

*The results reported here proved the necessity of introducing financial controlling tools into the system of adaptive management of the company's financial security, which is inextricably linked with technology transfer. The object of the study is the movement of technology with the application of any information on ensuring the implementation of financial controlling tools in the process of managing the financial security of enterprises. We analyzed theoretical approaches to adaptive management of financial security of enterprises. The principles, functions, and types of financial controlling were considered. The expediency of researching the financial security of enterprises using financial controlling as a functional system of adaptive management of deviations has been proven. A systematic approach was used to study scientific approaches to adaptive management of financial security based on financial controlling. Considerable attention was paid to the analysis of the functions and tasks of financial controlling under today's unstable conditions of the economic development of enterprises. Using the method of system analysis, theoretical and methodological approaches to understanding the essence of financial controlling in the adaptive management of financial security of enterprises were evaluated. Peculiarities in the scientific approaches of various scientists regarding the essence of the financial security of enterprises have been revealed. The role and significance of adaptive management of the financial security of enterprises with the help of a modern toolkit of financial controlling, which consists of contractual obligations that make it possible to ensure an effective mechanism for making managerial decisions regarding the enterprise and its counterparties or other financial institutions, is revealed. The extended capabilities of the financial controlling toolkit are useful for analysts and enterprise managers to justify and improve the quality of adaptive management of the enterprise's financial security in modern conditions of technology transfer*

**Keywords:** *technology transfer, financial controlling, financial security, adaptive management, financial condition, monitoring, diagnostics, threats*

# IMPLEMENTATION OF FINANCIAL CONTROL TOOLS IN THE ADAPTIVE MANAGEMENT OF ENTERPRISE FINANCIAL SECURITY

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Received date 04.10.2023

Accepted date 23.12.2023

Published date 28.02.2024

**How to Cite:** Pronoza, P., Kuzenko, T., Sablina, N. (2024). Implementation of financial control tools in the adaptive management of enterprise financial security. *Eastern-European Journal of Enterprise Technologies*, 1 (13 (127)), 33–40. doi: <https://doi.org/10.15587/1729-4061.2024.294765>

## 1. Introduction

Increasing scientific and technological development and improving the innovative strategy of economic entities under modern conditions is inextricably linked with the transfer of technologies, namely, the movement of technology with the use of any information from one enterprise. The issue of technology transfer as a new component of innovative implementation in the adaptive management of the financial security of the enterprise, the introduction of innovations and the transfer of knowledge, technologies, and innovative financial controlling tools to ensure effective activity, sustainable development and increase the competitiveness of enterprises is gaining particular relevance.

In countries with a consistently high level of financial security, there is a threat of aggressive manifestations of external factors, which confirms the involvement of the latest tools to strengthen its level. Understanding the importance of the results of the company's activity and their level of financial security, most of the economically developed countries of the world in recent years have removed most of the administrative and legislative restrictions and created favorable financial and economic conditions for activity. This requires mutually coordinated transfer of technologies and implementation of work on the creation and production

of tools for adaptive management of the enterprise. The conditions that have developed in the economic space today require a quick response of enterprises to changes in the external environment, acceleration of the process of their adaptation to new operating conditions. Only a small number of enterprises are able to compete with world leaders, and a significant part of them is not able to respond adequately to changing conditions of the external and internal environment. The course towards European integration also requires enterprises to respond immediately and strengthen their positions on the market, however, at the same time, there are risks of violating the optimal level of financial security of enterprises. To reduce the negative impact on the enterprise, its adaptive properties should be maximized.

