

Financial Situations Forecasting Models for Forming the Enterprise's Strategy Subject to Industrial Development Regulations

Olena Sergienko¹, Olga Gaponenko¹, Iryna Golofaieva²

¹ National Technical University "Kharkiv Polytechnic Institute",
Kharkiv, Ukraine

² Simon Kuznets Kharkiv National University of Economic, Kharkiv,
Ukraine

Abstract. The paper contains the complex of economic and mathematical forecasting models for financial situations of enterprises operating under conditions of uncertainty based on the concept of self-determination that provides the choice of perspective development alternatives under the threats. We have improved the financial situation diagnostics models of enterprises' economic activity based on recognition, identification and situation prediction, research of the enterprise's performance dynamics, which is the basis for qualitative strategic decisions.

Keywords. Forecasting, Financial situations, Models, Enterprises, Strategy

1. Introduction

Management of financial activity of industrial enterprises is characterized by high level of complexity of economic systems structure, as well as uncertainty and unpredictability of the processes taking place. The problems of developing forecasting financial management systems adapted to the specifics of management at each individual enterprise are qualitatively new, since in a modern market economy an enterprise is an independent subject of management, and national programs of development of branch complexes are not always formed taking into account the transformational processes of production systems development. Therefore, in the context of the formation and implementation of new open forecasting systems of financial and economic management, the range of unresolved global and local problems is expanding, which necessitates the implementation of a number of functions in the formation of effective tools for forecasting and improving financial management systems, which is an important and necessary condition for increasing the efficiency of management.

The purpose of the article is to develop proposals for the reorganization of the system and management structure based on the development of models for forecasting financial situations for the formation of an enterprise strategy. This enterprise system should promote a reasonable increase in the autonomy of structural units in making decisions, reducing the passage of information flows, and expanding the participation of personnel in enterprise management, i.e. increasing the effectiveness of management in accordance with the selected set of strategic alternatives.

2. Stages of construction and realization of a complex of models of financial situations forecasting

Predictive financial management system of an enterprise should implement management functions and consist of two subsystems (Figure 1): a control subsystem – a

management system that implements management functions and a controlled subsystem – an object of management.

Management of financial activities of an enterprise is a complex multi-step interconnected process, which unites the decision of a set of tasks that need to be solved in the process of organization, management and development of an enterprise. Thus, the implementation of management functions aimed at solving local and global tasks of financial management, which justifies the need to build a set of models of financial management of an enterprise must ensure the continuity of management process, the parallel execution of various tasks, integration into one integrated complex of the whole synthesis of financial strategy, estimation of financial possibilities and efficiency of activity [1, 4, 7]. The development of this complex of models is a central and basic prerequisite for effective management of financial activity of an enterprise in an unstable market environment. The main stages of the construction and implementation of a complex of models of financial situations forecasts and development of managerial decisions for the formation of an enterprise strategy development is shown in Fig. 2.

Thus, within the framework of the analysis of financial activity of an enterprise, the following tasks are foreseen: collection and processing of analytical and statistical information, assessment and analysis of financial condition and the results of financial activity.

The first stage of the proposed complex combines the task of defining goals, objectives and strategies for implementing financial activities of an enterprise. According to the priority directions of the financial development of an enterprise, the target programs that can be considered as management measures of the higher-level system and taking into account the external factors, a comprehensive strategy for the implementation of financial activity of enterprise can be formed. [2, 10, 12].

The second stage of the proposed complex is the formation of an information space for indicators for the assessment and analysis of financial activity of an enterprise [4, 15]. This stage combines the following tasks:

- formation of the information space of indicators of evaluation and analysis of the dynamics of financial activity. The result of the implementation is a representative system of financial indicators, for comparative analysis (spatial branch cut) and studying the peculiarities of financial situations of each enterprise (time cut);
- formation of a set of statistical criteria and substantiation of the standards of indicators change used in evaluation and analysis in different control circles. The result of the implementation is a comprehensive assessment of the state of main financial indicators of development based on normative values of indicators in the comparative and dynamic section of the study, adapted to industry standards.

