

DOI: [10.55643/fcaptp.6.53.2023.4242](https://doi.org/10.55643/fcaptp.6.53.2023.4242)
Zenovii-Mykhailo Zadorozhnyi

D.Sc. in Economics, Professor, Head of the Department of Accounting and Taxation, West Ukrainian National University, Ternopil, Ukraine;
 ORCID: [0000-0002-2857-8504](https://orcid.org/0000-0002-2857-8504)

Svitlana Zhukevych

Candidate of Economy Sciences, Associate Professor of the Department of Accounting and Taxation, West Ukrainian National University, Ternopil, Ukraine;
 ORCID: [0000-0002-6088-6232](https://orcid.org/0000-0002-6088-6232)

Tetiana Portovaras

Candidate of Economy Sciences, Doctoral Student of the Department of Accounting and Taxation, West Ukrainian National University, Ternopil, Ukraine;
 e-mail: tanyavilas77777@gmail.com
 ORCID: [0000-0002-2939-5101](https://orcid.org/0000-0002-2939-5101)
 (Corresponding author)

Victoria Rozelyuk

D.Sc. in Economics, Professor of the Department of Accounting and Taxation, West Ukrainian National University, Ternopil, Ukraine;
 ORCID: [0000-0002-2298-6160](https://orcid.org/0000-0002-2298-6160)

Natalia Zhuk

PhD in Economics, Senior Teacher of the Department of Financial and Economic Security, Educational and Scientific Humanitarian Institute, National Academy of the Security Service of Ukraine, Kyiv, Ukraine;
 ORCID: [0000-0003-3860-5489](https://orcid.org/0000-0003-3860-5489)

Iryna Nazarova

Candidate of Economy Sciences, Associate Professor of the Department of Accounting and Taxation, West Ukrainian National University, Ternopil, Ukraine;
 ORCID: [0000-0001-8942-3998](https://orcid.org/0000-0001-8942-3998)

Received: 05/11/2023

Accepted: 14/12/2023

Published: 31/12/2023

© Copyright
 2023 by the author(s)



This is an Open Access article distributed under the terms of the [Creative Commons CC-BY 4.0](https://creativecommons.org/licenses/by/4.0/)

ANALYSIS OF RISKS IN THE FINANCIAL SECURITY MANAGEMENT SYSTEM OF BUSINESS ENTITIES

ABSTRACT

Financial and economic activity is exposed to numerous systemic risks, which are a threat to the financial security of enterprises. The criterion for ensuring financial security is the appropriate level of the company's financial condition. The financial condition of the enterprise is a complex concept and is characterized by the system of indicators – financial coefficients: indicators of liquidity, financial stability, business activity, and management efficiency. The interrelationship and mutual determination between the indicators that cause the occurrence of risk when one of them changes is established.

A range of factors that comprehensively characterize the financial and economic activity of the enterprise has been determined and developed risk analysis and assessment methodology, which includes the following stages: preparatory stage; construction of an algorithm for quantitative assessment of risk in the financial security system; interpretation of the results of an integrated risk assessment in the financial security system; determining the priorities of risk management in the system. The methods of financial analysis (horizontal, vertical, coefficient, analysis of business activity and financial stability) were applied and a quantitative assessment of risks was carried out. The indicators-coefficients of the enterprise's functioning are calculated and given an interpretation.

The conclusion was formed that the construction of an effective risk management system and its universal functional component of risk analysis are current issues, as they allow to develop a set of measures to minimize threats and risks of conducting financial and economic activities of economic entities. Therefore, the correct assessment of risk with the help of the proposed methods and models of financial analysis for individual economic situations and business entities is effective and has value, as it gives the opportunity to make the optimal decision in specific situations and characterizes the criterion feature of financial security of industrial enterprises – liquidity, financial stability, business activity, profitability.

Keywords: risks, analysis, management, financial security of enterprises, analytical methods, financial analysis

JEL Classification: G01, G21, G28, G32

INTRODUCTION

Financial and economic activity in conditions of social, economic, military and political instability is exposed to systemic risks. Riskiness is displayed on the system of national interests, and the security of the state and business entities. The concept of risks is existential because it is related to a person's awareness of the presence of dangers. In the modern understanding, risks are associated with responsibility for the decisions made and due to the complication of social existence and activities caused by variability, instability, and force majeure circumstances of management.

Implementation of effective management and achievement of the goals of financial and economic activity requires prediction, monitoring, taking into account current and future risks. For this, a whole complex of methods and system calculations is used, the application of which will make it possible to avoid the crisis.

The main goal of risk management is to ensure the financial security of the enterprise in the process of development and prevent a possible decrease in its market value, which is determined by the level of financial condition. In anti-crisis management, a number of tasks are solved: identification of dangerous risks that threaten financial security and areas of financial and economic activity that they affect; a comprehensive objective assessment of the probability of crisis events and possible costs and losses caused by them; minimization of risks in relation to the projected level of profitability of financial activities; minimization of probable financial losses in the event of a risky event.

However, the lack of an adaptive approach and the underestimation of the impact of financial risks by enterprises negatively affect the effectiveness of their activities and financial condition. A particularly effective method of risk assessment is the use of quantitative methods of financial analysis, which requires thorough research and determines the relevance of the article.

LITERATURE REVIEW

In scientific thought, there are variable views on the meaning of the category "risk", studies of which are available as one of the prerequisites on the way to defining the special concept of "financial risk" in the context of ensuring financial security. Risk is a complex phenomenon characterized by disagreements and opposites in its real manifestation and causes the existence of a significant number of definitions of risk from different points of view. The Oxford dictionary notes that the word "risk" as a tendency to reward or willingness to fail, primarily in a commercial business, appeared in Italy at the beginning of the 17th century (*risiorishio*) and later migrated to France (*risqué*), from where it arrived in the middle of the 18th century to the written sources of England [15].

The modern paradigm of risk management, the formation of which has received intensive development since the beginning of the 20th century, is based on the works of mainly American researchers and covers numerous characteristics related mainly to the practical aspects of their use in various fields of economic activity. Risk theories stand out among them: H. Markowitz [12], as "modern portfolio theory". Markowitz H. was the first to build an economic-mathematical model of the problem of choosing the optimal portfolio structure, including the factor of uncertainty and the risk generated by it. Scientists were also offered a theoretical and probabilistic formalization of the concepts of "profit rate" and "risk".

The influence of Markowitz's "portfolio theory" significantly strengthened after the appearance of the works of the American economist Tobin J. [20] on similar issues, and is, in fact, a macroeconomic approach. The scientist proposed to include in the analysis risk-free assets – government bonds, and the main object of his research was the distribution of aggregate capital in the economy between its two forms: cash (money) and non-cash (in the form of securities). In addition, Tobin J. analyzed the adequacy of the quantitative characteristics of assets and portfolios, which are the initial data for Markowitz's theory.

The studies of Sharpe W. [19], Lintner J. [10] and Mossin J. [13] are devoted to the creation of the Capital Asset Price Model, which is a macroeconomic generalization of Markowitz's theory. The main result of the CAPM is to establish the relationship between the return and the risk of an asset in an equilibrium market. Ross S. [17] proposed an alternative model for the valuation of capital assets – the APM (Arbitrage Pricing Model), which assumes that the ratio between expected return and risk should be such that no individual investor can obtain unlimited income from a pure arbitrage agreement.