The strengthening of the global financial crisis requires special attention to strengthening the financial security of the enterprise since a mandatory condition for the transfer of any technology includes compliance with the financial security of the enterprise. Ensuring financial security in order to preserve the financial independence of the enterprise and its competitiveness prompted the intensification of scientific research in this area. The practice of functioning and scientific research prove that the vast majority of Ukrainian business entities need a well-founded and effective methodology for assessing and managing financial security. This is due

to the need for constant adaptation of the organizational, economic, and management mechanisms of enterprises to modern business conditions as a result of current technological transformations, development of flexible market tools for adaptive management of financial security. Given this, there is a need to conduct research. Therefore, the Ukrainian realities of the functioning of enterprises confirm the relevance of carrying out research aimed at devising measures for the adaptive management of financial security that meet the socio-economic and legal conditions of the functioning of Ukrainian enterprises.

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## 2. Literature review and problem statement

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The efficiency and competitiveness of the economy are determined by the ratio of the following sources: “science – technology – engineering – production” [1]. In work [2], technology transfer is considered as a set of economic relations in the field of using new systematized knowledge about production, process application, or service provision between its owner (developer) and the consumer. According to the approach of the Council for Scientific and Industrial Research (CSIR) [3], technology transfer is a process of transformation of new knowledge and technologies and licenses to third parties, such as entrepreneurs, new startups, existing industries, where these technologies will be introduced to the market in the form of goods and services for commercial benefits or social purposes. So, the concept of technology transfer is related to the transfer of skills, knowledge, technologies, etc.

The studies by many foreign and domestic scientists consider certain aspects of the formation of the organizational system of financial security of the enterprise, the determination of its level, and the assessment of the impact of threats. Thus, in work [4], attention was paid to the problems of organization and implementation of the financial security management process within the functioning of economic systems at the micro- and macro-level. The authors of the work [5] focused on financial stability as the main tool of financial security of the enterprise. However, in works [4, 5], the issue of adaptive management of the enterprise was neglected. The study of threats to the financial security of the enterprise and directions of its adaptation is devoted to development [6]. Also, in the context of ensuring the implementation of the company's financial strategy, financial security at work is considered [7]. However, the authors did not pay attention to the modeling of management decisions based on the functions of controlling in the management of financial security of enterprises.

General issues of financial controlling are studied in works [8–10], where the authors define the purpose and tasks, tools of financial controlling, ways of improving the system of financial controlling at enterprises. The authors of paper [8] proposed a system of the results of the effective implementation of strategic diagnostics of the implementation of controlling financial indicators and determined the place and role of diagnostics in the organizational structure of the enterprise. However, the development of strategic measures to ensure the management of the company's financial security with the use of controlling tools was neglected. In work [9], attention is paid to the adaptation of the controlling tool – ABC analysis to the economic and functional features of the restaurant industry. However, the authors do

not pay attention to other financial controlling tools in the contour of adaptive management of the financial security of the enterprise. Study [10] proved the hypothesis of substantiating the need to create an information space based on the construction of a corporate architecture model, which includes a controlling system. But the issues related to the implementation of controlling tools in the adaptive management of the enterprise remained unresolved.

Despite the available thorough research on the theoretical and practical aspects of financial security and financial controlling, the issue of using financial controlling tools in the application of adaptive management of financial security of economic entities, which is an unsolved problem due to the lack of development in this direction, needs improvement. Therefore, it is advisable to conduct further scientific research on the implementation of financial controlling tools to ensure a reliable level of financial security of the enterprise in the system of adaptive management of the enterprise.

Under the conditions of fierce competition, the problem of technology transfer and technology implementation is intensifying. In this context, we can talk about the presence of many problematic aspects of the implementation of adaptive management of financial security of technology transfer.

Formed proposals should ensure a higher level of technology transfer efficiency. The successful transfer of technologies will lead to a deeper and wider accumulation of knowledge in the field of adaptive management of the financial security of the enterprise. The conclusions formed within the framework of this study could become the basis for further scientific developments as a basis for the formation of promising international and national normative acts. The key to the formation of prospects for the sustainable development of the state's economy and ensuring its financial security is the construction of an effective and efficient technology transfer ecosystem.

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## 3. The aim and objectives of the study

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The purpose of this study is to generalize the approaches to the transfer of tools for substantiating the areas of improvement of the existing system of ensuring adaptive management of the financial security of the enterprise. The obtained achievements can be useful for ensuring the timeliness of management decisions aimed at achieving the financial stability of enterprises.

