

DOI: <https://doi.org/10.34069/AI/2022.53.05.13>

How to Cite:

Litvin, I., Fesenko, M., Hurman, O., Nahorniak, H., & Kuzmenko, O. (2022). Forecast-planning system of financial support for the development of industrial enterprises. *Amazonia Investiga*, 11(53), 132-145. <https://doi.org/10.34069/AI/2022.53.05.13>

Forecast-planning system of financial support for the development of industrial enterprises

Прогнозно-планова система фінансового забезпечення розвитку промислових підприємств

Received: February 14, 2022

Accepted: April 10, 2022

Written by:

Inna Litvin⁵⁹<https://orcid.org/0000-0003-1748-5537>**Maryna Fesenko**⁶⁰<https://orcid.org/0000-0003-2288-3388>**Olena Hurman**⁶¹<https://orcid.org/0000-0001-9415-2635>**Halina Nahorniak**⁶²<https://orcid.org/0000-0002-5446-2417>**Oksana Kuzmenko**⁶³<https://orcid.org/0000-0002-6141-5774>

Abstract

The aim of the article is to develop a forecast-planned system of financial support for enterprise development based on approaches to forecasting factors influencing the need for financial resources to ensure enterprise development and planning financial support for enterprise development. In order to ensure high-quality and accurate forecasting of external and internal environmental factors necessary for further planning and the possibility of sound planning, the system has formed forecasting and planning modules. Based on the structure of the forecasting module with the identification of key factors influencing the financial security of the enterprise and comparing the most effective forecasting methods, an approach to forecasting factors influencing the need for financial resources in ensuring the development of agricultural machinery. The forecasting module is built by combining quantitative forecasting methods based on the approximation of existing trends with quantitative and qualitative approaches based on expert assessments. Based on a combination of balance, calculation-analytical and program-target planning and formalization of the choice of the date of the

Анотація

Тому метою статті є розробка прогнозно-планової системи фінансового забезпечення розвитку підприємства на основі підходів до прогнозування факторів, що впливають на потреби у фінансових ресурсах для забезпечення розвитку підприємства та планування фінансового забезпечення розвитку підприємства. Для забезпечення якісного та точного прогнозування необхідних для подальшого планування чинників зовнішнього та внутрішнього середовища та можливості обґрунтованого планування, в системі сформовано модулі прогнозування та планування. На основі структури модулю прогнозування з визначенням ключових факторів, що мають вплив на фінансове забезпечення підприємства та співставленні для них найбільш ефективних методів прогнозування, розроблено підхід щодо прогнозування факторів, що впливають на потреби у фінансових ресурсах при забезпеченні розвитку підприємства сільськогосподарського машинобудування. Модуль прогнозування побудовано за рахунок комбінування методів кількісного прогнозування на базі апроксимації наявних

⁵⁹ PhD, Associate Professor of Kyiv Agrarian Institute of the National Academy of Agrarian Sciences of Ukraine, Kyiv, Ukraine.

⁶⁰ Doctor of Economics, Professor of Classic Private University, Zaporizhzhya, Ukraine.

⁶¹ Ph.D. of Pedagogical Sciences, Associate Professor of Department of Marketing and Management, Khmelnytskyi Cooperative Trade and Economic Institute, Khmelnytskyi, Ukraine.

⁶² PhD, Associate Professor of Ternopil Ivan Puluj's National Technical University, Ternopil, Ukraine.

⁶³ Associate Professor of Theoretical and Applied Economics, State University of Infrastructure and Technology, Kyiv, Ukraine.



beginning of measures to manage financial security depending on the importance of the event, an approach to planning financial support for enterprise development. In the planning module, the external element in relation to the financial management system is the goal-setting system of the enterprise, which determines the mission and its goals in the areas of development. Approbation of the forecast-planning system at PJSC "Harvesters" was carried out. The results would be useful for practitioners, for the effective implementation of sustainable planning and forecasting of enterprise resources in accordance with the objectives of its development.

Keywords: planning, forecasting, system, financial support, enterprise development, resources, agricultural engineering.

Introduction

The first stage of managing the financial security of the enterprise is to assess the prospects for further development by forecasting and building development plans based on them. A feature of agricultural machinery enterprises is the close relationship with the agricultural sector, which is the main consumer of specialized engineering products. The development of agriculture in Ukraine, due to both land reform and the growth of world demand for food, determines the importance of forecasting the domestic market of agricultural machinery. At the same time, the development of agriculture in third world countries, for which the price factor of agricultural machinery is important, necessitates forecasting foreign markets in order to expand domestic machine-building enterprises. All these global forecasts in terms of financial management of agricultural machinery eventually turn into forecasts of the need for financial resources for any industrial enterprise.