The third stage involves realization of spatially-dynamic estimation of financial activity of enterprises in accordance with the chosen strategy of financial activity and the established system of diagnostic indicators [13, 15], by solving the following tasks:

- formation of groups of homogeneous objects in the implementation of spatio-dynamic sectoral classification of financial situations and competitive positions types, assessment of stability of cluster entities;
- recognition of financial situations of the internal and external financial environment of enterprises on the basis of a complex system of indicators and on separate local components of financial activity;
- assessment and analysis of indicators structure – sectoral qualitative analysis of the dynamics of changes in indicators (ranges of changes) in the selected clusters of states and a comprehensive assessment of financial activity of an enterprise.

At the fourth stage, the following tasks of forecasting the diagnostic indicators of internal and external environment of financial activity of enterprises are solved:

- forecasting of financial indicators of industry characteristics on the basis of tightness of their spatial relationship, allowing to take into account the peculiarities in of development dynamics typical for the enterprises of the industry under the study;
- forecasting of financial indicators of dynamics of an enterprise development on the basis of causal links of dynamics of their development and mutual influence;
- recognition of forecast financial situations and comprehensive analysis of the results of the forecast dynamics of general sector changes and trends of internal environment indicators.

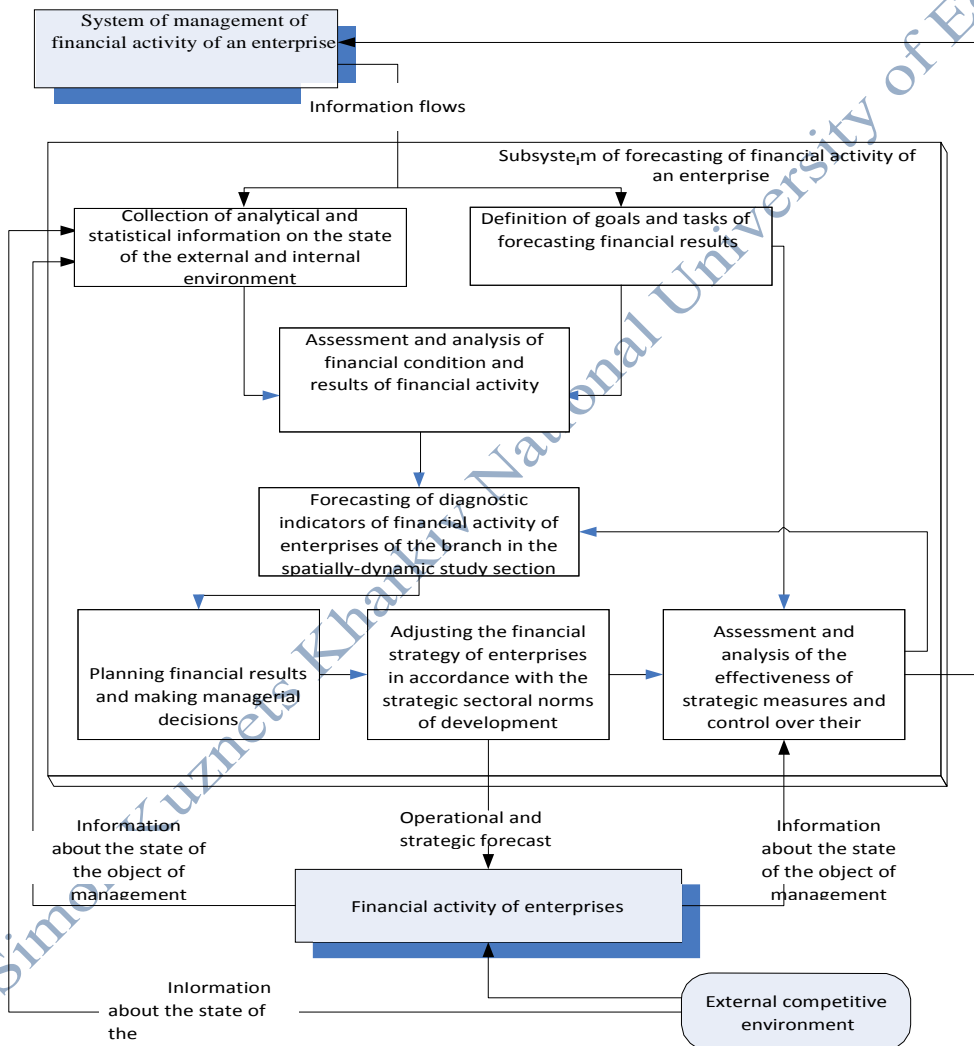


Fig. 1. Proposed structure of the system of an enterprise financial activity forecasting

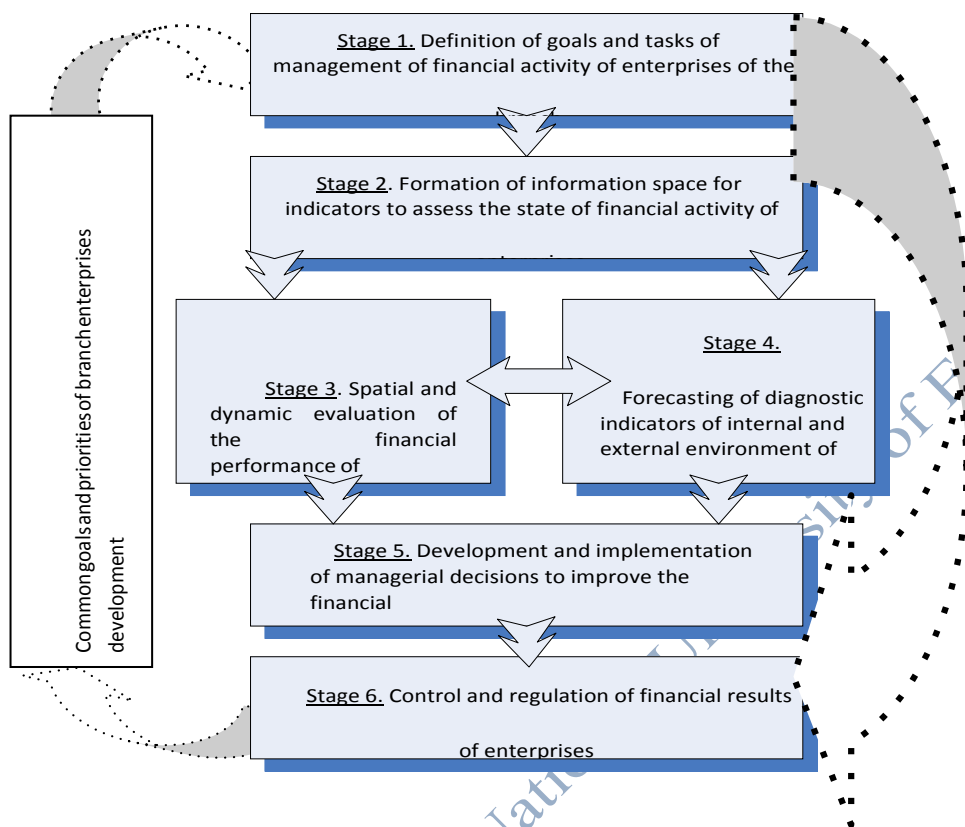


Fig. 2. The main stages of construction and implementation of a complex of models of financial situations forecasting

The fifth stage provides the solution of decision-making tasks for management of financial activity of an enterprise [2, 6]. Based on the prevailing set of financial situations and their forecast estimates in accordance with the general objectives and tasks the following activities are carried out:

- formation of a matrix of financial situations of current and predicted states of external and internal environment;
- simulation of management of financial situations and formation of possible scenarios of management;
- optimization of strategic norms of alternative financial management scenarios, according to the chosen criteria of efficiency.