The scientific work of Herasymenko O.M. is devoted to the study of the evolution of the formation of risk management in different countries of the world, its key stages of development and features, as well as historical approaches to risk assessment [6]. The evolutionary stages of risk management are based on large-scale world events in the financial and economic spheres. Having made a theoretical generalization that, the decision-making process in the economy at all levels of management takes place in the conditions of the constant presence of risks, the author singles out three main groups of causal factors: ignorance, randomness and countermeasures. Herasymenko O.M. at risk understands: "the probability of losing part of one's resources, not receiving income or incurring additional costs." Therefore, any kind of analysis and evaluation should be carried out taking into account the risks [6].

Berezianko T.V., Kostyrytsia O.V., and Doroshenko V.O. explore risk as "an activity associated with overcoming uncertainty in a situation of inevitable choice, in the process of which it is possible to quantitatively and qualitatively assess the probability of achieving the intended result, failure or deviation from the goal" [3]. In the conditions of military-pandemic threats, the issue of risk assessment becomes especially relevant, which is reflected in the increase in the number of scientific works on this topic in recent years. For example, Zhang Yantai [28] investigated the impact of economic and informational globalization on business development with the simultaneous growth of risks and problems. The scientist

revealed the prospects for the development of network technologies and big data, which generate a system of risks and threats, the need for management and analysis of which is justified in the context of big data.

Scientists Tomashuk I.V., and Tomashuk I.O. [21] prove the need to develop and implement effective tools for analyzing the probability of financial risks that can potentially arise in the process of financial and economic activity and affect the financial and economic security of the enterprise. With the help of methods of systematic analysis of financial security in combination with an analytical study of risks, the authors obtained scientific confirmation of the hypothesis that there is a clear, structural connection between the level of risks and the financial and economic security of economic entities.

In economic literature, there are the following approaches to the nature of risk definition: subjective, objective, and subjective-objective. Arguing the position that management decisions are made by a person or a team that enters into subjective relations taking into account objective conditions, it is advisable to adhere to the opinion regarding the subjective-objective nature of risk. At the same time, the amount of risk is a form of qualitative-quantitative expression of actually existing factors of uncertainty. Therefore, due to the fact that risk in conditions of uncertainty and a difficult situation creates the need to choose among a set of alternatives and calculate the probable result, it is a dialectical unity of the objective and the subjective. The relationship and interaction of the main elements of risk reflect its content. The team of authors Bereziianko T.V., Kostrytsia O.V., and Doroshenko V.O. distinguish the following signs of risk:

- uncertainty, one of the methods of "removal" of which is risk and which constitutes ignorance of the reliable, lack of unambiguity;
- the contradiction, which consists in the fact that, on the one hand, risk is aimed at obtaining socially significant results in extraordinary, new ways, in conditions of uncertainty and a situation of inevitable choice, on the other hand, risk leads to adventurism, voluntarism, subjectivism, etc.;
- alternative, which is related to the fact that the risk involves the need to choose from two or more possible solutions, options, directions, actions;
- absence of alternative means absence of risk [3].

One more characteristic of risk can be distinguished as a phenomenon that characterizes mostly the future, but not neglecting the past and present. This is explained by the fact that all events of the past in one way or another leave an imprint on the events of the future, provide experience, and contribute to establishing the causes and conditions that cause the occurrence and realization of risks, for their prevention and minimization in the future.

In the "portfolio" of risks, a significant place is occupied by financial risks, which are also called "speculative risks, where both a positive and a negative result are possible, the feature of which is the probability of receiving a loss as a result of risky transactions" (Karpyshyn N., Zhukevych S. [8]). According to the team of authors, financial risk is the result of a choice by owners or managers from among alternative financial solutions, which are aimed at achieving the desired target result of financial activity with the possibility of incurring economic damage (financial losses) due to the uncertainty of the conditions for its implementation (Hnylytska L. and others [7]).

However, the study of financial security is not limited to taking into account only the financial risks that are inherent in the financial activities of the enterprise, because the threat to its security can be the realization of both financial risk and risk in operational or investment activities. Therefore, it is appropriate to support the opinion of Parfentii L., who defines that "risk in the financial security system is the probability of negative financial consequences (economic loss or financial losses) of his actions due to his miscalculations or due to the unpredictability and uncontrollability of certain factors", justifying this the fact that in the "system of financial security, risks can be associated with various types of enterprise activity" [16].

In the article Zhao Yu, Du Huaming [20] carried out a review of the literature (more than 300 articles) that highlights the issue of modeling corporate risks for the period from 1968 to 2022, which makes it possible to summarize and systematize the existing studies of financial risks of enterprises and to interpret the mechanisms and strategies of their analysis, research concepts. Knowledge of current advanced research, according to the authors, will allow for developing opportunities for modelling corporate risks in the future. Authors Aryati Titik, Khomsiyah K., and Harahap Cicely [1] conducted a bibliographic study of 510 enterprise risk management (ERM) documents from the Web of Science Core Collection (WOS-CC) database from 2004 to 2023. Having identified the main trends, the activity of individual scientists and the influence of the journal "Journal of Risk and Financial Management", the authors proposed international cooperation in risk research.

Cheng Jinfeng [5] claims that in the conditions of change and rapid development, the financial condition has priority, and the prevention of financial risks has become especially relevant. Forecasting the financial risks of business entities with the help of large databases allows systematization and analysis of data, which contributes to forecasting, prevention of risks based on an understanding of their importance, formalization and algorithmization of the financial risk model by means of

determining and comparing financial ratios with other enterprises in the industry. The application of methods and models of quantitative determination and forecasting can prevent the occurrence of financial risks.

The importance of applying methods and techniques of financial analysis for early prediction and prevention of risks is substantiated in the article by Cheng Huifang, and Zhang Xishuan [4]. The authors emphasize that financial analysis, as an information base for management decision-making, cannot be ignored. After all, the financial condition is the basis of the enterprise's vital activity, and a quick and effective analysis of the enterprise's condition is an informational support for investors, creditors, and other stakeholders in making decisions about the potential of the enterprise. The development of intelligent methods such as the neural network of associative memory, and the study of decision support in financial analysis based on artificial intelligence is receiving increasing attention from scientists and management. Effective and accurate forecasting helps enterprises to predict possible financial risks in the future, to prevent the occurrence of problems and to take effective measures to minimize losses related to risks.

The article uses a research method of cross-integration of various disciplines and organically integrates key theories, methods and technologies of default risk management, theory analysis of financial indices (coefficient analysis), and intellectual analysis of big data using computer software products. Analysis of corporate risks arising from interaction with external agents of innovative products was carried out by Santos Ricardo et al [18]. The study proposes to systematize risks, the process of their identification and risk analysis of enterprises involved in the development of open product innovations. Usykova O. [22], investigating the issue of methodology for assessing the impact of risks on the supply chain, highlighted the relationship between the probability of their occurrence in the supply using risk maps and mathematical modelling. In Yuan Yaoyao's [23] study, the main focus is on the analysis of enterprise business processes, information systems and management. The author analyzed the risks associated with information security, protection of confidentiality and data quality, which are associated with computerization of accounting. The influence of risks on the promotion of one's own brand is studied by Chinese scientists Zhang Tao, Wang Hejin, Gao Zehua, and Zhang Anqi [27], who concluded that it is necessary to effectively identify, predict, warn and control risks at the stage of building an enterprise brand. Researchers Babukh I., and Fen K. [2] analyze risks in the marketing activities of the enterprise and come to the conclusion that diagnosing risks allows for minimizing their negative consequences. The domestic market with its specific characteristics creates a whole system of marketing risks for Ukrainian enterprises, and modern analysis and development of a set of special measures based on it will allow enterprises of the Ukrainian economy to develop them and strengthen their market positions. Zhang Shirui [26], justifying the importance and necessity of taking risks into account in management activities, suggests forecasting and controlling financial risks using regression analysis in order to best identify them.

