. 2597-VIII [14]. This Code establishes the conditions and procedure for restoring the solvency of a debtor - a legal entity or recognizing it as bankrupt for the purpose of satisfying creditors' claims, as well as restoring the solvency of an individual.

## Conclusions for section 1

Based on the analysis of Section 1 "Theoretical Aspects of Enterprise Bankruptcy Probability Analysis," the following conclusions can be drawn. Bankruptcy is considered a complex and multifaceted economic and legal process. Studies highlight that bankruptcy is not only an economic insolvency of a business but can also be seen as a criminal act, regulated by relevant legislation. The section places significant emphasis on both external and internal factors influencing business bankruptcy. External factors include economic crises, political instability, and legislative changes, while internal factors are related to management and financial strategies of the business. This underscores the importance of deeply understanding and managing these factors to prevent bankruptcy.

Various approaches to analyzing and predicting bankruptcy are described, including econometric and expert methods, as well as artificial intelligence systems. This highlights the necessity of integrating various methodological approaches for more accurate bankruptcy prediction. The author suggests enhancements in the tools for assessing the probability of bankruptcy considering the industry specifics and utilizing factor analysis to identify causes of bankruptcy, which can help in developing effective crisis management strategies.

The importance of preventive management and responding to crisis phenomena at a business is noted. This involves not just immediate reaction to emerging issues but also developing strategies to minimize the impacts of crisis situations. These conclusions emphasize the complexity of the bankruptcy issue and the need for a comprehensive approach to its study and management. This includes both theoretical analysis and practical recommendations aimed at reducing the probability of business bankruptcy.

# SECTION 2
# ANALYSIS OF THE EFFECTIVENESS OF ANTI-CRISIS MANAGEMENT AT LLC "KMP-ELECTRO" BASED ON THE PROBABILITY OF ITS BANKRUPTCY

## 2.1 Characteristics and analysis of the financial and economic activities of the enterprise

Limited Liability Company "KMP-Electro" is a company specializing in electrical installation works, providing a wide range of services in the field of design, installation, testing, and maintenance of electrical systems and equipment. Such companies play an important role in ensuring the safety, efficiency, and reliability of electrical installations in residential, commercial, and industrial facilities.

The main areas of the company's activities include:

- Design of electrical systems – development of technical documentation and connection schemes, taking into account the specifics of the object and the requirements of the customer.
- Installation of electrical equipment – installation of cable systems, control panels, lighting devices, and other equipment.
- Testing and commissioning works – verification of the correctness of installation, safety of systems, and compliance with technical standards.
- Maintenance and repair – regular inspection and maintenance of electrical systems to prevent malfunctions and extend their service life.

The effectiveness of anti-crisis management is often assessed based on the probability of the company's bankruptcy, as the key goal of such management is to prevent financial collapse and ensure the long-term stability of the organization, especially given the current conditions of uncertainty, economic and political instability, disruptions in logistics routes, and loss of raw material and sales markets.

Crisis management involves identifying, analyzing, and minimizing risks that may lead to crisis situations or bankruptcy. The use of bankruptcy prediction models allows managers to assess the financial health of the company and potential weaknesses in its financial structure. These models help identify critical indicators that may indicate insolvency risk, enabling management to take preventive measures such as debt restructuring, cost optimization, changes in operational activities, and strategy. By analyzing the probability of bankruptcy, companies can also communicate more effectively with creditors and investors, providing them with confidence in the stability of the company and its ability to handle crises.

Thus, assessing the probability of bankruptcy helps understand the company's current state and forecasts its future, which is crucial for successful crisis management. It is not just protection against potential bankruptcy but also a means of ensuring growth and development of the company in conditions of uncertainty and change.

The evaluation of the effectiveness of crisis management is based on analyzing the enterprise's financial condition. To characterize the financial state of LLC "KMP-Electro," we will analyze the structure and dynamics of the sources of formation and directions of use of this enterprise's financial resources. The structure of the sources of formation of financial resources of LLC "KMP-Electro" is presented in Fig. 2.1.

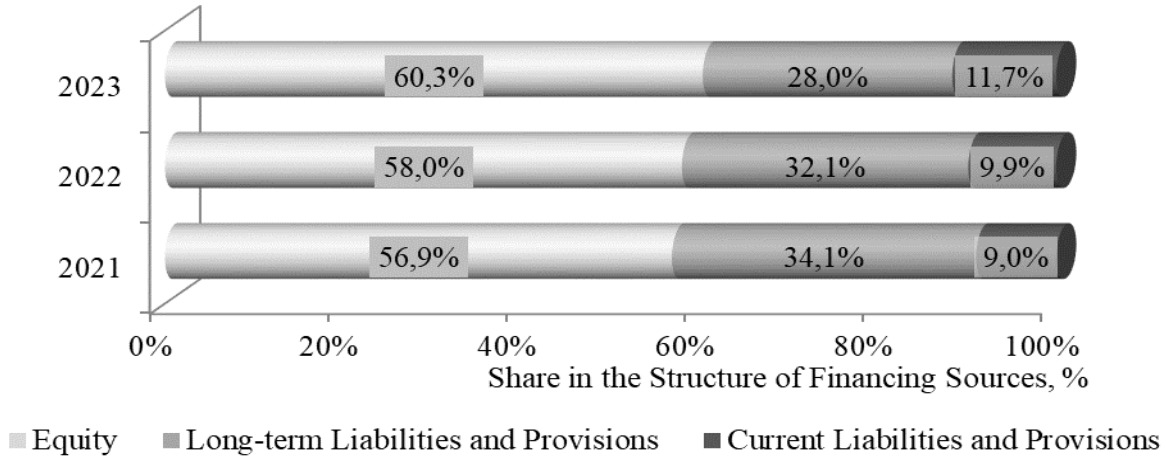


Figure 2.1 - Structure of financial resource formation sources for LLC "KMP-Electro" for 2021-2023

Based on the data from Figure 2.1, it can be argued that the main source of financial resource formation for the enterprise in 2021-2023 is equity capital. The share of equity capital in the structure of financial resource formation sources in 2021 is 56.9%, indicating a sufficient level of financial stability of the enterprise, its independence from external creditors and investors, and a low risk of bankruptcy. Additionally, over the study period, there is an increase in the absolute value and share of equity capital to 60.3% by the end of 2023. The indicators of the structure and dynamics of components of equity capital are provided in Table 2.1.

Table 2.1 - Indicators of the structure and dynamics of equity capital components of LLC "KMP-Electro" for the years 2021-2023

| Item | Value, thous. UAH. | | | Absolute change, thous. UAH. | | Growth rate, % | |
|---|---|---|---|---|---|---|---|
| | 2021 | 2022 | 2023 | 2022/ 2021 | 2023/ 2022 | 2022/ 2021 | 2023/ 2022 |
| Registered Capital | 64135 | 64135 | 64135 | 0 | 0 | 0,0 | 0 |
| Additional Capital | 1184549 | 1161538 | 1183740 | -23011 | 22202 | -1,9 | 1,9 |
| Reserve Capital | 2161 | 3111 | 4180 | 950 | 1069 | 44,0 | 34,4 |
| Undistributed Profit (Uncovered Loss) | 8539 | 86522 | 158476 | 77983 | 71954 | 913,3 | 83,2 |
| Total Equity Capital | 1259384 | 1315306 | 1410531 | 55922 | 95225 | 4,4 | 7,2 |

According to the data in Table 2.1, the basis of equity capital consists of additional capital formed through the revaluation of non-current assets of the enterprise and receiving gratuitous charitable assistance. However, despite the dominance of additional capital in the structure of equity capital, the dynamics of internal funding sources are determined by the dynamics of undistributed profit, which grows during the years 2021-2023. For instance, in 2022, this indicator increased by 77,983 thous. UAH compared to the previous year, or by 913.3%, and in 2023, it increased by 71,954 thous. UAH, which is 83.2%.

The growth of undistributed profit indicates an increase in the efficiency of

the enterprise's activities, an increase in sources of funding, and an expansion of the scale of the enterprise's activities.

In the structure of loan sources, long-term liabilities and securities predominate (Figure 2.2).

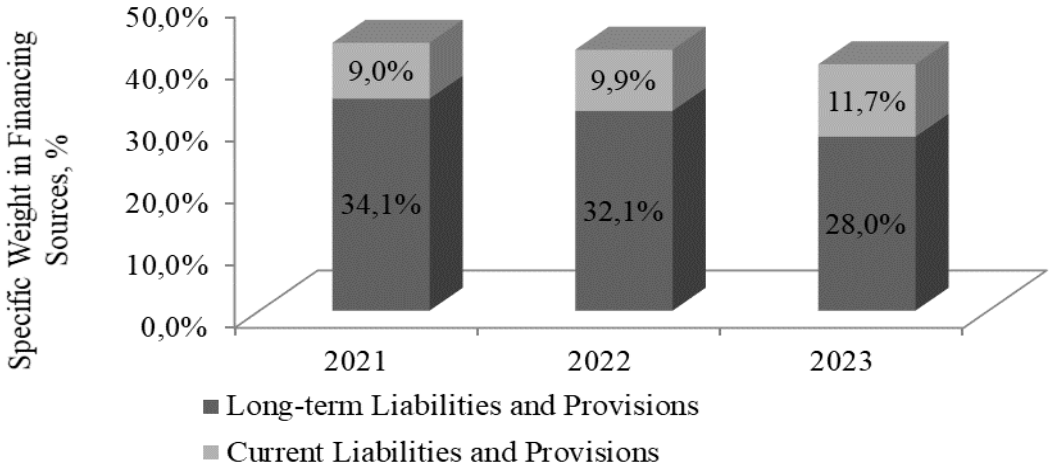


Figure 2.2 - Structure of loan capital of LLC "KMP-Electro" for the years 2021-2023

Throughout the years 2021-2023, long-term liabilities constitute the dominant portion among loan funds. Thus, during the years 2021-2023, LLC "KMP-Electro" has an optimal structure of loan capital and funding sources overall. The asset structure of the enterprise is presented in Figure 2.3.

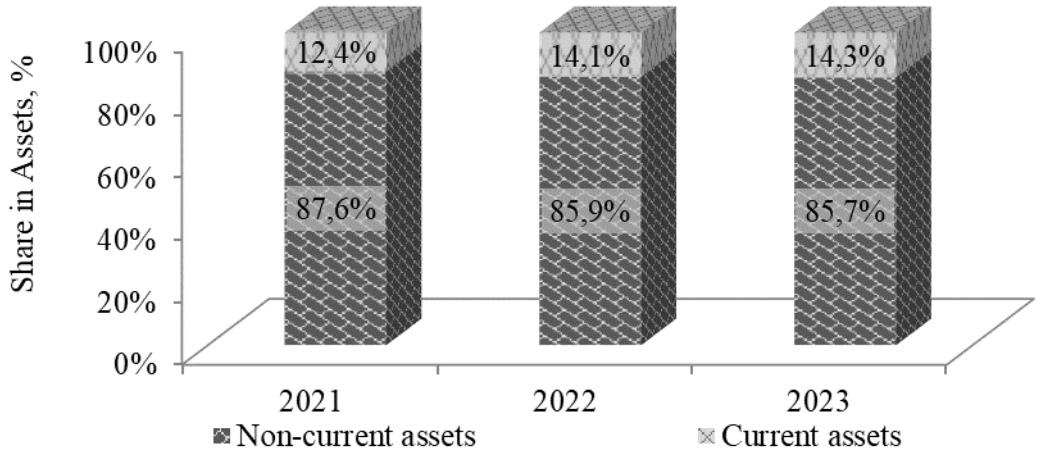


Figure 2.3 - Asset Structure of LLC "KMP-Electro" for the years 2021-2023

In the asset structure, non-current assets predominate (about 90%). The immobility of the company's assets indicates significant overhead costs, low liquidity, and solvency, which may lead to bankruptcy in the future.

Particular attention in the analysis of the company's assets needs to be paid to comparing the amount of accounts receivable with cash (Figure 2.4).