The sixth stage involves solving tasks of control over the results of financial activities and regulation [11, 14]. These tasks are solved basing on the information of managerial decisions on the implementation of financial activities, information on general priority directions of development, target programs and market conditions. The task of control is to verify the correspondence of the results to certain goals and objectives, which may lead to the following situations:

- no deviation - effective management of financial situations, local goals have been achieved;
- deviations are insignificant – regulating tasks are solved, i.e. monitoring the causes

and possible deviations in destabilization of system functioning;

- significant deviation – an in-depth analysis of internal and external competitive environment and adjustment of goals and objectives of financial activity are carried out. On their basis the strategy and means of their realization in financial activity management are reviewed.

Thus, the proposed set of models for forecasting financial situations and management of financial activities of an enterprise, which implements the functions of the predictive management system of financial activities of an enterprise can improve the quality and efficiency of the decisions by improving managerial tools.

3. Formation and selection of strategic alternatives, taking into account industry trends and forecasting financial state tendencies

Tasks of financial activity management of an enterprise require an integrated, systematic solution due to the complexity of financial processes and their interconnection, individual characteristics of each enterprise and their sectoral peculiarities of development, operating in conditions of uncertainty and influence of a large number of factors, need to use many conditions and criteria of management efficiency [1, 12, 13]. The complexity of solution of a set of tasks requires the use of modern tools for economic and mathematical modeling and forecasting. Therefore, the model means of supporting the implementation of the proposed set of financial management models play a crucial role in ensuring the effectiveness of its functioning.

For its effective functioning a financial management system should be based on the use of modern high-performance tools and economic and mathematical methods [11]. The paper proposes a tool for solving the selected tasks, based on the concept of management, on the use of managerial model basis and information technology, presented in Fig. 3.

The realization of the tasks of the first stage is the definition of goals and objectives of financial activity by instrumental methods is not considered in this paper, since the literature offers a large number of different methods and approaches, which are implemented in work [4, 7, 14].

The realization of the tasks of forming a complex system of diagnostic indicators for the evaluation of financial activity (stage 2) should be based on modern tools of formation of a sound system of indices of trends of an enterprise development in space and time [15], which allows a comprehensive methodology of robust statistical evaluation [16], expert [6] and factor analysis [16] to be implemented in work.

The basis of the solution of the tasks of spatially-dynamic evaluation of financial activity of enterprises (stage 3) is the complex use of tools of classification methods (cluster analysis) [16] and recognition (discriminant analysis) [16] in the dynamics of development of the investigated branches of industry, which allows to obtain complex and local assessment of financial activity of enterprises and is the basis for the formation of qualitative strategic decisions.

For realization of tasks of stage 4 – forecasting of diagnostic indicators of internal and external environment of financial activity of enterprises, the tools of econometric modeling [8, 9] and forecasting on the basis of panel data models of branch's typical indicators [5] and models of vector autoregression [8] for interrelated time series of indicators of dynamics of each particular enterprise are used.

Implementation of decision-making tasks on financial activity management (stage 5) is ensured by developing a matrix model of financial situations [2, 4] for choosing a strategy and implementation of management scenarios for external and internal environment of an enterprise by agreeing the forecast estimates of trends of the development of the company's

internal financial environment with the development of branches trends [2, 14]. The matrix of financial situations for the formation and selection of strategic alternatives, taking into account the trends of the industry and the forecast of financial state tendencies is presented in Fig. 4.

The matrix-positioning approach [1, 13] the comparison of the results of estimation of predicted and current financial situations and the trends of sectoral changes in the spheres of research is an effective tool for a comprehensive study of trends of financial development of enterprises, since it allows to identify and forecast the dynamics of indicators in general and in individual local areas, to determine characteristic tendencies and interconnections that are the basis of forming a complex of programs and preventive measures of management of financial and economic sectors transformations for different time horizons.

The aggregated characteristic of the proposed strategic alternatives of enterprise activities [7, 10, 12] in the field of mechanical engineering is presented in Table. 1.