Despite the importance and necessity of studying the riskiness of activities in the management of the financial security of enterprises, domestic scientists pay insufficient attention to the analytical assessment of risks.

AIMS AND OBJECTIVES

The aims of the article are to research the theory of risks and the main approaches, methods and models qualitative and quantitative measurement, assessment and analysis of risks that affect the level of financial security of enterprises. The hypothesis of the study is the positioning of financial analysis as an element of ensuring the financial security of enterprises in the part of comprehensive qualitative and quantitative measurement of risks, which allows them to be predicted, and recognized in certain areas of financial and economic activity and to make timely decisions regarding the application of measures to prevent or mitigate the impact of risks on efficiency entrepreneurial activity.

To achieve the aim, it is necessary to research the main theoretical approaches to the category of "risk"; to systematize the system of risks affecting the activities of enterprises; apply methods of financial analysis to assess and quantify risks to the financial condition and, accordingly, to the financial security of enterprises.

METHODS

An analytical study of the company's financial security involves an assessment of risks, the implementation of which is possible using quantitative and qualitative methods. Qualitative methods identify factors and circumstances leading to risk situations.

However, for risk management at enterprises in the context of ensuring their financial security, quantitative assessment is important, which makes it possible to choose the optimal solution from a set of alternatives, taking into account the smallest costs and losses and the possibility of preventing or minimizing risk.

Working out a number of literary sources on methods and models of risk definition and assessment allowed applying a methodical approach using methods of financial analysis, namely: horizontal, vertical, comparative, and ratio analysis.

It should be noted that the complexity and rapidity of economic conditions impose new requirements on the methodological base and its technical support. The application of economic and mathematical methods for risk analysis in the context of ensuring the financial security of enterprises with the aim of developing or adapting a complex indicator that allows to assess the level of risk is determined by the formation and use of financial potential.

An important component of the risk management mechanism is the system of financial risk analysis. Financial risk analysis is a process of researching the conditions, and factors of the external and internal environment of the enterprise, which affect the financial condition, determining the main results of financial activity and the level of financial security of the enterprise for the purpose of monitoring, diagnosis, identification, analysis and objective assessment of financial risks. The main components of the risk analysis methodology in the context of financial security should be those depicted in Figure 1.

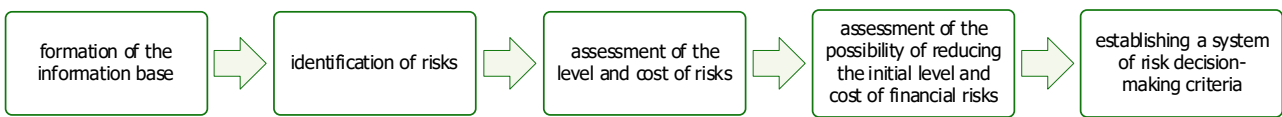


Figure 1. The main stages of the analytical study of risk in the system of financial security of enterprises.

The effectiveness of risk analysis is ensured by its information base, which contains data about the dynamics of external environment factors and the market situation in terms of its individual segments; financial stability and solvency of potential debtors; financial potential of investment partners; portfolios of offered insurance products and their rating, etc. In addition, the quality and completeness of information are important for identifying certain types of risks; generalization and construction of the necessary series of dynamics (assessment of the risk of inflation, exchange rates, interest rates); estimates of the amounts of financial losses with the same price policy; reliability of information sources. Undoubtedly, the use of insufficient and poor-quality information is a prerequisite for subjective vision and assessment of the level of risks and, accordingly, reduces the effectiveness of management decisions.

Risks are identified by dividing them into systematic (market) and unsystematic (specific). Among the market ones, they are distinguished: interest rate, currency and price risks. Since the market environment is characterized by a significant number of factors and unforeseen situations, therefore, practical activities are mostly limited to specific risks that are inherent in a certain type of financial and economic activity. Namely: reduction of financial stability of the enterprise, insolvency, credit, innovation, investment, and deposit risks.

The most difficult stage of risk analysis, which requires modern methodological tools, high-level technical and software, as well as qualified expert analysts, is the assessment of risks in the financial security system, especially the group of risks that is implemented in conditions of uncertainty and instability. At the same time, it is important to determine the amount of losses (loss), which is defined as "the maximum possible when carrying out a financial transaction or a certain type of activity without taking into account possible measures to neutralize the negative consequences of financial risk" [9].

Loss of expected profit, income or capital, the size of which is determined by the nature of financial transactions, the amount of assets (capital) involved in them and the maximum level of income from similar transactions. Taking into account the permissible limits of risk, it is advisable to highlight possible types of risk with the following restrictions (Table 1).

Table 1. Risk limits and their criteria.			
№	Types of risk	Criteria	Constituents
1	Tolerable risk R_d	$R_d < R$	R is the average level of risk in the economy Rmax is the maximum risk limit
2	Critical risk R_{kr}	$R_d < R_{kr} < R_{max}$	
3	Catastrophic risk R_{kat}	$R_{kat} > R_{max}$	

The level of risk of financial stability of enterprises and its change is monitored by changes in the integral indicator generated from indicators that reflect resource capabilities and results of financial and economic activity. The integral indicator of financial risk is an appropriate economic-mathematical model, which is an effective means of researching the structure of the task of assessing the level of risk, quantitatively takes into account the nature of the relationship between the

function and the set of factors, with a sufficient probability for the analyst, it makes it possible to forecast the expected level of financial risk as an individual enterprise, as well as a set of enterprises, with its help to find fundamentally new strategies for the development of enterprises [24].

Diagnostics and monitoring the level of financial risk of enterprises, using integral indicators, makes it possible to better analyze the financial security and functioning of enterprises, as well as to forecast financial indicators, with the aim of developing alternative development scenarios and taking them into account in the development or revision of the strategy of business entities in the market space.

RESULTS

Since the criterion for ensuring financial security is the financial condition of enterprises, accordingly, it is a reflection of the manifestation of financial risks. The financial condition of an enterprise is a complex concept determined by a system of indicators: financial stability, liquidity, business activity, capital structure, and operational efficiency. Moreover, there is a relationship and mutual determination between the indicators, which causes the occurrence of risk when one of them changes [11]. Thus, "financial stability reflects the change in the risk of the enterprise in accordance with the change in the share of loan capital, and liquidity, profitability and risk are not only closely related but also give rise to the "main financial contradiction" [30]. In the case of an increase in the company's debt share in the capital structure, there is a risk of increasing the influence of financial leverage, but at the same time, there is an increase in the company's profitability. An increase in profitability also involves the risk of non-payments and receivables, which, in turn, lowers the level of liquidity. A decrease in the share of short-term liabilities leads to an increase in liquidity and a decrease in the risk of repayment of liabilities in the situation of current insolvency (Figure 2).