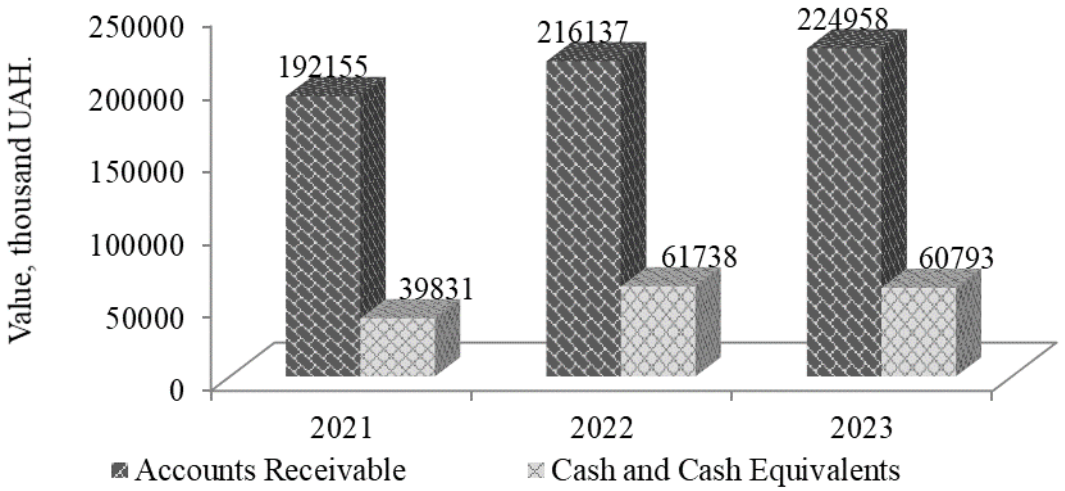


Figure 2.4 - Dynamics of accounts receivable and cash of LLC "KMP-Electro" for the years 2021-2023

The amount of accounts receivable exceeds the company's cash balance by 4.8 times at the end of 2021, 3.5 times at the end of 2022, and 3.7 times at the end of 2023.

The significant excess of accounts receivable over cash indicates an ill-considered sales policy, which negatively affects the company's current solvency.

Therefore, LLC "KMP-Electro" has an optimal structure of funding sources, but it also faces challenges in the utilization of the enterprise's resources, which can negatively impact its operation and pose solvency threats.

To characterize the efficiency of the enterprise's activities, let's conduct an analysis of its financial results.

Profit is one of the primary sources of financial resources for enterprises, forming centralized and decentralized funds of cash. Budgetary resources of the state

are significantly formed due to profit, financing of enterprise expansion, social and cultural events, material incentives for employees, and more. Both the workforce of the enterprises and the state should be interested in earning profit. Profit, as the ultimate financial result of business entities' activities, is formed as a result of the interaction of many components, both positive and negative. The financial results of LLC "KMP-Electro" are presented in Table 2.2.

Table 2.2 - Financial Results of LLC "KMP-Electro" for the years 2021-2023

| Inducators | Value, thous. UAH. | | | Absolute change, thous. UAH. | | Growth rate, % | |
|---|---|---|---|---|---|---|---|
| | 2021 | 2022 | 2023 | 2022/ 2021 | 2023/ 2022 | 2022/ 2021 | 2023/ 2022 |
| Gross Profit | 134968 | 57225 | 103809 | -77743 | 46584 | -57,601 | 81,405 |
| Financial Results from Operating Activities | 65306 | 464 | 46988 | -64842 | 46524 | -99,289 | 10026,7 |
| Financial Result Before Taxation | 68770 | -782 | 54537 | -69552 | 55319 | -101,14 | - |
| Net Financial Result | 19006 | -782 | 16383 | -19788 | 17165 | -104,11 | - |

The highest efficiency of the main activities of LLC "KMP-Electro" was observed in 2021 when the maximum values for gross profit, operating profit, profit before taxation, and net profit were achieved over the study period.

In 2022, due to the unstable economic situation caused by the war in Ukraine, disruption of logistical routes, and loss of regular customers, the company incurred losses before taxation and net losses.

In 2023, all financial performance indicators increased compared to 2022, indicating an improvement in the company's overall efficiency. In 2023, LLC "KMP-Electro" achieved profits from its core operations, operating profit, profit before taxation, and net profit, demonstrating the effectiveness of the company's activities.

Additionally, the company has an optimal structure of funding sources. However, it shows a negative trend in financial results and faces challenges related

to the utilization of its resources, which could negatively impact its operation and pose solvency threats.

In light of this, it is advisable for the company to focus on addressing issues related to the rationality of resource utilization to ensure sustainable financial development in the future.

## 2.2 Coefficient analysis of enterprise bankruptcy probability

Diagnosis of bankruptcy and assessment of its probability are part of a targeted financial analysis system aimed at identifying crisis tendencies in the development of an enterprise that may lead to its bankruptcy. For such analysis, a group of objects from the crisis field is taken, including indicators of asset liquidity, capital structure, timeliness of financial obligations, as well as indicators of the formation of net cash flow from operational (production-commercial), investment, and financial activities. To assess the current level of bankruptcy threat, a system of enterprise solvency ratios is used, primarily the absolute solvency ratio, and to assess the level of future bankruptcy threat, a system of financial stability ratios is used, the main one of which is the autonomy coefficient. The ability of an enterprise to neutralize the threat of bankruptcy is assessed using a system of profitability and asset turnover and capital turnover ratios.

In other words, this is a stage of crisis management and a prerequisite for its success, which is a logical continuation of the economic analysis of the enterprise, involving in-depth examination of the object with subsequent development of influence measures. According to the statement "diagnosis of bankruptcy is a prerequisite for the success of crisis management," it is important how effectively and competently it will be carried out, which, in turn, depends on determining the content and stages of its implementation [7].

The initial information for assessing the probability of enterprise bankruptcy

consists of the financial statements: Form 1 "Balance Sheet (Statement of Financial Position)", Form 2 "Statement of Financial Performance (Statement of Comprehensive Income)", and Form 3 "Statement of Cash Flows". The financial statements of the LLC "KMP-Electro" necessary for analysis are provided in Appendixes A-D.

The assessment of bankruptcy probability is presented in two stages, logically following each other and allowing conclusions to be drawn about the existence of threats in the enterprise's activities, determining the likelihood of its bankruptcy, and developing measures to minimize the risk of enterprise bankruptcy:

The first stage involves an analysis of the financial position of the enterprise using groups of ratios that describe asset condition, liquidity, solvency, financial stability, business activity, and profitability.

The second stage involves discriminant analysis (models by E. Altman, Springate, R. Liss, Taffler, and others) [4].

The analysis of the financial position of the enterprise is carried out using groups of ratios characterizing asset condition, liquidity, financial stability, business activity, and profitability based on Methodological Recommendations for identifying signs of enterprise insolvency and signs of actions aimed at concealing bankruptcy, fraudulent bankruptcy, or bankruptcy induction [47]. These Methodological Recommendations are developed to establish clear approaches during the analysis of the financial and economic condition of enterprises to identify signs of enterprise insolvency and actions aimed at concealing bankruptcy, fraudulent bankruptcy, or bankruptcy induction; timely identification of the formation of an unsatisfactory balance sheet structure to take preventive measures against enterprise bankruptcy, as well as identification of reserves for increasing production efficiency and restoring solvency through their reorganization.

Financial state diagnosis involves calculating financial ratios and comparing their actual values with normative ones. During the analysis, the following are determined:

- The state of the enterprise's financial and economic activities, the structure

of its balance sheet (whether satisfactory or unsatisfactory), and the justification for recognizing the enterprise as insolvent.

– Trends in the dynamics of key performance indicators of the enterprise's activities.

– Identification of signs of enterprise insolvency, if present.

In the context of this stage, the following sequence of actions can also be outlined:

– Analysis of current assets.

– Analysis of the enterprise's asset condition.

– Analysis of the structure of the enterprise's cash flows.

– Analysis of production costs.

– Analysis of labor resource utilization.

– Analysis of the production structure of goods.

– Profitability analysis [47].

First and foremost, the process of diagnosing and assessing the likelihood of bankruptcy for LLC "KMP-Electro" should begin with a preliminary analysis of the financial state of the enterprise using groups of ratios. The main indicators characterizing the financial and economic state of the enterprise are presented in Table 2.3.

Table 2.3 - Key Indicators Determining the Financial and Economic State of LLC "KMP-Electro" for the Years 2021-2023

| № | Indicator, Unit of measurement | Actual value over three years | | | Changes (+/-) | | Normative value |
|---|---|---|---|---|---|---|---|
| | | 2021 | 2022 | 2023 | 2022/ 2021 | 2023/ 2022 | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1.1 Overall performance indicators of the enterprise | | | | | | | |
| 1 | Net income (revenue) from product sales, thousand UAH | 1882131 | 1912967 | 2401911 | 30836 | 488944 | - |
| 2 | Net profit (loss), thousand UAH | 19006 | -782 | 16383 | -19788 | 17165 | - |
| 3 | Average number of employees, persons | 7427 | 7542 | 7462 | 115 | -80 | - |

Continuation of Table 2.3

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| 4 | Labor remuneration fund, thousand UAH | 183200 | 211600 | 222600 | 28400 | 11000 | - |
| 5 | Equity capital, thousand UAH | 1259384 | 1315306 | 1410531 | 55922 | 95225 | - |
| 6 | Non-current assets, thousand UAH | 1940143 | 1947774 | 2003319 | 7631 | 55545 | - |
| 7 | Long-term liabilities, thousand UAH | 743697 | 716978 | 641044 | -26719 | -75934 | - |
| 8 | Accounts receivable, thousand UAH | 211468 | 222426 | 227504 | 10958 | 5078 | - |
| 9 | Inventories, thousand UAH | 19923 | 21083 | 22958 | 1160 | 1875 | - |
| 10 | Own current assets, thousand UAH | -680759 | -632468 | -592788 | 48291 | 39680 | - |
| 11 | Working capital, thousand UAH | 74196 | 95823 | 61034 | 21627 | -34789 | - |
| 12 | Labor productivity, thousand UAH per person | 253,42 | 253,64 | 321,89 | 0,22 | 68,24 | - |
| 1.2 Liquidity indicators | | | | | | | |
| 13 | Current Ratio | 1,30 | 1,36 | 8,17 | 0,06 | 6,81 | > 1,5 |
| 14 | Quick Ratio | 1,20 | 1,27 | 8,09 | 0,07 | 6,82 | 0,6 - 0,8 |
| 15 | Absolute Liquidity Ratio (Solvency Ratio) | 0,19 | 0,26 | 0,21 | 0,07 | -0,05 | 0,2 – 0,35 |
| 16 | Inventory Turnover Ratio | 13,76 | 15,18 | 14,57 | 1,42 | -0,61 | > 1 |
| 1.3 Financial Stability Indicators | | | | | | | |
| 17 | Financial Autonomy Ratio | 0,57 | 0,58 | 0,6 | 0,01 | 0,02 | > 0,5 |
| 18 | Financial Dependency Ratio | 1,75 | 1,72 | 1,67 | -0,03 | -0,06 | ≤ 2 |
| 19 | Loan Capital Concentration Ratio | 0,43 | 0,42 | 0,4 | -0,01 | -0,02 | < 0,5 |
| 20 | Long-term Investment Coverage Ratio | 0,38 | 0,37 | 0,32 | -0,01 | -0,05 | - |
| 21 | Long-term Debt-to-Equity Ratio | 0,37 | 0,35 | 0,31 | -0,02 | -0,04 | - |
| 22 | Loan Capital Structure Ratio | 0,79 | 0,76 | 0,70 | -0,03 | -0,06 | |
| 23 | Debt-to-Equity Ratio | 0,75 | 0,72 | 0,65 | -0,03 | -0,07 | ≤ 0,5 |
| 24 | Equity Coverage Ratio | -2,45 | -1,94 | -1,74 | 0,51 | 0,2 | 0,1 |
| 25 | Duration of Financial Cycle | -232,36 | -138,37 | -74,82 | 93,99 | 63,55 | - |
| 26 | Current Solvency Ratio | -888719 | -864477 | -838590 | 24242 | 25887 | - |
| 27 | Beaver Ratio | 0,14 | 0,1 | 0,15 | -0,04 | 0,05 | > 0,2 |

According to the calculations of liquidity indicators of LLC "KMP-Electro," the following conclusions can be drawn: the current ratio (coverage ratio) for the reporting periods (end of 2021-2023) was 1.30; 1.36; 8.17 respectively. The normative value of this indicator is from 1.5 to 2. It can be argued that the non-compliance with the norm in 2021 and 2022 indicates insufficient current assets to fully cover current liabilities. However, in 2023, as a result of a 7.3-fold increase in current assets compared to the previous year, the current ratio reached 8.17, indicating a high level of liquidity of the enterprise at the end of 2023.

The quick (intermediate) liquidity ratio is calculated on a narrower range of current assets, when the least liquid part - inventories - is deducted from their total value. The approximate value of the indicator is from 0.5 to 1. For the company over the years, it amounted to 1.20; 1.27; and 8.09 respectively. The predominance of this indicator over the normative value indicates a sufficient level of intermediate liquidity of LLC "KMP-Electro".

The most stringent criterion of liquidity is represented by the absolute liquidity ratio, which is determined by the ratio of the most liquid assets to current liabilities. It indicates what portion of short-term debt can be immediately repaid using the most liquid assets if necessary. Theoretically, a ratio of absolute liquidity is considered adequate if it falls within the range of 0.2 to 0.35 [28]. In this case, it amounts to 0.19; 0.26; and 0.21. These values fall within the normative range, which is a positive characteristic.

The inventory coverage ratio shows the relationship between the size of "normal" sources of inventory coverage and the size of inventories. These sources include own current assets, short-term bank loans, and trade payables for goods, works, and services [28]. The value of this indicator was 13.76; 15.18; and 14.57. Overall, it can be said that the financial position of the company is stable since the inventory coverage ratio exceeds 1.