To achieve the goal, the following tasks were solved:

- to analyze the essence and content of the concept of “adaptive management of the financial security of the enterprise” in relation to the transfer of technologies for the implementation of financial controlling tools;
- to advance regulations on the implementation of technology transfer on the expediency of using financial controlling as a tool for adaptive management of financial security of enterprises.

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## 4. The study materials and methods

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The object of our study is the process of ensuring the implementation of financial controlling tools in the process of managing the financial security of enterprises.

The research hypothesis assumes that the existing methodical approach of adaptive management of the financial security of the enterprise does not satisfy the needs of the

economy and society and therefore needs improvement. When conducting this study, it was assumed that the key prerequisites for the formation of financially safe development conditions – adaptation and maximum effective use of internal reserves, are limited financial resources and the absence of an effective technology transfer system, which negatively affects the level of development of the enterprise. The basis for this was the assessment of application methods and techniques and a large amount of feedback from technology transfer participants.

Research was conducted on the basis of statistical information using methods of scientific knowledge. The methods of system approach, analysis, synthesis, scientific abstraction, and generalization were used to research and clarify the conceptual apparatus of financial controlling and adaptive management of the company's financial security. Implementation of a controlling system at enterprises contributes to increasing the efficiency of the entire process of managing the enterprise's financial security. It makes it possible to concentrate control measures on priority areas of financial work, to ensure timely management decisions aimed at achieving financial stability of enterprises.

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## 5. Results of research on the implementation of financial controlling tools in adaptive management of financial security of the enterprise

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### 5.1. The essence and content of the concept of “adaptive management of the financial security of the enterprise”

The situation that has developed in the economic space of the country for many enterprises is accompanied by the inability to respond adequately and effectively to the effects of the external environment and has led to the need to adjust management methods. Under the conditions of increasing influence of uncertainty, there was a need to transfer technologies of market tools for adaptive management of financial security.

The term “adaptation” in translation from the Latin “*adaptare*” means “to adapt”. Adaptability should be understood as the process of changing the object in terms of its parameters and structure, certain of its properties as a response to the processes taking place around it. Agreeing with [11], we note that adaptability, according to scientists, reflects the level of adaptation of the business entity to the changes occurring around it and in the middle of the enterprise. Adaptability is an integral characteristic of the country's economic component. It combines flexibility, mobility, maneuverability, and other characteristics that ensure regrouping of system elements without significant changes in its structure. It reflects the level of ability of the general management system of the enterprise to function under the conditions of a changing external environment. Scientists also focus on the transfer of technologies, which will contribute to the adoption of non-standard decisions to ensure adaptive policy based on understanding and the ability to forecast trends in changes in the external environment.

Investigating the essence of adaptation, work [12] considered it from three perspectives: as adaptability, survival, and the possibility of introducing modern methods into the company's activities. So, adaptability meant the ability of the enterprise to perform certain actions. First, to function independently in the market environment (to be a completely economically separate unit). Secondly, to change the form of ownership, if necessary. Thirdly, to enter foreign markets.

Fourth, to calculate the planned volumes of production, determine the direction of product sales, maximize the level of profit, and minimize the level of expenses, optimize the number of personnel, etc. By the survival of the enterprise, the author of paper [12] understood the possibility of the functioning of the enterprise during periods of economic decline.

Based on the essence of the concept of “adaptability” and “management”, it can be noted that the economic essence of adaptive management consists in reasonable and consistent decisions, based on the application of knowledge technology and the actions of the company's management. These actions should be aimed at ensuring sustainable development by transforming innovative technologies and increasing flexibility in the face of unforeseen changes.