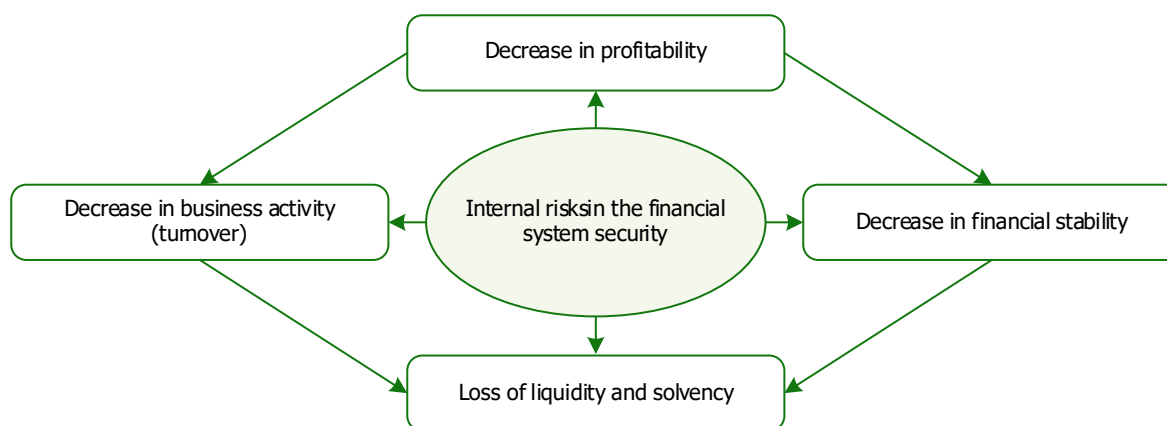


Figure 2. Components of risk in the financial security system and their relationship.

Therefore, it is advisable to assess the risk in the system of financial security of enterprises according to the following groups: financial stability; liquidity and solvency; business activity; profitability.

Having determined the necessary range of factors that comprehensively characterize the financial and economic activity of the enterprise, the proposed analysis and assessment of risks in the financial security system, the criterion of which is the financial condition of the enterprise. The tested technique involves the following stages of implementation, which are shown in Figure 3.

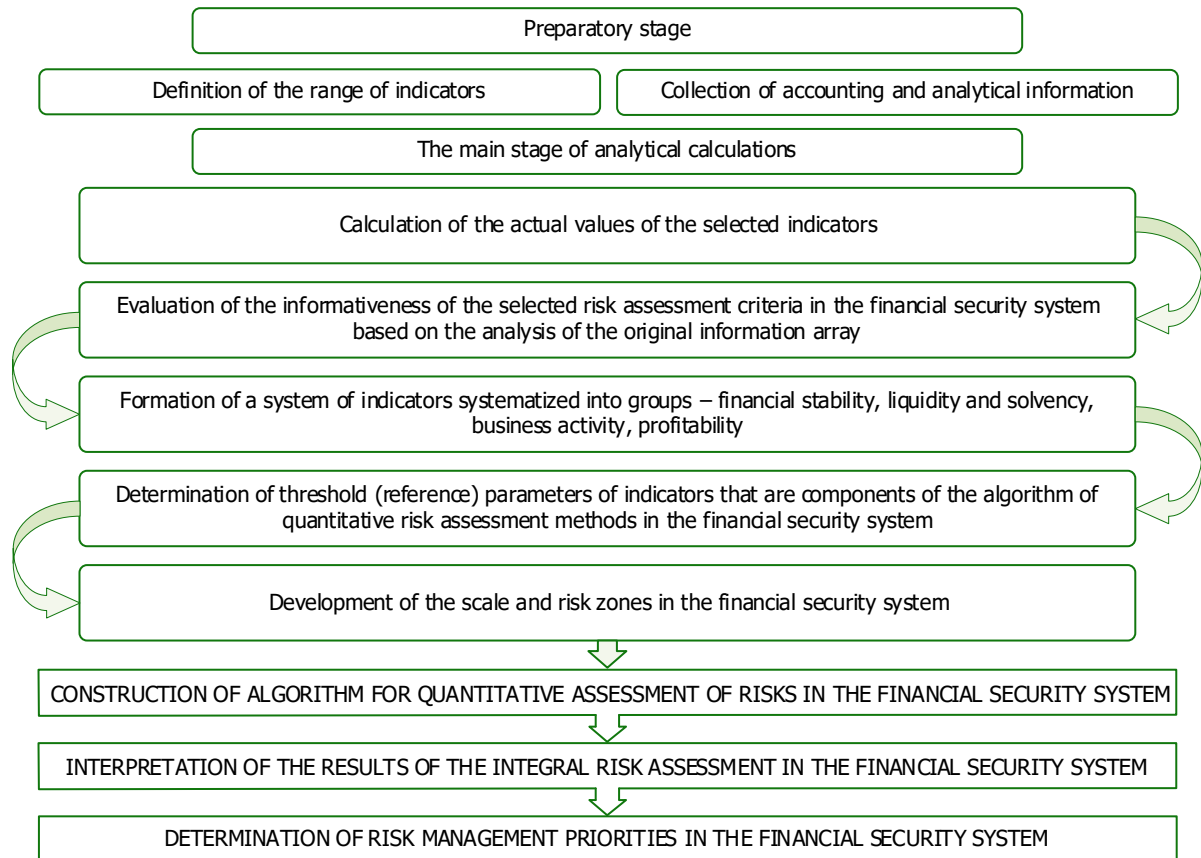


Figure 3. Components of quantitative assessment and analysis of risks in the financial security system.

The preparatory stage covers the definition of a system of indicators, which are indicators of the level of risk in the financial security system. The expediency and necessary number of determined indicators are substantiated by studies of regulatory instructional and scientific sources with the use of financial indicators that determine the degree of risk generation, their impact on financial and economic activity and financial security, taking into account the sectoral characteristics of enterprises. Note that the indicators that will be part of the calculations are indicators of public financial reporting – the Balance Sheet (Statement of Financial Condition) and the Statement of Financial Results (Statement of Total Income) [25].

The main requirements for indicators are: to be relative (coefficients), to be measured in fractions of a unit (or percentages), and to have the same directionality (that is, an increase in coefficients means an improvement in the financial condition and a decrease in the level of risk), to allow for their space-time comparison, and to be present in most methodological developments.

The main stage of analytical calculations should include the following components:

- calculation of the determined indicators, grouping of the actual values of the received information by importance;
- construction of hierarchical relationships of quantitative assessment on the basis of the formed system of indicators, which are determinants of the financial condition and determination of the overall integrated assessment of the potential and level of risk in the system of financial security;
- determination of threshold (reference) values of indicators selected for risk assessment of coefficients with which their actual values in dynamics are compared. References are considered to be: average values of indicators recommended by scientists, taking into account industry specifics, proposed by regulatory and instructional documents, determined by experts, and maximum achieved by the enterprise. Establishing benchmarks makes it possible to assess the stability of the financial condition of food industry enterprises, determine the nature of its changes in accordance with business processes, identify the factors and the nature of the impact on the results of operations, and develop measures to ensure financial security;
- delineation of the boundaries of the proposed risk states in the financial security system, among which the following zones are distinguished: risk-free, permissible risk, critical and catastrophic risk.