The financial stability of a company is characterized by the degree of its financial independence from external creditors and investors. Financial stability is a state of a company's financial resources where their rational management ensures

the availability of own funds, stable profitability, and provision of the process of expanded reproduction. For its analysis, coefficients of autonomy, financial dependency, financial risk, flexibility of equity, structure of long-term investment coverage, long-term borrowing, and the coefficient of financial independence of capitalized sources are used [7].

The autonomy ratio (equity concentration ratio) characterizes the share of the company's own funds (equity) in the total amount of funds invested in it. The higher the value of this ratio, the more financially stable, stable, and independent from external creditors the company is [4]. Thus, for LLC "KMP-Electro," this ratio from 2021 to 2023 was 0.57; 0.58; and 0.60 respectively. It can be said that the main source of financing for the company's activities is its own funds, the share of which exceeds 50%, indicating a sufficient level of financial stability of the company.

The financial dependency ratio is the inverse of the previous ratio. This ratio during the reporting periods was 1.75; 1.72; and 1.67. The indicator experienced a slight decrease, which may indicate a decrease in the financial dependency of the company on external creditors.

The financial risk ratio shows the relationship between borrowed funds and equity. This ratio provides the most comprehensive assessment of financial stability. It indicates how many units of borrowed funds correspond to one unit of equity [27]. This indicator for the years amounts to 0.75; 0.72; and 0.65. This decrease in dynamics indicates a weakening of the company's dependence on external investors and creditors, i.e., an increase in financial stability.

The ratio of long-term investment coverage indicates the portion of the company's non-current assets financed by external investors. This indicator had a tendency to decrease, indicating a decrease in the company's dependence on external investors. The long-term borrowing ratio for the reporting years also decreased over time. This means that the company is increasingly less dependent on external factors.

The likelihood of crises at the enterprise is characterized by the structure of cash flows from various types of activities. Information about the movement of the company's cash flows is used to assess the possibility of attracting and using cash

for financing the enterprise and utilizing its financial resources. The overall assessment of the quality of enterprise management is determined by the results of analyzing the cash flow movements regarding receipts and expenditures in three main categories: from operating activities; from investing activities; from financing activities. The results of the calculations are presented in Table 2.4.

Table 2.4 - Cash Flow Structure of LLC "KMP-Electro" for the Years 2021-2023

| Type of Activity | 2021 | | 2022 | | 2023 | |
|---|---|---|---|---|---|---|
| | kUAH | (+/-) | kUAH | (+/-) | kUAH | (+/-) |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. Operating | 146624 | + | 148971 | + | 146101 | + |
| 2. Investment | -141346 | - | -124355 | - | -140698 | - |
| 3. Financial | -2306 | - | -2709 | - | -6348 | - |
| 4. Net Cash Flow for the Reporting Period | 2972 | + | 21907 | + | -945 | - |

Conditional notations: (+) - receipts; (-) – expenditures; k - thousand UAH

The quality of enterprise management is characterized as follows:

– "good" - if for the reporting period, the net cash flow from operating activities is positive, and from investment and financial activities is negative;

– "normal" - if for the reporting period, the net cash flow from operating and financial activities is positive, and from investment activities is negative;

– "crisis" - if for the reporting period, the net cash flow from operating activities is negative, and from investment and financial activities is positive [7].

Thus, based on the calculations conducted, it can be concluded that the quality of management of LLC "KMP-Electro" is assessed as "good," as according to Table 2.5, in 2021, 2022, and 2023, the net cash flow from operating activities is positive, while from investment and financial activities is negative.

To assess the volume and nature of expenses related to the enterprise's activities, their analysis is performed. In market conditions, the main condition for effective management of the production process of an enterprise is the completeness, reliability, and timeliness of information about production costs, which form the cost

of manufactured products. Such information is provided by cost accounting, which is a central subsystem in the information system of accounting. The proper organization of cost accounting determines the level of economic management of the enterprise, the degree of influence of the results of activities of individual units on increasing production efficiency, the substantiation of planning qualitative and quantitative indicators, and optimal pricing [7].

Expenses of a certain period are simultaneously determined with the income for which they were incurred. Expenses that cannot be directly associated with the income of a specific period are reflected in the expenses of the reporting period in which they were incurred. The calculations are presented in Table 2.5.

Table 2.5 - Composition of Expenses of LLC "KMP-Electro" for the Years 2021-2023

| Indicators | 2021 | | 2022 | | 2023 | | Deviation 2022/2021 | | Deviation 2023/2022 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | kUAH | % | kUAH | % | kUAH | % | kUAH | % | kUAH | % |
| Material Costs | 93733 | 17,1 | 99288 | 17,2 | 105668 | 17,0 | 5555 | 0,2 | 6380 | -0,2 |
| Labor Costs | 186569 | 33,9 | 212594 | 36,9 | 225059 | 36,2 | 26025 | 3 | 1246 | -0,7 |
| Social Contributions | 68777 | 12,5 | 78436 | 13,6 | 83101 | 13,3 | 9659 | 1,1 | 4665 | -0,2 |
| Depreciation | 117436 | 21,4 | 113570 | 19,7 | 117479 | 18,9 | -3866 | -1,6 | 3909 | -0,8 |
| Other Operating Expenses | 83007 | 15,1 | 71480 | 12,4 | 89842 | 14,4 | -11527 | -2,6 | 1836 | 2 |
| Total | 549522 | 100 | 575368 | 100 | 621149 | 100 | 25846 | 0 | 4578 | 0 |

k - thousand UAH

Based on the results of the calculations, it can be concluded that in all three years, labor costs had the highest relative weight in total expenses, as LLC "KMP-Electro" has a significant number of personnel. The smallest relative weight in total expenses was attributed to social contributions. As we can see, there were no significant changes in the context of expenses over the three reporting years.

A significant factor for efficient operation and dynamic profit generation is the category of labor resources of the enterprise. Labor resources include all citizens working in the enterprise who contribute their labor, physical and mental abilities,

knowledge, and practical skills to production and economic activities to fulfill the enterprise's mission and achieve its goals. The term "labor resources" is commonly used to characterize the workers of the enterprise as one of the elements of the enterprise's resource potential [20]. The analysis of labor resource utilization is presented in Table 2.6.

Table 2.6 - Indicators of Labor Resource Utilization of LLC "KMP-Electro" for the Years 2021-2023

| № | Indicators | 2021 | 2022 | 2023 | Changes | |
|---|---|---|---|---|---|---|
| | | | | | 2022-2021 | 2023-2022 |
| 1 | Average number of permanent staff members, persons | 7427 | 7542 | 7462 | 115 | -80 |
| 2 | Hired employees, persons | 718 | 744 | 658 | 26 | -86 |
| 3 | Departed employees, total, persons, including: | 822 | 686 | 676 | -136 | -10 |
| 3.1 | Due to staff reduction, persons | 136 | 1 | 2 | -135 | 1 |
| 4 | Unworked hours, total, person-hours, including: | 1700316 | 1746492 | 1798896 | 46176 | 52404 |
| 4.1 | Absenteeism, person-hours | 1917 | 3108 | 4886 | 1191 | 1778 |
| 5 | Average number of all employees in full-time equivalent, persons | 7274 | 7187 | 7172 | -87 | -15 |
| 6 | Number of permanent staff members as of December 31 of reporting years, total, persons | 7622 | 7680 | 7662 | 58 | -18 |
| 7 | Number of employees in the largest shift on the last working day of the year, persons | 6103 | 5287 | 5868 | -816 | 581 |
| 8 | Employee turnover coefficient | 1,25 | 1,45 | 1,31 | 0,2 | -0,14 |
| 9 | Labor cost, thousand UAH | 183200 | 211600 | 222600 | 28400 | 11000 |

The number of employees of the enterprise as of December 31, 2021, amounted to 7,427 people. The payroll fund for 2021 amounted to 183.2 million UAH. During the year, the company implemented measures for personnel recruitment and training. In the reporting year, 1,956 individuals underwent training: including 1,508 individuals at the specialized personnel training center of LLC "KMP-Electro" and 448 individuals at external educational institutions.

The number of employees of the enterprise as of December 31, 2022, amounted to 7,542 people, which is 115 people more than as of December 31, 2021.

The payroll fund for 2022 amounted to 211.6 million UAH.

The number of employees of the enterprise as of December 31, 2023, amounted to 7,462 people, which is 80 people less than as of December 31, 2022. The payroll fund for 2023 amounted to 222.6 million UAH. The increase in the payroll fund compared to 2022 amounted to 11.0 million UAH (or 5.2%).

One of the most important indicators of enterprise performance is profitability indicators. Profitability is a relative indicator of production intensity, which characterizes the level of profitability of the respective components of the production process or the total expenses of the enterprise. The calculations of the enterprise's profitability indicators are presented in Table 2.7.

Table 2.7 - Profitability Indicators of LLC "KMP-Electro" for 2021-2023

| Idicators | 2021 | 2022 | 2023 | Changes | |
|---|---|---|---|---|---|
| | | | | 2022-2021 | 2023-2022 |
| 1 | 2 | 3 | 4 | 5 | 6 |
| Product profitability (%) | 1,09 | -0,04 | 0,71 | -1,13 | 0,76 |
| Asset profitability (%) | 3,11 | -0,03 | 2,33 | -3,14 | 2,37 |
| Equity profitability (%) | 1,51 | -0,06 | 1,16 | -1,57 | 1,22 |
| Payback period of equity (days) | 241 | 248 | 211 | 6,64 | -36,12 |

Profitability of production is calculated as the ratio of net profit to the expenses for its production and realization. In 2022, this profitability indicator, like others, was negative due to the loss-making activities of the enterprise. In 2023, compared to 2021, profitability tended to decrease due to increased expenses.

Asset profitability is determined by the ratio of net profit to the size of the assets. For each unit of invested assets, the enterprise obtained profitability. Equity profitability is the ratio of net profit to the size of the equity.

Profitability indicators indicate the inefficiency of operations in 2022 due to the adverse impact of external factors caused by the onset of war in Ukraine, and improved efficiency in 2023 due to the enterprise's adaptation to new economic conditions.

## 2.3 Evaluation of enterprise bankruptcy probability using discriminant models

In world practice, discriminant analysis methods are widely used to assess the likelihood of bankruptcy and predict crisis phenomena. This method is based on empirical-inductive research of financial indicators of a large number of enterprises, some of which have gone bankrupt, while others continue their operations successfully. Econometric modeling methods are extensively employed in this regard.

The essence of discriminant analysis lies in constructing a function using mathematical-statistical methods and computing an integral indicator based on which bankruptcy of a business entity can be predicted with a certain probability. This method involves grouping indicators into generalized integral measures while determining their significance.

In foreign practice, the development of diagnostic models and assessment of the probability of enterprise bankruptcy were addressed by scholars such as Springate, Altman, Beaver, Taffler, Tishaw, Liss, Conan and Holder, Beerman, Argenti, Scoum, Fulmer, Chesser, J. Depalian, among many others [4, 17, 63]. These scholars have made significant efforts to identify relevant economic and mathematical parameters for forecasting and assess their contributions to the overall solvency evaluation of enterprises.

Therefore, the next stage in diagnosing and assessing the likelihood of enterprise bankruptcy involves determining the probability of bankruptcy using Taffler's and Altman's models (two-factor and five-factor). Tables with calculations for all these models are presented in Tables 2.8-2.10.

In the UK in 1977, Taffler proposed a predictive four-factor model. The dominant position in this discriminant function belongs to the indicator of the ratio of profit from sales to the sum of short-term obligations of the enterprise, which has a weight 3-4 times higher than other coefficients. Therefore, slight fluctuations in

only two financial indicators (gross profit and current liabilities) can significantly affect the change in the integral index and, consequently, on the objectivity of assessments of the likelihood of the enterprise's bankruptcy. The calculation of this model is presented below (Formula 2.1) [4].

$$Z = 0,53\ X1 + 0,13\ X2 + 0,18\ X3 + 0,16\ X4, \quad (2.1)$$

Where X1 – the ratio of profit from sales to short-term obligations;

X2 – the ratio of current assets to total liabilities;

X3 – the ratio of short-term liabilities to total assets;

X4 – the ratio of sales revenue to total assets.

When *Z* is greater than 0.3, the threat of bankruptcy is minimal, indicating that the enterprise is financially stable. Conversely, when *Z* is less than 0.2, the enterprise is experiencing a financial crisis, and the likelihood of bankruptcy is very high.

The calculation of bankruptcy probability indicators for LLC "KMP-Electro" using Taffler's model is presented in Table 2.8.