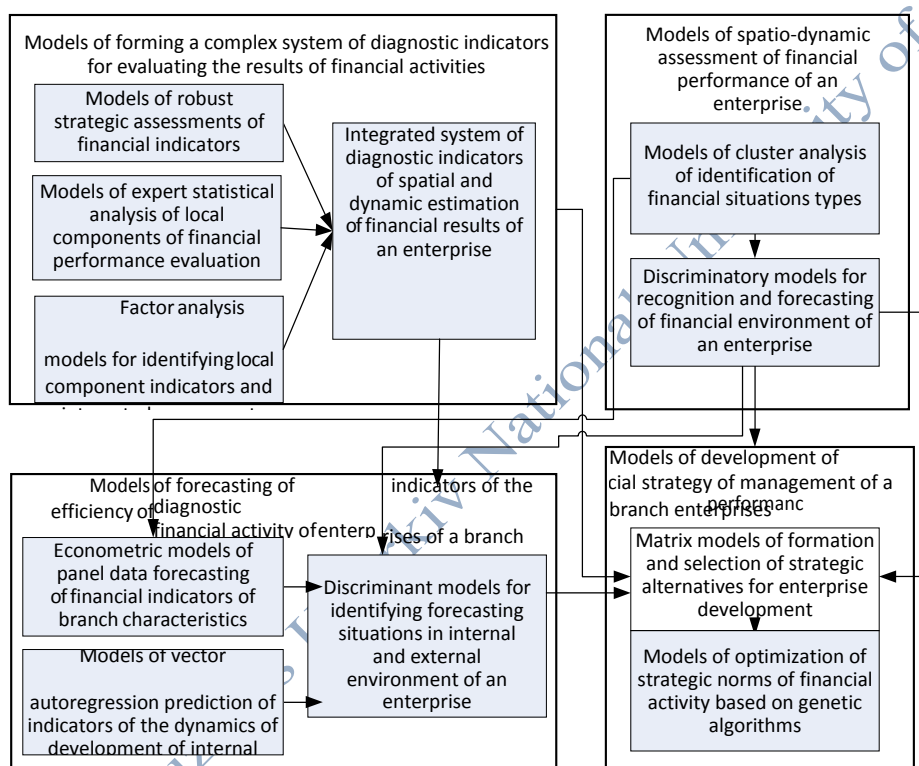


Fig. 3. Model basis for forecasting financial situations and developing a strategy for managing financial activities of enterprises

4. Management measures and decisions on optimization of strategy parameters depending on the type of financial situation

The solution of problem of optimal enterprise management, through the implementation of managerial scenarios aimed at raising the level of financial status and improving competitive positions at work are carried out using models based on genetic algorithms [3]. The genetic algorithm [3] is an algorithm for finding solutions to problems of optimization and modeling by random selection, combining and variation of the desired parameters using mechanisms that resemble biological evolution. Genetic algorithm is a universal method for optimizing multi-parameter functions, which allows to perform a wide

range of control tasks, among which one can distinguish: various tasks in graphs, bioinformatics, optimization of functions, scheduling, game strategies, approximation theory, artificial neural networks, optimization of queries in databases, tasks layout, etc. [3].