Risk assessment is carried out using the developed economic-mathematical model using the system of financial indicators, clarification of the dependence of parameters, with further determination of their hierarchy, formation of the function of goals and criteria, outline of the model of the coefficient of risk level assessment in the financial security system.

The interpretation of the obtained results of the integral assessment makes it possible to determine the main factors that determine the amount of risk in the financial security system.

Delineation of priorities in risk management using a step-by-step analysis and assessment of the potential function of financial stability is necessary for the generation of measures to increase the level of financial security of the enterprise.

Taking into account the methodology of determining the main determinants of financial security, which is determined by the financial condition, a hierarchy of the system of indicators – financial coefficients of enterprises according to the following groups was formed (Figure 4).

Liquidity indicators	<ul style="list-style-type: none"> · Absolute liquidity ratio · Quick liquidity ratio · Coverage ratio
Indicators of financial stability	<ul style="list-style-type: none"> · Coefficient of financial independence · Financial risk factor · Coefficient of maneuvering
Indicators of business activity (turnover)	<ul style="list-style-type: none"> · Asset turnover ratio · Inventory turnover ratio · Accounts receivable turnover ratio · Accounts payable turnover ratio
Profitability indicators	<ul style="list-style-type: none"> · Return on assets · Return on equity · Net return on sales

Figure 4. Indicators of quantitative assessment of enterprise risks.

The developed indicators for risk assessment in the financial security system objectively reflect financial and economic activity and take into account the industry specifics of enterprises. Accounts receivable and payables have a significant specific weight in the studied enterprises. Therefore, it is advisable to pay special attention to turnover indicators (in particular, receivables and payables) in order to maintain the self-financing of activities at an appropriate level.

It is important to have reference values. After all, analytical coefficients calculated from financial statements are useful for their use and spatial-temporal analysis only if there are criteria with the limit values of which these coefficients can be compared.

It should be noted that there are recommended values for liquidity and financial stability ratios. Indicators of profitability and business activity (turnover) are evaluated according to their dynamics, according to which it is possible to characterize financial and economic activity. In this case, the reference values will be the maximum achieved values. Since the negative value of the financial result of activity (loss) is not always determined by the influence of risk factors, the lower level should not be a negative value (<0). Sufficient cash to pay income tax and loan interest determines the same level of security.

The main methods of quantitative risk assessment are methods of financial analysis – horizontal, vertical, ratio, analysis of business activity and financial stability. The calculated indicators-coefficients based on the data of the investigated enterprise – Public joint-stock company "TerA" are systematized in Table 2.

Table 2. Performance indicators of PJSC "TerA" and their analysis.

№	Indexes	Normative values	Years			Deviation	
			2020	2021	2022	22/21	22/20
1	Coefficient of financial independence (equity security)	0.5 ↑	-0.231	-0.179	-0.095	0.084	0.136
2	Coefficient of financial dependence	0.5-1	-4.338	-5.589	-10.560	-4.972	-6.223
3	Loan capital concentration ratio	↓	1.231	1.179	1.095	-0.084	-0.136
4	Financial risk factor	< 1 ↓	-5.338	-6.589	-11.560	-4.972	-6.223
5	Coefficient of financial stability	>1	-0.187	-0.152	-0.087	0.065	0.101
6	Investment ratio	> 1	-0.715	-0.460	-0.380	0.079	0.335
7	Amount of own working capital (own working capital)	↑	-5598.0	-7016.0	-7265.0	-249.0	-1667.0
8	Coefficient of maneuvering	↑	2.398	3.175	3.629	0.454	1.23
9	Stock coverage ratio	> 0.6-0.8	-0.129	-1.476	-0.972	0.504	-0.843
10	The coefficient of provision of current assets with own working capital	↑	-1.715	-1.460	-1.380	0.079	0.335
11	Current liquidity ratio	1-2 ↑	0.551	0.518	0.686	0.168	0.135
12	Quick liquidity ratio (2nd level liquidity)	0.6-1 ↑	-2.920	0.192	0.363	0.171	3.283
13	Absolute liquidity ratio	0.2-0.6 ↑	0.069	0.024	0.052	0.027	-0.017
14	Interest coverage ratio	↑	0.0	1.0	2.0	1.0	2.0
15	Profitability of sales turnover (goods, works, services)	↑	0.0	0.004	0.003	-0.002	0.003

The obtained results of the coefficient analysis indicate a high risk of the capital structure of PJSC "TerA" (Table 2) and, accordingly, a low level of financial stability and financial security. Thus, the investigated company PJSC "TerA" has a negative value of equity in 2020-2022 (Figure 5). However, the implementation of financial and economic activities without the involvement of bank loans indicates an acceptable level of capital structure risk in the activities of PJSC "TerA". The financing of merchandise stocks is carried out using only merchandise credit.

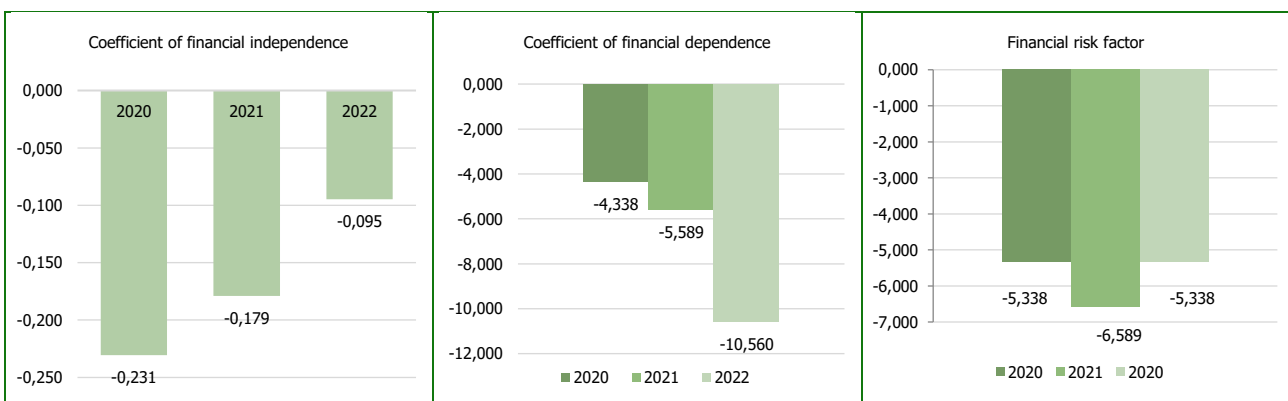


Figure 5. Dynamics of indicators of financial sustainability of PJSC "TerA" for 2020-2022. (Source: calculated on the basis of public financial reporting indicators from the official website of PJSC "TerA" [14])

There is a risk of liquidity since the liquidity coefficients close to the normative values were provided mainly at the expense of the commodity component (Figure 6).