Table 2.8 - Calculation of Bankruptcy Probability Indicators for LLC "KMP-Electro" using Taffler's Model

| № | Indicators | 2021 | 2022 | 2023 |
|---|---|---|---|---|
| 1 | Profit from sales to short-term liabilities ratio | 0,68 | 0,51 | 0,38 |
| 2 | Current assets to total liabilities ratio | 0,29 | 0,34 | 0,37 |
| 3 | Short-term liabilities to total assets ratio | 0,09 | 0,09 | 0,12 |
| 4 | Revenue from product sales to total assets ratio | 1,02 | 0,98 | 1,23 |
| 5 | Taffler's Model | 0,578 | 0,507 | 0,468 |

The most widely used method for bankruptcy prediction is the Z-score model by E. Altman. Altman constructed his model based on the analysis of the financial condition and operating results of 66 companies, calculating 22 financial ratios and utilizing only five most significant ones for his model. These ratios characterize the profitability of capital and its structure from various perspectives. The advantages of this model lie in its maximum accuracy; however, the question of its application

to the economy of Ukraine remains open due to the lack of information, primarily in the analytical block. The weighting coefficients of the model are not reliable for assessing the financial condition of domestic enterprises. Altman's multifactor models served as the basis for further research on bankruptcy prediction and assessment of the financial condition of enterprises. His Z-score model can predict bankruptcy in 94% of cases, classify a corporation as bankrupt or non-bankrupt with 95% accuracy, and predict bankruptcy fairly accurately two years in advance [4].

The calculation of its modifications is presented below:

Altman's two-factor model for assessing the likelihood of corporate bankruptcy. It is considered one of the simpler bankruptcy prediction models. It is based on two key indicators - the current liquidity ratio (CL) and the proportion of borrowed funds (AF) (formula 2.2) [4]:

$$Z = – 0,3877 – 1,0736 * CL + 0,0579 * (AF/ TA), \quad (2.2)$$

Where CL is the current liquidity ratio;

AF is the proportion of borrowed capital;

TA is the total asset value.

If the result is negative, the likelihood of bankruptcy is low. A positive value of Z indicates a high probability of bankruptcy. The calculation of bankruptcy probability indicators for LLC "KMP-Electro" using Altman's two-factor model is presented in Table 2.9.

Table 2.9 - Calculation of Bankruptcy Probability Indicators for LLC "KMP-Electro" Using Altman's Two-Factor Model

| № | Inicaors | 2021 | 2022 | 2023 |
|---|---|---|---|---|
| 1 | Coefficient of Current Liquidity | 0,29 | 0,34 | 0,37 |
| 2 | Ratio of Borrowed Capital to Total Liabilities | 0,426 | 0,415 | 0,391 |
| 3 | Altman's Two-Factor Model | -0,674 | -0,729 | -0,762 |

The Five-Factor Altman Model, which he developed in 1985, takes the form

(formula 2.3) [4].

$$Z = 0,717 * X1 + 0,874 * X2 + 3,1 * X3 + 0,42 * X4 + 0,995 * X5, \quad (2.3)$$

Where X1 – the ratio of working capital to total assets;

X2 – the ratio of retained earnings to total assets;

X3 – the ratio of earnings before tax to total assets;

X4 – the ratio of equity value to debt value;

X5 – the ratio of revenue from sales to total assets.

The probability of bankruptcy in the five-factor Altman model is assessed based on the value of the Z-score calculated using real company data: if $z < 1.2$, the probability of bankruptcy is very high; when $1.2 < z < 2.0$, the probability of bankruptcy is high; when $2.0 < z < 2.9$, bankruptcy is possible; and finally, when $z > 2.9$, the company is financially stable, and the probability of bankruptcy is very low. According to foreign sources, the accuracy of bankruptcy prediction using this model reaches 95% [4].

The calculation of bankruptcy probability indicators for LLC "KMP-Electro" using the Altman five-factor model is presented in Table 2.10.

Table 2.10 - Calculation of Bankruptcy Probability Indicators for LLC "KMP-Electro" using the Altman Five-Factor Model

| № | Idicators | 2021 | 2022 | 2023 |
|---|---|---|---|---|
| 1 | Ratio of working capital to total assets | -0,31 | -0,28 | -0,25 |
| 2 | Ratio of retained earnings to total assets | 0,0039 | 0,038 | 0,068 |
| 3 | Ratio of earnings before tax to total assets | 0,031 | -0,0003 | 0,023 |
| 4 | Ratio of equity value to debt value | 1,76 | 1,72 | 1,66 |
| 5 | Ratio of revenue from sales to total assets | 0,85 | 0,84 | 1,03 |
| 6 | Altman Five-Factor Model | 1,456 | 1,589 | 1,822 |

According to the calculated Altman five-factor model, we observe that in 2021, the indicator had a value of 1.46, in 2022 – 1.59, and in 2023 – 1.82, indicating a high likelihood of the company's bankruptcy in the future. This is associated with

a shortage of working capital to finance its current assets.

Using both the calculated two-factor Altman model and the Taffler model, it was determined that bankruptcy is not imminent for the company in the coming years. However, according to the Altman five-factor model, the likelihood of bankruptcy for the company is high, as it lacks sufficient working capital, which could lead to insolvency in the future.

The shortage of working capital means that the normative level of working capital exceeds the actual availability of it. This shortage can arise due to the company's own fault, other companies, changes in business conditions not taken into account in a timely manner (such as untimely financing of an increase in the normative level of working capital). The main reasons for the shortage of working capital may include poor performance of the marketing department, failure to meet profit plans, weak responsibility of companies for forming and preserving working capital, and its misallocation, among others.

Another problem in the financial condition of LLC "KMP-Electro" that could lead to the company's bankruptcy is the loss-making activity in 2022. The risk of bankruptcy is heightened by the unstable macroeconomic and political situation in the country, which could lead to a sharp decline in profitability, as evidenced by the year 2022.

## Conclusions for section 2

LLC "KMP-Electro" has an optimal structure of sources for forming financial resources; however, it also faces challenges in the utilization of the company's resources, which could negatively impact its operations and pose threats of insolvency. Specifically, the amount of accounts receivable exceeds the company's cash by 4.8 times at the end of 2021, 3.5 times at the end of 2022, and 3.7 times at the end of 2023. This significant excess of accounts receivable over cash indicates

an ill-considered sales policy, which adversely affects the company's current solvency.

The absence of stable profitability over the studied period also signals the risk of bankruptcy. Profitability indicators indicate inefficiency in 2022 due to unfavorable external factors, including the onset of war in Ukraine, and improved efficiency in 2023 due to the company's adaptation to new business conditions.

Discriminant analysis using the two-factor Altman model and the Taffler model has shown that bankruptcy is not imminent for the company in the coming years. However, the Altman five-factor model has confirmed the risk of bankruptcy for LLC "KMP-Electro." This is attributed to the shortage of working capital, which could lead to insolvency in the future. This necessitates the development of strategies to enhance crisis management within the company, especially considering the adverse impact of the external environment and high levels of uncertainty.

# SECTION 3
# IMPROVEMENT DIRECTIONS OF CRISIS MANAGEMENT FOR LLC "KMP-ELECTRO"

## 3.1 Enhancement of bankruptcy probability assessment tools considering the industry of operation

The methodological support for diagnosing the crisis state and bankruptcy threat is characterized by a wide range of approaches and tools for its implementation. In modern concepts of enterprise bankruptcy probability diagnostics, scholars recommend applying certain models or utilizing a combination of models and methodologies. Additionally, industry-specific and thematic approaches are suggested. It is known that the assessment of the financial condition of enterprises is carried out using a variety of methodologies developed by ministries, agencies, the National Bank of Ukraine, and banks. The foundation of these methodological approaches was laid in 1998 by the Agency for Prevention of Enterprise Bankruptcy and the State Tax Administration of Ukraine. As of today, governmental bodies have developed Methodological Recommendations for identifying signs of enterprise insolvency and actions related to concealing bankruptcy, fictitious bankruptcy, or bankruptcy induction, which were approved by the Order of the Ministry of Economy of Ukraine dated January 19, 2006, No. 14, detailing the methodology for diagnosing the probability of bankruptcy of Ukrainian enterprises [47].

Some scholars argue that bankruptcy prediction methodologies, commonly referred to in domestic practice, actually attempt to predict various types of crises. Therefore, assessments obtained using them often differ significantly. It would be more appropriate to call these methodologies methods for predicting a specific type of crisis, as none of them can claim to be universally applicable due to their

specialization in a particular type of crisis.

In global practice, a multifactor discriminant analysis is often used to assess the likelihood of enterprise bankruptcy. This method is based on an empirical-inductive approach to investigating financial indicators with extensive use of econometric modeling elements. Multifactor discriminant analysis is a statistical method that enables the classification of a set of objects into two or more groups based on their individual characteristics. The uniqueness of this method lies in forming a function that characterizes the relationship between changes in quantitative characteristics and the qualitative feature of the corresponding group.

Currently, a large number of statistical models for diagnosing bankruptcy probability have been developed, such as the Altman model, the Springate model, the Taffler model, the Lis model, and others. However, the forecasting methodologies proposed by foreign authors have several significant limitations for their application in Ukrainian enterprises [61].

Most foreign bankruptcy probability diagnosis methodologies are constructed using weighted coefficient indicators based on American analytical data from previous years. Therefore, they do not correspond to the current economic situation for several reasons:

– these models are not adapted to the domestic economy and do not consider the specificities of Ukrainian enterprises, such as accounting system peculiarities, tax legislation, industry affiliation, etc.;

– lack of statistical data on bankrupt enterprises prevents adjusting the methodology for calculating the weight coefficients considering economic conditions;

– the analyzed methodologies do not consider other important performance indicators of the enterprise (they are built solely on balance sheet indicators and financial statement indicators);

– these models do not provide insights into which factors influenced changes in the level of financial stability.

As a result of using these models, it is impossible to obtain information about

the possible further development of the enterprise. The threshold values of indicators proposed by foreign scholars are often unattainable for Ukrainian enterprises. Moreover, while these methodologies allow for the approximation of enterprise bankruptcy (crisis stages), they do not enable forecasting the transition of the enterprise from one stage of the life cycle to another. The presence of numerous drawbacks indicates the complexity of applying these models in domestic analytical practice.

The operating conditions of Ukrainian enterprises are better suited to the discriminant model developed by the Ukrainian researcher O. O. Tereshchenko. It exists in two variants. The first is a universal model that includes 6 indicators and is based on data from 850 enterprises in various industries [63].

The universal model by O. O. Tereshchenko is presented below (Formula 3.1) [63]:

$$Z_{TEP} = 1{,}5\ K_1 + 0{,}08\ K_2 + 10\ K_3 + 5\ K_4 + 0{,}3\ K_5 + 0{,}1\ K_6, \quad (3.1)$$

Where K1 – the ratio of the cash-flow indicator to liabilities;

K2 – the ratio of balance currency to liabilities;

K3 – the ratio of total profit to balance currency;

K4 – the ratio of profit from sales to revenue from sales;

K5 – the ratio of production inventories to revenue from sales;

K6 – the turnover of fixed assets, i.e., the ratio of revenue from sales to balance currency.

To calculate coefficient X1, the Cash-flow indicator is used. It was introduced in the early 1950s for analyzing the financial condition of the enterprise and assessing the attractiveness of securities. The factual basis for Cash-flow analysis is the financial statements and their utilization. The Cash-flow indicator characterizes the magnitude of net cash flows generated by operational and investment activities and retained by the enterprise within a certain period.

The obtained results after calculations can be interpreted as follows:

Z > 2 – the enterprise is considered financially stable, and therefore bankruptcy is not imminent;

1 < Z < 2 – financial equilibrium (financial stability) of the enterprise is disrupted, but with the transition to crisis management, bankruptcy is not imminent;

0 < Z < 1 – the enterprise faces bankruptcy if it does not take remedial measures;

Z < 0 – the enterprise is in a semi-bankrupt state [63].

Thus, we will enter the calculation results for O. O. Tereshchenko's model into Table 3.1.

Table 3.1 - Calculation Of Bankruptcy Probability Indicators For LLC "KMP-Electro" Using O. O. Tereshchenko's Universal Model

| № | Indicators | 2021 | 2022 | 2023 |
|---|---|---|---|---|
| 1 | Cash-flow to liabilities ratio | 0,2 | 0,28 | 0,22 |
| 2 | Balance currency to liabilities ratio | 11,11 | 10,14 | 8,57 |
| 3 | Total profit to balance currency ratio | 0,03 | -0,0003 | 0,02 |
| 4 | Profit from sales to revenue from sales ratio | 0,04 | 0,03 | 0,02 |
| 5 | Production inventories to revenue from sales ratio | 0,01 | 0,01 | 0,01 |
| 6 | Turnover of fixed assets ratio (revenue from sales to balance currency) | 0,85 | 0,84 | 1,03 |
| | Integrated indicator value | 1,81 | 1,70 | 1,42 |

Based on the results of the calculations, it can be stated that during the years 2021-2023, the financial equilibrium of the enterprise was disrupted, but with the transition to crisis management, bankruptcy is not imminent. This situation requires implementing crisis management measures to prevent bankruptcy in the future.