Financial security is a complex mechanism that ensures the optimal development of the enterprise under any economic conditions characterized by balanced finances, a sufficient level of liquidity and solvency of the enterprise's assets, cash reserves. In a broad sense, financial security is a certain state of the enterprise, characterized by the protection of interests, under which the main activity is carried out, aimed at achieving the strategic goal of the enterprise and ensuring its development.

Management of the financial security of enterprises determines the ability for sustainable development under conditions of instability of the macro-, meso-, and micro-environment, which is based on the optimization of the attraction, use, and control of financial resources in order to increase the market value of the enterprise. As a result of the analysis of approaches to the definitions of financial security, we can talk about already formed characteristics that reveal the meaning of this concept. Financial security as an independent object of management is defined in works [13, 14]. According to their approach, financial security involves the use of a set of interrelated measures of a financial nature (diagnostic, instrumental, and control), reflecting the ability of an enterprise to carry out its financial activities efficiently and stably. These measures should optimize the use of financial resources, ensure their appropriate level, and minimize the impact of risks [13]. The author of work [14] characterizes financial security as a result of management. Achieving the maximum values of financial indicators of the business, the efficiency of using the company's fixed and current assets, its capital characterizes the efficiency of using the company's corporate resources. As a result, a sufficient level of financial security of the enterprise. A supporter of another approach [15] claims that the financial security of an enterprise characterizes the level of the enterprise's financial condition in both quantitative and qualitative aspects. This ensures stable protection of the company's priority financial interests from internal and external threats. Also, in many works there is an approach according to which financial security is considered as a process of achieving a certain state. In particular, [16] refers to a purposeful multi-level process of ensuring the security of the company's financial interests. It includes a set of methods, resources, levers to ensure the balance of the enterprise under the influence of internal and external threats under the conditions of a competitive environment. An interesting understanding is given in [17], which defines the financial security of an enterprise as the ability to promote and expand the economic processes of the corporation, manage the risks of activity, and level their consequences. Moreover, the category of financial security is a category that is characterized by a feature of continuity in time: it can only change as a derivative of the totality of all elements of the category of finance. Financial security of an

enterprise is interpreted as a complex concept [18]. That is, it characterizes such a financial state, for which the following aspects are ensured. First, the balance and quality of the set of financial instruments, technologies and services used by the enterprise. Secondly, resistance to internal and external threats. Thirdly, the ability of the enterprise's financial system to ensure the realization of its financial interests and tasks with sufficient amounts of financial resources. Fourth, efficient and sustainable development of this financial system.

Considering the essence of financial security, paper [19] notes that in order to increase the market value of the enterprise due to the effective use of financial potential, the formation of financial balance is necessary to ensure the protection of the subject from the negative impact of financial threats. It is a complex multi-level process. According to the authors, effective use of resources is one of the main elements of achieving a high level of financial security. However, other processes and measures should be taken into account when determining the essence of financial security. One of these processes is the ability to develop and successfully implement a financial strategy. From the point of view of [20], the financial security of an enterprise is a financial state characterized by the balance and quality of a set of financial instruments, technologies and services used by the enterprise, and resistance to internal and external threats.

Accordingly, it can be concluded that the majority of scientists characterize the financial security of the enterprise as a certain state.

There are reasons to understand the adaptive management of financial security as the process of adapting the enterprise to changing external conditions, which should ensure the financial stability and independence of the enterprise's functioning in a strategic perspective. The goal of adaptive management of the company's financial security is the development and implementation of effective solutions aimed at the stable functioning and development of enterprises. The tasks of adaptive management of the financial security of enterprises are to ensure the implementation of the goals of the functioning and development of enterprises.

The main tools of adaptive management of the financial security of enterprises should include financial controlling, which allows assessing the adaptive development possibilities and developing strategic priorities for the further functioning of enterprises.

In a broad sense, controlling is a concept of enterprise management, aimed at clarifying all chances and risks in the enterprise's activity," which is stated in [21]. The author of paper [22] notes that financial controlling is a system whose main purpose is the organization of the process of effective financial management of the enterprise. Financial controlling as a system that provides control of all areas of financial activity of the enterprise, monitoring deviations of actual indicators from the planned and making operational management decisions that contribute to the normalization of these indicators determines [23].