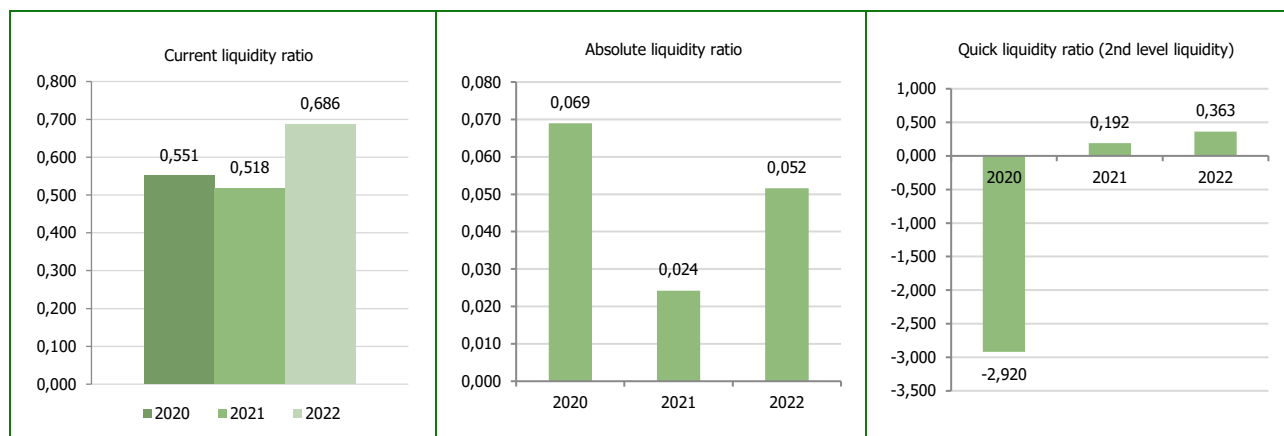


Figure 6. Dynamics of liquidity indicators of PJSC "TerA" for 2020-2022. (Source: calculated on the basis of public financial reporting indicators from the official website of PJSC "TerA" [14])

The calculation of financial ratios in Table 5 shows fluctuations in the level of business activity of the enterprise. This indicates the existence of financial risks of reduced turnover, which negatively affects the formation of the financial result of PJSC "TerA" (Figure 7). There is also a decrease in turnover caused by fluctuations in the level of business activity, which negatively affects the production of financial results and financial security. At the same time, the risk of profitability is characteristic of the company under investigation during 2020-2022, negatively affecting the possibility of using the effect of financial leverage, which is possible due to the attraction of a bank loan.

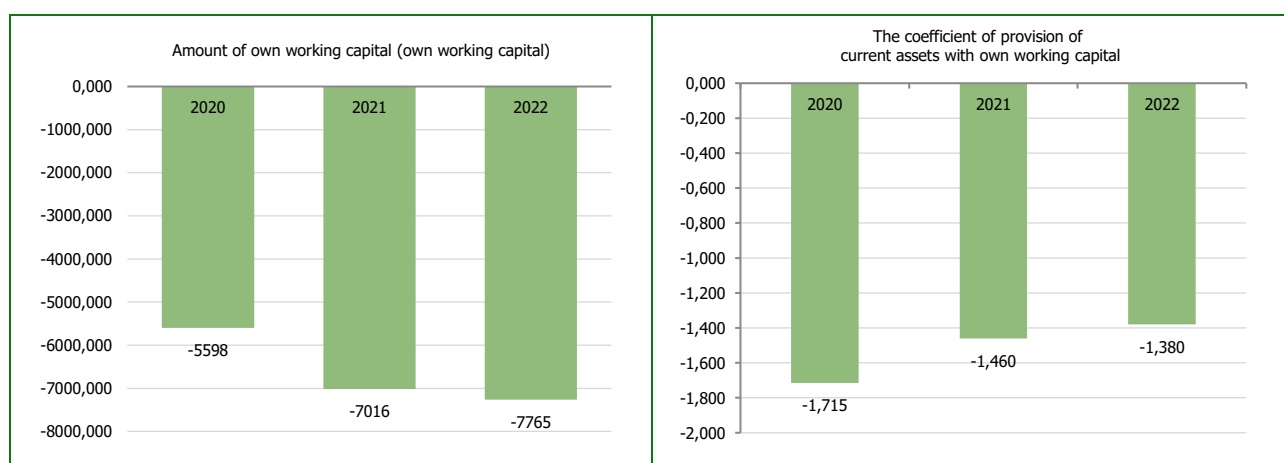


Figure 7. Dynamics of indicators of business activity of PJSC "TerA" for 2020-2022. (Source: calculated on the basis of indicators of public financial reporting from the official website of PJSC "TerA" [14])

Thus, the construction of an effective system of risk management and its universal functional component of risk analysis are urgent issues today, as they allow to develop a set of measures to minimize threats and risks of conducting financial and economic activities of economic entities. This becomes especially important in the conditions of systemic crisis phenomena, the integration of the domestic economy into the global structure and the expansion of business scales, instability and rapid change in the conditions of conducting financial and economic activities. Therefore, the correct assessment of risk with the help of methods and models of financial analysis for individual economic situations and economic entities is effective and has value, as it gives the opportunity to make the optimal decision in specific situations and characterizes the criterion feature of the financial security of industrial enterprises – liquidity, financial stability, business activity, profitability.

DISCUSSION

Having covered the theoretical aspects of risk analysis in the enterprise management system must be specified the significant limitations of this research, especially for food industry enterprises, whose place and role in the economy are significant and require regular research. Methods of analytical assessment of risks, which are the result of external influences

of an unstable, changing market system, geopolitical processes and social crises, and force majeure circumstances, are especially necessary. Analytical assessment of risks using methods of financial analysis and the development of an integrated methodology for measuring the impact of risks on financial and economic activity in the management of food industry enterprises are proposed in the study. Methods of financial analysis and the development of an integral methodology for measuring the impact of risks on financial and economic activity are applied. This makes it possible to assert the effectiveness and practical orientation of financial analysis technologies that do not require complex mathematical calculations and special software, with the simultaneous opportunity to monitor risks that cause changes in the financial state and, accordingly, affect the security of the enterprise. The positive thing is that the application of the method involves the use of financial information that is freely available and can be read by privileged persons. At the same time, the specifics of industry activity, the size of the enterprise, and the "life stage of development" are important. Since the proposed model uses a medium enterprise of the food industry, the risk analysis of other enterprises requires additional familiarization with the characteristics and definition of the range of priority criteria with the possibility of adequately assessing the risks that affect or may affect the financial and economic activity.

CONCLUSIONS

Implementation of effective management and achievement of the goals of financial and economic activity requires prediction, monitoring, and taking into account current and future risks. For this, it is advisable to use a complex of methods and system calculations, the application of which will make it possible to avoid the occurrence of crisis situations.

The main goal of risk management is to ensure the financial security of the enterprise in the process of development and prevent a possible decrease in its market value, which is determined by the level of financial condition. A particularly effective method of risk assessment is the use of quantitative methods of financial analysis and the development of an integrated method of measuring the impact of risks on financial and economic activity. However, the lack of an adaptive approach and underestimation of the impact of financial risks by enterprises and management negatively affect the effectiveness of their activities and financial condition.