The second model contains 10 indicators and takes into account the differentiation of enterprises by industries (see Table 3.2). A peculiar feature of Tereshchenko's methodology is that it has slightly biased estimates. It emphasizes reducing the misclassification of financially distressed enterprises into the stable group.

This asymmetry aims to protect investors from risky investments but reduces the overall forecast accuracy. Another significant drawback of this model is the wide

interval of uncertainty.

Table 3.2 - Discriminant Models By O. O. Tereshchenko, Considering The Industry-Specific Characteristics Of The Enterprise [61]

| Groups of Economic Activities | Discriminant Model |
|---|---|
| Agriculture | $Z=0,105X_1+1,567X_2+0,301X_3+1,375X_4+1,689X_8+$ $+0,168X_9-0,260$ |
| Food Industry | $Z=0,261X_1+1,272X_2+0,13X_3+0,486X_4+0,639X_9+$ $+0,221X_{10}-1,433$ |
| Other Branches of Processing Industry | $Z=0,139X_1+1,535X_2+0,486X_3+1,459X_4+0,265X_9+$ $+0,159X_{10}-1,757$ |
| Extractive Industry, Metallurgy, Engineering, Electricity, Gas, Water Production | $Z=0,213X_1+2,208X_2+0,67X_3+1,13X_4+1,48X_5+$ $+0,515X_8+0,467X_{10}-2,599$ |
| Construction | $Z=0,333X_1+1,458X_2+0,395X_4+1,407X_5+0,040X_6+$ $+0,41X_{10}-2,325$ |
| Wholesale and Retail Trade, Hotels and Restaurants | $Z=0,268X_1+1,773X_2+1,478X_4+0,775X_5+0,028X_6+$ $+0,097X_9+0,177X_{10}-2,026$ |
| Transport | $Z=0,145X_1+1,481X_2+1,007X_4+0,048X_6+$ $0,146X_{10}-1,779$ |
| Other Types of Activities | $Z=0,306X_1+0,331X_2+1,309X_4+0,050X_6+$ $+0,363X_9+0,258X_{10}-1,387$ |

X1 - Coverage ratio (current assets / current liabilities);

X2 - Financial independence ratio (equity / balance currency);

X3 - Capital turnover ratio (net sales revenue / balance currency);

X4 - Operational sales profitability ratio (cash-flow / (net sales revenue + other operating income));

X5 - Asset profitability ratio (net income / balance currency);

X6 - Loan capital turnover ratio (net sales revenue / loan capital);

X7 - Ratio of cash-flow to loan capital;

X8 - Sales profitability (gross profit / net sales revenue);

X9 - Equity profitability (profit (loss) after tax / equity);

X10 - Turnover of current assets ratio (net sales revenue / average current assets).

Interpretation of O. O. Tereshchenko's models results, taking into account the

specifics of the industry in which the enterprise operates:

$Z < -0.8$ - financial crisis zone;

$-0.8 \leq Z \leq 0.51$ - additional analysis zone;

$Z > 0.51$ - financial stability zone [61].

Since the investigated enterprise LLC "KMP-Electro" is engaged in electrical installation works (NACE code 43.21), which belongs to the construction sector, we will select the appropriate formula according to the industry of the enterprise.

The results of calculating the indicators according to this model will be entered into Table 3.3.

Table 3.3 - Bankruptcy probability indicators of LLC "KMP-Electro" according to Tereshchenko's model, adjusted for the industry of operation of the enterprise

| № | Indicators | Designations | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | Coverage Ratio (current assets / current liabilities) | X1 | 1,37 | 1,43 | 1,22 |
| 2 | Financial Independence Ratio (equity / balance currency) | X2 | 0,58 | 0,59 | 0,61 |
| 4 | Operating Sales Profitability Ratio (cash-flow / (net sales revenue + other operating income)) | X4 | 0,077 | 0,007 | 0,06 |
| 5 | Asset Profitability Ratio (net profit / balance currency) | X5 | 0,03 | -0,0003 | 0,02 |
| 6 | Loan Capital Turnover Ratio (net sales revenue / loan capital) | X6 | 1,98 | 2,17 | 2,59 |
| 7 | Current Assets Turnover Ratio (net sales revenue / average current assets) | X10 | 7,59 | 6,99 | 7,35 |
| | Value of the Integral Indicator | Z | 4,507 | 4,048 | 3,054 |

Based on the results of the calculations, we conclude that from 2021 to 2023, the values of this calculated model significantly exceeded 0.51, indicating the financial stability of the enterprise. However, over time, as we can see, the value of

the integral indicator gradually decreases. This may lead to the emergence of corresponding crisis situations in the future.

Analyzing existing Ukrainian methodologies for assessing the probability of bankruptcy, which are closest to the practices of Ukrainian enterprises, we can distinguish their respective advantages and disadvantages, presented in Table 3.4 [61-64].

Table 3.4 - Advantages and disadvantages of Ukrainian methods for determining bankruptcy probability

| № | Advantages | Disadvantages |
|---|---|---|
| 1 | 2 | 3 |
| 1 | Models developed by Tereshchenko take into account the specific nature of the enterprise's industry | Selective approach to forming a system of indicators, which is subjective in nature |
| 2 | Normative values proposed by methodological recommendations are constantly reviewed and revised | Absence of indicators in the proposed systems characterizing the efficiency of resource utilization, operational efficiency |
| 3 | Information for calculating all indicators is available and contained in the primary reporting forms | Limited information support for calculating specific criteria of weighting coefficients |
| 4 | The number of studies by domestic scientists on the formation of the most optimal and universal model that meets modern conditions is increasing | Inaccurate, unjustified determination of threshold values for individual criteria derived from financial reporting indicators |

It is worth noting that the advantages and disadvantages of domestic methodologies, characteristic of Ukrainian practice, can be used in prospective research. Some advantages require further development and improvement, while disadvantages require resolution and elimination.

## 3.2 Determining factors of enterprise bankruptcy using factor analysis technology

The functioning of any socio-economic system (including the enterprise LLC "KMP-Electro") occurs in the conditions of complex interaction of a set of internal and external factors.

A factor is the cause, the driving force of any process or phenomenon, determining its character or one of its main features.

Factor analysis is a methodology for comprehensive and systematic study and measurement of the influence of factors on the magnitude of outcome indicators, a branch of multidimensional statistical analysis that combines methods for assessing the dimensionality of numerous observed variables. In other words, the method's task is to transition from the real state of a large number of features or causative factors determining observable variability to a small number of the most important variables (factors) with minimal loss of information [8].

Thus, the purpose of factor analysis is to determine the impact of factors on the outcome.

The main stages of factor analysis:

1. Selection of factors determining the investigated outcome indicators.

2. Classification and systematization of factors to ensure a comprehensive and systematic approach to studying their impact on the results of economic activity.

3. Determination of the form of dependence between factors and outcome indicators.

4. Modeling relationships between factors and outcome indicators.

5. Calculation of the influence of factors and assessment of the role of each of them in changing the outcome indicator.

6. Interpretation of the obtained results [37].

Therefore, conducting factor analysis of a process or phenomenon involves identifying factors that influence this process or phenomenon; systematizing them;

identifying the relationship between the resulting indicator and the factors; calculating the impact of factors on the resulting indicator and economically interpreting the obtained results.

The modern operation of any enterprise is directed towards profit-making in a highly competitive market environment. In these conditions, financial analysis in general and analysis of enterprise performance efficiency in particular becomes crucial.

The most widespread factor model for analyzing enterprise performance efficiency is the DuPont system or model. The DuPont model is a coordinated methodology for analyzing a company's ability to efficiently generate profit, reinvest it, and grow turnovers.

This model allows for the examination of the dynamics of key indicators of enterprise performance efficiency: net profit margin; capital turnover ratio; the company's financial structure ratio and their impact on return on equity [37].

Since the main cause of enterprise bankruptcy is the unprofitability of its operations, special attention should be paid to analyzing the efficiency of its operations when assessing the probability of enterprise bankruptcy. Additionally, the problem faced by LLC "KMP-Electro" is the negative trend in financial results and profitability indicators, which necessitates the investigation of factors that have led to such a situation.

Therefore, the resulting indicator for factor analysis is the return on equity ratio, which characterizes the level of profitability of equity invested in the enterprise and is determined by formula (3.2) [37]:

$$ROE = NP / EC, \quad (3.2)$$

Where ROE - Return on Equity;

NP - Net Profit;

EC - Equity Capital.

Return on Equity (ROE) is a financial metric that measures the efficiency of a company's utilization of its equity capital to generate profit. This indicator serves as a crucial gauge of financial health and operational effectiveness of a company, and it's a valuable tool for investors in assessing the income potential from invested capital.

Closely related to Return on Equity is the Return on Capital of the enterprise. The relationship between these metrics is reflected in formula (3.3) [37]:

$$ROE = \frac{NP}{EC} \times \frac{K}{K} = \frac{NP}{K} \times \frac{K}{EC}, \quad (3.3)$$

Where K - Total capital of the enterprise

Expanding the factor model of return on equity can be achieved by breaking down the components of the return on total capital indicator through the introduction of net income into the formula of the indicator.

The expanded factor model of return on equity takes the following form (formula 3.4) [37]:

$$ROE = NPM \times ATR \times KFS, \quad (3.4)$$

Where ROE - Return on Equity;

NPM - Net Profit Margin;

ATR - Asset Turnover Ratio;

KFS - Financial Structure Coefficient.

The Net Profit Margin (NPM) is a metric that measures what portion of total sales remains with the company as net profit after covering all expenses, including taxes, interest, and other costs. This indicator is crucial for evaluating the efficiency of company management and its ability to convert revenues into profit. A high NPM indicates that the company effectively controls expenses and can retain a significant

portion of revenues as net profit. Conversely, a low NPM may indicate high expenses or pricing issues, diminishing profitability.

This metric is vital for investors and company management because it not only demonstrates the company's ability to generate profit but also its efficiency in conducting business compared to competitors. It is also useful for comparing profitability across different industries where expense levels and margins may vary significantly.

The Asset Turnover Ratio (ATR) is a financial metric that demonstrates how effectively a company utilizes its capital to generate revenue. This ratio is important for assessing the productivity of the company's asset utilization and its ability to generate income from invested resources.

The Financial Structure Coefficient (KFS) is a metric that demonstrates the degree of dependency of the company on external sources of financing (liabilities) compared to equity capital. This coefficient is essential for evaluating the financial risk of the company, as a high level of dependence on borrowed funds increases risk.

Let's evaluate the impact of each of these factors on the return on equity and the likelihood of bankruptcy for the LLC "KMP-Electro" based on the data in Table 3.5.

Table 3.5 - Values of Return on Equity Factors for LLC "KMP-Electro" for the Years 2021-2023

| № | Indicators | Values | | |
|---|---|---|---|---|
| | | 2021 | 2022 | 2023 |
| 1 | Net Income, thousand UAH | 1882131 | 1912967 | 2401911 |
| 2 | Net Profit, thousand UAH | 19006 | -782 | 16383 |
| 3 | Capital, thousand UAH | 2214256 | 2267916 | 2337867 |
| 4 | Equity Capital, thousand UAH | 1259384 | 1315306 | 1410531 |
| 5 | Net Profit Margin | 0,01 | -0,0004 | 0,01 |
| 6 | Asset Turnover Ratio | 0,85 | 0,84 | 1,03 |
| 7 | Financial Structure Coefficient | 1,76 | 1,72 | 1,66 |
| 8 | Return on Equity | 0,015 | -0,001 | 0,012 |

The data from the table indicates the efficiency of the company's operations in 2021 and 2023, as profitability indicators have positive values. However, in 2022, return on equity was negative. This suggests issues within the company regarding cost management, pricing policies, and capital management at LLC "KMP-Electro".

Quantifying the impact of factors on the return on equity of the company is best done using the method of chain substitutions, which allows determining the influence of each factor on the change in the resulting indicator.

The chain substitution method is an economic analysis technique used to study the impact of changes in one or more economic indicators on other variables. This method helps to assess how small changes in one parameter can sequentially affect a series of other parameters in a long chain of dependencies.

The chain substitution method involves making changes to various elements of the model sequentially, enabling tracing and analyzing the reaction of the entire system to these changes. This helps understand how individual components interact with each other and what consequences can be caused by primary influences.

Advantages of the method include:

– Detailed analysis, providing a deep understanding of the relationships between different parameters.

– Prediction of consequences, helping anticipate the long-term effects of certain decisions or events.

– Limitations in usage include:

– Complexity, requiring accurate data and complex calculations, which may be difficult to perform without appropriate software.

– Uncertainty, as results heavily depend on assumptions and initial data, errors in which may lead to incorrect conclusions.

The results of calculations regarding changes in the return on equity coefficient when altering individual factors using the chain substitution method are presented in Table 3.6 and Figure 3.1.