Therefore, agreeing with work [24], it is worth noting that financial controlling is the "brain center" of the enterprise, which is designed to provide informational and methodological support for financial decisions and coordination of individual management subsystems.

The main tasks of financial controlling are:

- ensuring the formation and functioning of the company's information management system based on internal information and monitoring of the external environment;

- application of the latest methodologies of analysis and planning of the company's activities;

- monitoring of actual and planned indicators in order to identify bottlenecks in the enterprise's activities;

- ensuring interaction of planned tasks for all structural divisions of the enterprise;

- provision of methodical approaches to planning and control and management decision-making at the enterprise.

Therefore, the introduction of financial controlling into the system of adaptive management of financial security of enterprises will make it possible to ensure high-quality functional support of financial management. In this way, the management process will focus the management process on maximizing the effectiveness of the functioning of the finance sphere of enterprises while minimizing risks and threats caused by both internal and external factors.

## 5.2. Implementation of financial controlling in the system of adaptive management of financial security of the enterprise

The main elements of adaptive management should include the internal variables of the enterprise that shape its potential and "survival", which allow assessing adaptive capabilities and adaptive development capabilities. The basic principles of implementing an adaptive model of managing the financial security of an enterprise include the following principles:

- continuously monitor the state of the external and internal environment, as well as carry out diagnostics of the enterprise management system;

- determine which process of managing resistance to changes at the enterprise is the most effective;

- apply modern information technologies that will allow optimization of planned management systems.

Therefore, at the current stage of development of Ukrainian enterprises, the primary task of their management is the formation of an effective system of adaptive management of financial security. This ensures timely economic diagnostics, helps determine the optimal financial instruments, methods, and levers, introduces mandatory control over financial and economic activity and evaluation of its results.

Adaptive management of the financial security of the enterprise to ensure its effective functioning with the help of controlling allows timely assessment of the state of the enterprise and making optimal management decisions regarding the effective use of financial resources. A methodical approach to the formation of management decisions using the controlling mechanism in the system of adaptive management of the financial security of enterprises is shown in Fig. 1.

The need to apply controlling at modern enterprises is explained by the following reasons:

- the enterprise management system needs to be adjusted in view of unexpected changes in the external environment;

- the need to implement the analysis of the future ahead of the control of the past in order to have the right priorities;

- the application of an adaptive response to changes in the external environment, the formation of an adaptive policy, which will lead to an increase in the flexibility of the enterprise;

- constant monitoring and analysis of changes occurring at the macro, meso, and macro levels;

- formation of an adaptive system of actions to ensure the effective operation of the enterprise and prevent crisis situations;

- formation of the coordination mechanism of the entire enterprise management system;

– in order to take into account a large number of information flows and extract the most important information, there is a need to build a special management information support system;

– the need to synthesize activities [14].

The main functions of controlling at enterprises from the point of view of adaptive management of financial security can be defined as:

– analysis and management of costs and financial results;  
 – obtaining information, studying it, and turning it into recommendations for management to make effective management decisions.

To ensure the state of financial security of the enterprise, it is advisable to represent the system of interaction of financial controlling and financial security through successive stages:

- 1) goal formation;
- 2) outlining the parameters for achieving the goal and setting their parameters;

3) determination of target parameter values and possible deviation;

4) identifying threats to achieving the goal;

5) assessment of the level of risk and the level of protection for each of the threats (Fig. 2) [25].

It should be noted that the adaptive management of the financial security system of enterprises with the use of controlling tools is aimed at ensuring the sustainable development of the enterprise. Namely, maximizing the market value of the enterprise, identifying threats, assessing the probability of their occurrence and destructive impact on the financial result, determining the possible financial loss and choosing the most effective way to minimize it. The basis of the adaptive management of the financial security of the enterprise with the help of controlling is the financial toolkit. It consists of contractual obligations that make it possible to ensure an effective mechanism for making management decisions regarding the enterprise and its counterparties or other financial institutions.