An important component of the risk management mechanism is the system of financial risk analysis. Financial risk analysis is the process of researching the conditions, and factors of the external and internal environment of the enterprise, which affect the financial condition, determining the main results of financial activity and the level of financial security of the enterprise for the purpose of monitoring, diagnosis, identification, analysis and objective assessment of financial risks.

The main components of the risk analysis methodology in the context of financial security should be the formation of an information base, identification of risks, assessment of the level and cost of risks, assessment of the possibility of reducing the initial level and cost of financial risks, establishment of a system of criteria for making risk decisions. Risks have an impact on financial security, the criterion of which is the financial condition of enterprises, which is a complex concept and is determined by a system of indicators: financial stability, liquidity, business activity, capital structure, and operational efficiency. There is a relationship and mutual determination between the factor indicators that comprehensively characterize the financial and economic activity of the enterprise, and a change in one of them causes the emergence of risk.

The methodology of risk analysis should include a preparatory stage, construction of a quantitative risk assessment algorithm, interpretation of the results of an integrated risk assessment, and determination of risk management priorities in the system. Each stage of risk analysis in the financial security management system involves certain functions and tasks. In this context, a hierarchy of the system of indicators – financial coefficients of enterprises according to the following groups was formed: indicators of liquidity, financial stability, business activity, and management efficiency.

The developed indicators for risk assessment in the financial security system objectively reflect financial and economic activity and take into account the industry specifics of enterprises. Using the methods of financial analysis (horizontal, vertical, ratio, analysis of business activity and financial stability), indicators-coefficients were calculated based on the results of the operation of the investigated enterprise – Public joint-stock company "TerA". The obtained results of the coefficient analysis indicate a low level of financial stability and a high level of financial security.

Correct assessment of risks with the help of proposed methods and models of financial analysis for individual economic situations and business entities is effective and has value, as it provides an opportunity to make the optimal decision in specific situations and characterizes the criterion feature of financial security of enterprises.

There are also other methods of quantitative measurement of risk, such as assessment of the provision of stocks by sources of financing and analysis of liquidity, use of the integral function of assessing the potential of a multidimensional

dynamic object, which involves the adjustment of factors to weighted values, the analysis of which will be the subject of subsequent scientific studies.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

Conceptualization: Zenovii-Mykhailo Zadorozhnyy, Svitlana Zhukevych, Tetiana Portovaras, Victoria Rozelyuk

Data curation: Zenovii-Mykhailo Zadorozhnyy, Svitlana Zhukevych, Tetiana Portovaras, Iryna Nazarova

Formal Analysis: Zenovii-Mykhailo Zadorozhnyy, Svitlana Zhukevych, Natalia Zhuk

Methodology: Zenovii-Mykhailo Zadorozhnyy, Svitlana Zhukevych, Tetiana Portovaras, Victoria Rozelyuk

Software: Svitlana Zhukevych, Tetiana Portovaras

Resources: Svitlana Zhukevych, Tetiana Portovaras, Victoria Rozelyuk, Natalia Zhuk, Iryna Nazarova

Supervision: Zenovii-Mykhailo Zadorozhnyy, Tetiana Portovaras, Victoria Rozelyuk

Validation: Zenovii-Mykhailo Zadorozhnyy, Tetiana Portovaras, Victoria Rozelyuk

Investigation: Zenovii-Mykhailo Zadorozhnyy, Svitlana Zhukevych, Tetiana Portovaras, Victoria Rozelyuk, Natalia Zhuk, Iryna Nazarova

Visualization: Svitlana Zhukevych, Tetiana Portovaras, Natalia Zhuk

Project administration: Zenovii-Mykhailo Zadorozhnyy, Tetiana Portovaras, Victoria Rozelyuk

Funding acquisition: Svitlana Zhukevych, Victoria Rozelyuk, Iryna Nazarova

Writing – review & editing: Zenovii-Mykhailo Zadorozhnyy, Svitlana Zhukevych, Tetiana Portovaras, Victoria Rozelyuk, Natalia Zhuk, Iryna Nazarova

Writing – original draft: Zenovii-Mykhailo Zadorozhnyy, Svitlana Zhukevych, Tetiana Portovaras, Victoria Rozelyuk, Natalia Zhuk, Iryna Nazarova

REFERENCES

1. Aryati, Titik, Khomsiyah, K., & Harahap, Cicely. (2023). Enterprise risk management: A bibliometric analysis of research trends. *Decision Science Letters*, 12, 561-570. <https://doi.org/10.5267/j.dsl.2023.4.007>
2. Babukh, I., & Fen, K. (2023). Identification of risks in the marketing analysis of an enterprise. *Economic scope*, 186, 93-96. <https://doi.org/10.32782/2224-6282/186-16>
3. Bereziianko, T.V., Kostrytsia, O.V., & Doroshenko, V.O. (2022). Finansovy ryzyk pry formuvanni stratehii staloho rozvytku pidpriemstva. *Ekonomika ta suspilstvo*, 35, <https://doi.org/10.32782/2524-0072/2022-35-1>.
4. Cheng, Huifang, & Zhang, Xishuan. (2022). Empirical Analysis of Enterprise Financial Management Risk Prediction in View of Associative Memory Neural Network. *Security and Communication Networks*, 1-12. <https://doi.org/10.1155/2022/7825000>
5. Cheng, Jinfeng. (2022). Enterprise Financial Risk Prediction and Prevention Based on Big Data Analysis. *Security and Communication Networks*, 1-12. <https://doi.org/10.1155/2022/1442999>
6. Herasyenko, O.M. (2013). Evoliutsiia svitovoho ryzyk menedzhmentu. *Investytsii: praktyka ta dosvid*, 12, 26-31. http://www.investplan.com.ua/pdf/12_2013/9.pdf
7. Hnylytska, L., Franchuk, V., Melnyk, S., Nakonechna, N., Leskiv, H., & Hobela, V. (2022). Bezpekoorientovana model otsiniuvannya ryzyku pidpriemnytskoi diialnosti. *Financial and Credit Activity Problems of Theory and Practice*, 45, 202-210. <https://doi.org/10.55643/fcactp.4.45.2022.3838>
8. Karpyshyn, N.I., & Zhukevych, S.M. (2017). Analiz y otsinka finansovykh ryzykiv v systemi upravlinnia subiektiv hospodariuvannya. *Innovatsiina ekonomika*, 5-6(63), 180-185. <http://dspace.tneu.edu.ua/handle/316497/25458>
9. Kloba, L. H. (2016). Finansova bezpeka ta ryzyky bankivskoi investytsiinoi diialnosti. *Investytsii: praktyka ta dosvid*, 12, 6-12. <http://www.investplan.com.ua/?op=1&z=5047&i=0>
10. Lintner, J. (1965). The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolio and Capital Budgets. *Review of Economics and Statistics*, 13-37. <https://doi.org/10.2307/1924119>
11. Luchko, M., Zhukevych, S., & Farion, A. (2016). Financial analysis: teaching. manual Ternopil: TNEU. <http://dspace.tneu.edu.ua/bitstream/316497/19240/1/Fin%20analiz%20Verstka.pdf>