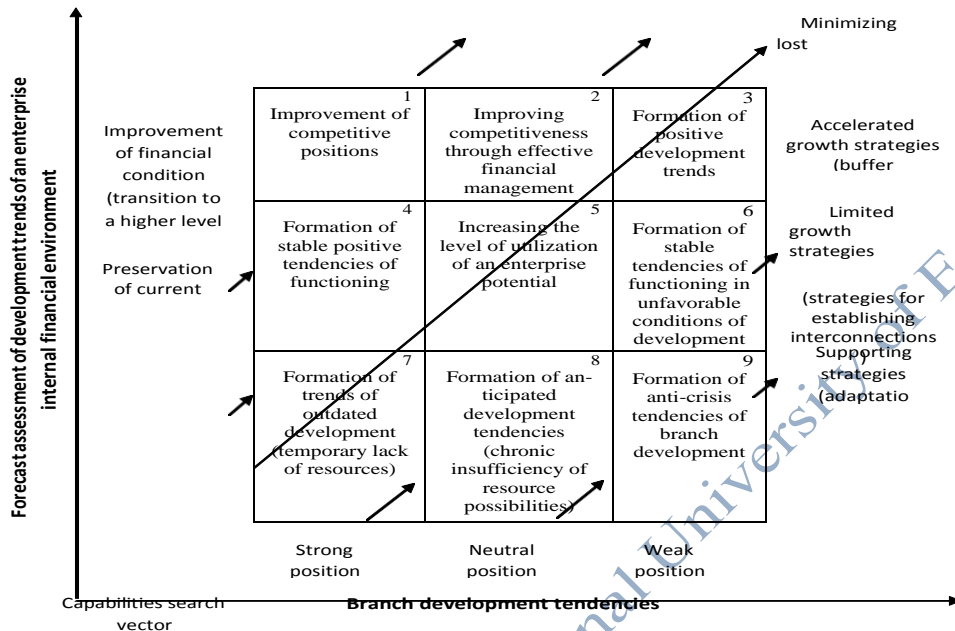


Fig. 4. The matrix of financial situations for the formation and selection of strategic alternatives of performance

Table 1. Characteristics of strategic alternatives of performance

Proposed strategy	Characteristics of strategy	Modification (typical substrategies)
Buffer strategies (accelerated growth strategies)	These strategies are useful when an enterprise gains authority and strives to streamline its own inputs and outputs, as well as during times of fragility in the industry or in periods of major conflicts with the structural units of the environment, when it is important for organizations to maintain their relative independence from some objects of external environment to get freedom in the realization of their own goals.	The strategy of autonomy from the environment, or the strategy of creating reserves, when an enterprise, by storing raw materials, accumulating information, accumulating other resources, becomes independent to some extent (for a certain period of time) from other organizations
		The strategy of strengthening control over the entrance and exit of an enterprise that shows itself primarily in the organization's rigidity with respect to the environment in order to limit itself from the adverse external influences.
		The strategy of expansion, when isolation from the environment is achieved by expanding an enterprise or gaining an increasing share of the market.

		In this case, an enterprise inevitably puts up the resistance to the external environment (at least passive) and very rarely it feels a need for help and cooperation
Strategies for establishing interconnections (limited growth strategies)	The main goal of an enterprise in choosing and implementing strategies for establishing interconnections is to organize the organization's relations exchange, to expand the boundaries of business contacts, to acquire new spheres of influence in external environment. These strategies include the interdependence of different organizations, the control over each other, primarily on the basis of trust. This strategy implements the competitive advantages of management system and management object	The strategy of concluding transactions is the constant desire of an organization to establish new relationships with various objects of external environment, allowing the organization to fit organically into external environment for the expansion of production and a successful balance between the input and output of the system
		The strategy of mutual diffusion consists in an interpenetration of separate directions of activity of several (at least two) enterprises. In particular, it may be a joint implementation of a product, a constant mutual assistance in the search and use of necessary information, a joint research, a mutual financial support
		The strategy of merging or integration is a merge of several enterprises into a corporation or an integrated organization for the most effective activity in external environment. During the implementation of the merger strategies, the most viable and multidisciplinary companies may emerge
Adaptation strategies (supporting strategies)	These strategies are aimed not only at the survival of enterprises in the external environment, which is typical for Ukrainian enterprises, but also for the long-term sustainable development, taking into account the threats and opportunities of internal and external environment. These strategies realize the competitive advantages of management optimization system	Cost-minimization strategies are one of the global strategies for doing business and competition, It involves lowering the full costs of goods production or services provision and, accordingly, selling price-cutting, in order to attract consumers and obtain additional financial resources
		Focusing strategies are the concentration of efforts of an enterprise on servicing a rather narrow segment of the market, which allows to achieve certain competitive advantages at the expense of considerable specialization
		Differentiation strategies involve the production of a larger range of products or the expansion of the range of services provided while maintaining their overall functional orientation
		Rapid Response Strategy involves a high level of use of the principle of a feedback in management, based on a rapid adaptation to changing external and internal environment by minimizing the risk of lost opportunities