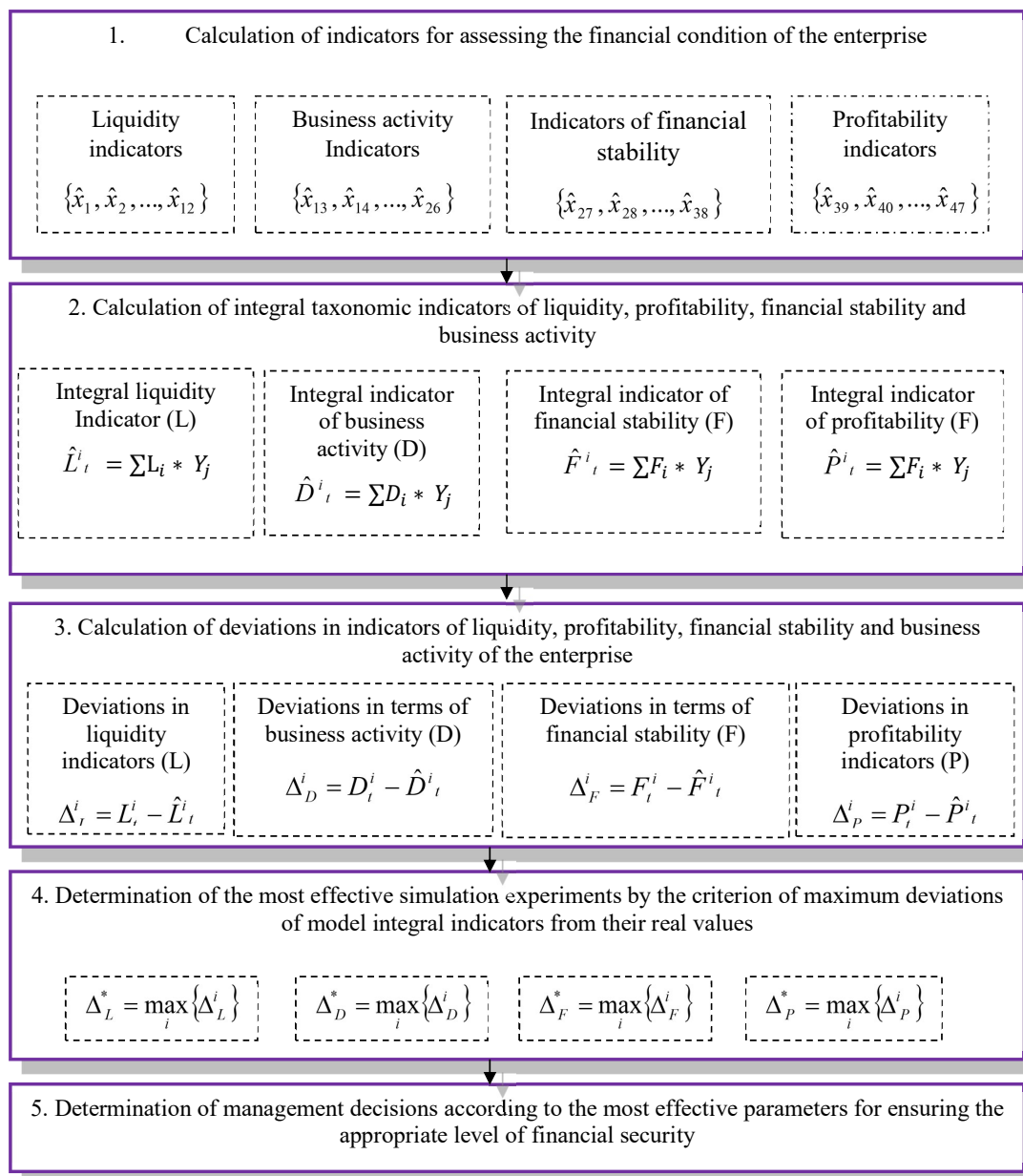


Fig. 1. A methodical approach to the formation of management decisions using the controlling mechanism in the system of adaptive management of the financial security of enterprises