Table 3.6 - Assessment of Factors' Impact on the Capital Profitability of LLC "KMP-Electro"

| № | Indicators | Change Over the Period | | |
|---|---|---|---|---|
| | | 2022-2021 | 2023-2022 | 2023-2021 |
| Change in Factors | | | | |
| 1 | Change in Net Profit Margin Coefficient | 0,0002 | -0,0035 | -0,0033 |
| 2 | Change in Asset Turnover Ratio Coefficient | 0,0627 | 0,1147 | 0,1774 |
| 3 | Change in Financial Structure Coefficient | -0,0340 | -0,0668 | -0,1008 |
| Change in the Resulting Indicator Due to Changes in Factors | | | | |
| 4 | Change in Return on Equity due to Change in Net Profit Margin | 0,0003 | -0,0055 | -0,0049 |
| 5 | Change in Return on Equity due to Change in Asset Turnover Ratio | 0,0011 | 0,0013 | 0,0021 |
| 6 | Change in Return on Equity due to Change in Financial Structure | -0,0003 | -0,0005 | -0,0007 |
| 7 | Change in Return on Equity | 0,0012 | -0,0046 | -0,0035 |

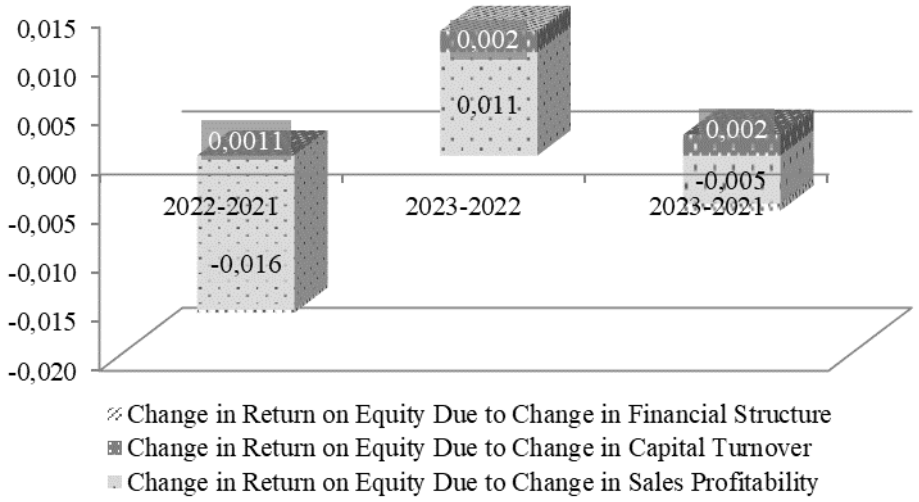


Figure 3.1 - Impact of Factors on the Return on Equity of LLC "KMP-Electro"

The primary negative impact on the return on equity is primarily exerted by the dynamics of the net profit margin coefficient. As a result of this influence, the

return on equity in 2022 compared to 2021 decreased by 0.016, and in 2023 compared to 2021, it decreased by 0.005.

The results obtained from the factor analysis indicate a negative trend in the return on equity, which could potentially lead to the bankruptcy of LLC "KMP-Electro" without prompt intervention. The factors posing a threat to the functioning of LLC "KMP-Electro" primarily include the net profit margin coefficient.

Overall, the return on equity of LLC "KMP-Electro" in 2022 compared to 2021 decreased by 0.016. Of this decrease, 0.0003 is attributed to the decrease in the financial structure coefficient, which, on one hand, indicates an increase in the financial stability of the company. However, on the other hand, due to the excessive financial stability, the decrease negatively impacts the efficiency of LLC "KMP-Electro" and its overall financial condition. Changes in 2023 relative to 2021 are similar: the decrease in return on equity by 0.003 is due to the decrease in the financial structure coefficient by 0.1.

The net profit margin coefficient exerts the greatest impact on the return on equity of LLC "KMP-Electro". These changes negatively affect the efficiency of the company's operations and pose threats to its functioning.

The only indicator that exerts a positive impact on the return on equity of LLC "KMP-Electro" is the asset turnover ratio. However, this impact is minor, and such an increase in the asset turnover ratio is insufficient to offset the negative influence of the net profit margin coefficient and the financial structure coefficient of the company.

Therefore, the analysis reveals a decrease in the return on equity due to the negative impact of the net profit margin coefficient. Hence, to ensure the stable functioning of LLC "KMP-Electro" and prevent bankruptcy, it is crucial to prioritize the formulation of the company's pricing policies and the efficiency of cost management.

## 3.3 Measures to improve the efficiency of crisis management by the enterprise

The enterprise LLC "KMP-Electro" is facing profitability issues and bankruptcy risk. Therefore, to overcome insolvency and prevent further bankruptcy at the corporate level, it is necessary to apply a strategy of financial and economic recovery. For the effective implementation of this direction at the business strategy level, efforts should be made to ensure production with low costs and to incentivize personnel to increase production efficiency.

At the functional level, the following strategies are characteristic for the researched enterprise [45]:

- Personnel management strategy characterized by engaging professional staff with relevant qualifications;
- Financial strategy aimed at providing the enterprise with sufficient financial resources to restore solvency;
- Production strategy involves producing goods in sufficient quantity and quality.

At the operational strategy level, it is necessary to strengthen control over the enterprise's operations, improve employees' workplaces to enable more rational use of working time.

The mechanism of planning and implementing the anti-crisis development strategy, based on the management cycle theory, is a process of preparing management decisions consisting of a strictly defined sequence of stages.

This mechanism includes the following main stages [7]:

- Justification of the system of key strategic indicators for the anti-crisis development of the enterprise;
- Justification of methods for evaluating key strategic indicators;

– Development of a methodology for substantiating the "critical" values of the system of key strategic indicators for the anti-crisis development of the enterprise;

– Development of an algorithm for selecting the type of anti-crisis development strategy for the enterprise.

The proposed mechanism enables the preparation of strategic anti-crisis management decisions that stabilize the enterprise's activities (Figure 3.2).

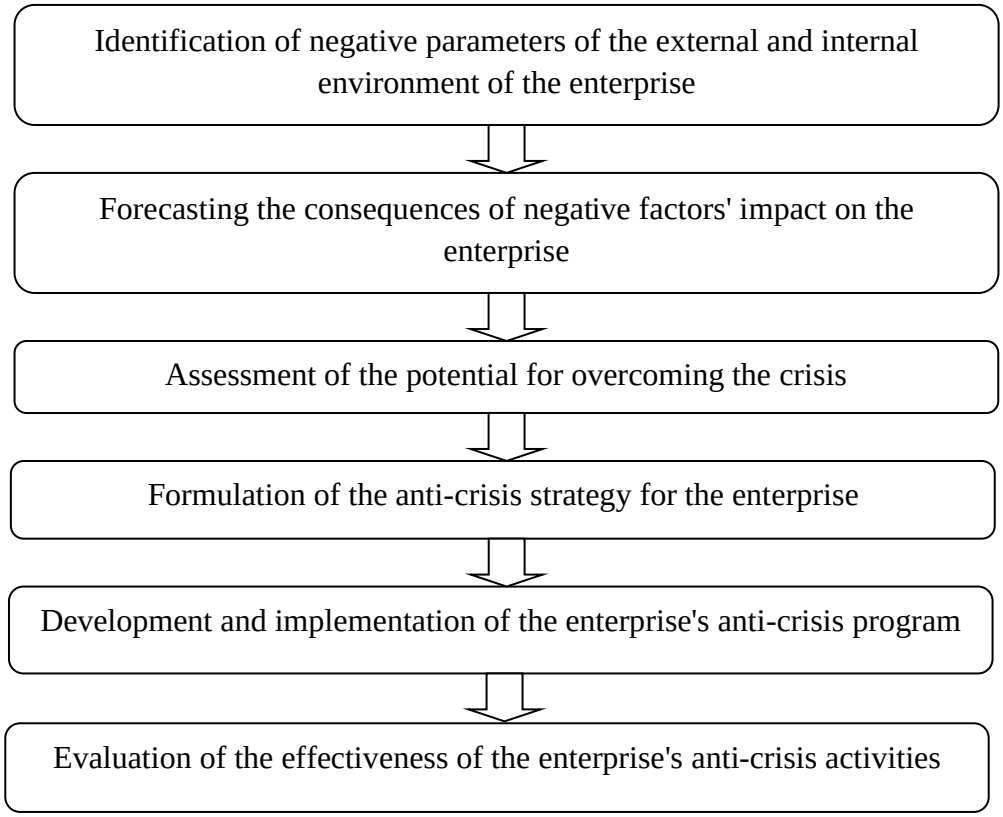


Figure 3.2 - Stages of enterprise anti-crisis activities

*Source: Constructed by the author based on [48, 65]*

Distinctive features of the mechanism include [49]:

– its applicability exclusively at the stage of implementing the main strategy;

– inclusion of two cyclical algorithms: selection of crisis management strategy (in operational mode), selection of crisis prevention strategy (in a strategic aspect);

– conducting diagnostics of pre-crisis state of the enterprise, enhancing the preventive function of crisis management, utilizing forecasting of the system of key strategic indicators of the enterprise's anti-crisis development [45].

Figure 3.3 presents the program of a complex of tactical measures for implementing enterprise anti-crisis activities.

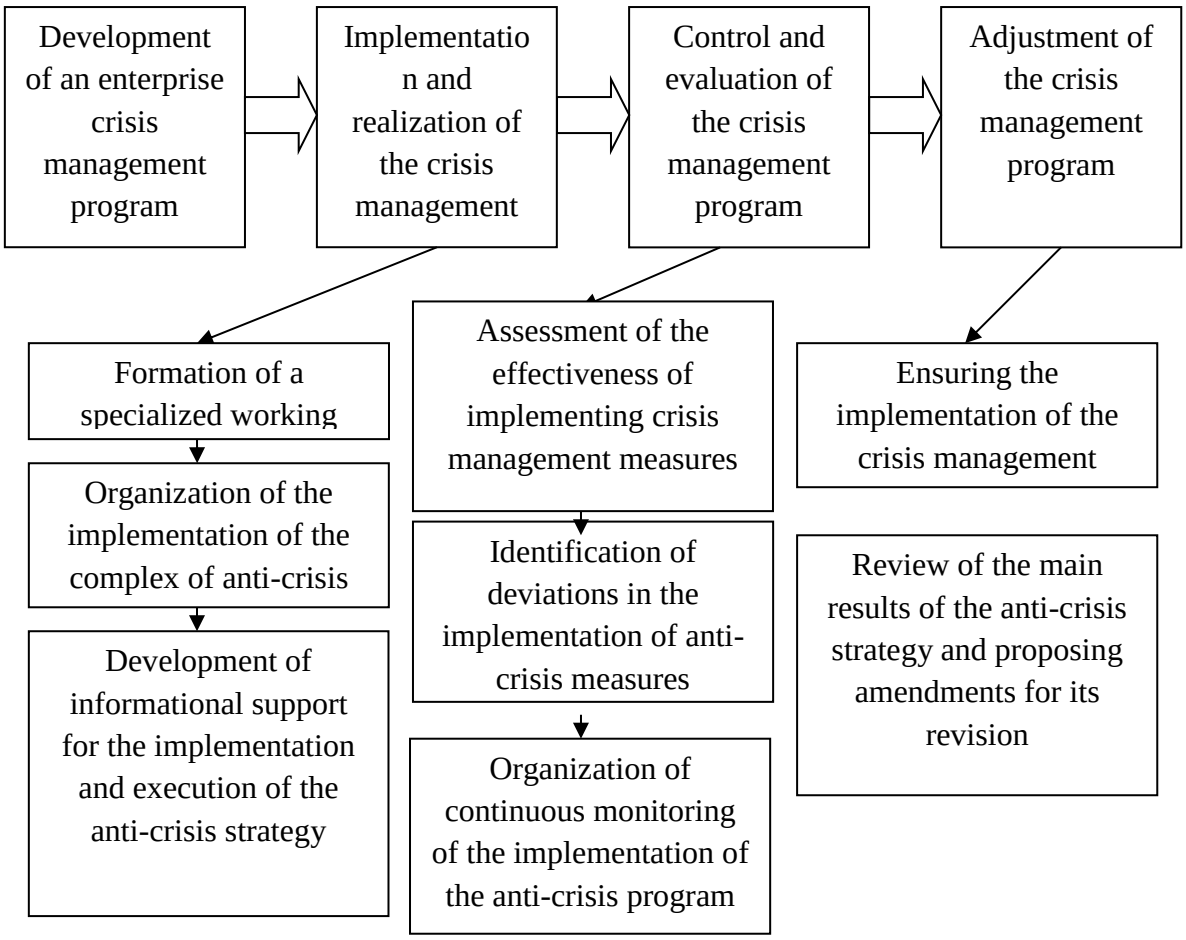


Figure 3.3 - Complex of operational measures for implementing enterprise crisis management

*Source: Constructed by the author based on [27, 38]*

Thus, the proposed model reflects a complex interconnected set of strategic (Figure 3.3) and operational (Figure 3.4) measures, each of which is subordinated to the unified goal, objectives, and tasks related to the implementation of the enterprise's crisis management program. Its elements can have both defensive and offensive characteristics, the use of which will allow the manufacturing enterprise

to not only solve the survival problem in crisis conditions but also realize the prospect of sustainable growth. Therefore, choosing the right and most effective crisis management strategy, following all the rules and stages of crisis resolution, guarantees the long-term success of the enterprise.