Optimization of strategic norms of alternative scenarios of financial activity management in accordance with the chosen efficiency criterion is carried out in the corresponding quadrant of the matrix of financial situations on the basis of implementation of genetic algorithms on neural networks. To select the functional financial strategies of an

enterprise in the field of management of fixed assets, financial stability, liquidity, profitability and business activity, it is suggested to use a three-component indicator of financial situation of an enterprise, which is expressed by the formula

$$FS = \{P, D, S\} \quad (1)$$

where P is an indicator characterizing the current class of states of the internal financial environment of an enterprise; D is an indicator reflecting the class of the forecast state of the internal financial environment of an enterprise; S is an indicator reflecting the class of the forecast state of the external financial environment of an enterprise.

Thus, local indicators can be represented by the following combination:

$$P = (P_1, P_2, P_3); \quad D = \{D_1, D_2, D_3\}; \quad S = (S_1, S_2) \quad (2)$$

Where P_i is the classes of states of the internal financial environment of the enterprise, which are classified as follows: (1 – strong, 2 – neutral and 3 – weak competitive position of the enterprise); D_i is the directions of the company's transition according to the forecast estimates that are classified according to the following scale: (1 – a transition to the higher class of financial condition; 2 – a lack of transition, maintaining current positions; 3 – a transition to a class with a lower level of financial condition); S_i is the classes of the forecast state of the environment (1 – a favorable external financial environment, 2 – the aggressive effect of the factors of the external financial environment).

The development of directions for the reorganization transformations is an important and necessary condition for the actualization of the financial management system [7, 11]. In order to determine the need for their conduct, an assessment of the adequacy of the development of enterprises to the requirements of the internal and external environment should be made on the basis of evaluation and analysis of the results of functioning of both individual components and the enterprise as a whole and compare them with their own and industry forecast values. If there are negative trends, we can conclude that there is an urgent need to implement certain strategic measures and adjust the development strategy.

Managerial measures and decisions aimed at raising the level of financial situation and improving the competitive position of a branch wick depending on the type of financial situation is presented in Table. 2.

Table 2 – Managerial measures and decisions aimed at raising the level of financial situation and improving the competitive position of a branch

Type of financial situation	Characteristics of the situation	Managerial measures and decisions on optimization of strategy parameters
1	2	3
FS = {1, 2, 1}	The situation is characterized by a strong competitive position of a company, which lasts in the forecast period with an increase in the level of business activity in a branch	A strategy of sustainable growth without changing the current financial strategy parameters (there is no need for comprehensive measures to reorganize activities at a given time period, but it is necessary to plan all possible restructuring reorganizations in the future that will use the active development strategies)
FS = {1, 2, 2}	The situation is characterized by a strong competitive position of a company, which lasts in the forecast period with a decrease in the level of business activity in a branch and the negative impact of environmental factors	
FS = {2, 1, 1}	The situation is characterized by the strengthening of the competitive position of a company due to the effective financial	