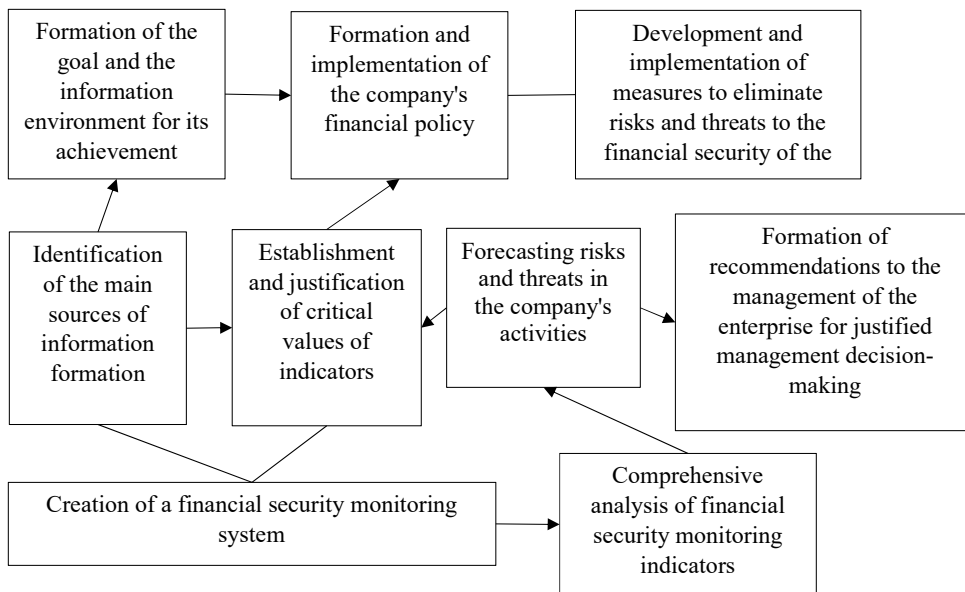


Fig. 2. Tools of financial controlling in the system of strengthening the financial security of the enterprise

Several approaches are known according to the rate of introduction of controlling into the adaptive management system of the enterprise [26]:

1. “Small steps” – minor transformations are taking place at a slow pace in the existing management structure. The disadvantage of this approach is a significant period of reorganization, non-fulfillment of the objectives of the implementation of controlling, or termination of its implementation altogether.

2. “Bombing” – the reorganization of the existing management system is proceeding at a rapid pace. The disadvantage is the likelihood of opposition to the introduction of controlling, but the advantage is the rapid introduction of the controlling mechanism into the enterprise’s activities.

3. “Planned evolution” is the optimal approach for introducing controlling into the management system, as it has the advantages of previous approaches. A characteristic feature of this approach is the formation of the concept of the controlling system, the elements and timing of the implementation of controlling.

The study of controlling approaches and its features as a management system gives reasons to define it as an effective tool for ensuring the financial security of the enterprise, which:

1. It allows identifying problem areas and risks, as well as developing measures to prevent them.

2. It contributes to solving the tasks of adaptive management of financial security. It is based on effective and timely work with information. It requires a powerful economic and analytical toolkit for its processing in view of the significant need for coordination of actions to manage various risks of the enterprise.

3. It makes it possible to receive information about threats, to carry out monitoring and financial analysis, which is quite difficult to perform with traditional methods of enterprise management.

4. It requires the development of a special mechanism through which complex risk management is carried out based on an integrated approach and a combination of relevant aspects of the enterprise’s economic activity and management approaches.

5. It contributes to the creation of a specialized information and cognitive system of adaptive management of financial security.

6. It provides methodical and consulting support on issues of adaptive management of the enterprise’s financial security.