However, crisis management measures should be implemented not only when the crisis is already destroying the business but also preventively, systematically. The enterprise must operate according to its strategic plan, have developed business plans for each business direction, and based on them, plans for equipment modernization, marketing action plans, and so on.

For the LLC "KMP-Electro" enterprise, to reduce the risk of bankruptcy in conditions of unstable profitability caused by war and adverse external influences, proposed measures are presented in Figure 3.4.

Measures to reduce the risk of bankruptcy for LLC "KMP-Electro" include:

– Diversification of sales markets - seeking opportunities to enter new markets or expand presence in existing ones, which can reduce dependence on unstable regional markets and enterprises subject to sanctions due to the war in Ukraine or those that have been destroyed and ceased operations.

– Cost optimization - revising company expenses to reduce them. This may include reviewing contracts with suppliers, reducing energy consumption, revising the staffing schedule, and using outsourcing for certain functions.

– Enhancement of production flexibility - implementing flexible production processes can help quickly adapt to changes in demand and market conditions.

– Improvement of service quality, which can increase competitiveness and customer loyalty, which is critically important in crisis periods.

– Risk insurance - insuring against commercial and political risks to protect the enterprise from unforeseen losses.

– Enhancement of financial flexibility - reviewing the financial structure, including refinancing existing obligations, seeking additional sources of funding, including government support.

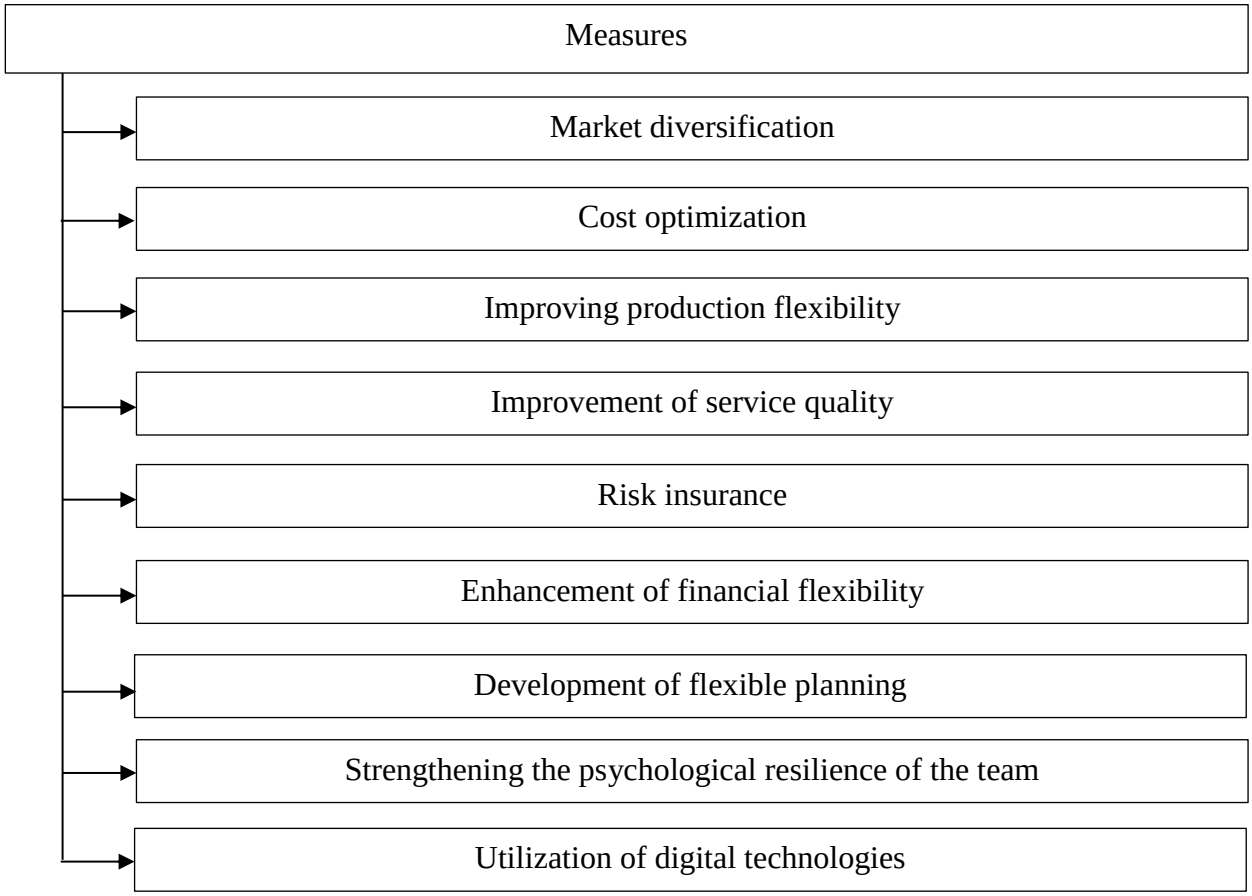


Figure 3.4 - Measures to Reduce Bankruptcy Risk for LLC 'KMP-Electro'

*Source: Constructed by the author*

– Development of flexible planning - developing multi-scenario plans that take into account various possible developments in the country and internationally, for timely response to crisis phenomena.

– Strengthening the psychological resilience of the team - supporting the morale of employees through honest communication, training and development, as well as employee assistance programs.

– Utilization of digital technologies - integrating modern IT solutions to improve management, logistics, customer interaction, and optimize business processes.

These measures aim not only to reduce the risk of enterprise bankruptcy but also to create resilience to future shocks, which is particularly relevant in crisis periods associated with military actions or political instability.

## Conclusions for section 3

Improvement of crisis management at LLC "KMP-Electro" involved enhancing the tools for assessing the probability of enterprise bankruptcy, identifying factors contributing to enterprise bankruptcy using factor analysis technology, and determining measures aimed at increasing the effectiveness of crisis management at the enterprise.

The enhancement of the enterprise bankruptcy probability assessment toolkit was based on considering the industry of operation, for which the Tereshchenko discriminant model was used. According to the results of the calculations, it is concluded that from 2021 to 2023, the value of this calculated model significantly exceeded 0.51, indicating the financial stability of the enterprise. However, over time, as we can see, the value of the integral indicator gradually decreases. This could lead to the emergence of corresponding crisis situations in the future.

The results obtained from factor analysis revealed a negative trend in the return on equity indicator, which could lead to enterprise bankruptcy without prompt intervention. Factors posing a threat to the operation of LLC "KMP-Electro" include the downward trend in sales profitability.

It has been determined that the most effective measures to reduce the risk of bankruptcy for LLC "KMP-Electro" are: diversification of sales markets, cost optimization, enhancement of production flexibility, improvement of service quality, risk insurance, enhancement of financial flexibility, development of flexible planning, strengthening the psychological resilience of the team, and utilization of digital technologies. These measures aim not only to reduce the risk of enterprise bankruptcy but also to create resilience to future shocks, which is particularly relevant in crisis periods associated with military actions or political instability.

# CONCLUSIONS

During the writing of the paper, it was theoretically established that bankruptcy is one of the key elements of a market economy and an institution of civil and commercial law. To date, there are quite a variety of perspectives in scientific literature regarding the definition of the essence of bankruptcy, but there is no single approach to its interpretation. Moreover, there is a lack of certain systematization of these approaches, as authors use different meaningful terms when defining the concept of bankruptcy, such as "insolvency," "unpaid obligations," "crisis state," "insolvency." Based on literary generalization, it is determined that from an economic perspective, bankruptcy is the inability of a subject with significant debts to creditors and obligations to the budget to continue its entrepreneurial activities due to its economic unprofitability and lack of profitability. The factors contributing to its occurrence include external (economic, political, demographic) and internal (deficiency of own working capital, low level of production technology and organization, decreased efficiency of enterprise resource utilization, creation of excessive unfinished construction, unfinished production, production reserves, poor customer base of the enterprise, attraction of loan funds into the enterprise turnover on unfavorable terms, etc.).

A problematic aspect of researching the theoretical foundations of enterprise bankruptcy, alongside the imperfect terminology, is the absence of a clear classification of its types. Bankruptcy can manifest in four forms: intentional, real, concealed, and fictitious, each of which characterizes a specific state of enterprise insolvency and has certain negative consequences for the enterprise. The type of bankruptcy directly depends on the true cause of its occurrence, and accordingly, each type of bankruptcy is identified. Determining the type of bankruptcy is important not only for its economic assessment but also has legal significance.

It has been determined that among the existing bankruptcy prediction models, there is currently no methodology that can provide reliable results regarding the

bankruptcy of domestic enterprises. When using various methods and techniques for predicting bankruptcy probability, conflicting conclusions about the level of the enterprise's financial condition and the threat of bankruptcy are obtained.

Practical aspects of crisis management in the face of bankruptcy risk were considered using the example of LLC "KMP-Electro". In practice, foreign models for assessing bankruptcy probability are used, such as Altman's two-factor and five-factor models, as well as the Toffler model. According to the results of calculations using these models, it was concluded that, for the majority of presented models, the likelihood of bankruptcy at the enterprise in the near future is minimized. However, the five-factor Altman model yielded a high likelihood of bankruptcy. This is because LLC "KMP-Electro" lacks sufficient working capital to finance its current assets.

It has been found that the discussed bankruptcy prediction methodologies by foreign authors have several significant limitations for their use in Ukrainian enterprises, such as.

Most foreign methods for diagnosing bankruptcy probability use weighted coefficients of indicators calculated using American analytical data from past years; thus, they do not correspond to the current economic situation.

These models are not adapted to the domestic economy and do not consider the specifics of Ukrainian enterprises' activities, such as peculiarities in the accounting system and tax legislation, the impact of inflation on the formation of enterprise performance indicators, industry affiliation, and others.

The analyzed methodologies do not consider other important indicators of enterprise activity (methods are based on the use of balance sheet indicators and indicators of financial statements).

The models do not answer questions about which factors influenced the change in the level of the respective indicator; as a result of using these models, it is impossible to obtain information about the possible further development of the enterprise.

The presence of a significant number of drawbacks indicates the complexity of applying these models in domestic analytical practice. Therefore, it was proposed to use two Ukrainian models: the universal model by O.O. Tereshchenko and a model oriented towards the industry in which the enterprise specializes.

According to the results of the calculations, it can be stated that LLC "KMP-Electro" has a minimal probability of bankruptcy during 2021-2023. However, over time, the value of the integral indicator gradually decreases. This could lead to the emergence of corresponding crisis situations in the future. Such deterioration of the financial condition of the enterprise is caused by a decrease in overall profit, a decrease in profit from product sales, and a lack of working capital.

The results obtained from factor analysis revealed a negative trend in the return on equity indicator, which could lead to enterprise bankruptcy without prompt intervention. Factors posing a threat to the operation of LLC "KMP-Electro" include the downward trend in sales profitability.

It has been determined that the most effective measures to reduce the risk of bankruptcy for LLC "KMP-Electro" are: diversification of sales markets, cost optimization, enhancement of production flexibility, improvement of service quality, risk insurance, enhancement of financial flexibility, development of flexible planning, strengthening the psychological resilience of the team, and utilization of digital technologies. These measures aim to reduce the risk of enterprise bankruptcy and create resilience to future shocks, which is particularly relevant in crisis periods associated with military actions or political instability.