	management with positive trends in the development of a branch and the improvement of the environment	
FS = {2, 2, 2}	The situation is characterized by the preservation of the neutral competitive position of a company in case of negative trends in branch development	Sustainable growth strategy based on partial adjustment of current financial strategy parameters (requires a partial reorganization of those areas that are in line with the positive trends of the branch and have the most negative projections (depending on the depth, importance and urgency of the transformation), which will be characterized by the preservation and maintenance of competitive positions)
FS = {3, 1, 1}	The situation is characterized by a weak competitive position, which strengthens in the forecast period with the positive trends in the development of a branch.	
FS = {3, 1, 2}	The situation is characterized by a weak competitive position, which strengthens in the forecast period with the positive trends in the development of a branch.	
FS = {1, 3, 1}	The situation is characterized by a strong competitive position of a company, which it may lose in the forecast period with the positive trends in a branch. The enterprise does not use new possibilities of financial development, which testifies to the inefficiency of financial management	The strategy of accelerated growth by identifying hidden reserves and focusing on the parameters of enterprises of a higher level of development (the situation shows an unevenness and inconsistency in management of resource potential and high decentralization of management functions. In this case, the process of transformational changes in management should be initiated from the top, being conducted urgently and intensively, supporting the priority of development according to the spheres of positive change)
FS = {1, 3, 2}	The situation is characterized by a strong competitive position of a company, which it loses in the forecast period with the negative trends in a branch. The enterprise has a low level of adaptability to the external threats, which testifies to the inefficiency of financial management	
FS = {2, 2, 1}	The situation is characterized by the preservation of the neutral competitive position of a company with the positive trends in a branch. Enterprises do not fully utilize the potential of financial development	
FS = {2, 3, 1}	The situation is characterized by a neutral competitive position of a company, which it loses in the forecast period with the positive trends in a branch. The enterprise does not use the new possibilities of financial development, which testifies to the inefficiency of the enterprise's financial management apparatus	A strategy of limited growth through optimization of resource potential and labor resources while focusing on the parameters of enterprises of a higher level of development in order to maintain and improve the development of a branch in whole (there should be an urgent reorganization of the process of financial and production resources management aimed at preventing the development of crisis situations both at each separate enterprise and in a branch in general)
FS = {2, 3, 2}	The situation is characterized by the neutral competitive position of a company, which it loses in the forecast period with the negative trends in a branch. The enterprise has a low level of adaptability to external threats because of the inefficiency of financial management	
FS = {3, 2, 2}	The situation is characterized by a weak competitive position, which is maintained in the forecast period with the negative	

	trends in a branch. An enterprise can not withstand the negative environmental factors due to the inefficiency of financial management	
FS = {3, 2, 1}	The situation is characterized by a weak competitive position, which is maintained in the forecast period with the positive trends in a branch. The enterprise does not use the new possibilities of financial development, which testifies to the necessity of reorganization of the financial management system	

Inefficiency in the implementation of managerial decisions is implemented through the implementation of control and regulation, taking into account the individual nature of specific causes in case of significant deviations of results from certain goals of financial activity, which determines the need to study more additional factors of influence and the impossibility of studying the characteristics of the occurrence of financial situations in each enterprise of the industry that are typical for each of them.

5. Conclusions

Successful functioning of industrial enterprises in the branch is possible when they have an opportunity to respond adequately to changes occurring in the internal and external environment, i.e. synchronously, in accordance with the depth and speed of the latter, which requires the internal transformation of financial and economic interrelations, which in a transient transformational environment become an integral part of life. Improving the management of a company's financial activity by introducing the proposed toolkit in accordance with the principles of heterarktion, multivariateness, rationality and diversity, as well as adaptive efficiency of production system will add the necessary flexibility, the possibility of self-development, and create conditions for the effective implementation of the established set of management strategies for each of the local components of financial activity, which function to achieve common agreed development goals.

Thus, the following elements have been improved in the work as a model tools towards financial situations forecasting models for forming an enterprise's strategy taking into account the industrial development regulations:

- the development models for forecasting financial situations for the formation of an enterprise strategy;
- set of models of financial situations forecasting and financial management of an enterprise that implements the functions of the forecasting system of financial management of an enterprise and allows to improve the quality and efficiency of the decisions by improving the management tools;
- the matrix of financial situations for the formation and selection of strategic alternatives, taking into account trends of the industry development, forecast trends and financial conditions.
- the management measures and decisions on optimization of strategy parameters depending on the type of financial situation.

The implementation of the developed modeling tools will improve the efficiency of functioning of the forecasting system of financial activity management of an enterprise, which ensures the implementation of management functions, based on modern economic and

mathematical tools, and improving the management system of financial activities of an enterprise will improve the efficiency and effectiveness of production and economic activity of enterprises and branch as a whole.

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