7. It monitors all current and potential negative changes in the enterprise that have led or may lead to relevant risks, based on their analysis, provides complete information to the management for making appropriate managerial strategic decisions regarding financial security.

Thus, according to our opinion, the specific principles, functions, mechanism,

and tools on which the controlling system is built should be oriented towards complex adaptive management of the financial security of enterprises.

## 6. Discussion of results of investigating the implementation of financial controlling tools in the adaptive management of the financial security of the enterprise

The current work examines the essence of adaptive management of the financial security of the enterprise. The obtained conclusions are confirmed by the studies of scientists who deal with the issues of ensuring the financial security of the enterprise [4–7] and the study of adaptive management of the enterprise [12, 13].

The result of solving the first task is the clarification of the meaning of the concept of “adaptive management of financial security”. The result of solving the second task is to determine the expediency of implementing financial controlling as a tool for adaptive management of the financial security of enterprises (Fig. 1, 2).

The use of controlling tools to make sound management decisions on financial security should be considered a positive direction of the development of the conducted research. The primary solution is to improve the unfavorable macroeconomic situation, which is expressed in the fall in the profitability of enterprises.

Our results solve most of the actual problems that exist in the implementation of innovations and the transfer of knowledge, technologies and innovative tools of financial controlling in the adaptive management of the financial security of the enterprise to ensure its effective operation, sustainable development and increase the competitiveness of enterprises. This makes it possible to solve the problem of the possibility of effective application of modern forms of transfer of tools in the field of production.

As a result of the analysis of existing works on the adaptive management of the financial security of the enterprise, the problem of inefficient use of tools for ensuring the finan-

cial security of the enterprise was revealed. The obtained results close this problem.

The limits of application of the proposed solutions are adequate and can be reproduced at industrial enterprises of Ukraine but are not adequate for application in budgetary institutions.

In addition, the research results solve the problems of works [5, 6]; their authors only outlined the main patterns of the existing state. In the framework of our research, conclusions were drawn that offer a solution to the problem of the issue defined in work [7]; its author only states the need for such improvement. This further emphasizes the value of the results of the current study.

The limitations of our research are the impossibility of applying the results by economic entities outside the production sphere.

The main drawback of the study is the insufficient objectivity of the systematization of information about the use of methods and techniques for determining the financial security of technologies by participants in their transfer. The shortcomings of this study also include the lack of application of a mathematical apparatus to justify the effectiveness of the implementation of financial controlling tools in the adaptive management of the company's financial security. These shortcomings of the study must be taken into account in the case of further study of the outlined questions. As part of the development of this study, it is possible to apply the method of analyzing hierarchies in order to determine the influence of external and internal environmental factors on the adaptive management of the financial security of the enterprise.

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## 7. Conclusions

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1. The concept of “adaptive management of financial security” should be understood as the process of adapting the enterprise to changing external conditions, which should ensure the financial stability and independence of the enterprise's functioning in a strategic perspective.

2. Our analysis of the use of controlling in the system of adaptive management of the company's financial security revealed a positive impact on the financial condition, revealed additional opportunities, hidden reserves for increasing the efficiency of financial and economic activity. Studies have shown that the implementation of a controlling system at enterprises contributes to increasing the efficiency of the entire process of managing the financial security of the enterprise. It makes it possible to concentrate control measures on priority areas of financial work, ensure timely management decisions aimed at achieving financial stability of enterprises. A rational relationship between different types of controlling and the possibility of their interchange or complementarity could contribute to the implementation of integrated adaptive management for the financial security of enterprises.

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## Conflicts of interest

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The authors declare that they have no conflicts of interest in relation to the current study, including financial, personal, authorship, or any other, that could affect the study and the results reported in this paper.

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## Funding

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The study was conducted without financial support.

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## Data availability

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All data are available in the main text of the manuscript.

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## Use of artificial intelligence

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The authors confirm that they did not use artificial intelligence technologies when creating the presented work.

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