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# APPENDIXES

## Appendix A

## Balance Sheet (Statement of Financial Position) of LLC "KMP-Electro" as of December 31, 2022

| Assets | Line code | At the beginning of the reporting period | At the end of the reporting period |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| I. Non-current assets | | | |
| Intangible assets: | 1000 | 1767 | 1469 |
| initial value | 1001 | 12301 | 13540 |
| accumulated depreciation | 1002 | -10534 | -12071 |
| Incomplete capital investments | 1005 | 51422 | 34770 |
| Fixed assets: | 1010 | 1852675 | 1890799 |
| initial value | 1011 | 7360775 | 7451116 |
| Wear and tear | 1012 | -5508100 | -5560317 |
| Investment real estate | 1015 | | |
| Long-term financial investments: | | | |
| accounted for using the equity method in other enterprises | 1030 | 0 | 0 |
| other financial investments | 1035 | 14448 | 14447 |
| Long-term accounts receivable | 1040 | 19831 | 6289 |
| Deferred tax assets | 1045 | 0 | 0 |
| Total for section I | 1095 | 1940143 | 1947774 |
| II. Current assets | | | |
| Stocks | 1100 | 19923 | 21083 |
| Production stocks | 1101 | 19890 | 21073 |
| Unfinished production | 1102 | 9 | 10 |
| Final product | 1103 | 23 | 0 |
| Cargo | 1104 | 1 | 0 |
| Promissory notes received | 1120 | 0 | 0 |
| Accounts receivable for products, goods, works, services | 1125 | 150969 | 154682 |
| Accounts receivable by calculations:<br>on issued advances | 1130 | 35942 | 55205 |
| with a budget | 1135 | | |
| including income tax | 1136 | 0 | 0 |
| from accrued income | 1145 | 242 | 0 |
| Other current receivables | 1155 | 0 | 0 |
| Current financial investments | 1160 | 5244 | 6250 |

Continuation of Appendix A

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Money and its equivalents | 1165 | 39831 | 61738 |
| Cash | 1166 | | |
| Bank accounts | 1167 | 39831 | 61738 |
| Deferred expenses | 1170 | 512 | 635 |
| Other current assets | 1190 | 20586 | 20549 |
| Total for section II | 1195 | 274009 | 320142 |
| III. Non-current assets held for sale and disposal groups | 1200 | 104 | 0 |
| Balance | 1300 | 2214256 | 2267916 |
| Liabilities | Line code | At the beginning of the reporting period | At the end of the reporting period |
| I. Equity | | | |
| Registered (share) capital | 1400 | 64135 | 64135 |
| Capital in revaluations | 1405 | 0 | 0 |
| Additional capital | 1410 | 1184549 | 1161538 |
| Reserve capital | 1415 | 2161 | 3111 |
| Retained earnings (uncovered loss) | 1420 | 8539 | 86522 |
| Unpaid capital | 1425 | 0 | 0 |
| Withdrawn capital | 1430 | 0 | 0 |
| Other reserves | 1435 | 0 | 0 |
| Total for section I | 1495 | 1259384 | 1315306 |
| II. Long-term liabilities and collateral | | | |
| Deferred tax liabilities | 1500 | 327265 | 317230 |
| long-term bank credits | 1510 | 0 | 0 |
| Other long-term liabilities | 1515 | 416432 | 399748 |
| Long-term security | 1520 | 0 | 0 |
| Long-term staff costs | 1521 | | |
| Targeted financing | 1525 | 0 | 0 |
| Charity | 1526 | | |
| Total for section II | 1595 | 743697 | 716978 |
| III. Current liabilities and collateral | | | |
| Short-term bank credits | 1600 | 0 | 0 |
| Promissory notes issued | 1605 | 0 | 0 |
| Current debt on long-term liabilities: on long-term liabilities | 1610 | 0 | 0 |
| for goods, works, services | 1615 | 21444 | 28467 |
| according to calculations with the budget | 1620 | 8030 | 23266 |
| for including income tax | 1621 | | |
| according to insurance calculations | 1625 | 3514 | 3907 |
| according to payroll calculations | 1630 | 7866 | 8665 |
| on received advances | 1635 | 116403 | 120206 |

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| according to calculations with participants | 1640 | 1620 | 1762 |
| from internal calculations | 1645 | | |
| Current supplies | 1660 | 12033 | 11947 |
| Deferred commission income from reinsurers | 1665 | 1 | 1 |
| Other current commitments | 1690 | 40264 | 37411 |
| Total for section III | 1695 | 211175 | 235632 |
| IV. Liabilities related to non-current assets held for sale and disposal groups | 1700 | | |
| Balance | 1900 | 2214256 | 2267916 |

## Appendix B

## Balance Sheet (Statement of Financial Position) of LLC "KMP-Electro" as of December 31, 2023

| Assets | Line code | At the beginning of the reporting period | At the end of the reporting period |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| I. Non-current assets | | | |
| Intangible assets: | 1000 | 1469 | 1097 |
| initial value | 1001 | 13540 | 14419 |
| accumulated depreciation | 1002 | -12071 | -13322 |
| Incomplete capital investments | 1005 | 34770 | 37423 |
| Fixed assets: | 1010 | 1890799 | 1947806 |
| initial value | 1011 | 7451116 | 7448964 |
| Wear and tear | 1012 | -5560317 | -5501158 |
| Investment real estate | 1015 | | |
| Long-term financial investments: | | | |
| accounted for using the equity method in other enterprises | 1030 | 0 | 0 |
| other financial investments | 1035 | 14447 | 14447 |
| Long-term accounts receivable | 1040 | 6289 | 2546 |
| Deferred tax assets | 1045 | 0 | 0 |
| Total for section I | 1090 | 0 | 0 |
| II. Current assets | 1095 | 1947774 | 2003319 |
| Stocks | | | |
| Production stocks | 1100 | 21083 | 22958 |
| Unfinished production | 1101 | 21073 | 22940 |
| Final product | 1102 | 10 | 16 |
| Cargo | 1103 | 0 | 0 |
| Promissory notes received | 1104 | 0 | 2 |
| Accounts receivable for products, goods, works, services | 1120 | 0 | 0 |
| Accounts receivable by calculations:<br>on issued advances | 1125 | 154682 | 166625 |
| with a budget | 1130 | 55205 | 53893 |
| including income tax | 1135 | 0 | 0 |
| from accrued income | 1136 | | |
| from internal calculations | 1140 | 0 | 0 |
| Other current receivables | 1145 | 0 | 0 |
| Long-term financial investments:<br>which are accounted for using the equity method of other enterprises | 1155 | 6250 | 4440 |
| Current financial investments | 1160 | 0 | 0 |
| Money and its equivalents | 1165 | 61738 | 60793 |

Continuation of Appendix B

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Cash | 1166 | | |
| Bank accounts | 1167 | 61738 | 60793 |
| Deferred expenses | 1170 | 635 | 728 |
| Other current assets | 1190 | 20549 | 25111 |
| Total for section II | 1195 | 320142 | 334548 |
| III. Non-current assets held for sale and disposal groups | 1200 | 0 | 0 |
| Balance | 1300 | 2267916 | 2337867 |
| Liabilities | Line code | At the beginning of the reporting period | At the end of the reporting period |
| I. Equity | | | |
| Registered (share) capital | 1400 | 64135 | 64135 |
| Capital in revaluations | 1405 | 0 | 0 |
| Additional capital | 1410 | 1161538 | 1183740 |
| Reserve capital | 1415 | 3111 | 4180 |
| Retained earnings (uncovered loss) | 1420 | 86522 | 158476 |
| Unpaid capital | 1425 | 0 | 0 |
| Withdrawn capital | 1430 | 0 | 0 |
| Other reserves | 1435 | 0 | 0 |
| Total for section I | 1495 | 1315306 | 1410531 |
| II. Long-term liabilities and collateral | | | |
| Deferred tax liabilities | 1500 | 317230 | 285095 |
| long-term bank credits | 1510 | 0 | 0 |
| Other long-term liabilities | 1515 | 399748 | 355949 |
| Long-term security | 1520 | 0 | 0 |
| Long-term staff costs | 1521 | | |
| Targeted financing | 1525 | 0 | 0 |
| Charity | 1526 | | |
| Total for section II | 1595 | 716978 | 641044 |
| III. Current liabilities and collateral | | | |
| Short-term bank credits | 1600 | 0 | 0 |
| Promissory notes issued | 1605 | 0 | 0 |
| Current debt on long-term liabilities:<br>on long-term liabilities | 1610 | 0 | 0 |
| for goods, works, services | 1615 | 28467 | 52636 |
| according to calculations with the budget | 1620 | 23266 | 25519 |
| for including income tax | 1621 | | |
| according to insurance calculations | 1625 | 3907 | 3586 |
| according to payroll calculations | 1630 | 8665 | 8069 |
| on received advances | 1635 | 120206 | 144373 |

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| according to calculations with participants | 1640 | 1762 | 1829 |
| from internal calculations | 1645 | | |
| Current supplies | 1660 | 11947 | 13399 |
| Deferred commission income from reinsurers | 1665 | 1 | 107 |
| Other current commitments | 1690 | 37411 | 36774 |
| Total for section III | 1695 | 235632 | 286292 |
| IV. Liabilities related to non-current assets held for sale and disposal groups | 1700 | | |
| Balance | 1900 | 2267916 | 2337867 |

# Appendix C

## Statement of Financial Results (Statement of Comprehensive Income)

## LLC "KMP-Electro" for 12 months of 2022

### I. Financial Results

| Item | Line code | For the reporting period | For the same period of the previous year |
|---|---|---|---|
| Net income from sales of products (goods, works, services) | 2000 | 1912967 | 1882131 |
| Cost of goods sold (goods, works, services) | 2050 | (1855742) | ( 1747163 ) |
| Gross profit | 2090 | 57225 | 134968 |
| Gross: damage | 2095 | ( 0 ) | ( 0 ) |
| Other operating income | 2120 | 32464 | 33991 |
| Administrative expenses | 2130 | ( 42338 ) | ( 40160 ) |
| Selling expenses | 2150 | ( 0 ) | ( 0 ) |
| Other operating expenses | 2180 | ( 46887 ) | ( 63493 ) |
| The financial result from operating activities: profit | 2190 | 464 | 65306 |
| The financial result from operating activities: loss | 2195 | ( 0 ) | ( 0 ) |
| Income from equity participation | 2200 | 0 | 0 |
| Other financial income | 2220 | 0 | 0 |
| Other income | 2240 | 7505 | 6149 |
| Financial expenses | 2250 | ( 0 ) | ( 0 ) |
| Losses from equity participation | 2255 | ( 0 ) | ( 0 ) |
| Other expenses | 2270 | ( 2651 ) | ( 2685 ) |
| Pre-tax financial result: profit | 2290 | 0 | 68770 |
| Pre-tax financial result: loss | 2295 | (782 ) | ( 0 ) |
| Expenses (income) from income tax | 2300 | ( 0 ) | ( 49764 ) |
| Net financial result: profit | 2350 | 0 | 19006 |
| Net financial result: loss | 2355 | (782) | ( 0 ) |

## II. Comprehensive income

| Item | Line code | For the reporting period | For the same period of the previous year |
|---|---|---|---|
| Revaluation (depreciation) of non-current assets | 2400 | 0 | 0 |
| Revaluation (depreciation) of financial instruments | 2405 | 0 | 0 |
| Accumulated exchange rate differences | 2410 | 0 | 0 |
| Share of other comprehensive income of associates and joint ventures | 2415 | 0 | 0 |
| Other total income | 2445 | 0 | 0 |
| Other aggregate pre-tax income | 2450 | 0 | 0 |
| Income tax related to other comprehensive income | 2455 | 0 | 0 |
| Other total income after tax | 2460 | 0 | 0 |
| Total income (sum of lines 2350, 2355, and 2460) | 2465 | (782) | 19006 |

**Appendix D**

**Statement of Financial Results (Statement of Comprehensive Income)**

**LLC "KMP-Electro" for 12 months of 2023**

## I. Financial Results

| Item | Line code | For the reporting period | For the same period of the previous year |
|---|---|---|---|
| Net income from sales of products (goods, works, services) | 2000 | 2401911 | 1912967 |
| Cost of goods sold (goods, works, services) | 2050 | ( 2298102 ) | (1855742) |
| Gross profit | 2090 | 103809 | 57225 |
| Gross: damage | 2095 | ( 0 ) | ( 0 ) |
| Other operating income | 2120 | 30093 | 32464 |
| Administrative expenses | 2130 | ( 46298 ) | ( 42338 ) |
| Selling expenses | 2150 | ( 0 ) | ( 0 ) |
| Other operating expenses | 2180 | ( 40616 ) | ( 46887 ) |
| The financial result from operating activities: profit | 2190 | 46988 | 464 |
| The financial result from operating activities: loss | 2195 | ( 0 ) | ( 0 ) |
| Income from equity participation | 2200 | 0 | 0 |
| Other financial income | 2220 | 0 | 0 |
| Other income | 2240 | 9571 | 7505 |
| Financial expenses | 2250 | ( 0 ) | ( 0 ) |
| Losses from equity participation | 2255 | ( 0 ) | ( 0 ) |
| Other expenses | 2270 | ( 2022 ) | ( 2651 ) |
| Pre-tax financial result: profit | 2290 | 54537 | 0 |
| Pre-tax financial result: loss | 2295 | ( 0 ) | (782 ) |
| Expenses (income) from income tax | 2300 | ( 38154 ) | ( 0 ) |
| Net financial result: profit | 2350 | 16383 | 0 |
| Net financial result: loss | 2355 | ( 0 ) | (782) |

## II. Comprehensive income

| Item | Line code | For the reporting period | For the same period of the previous year |
|---|---|---|---|
| Revaluation (depreciation) of non-current assets | 2400 | 0 | 0 |
| Revaluation (depreciation) of financial instruments | 2405 | 0 | 0 |
| Accumulated exchange rate differences | 2410 | 0 | 0 |
| Share of other comprehensive income of associates and joint ventures | 2415 | 0 | 0 |
| Other total income | 2445 | 0 | 0 |
| Other aggregate pre-tax income | 2450 | 0 | 0 |
| Income tax related to other comprehensive income | 2455 | 0 | 0 |
| Other total income after tax | 2460 | 0 | 0 |
| Total income (sum of lines 2350, 2355, and 2460) | 2465 | 16383 | (782) |