12. Markowitz, H.M. (1990). Normative portfolio analysis: past, present, and future. *Journal of Economics and Business*, 42(2), 99-103.
[https://doi.org/10.1016/0148-6195\(90\)90026-9](https://doi.org/10.1016/0148-6195(90)90026-9)
13. Mossin, J. (1966). Equilibrium in a Capital Asset Market. *Econometrica*. October, 768-783.
<http://dx.doi.org/10.2307/1910098>
14. Official website of public joint-stock company "TerA". (n.d.). <https://tera.ua/>
15. Oxford learners dictionaries. (n.d.).
<https://www.oxfordlearnersdictionaries.com/>
16. Parfentii, L. A. (2019). Upravlinnia finansovoiu bezpekoiu pidpriemstv v umovakh ekonomichnoi nestabilnosti. Sumy: vydavnycho-vyrobnyche pidpriemstvo «Mriia».
<http://dspace.univd.edu.ua/xmlui/handle/123456789/7127>
17. Ross, S.A. (1976). The Arbitrage Theory of Capital Asset Pricing. *Journal of Economics Theory*. December, 341-360. [https://doi.org/10.1016/0022-0531\(76\)90046-6](https://doi.org/10.1016/0022-0531(76)90046-6)
18. Santos, Ricardo, Oliva, Fábio, Grisi, Celso, Kotabe, Masaaki, Giudice, Manlio, & Papa, Armando. (2023). Identification and analysis of enterprise risks in the open product innovation: the case of Volkswagen Brazil. *Management Decision*.
<https://doi.org/10.1108/MD-06-2022-0799>
19. Sharpe, W.F. (1964). Capital Asset price. *Journal of Finance*. September, 425-442.
<https://doi.org/10.2307/2977928>
20. Tobin, J. (1969). A general equilibrium approach to monetary theory? *Journal of Money Credit and Banking*, 1(1), 15-29.
<https://doi.org/10.2307/1991374>
21. Tomashuk, I., & Tomashuk, I. (2022). Upravlinnia finansovomy ryzykamy pidpriemstva yak skladova zabezpechennia staloho funkcionuvannia subiekta ekonomiky. *Ekonomika ta suspilstvo*, (39).
<https://doi.org/10.32782/2524-0072/2022-39-64>
22. Usykova, O. (2023). Risk Analysis of Supply Chains at an Enterprise. *Modern Economics*, 37, 96-100.
[https://doi.org/10.31521/modecon.V37\(2023\)-14](https://doi.org/10.31521/modecon.V37(2023)-14)
23. Yuan, Y. (2023). Analysis of Enterprise Accounting Informatization Risk and Prevention Under Data Mining Technology. In: Hung, J.C., Yen, N.Y., Chang, J.W. (eds) *Frontier Computing. FC 2022. Lecture Notes in Electrical Engineering*, vol 1031. Springer, Singapore. https://doi.org/10.1007/978-981-99-1428-9_208
24. Zadorozhnyi, Z. -M., Muravskiy, V., Shevchuk, O. Rusin, V., Akimjaková, B., & Gažiová, M. (2022). Intelligent behavioural analysis of social network data for the purposes of accounting and control, 12th International Conference on Advanced Computer Information Technologies (ACIT). Spisska Kapitula, Slovakia. 26-28 September, 276-280.
<https://doi.org/10.1109/ACIT54803.2022.9913136>
25. Zadorozhnyi, Z. -M., Ometsinska, I., & Muravskiy, V. (2021). Determinants of Firm's Innovation: Increasing the Transparency of Financial Statements. *Marketing and Management of Innovations*, 2, 74-86.
<http://doi.org/10.21272/mmi.2021.2-06>
26. Zhang, Shirui. (2023). Research on Enterprise Financial risk Prediction Method Based on Regression Analysis. *SHS Web of Conferences*, 154.
<https://doi.org/10.1051/shsconf/202315402017>
27. Zhang, Tao, Wang, Hejin, Gao, Zehua, & Zhang, Anqi. (2023). Internal Risk Management Analysis of Brand Construction of Time-honored Enterprises: Take the Time-Honored Traditional Chinese Medicine Enterprise as An Example. *Frontiers in Business, Economics and Management*, 7, 108-109.
<https://doi.org/10.54097/fbem.v7i3.5401>
28. Zhang, Yantai. (2022). Economic Globalization and Corporate Accounting Risks: An Analysis of Enterprise Risk Management Based on Big Data. Security and Communication Networks.
<https://doi.org/10.1155/2022/8673357>
29. Zhao, Yu, & Du, Huaming. (2022). A Comprehensive Survey on Enterprise Financial Risk Analysis: Problems, Methods, Spotlights and Applications.
<https://doi.org/10.48550/arXiv.2211.14997>
30. Zhukevych, S., & Zhuk, N. (2023). Analysis of the probability of crisis events as a determinant of the financial security of food industry enterprises. *Visnyk ekonomiky*, 1, 182-200.
<https://doi.org/10.35774/visnyk2023.01.182>

Задорожний З.-М., Жукевич С., Портоварас С., Рожелюк В., Жук Н., Назарова І.

АНАЛІЗ РИЗИКІВ У СИСТЕМІ УПРАВЛІННЯ ФІНАНСОВОЮ БЕЗПЕКОЮ СУБ'ЄКТІВ ГОСПОДАРЮВАННЯ

Фінансово-господарська діяльність піддається впливу численних системних ризиків, що є загрозою фінансовій безпеці підприємств. Критерієм забезпечення фінансової безпеки є належний рівень фінансового стану підприємства. Фінансовий стан підприємства є комплексним поняттям та характеризується системою показників – фінансових коефіцієнтів за такими групами: показники ліквідності, фінансової стійкості, ділової активності, ефективності господарювання. Установлено взаємозв'язок і взаємовизначеність між показниками, що спричиняють виникнення ризику при зміні одного з них.

Визначено коло чинників, які всесторонньо характеризують фінансово-господарську діяльність підприємства, і зроблено методичку аналізу та оцінки ризиків, яка передбачає такі етапи: підготовчий етап; побудова алгоритму кількісної оцінки ризику в системі фінансової безпеки; трактування результатів інтегральної оцінки ризику в системі фінансової безпеки; визначення пріоритетів управління ризиками в системі. Застосовано методи фінансового аналізу (горизонтальний, вертикальний, коефіцієнтний, аналіз ділової активності та фінансової стійкості) й здійснено кількісну оцінку ризиків. Розраховано показники-коефіцієнти функціонування підприємства та дано інтерпретацію слабких місць на прикладі Публічного акціонерного товариства «ТерА».

Сформульовано висновок, що побудова ефективної системи ризик-менеджменту та її всезагальної функціональної складової ризик-аналізу є актуальними питаннями сьогодення, оскільки дозволяють розробити комплекс заходів із мінімізації загроз і ризиків провадження фінансово-господарської діяльності суб'єктів господарювання. Відтак, коректна оцінка ризику з допомогою запропонованих методів і моделей фінансового аналізу для окремих економічних ситуацій і суб'єктів господарювання є дієвою та має цінність, оскільки дає можливість ухвалити оптимальне рішення в конкретній ситуації та характеризує критеріальну ознаку фінансової безпеки підприємств промисловості – ліквідність, фінансову стійкість, ділову активність, рентабельність.

Ключові слова: ризики, аналіз, управління, фінансова безпека підприємств, аналітичні методи, фінансовий аналіз

JEL Класифікація: G01, G21, G28, G32