The aim of the article is to develop a forecast-planned system of financial support for enterprise development based on approaches to forecasting factors that affect the needs for financial resources in ensuring enterprise development and planning financial support for enterprise development.

трендів з кількісно-якісними підходами на основі експертних оцінок. На базі комбінування балансового, розрахунково-аналітичного та програмно-цільового планування та формалізації вибору дати початку заходів з управління фінансовим забезпеченням в залежності від важливості заходу, розроблено підхід щодо планування фінансового забезпечення розвитку підприємства. В модулі планування зовнішнім елементом по відношенню до системи управління фінансовим забезпеченням є система цілепокладання підприємства в якій визначаються місяця та його цілі за напрямком розвитку. Проведено апробацію прогнозно-планової системи на ПрАТ «Харвестери». Результати були б корисними для практиків, для ефективного впровадження систем сталого планування та прогнозування ресурсів підприємства у відповідності цілям його розвитку.

Ключові слова: планування, прогнозування, система, фінансове забезпечення, розвиток підприємство, ресурси, сільськогосподарське машинобудування.

The problem is proposed to be solved by a combination of quantitative forecasting methods based on the approximation of existing trends with quantitative and qualitative approaches based on expert assessments.

In the forecasting modules of the forecast-planned management system of financial support of the agricultural machinery enterprise it is offered to carry out forecasting on three groups of forecasts:

- forecasting the factors influencing the demand for agricultural machinery and equipment;
- forecasting factors that affect the cost of financial resources;
- forecasting the factors influencing the needs of the agricultural machinery enterprise in financial resources.

Forecasting of factors influencing the needs of agricultural machinery in financial resources consists of forecasting the labor market and markets of raw materials, as well as assessing scenarios of equipment upgrades, scenarios of technology improvement, estimating the cost of reengineering business processes, estimating the cost of staff training. Forecasting of labor markets, materials, raw materials, et al. is proposed to be carried out using classical

extrapolation models and methods of cyclical research to identify the impact of long economic waves. It is also advisable to use correlation-regression analysis to establish relationships between market development indicators and their impact on the performance of the machine-building enterprise.

In turn, the evaluation of scenarios of equipment modernization, costs of business process reengineering, staff training costs is proposed to be carried out through expert methods through interviews, ie surveys of internal experts and external contractors who provide relevant services. Evaluations of technology improvement scenarios should be carried out using a set of technology forecasting methods (forecasting by analogy, growth curves, component forecasts).

All these global forecasts in terms of financial management of agricultural machinery eventually turn into forecasts of the need for financial resources for any industrial enterprise.

Based on the analysis of existing concepts on approaches to forecasting and planning of financial support of enterprise development (section "Theoretical Framework or Literature Review", in the section "Methodology" the composition of forecasting and planning modules in the forecast-planning system of financial support of agricultural engineering development and their sequence The section is divided into two parts, in the first part based on the structure of the forecasting module with the identification of key factors that affect the financial security of the enterprise and comparing the most effective forecasting methods, developed an approach to forecasting factors affecting financial resource needs In the second, on the basis of a combination of balance, calculation-analytical and program-target planning and formalization of the choice of the start date of measures to manage financial security Depending on the importance of the event, an approach to planning financial support for enterprise development has been developed.

In the section "Results and discussion" the results of approbation of the forecast-planning system at PJSC "Harvesters" are presented.

Theoretical Framework or Literature Review

In the general sense, the issue of forecasting and planning of financial resources of enterprises is sufficiently developed, but not enough attention is paid to the development of methods for

quantitative forecasting and justification of future needs of enterprises in financial resources.

The purpose of article Jianxiong Lin, (2021) is to provide a complex embedded system analysis of early warning systems and their development and use in a variety of environments, especially in the economic and financial fields. The aim of the article is to provide a comprehensive built-in system analysis of early warning systems and their development and use in various environments, especially in the economic and financial spheres.

Tarasova H et al., (2021) an approach to forecasting crisis phenomena in management, including taking into account risks, has been developed (TarasovaH et al., 2018).

Reshetnyak, T.V. (2016), Reshetnyak, Ivchenkova and Krykunenko (2017) proposed a system for forecasting the financial condition of the enterprise, which is based on establishing the dynamics of the liquidity ratio and using Markov processes to build trajectories for the financial condition of the enterprise. Without denying the prospects of this approach, it should be noted that the financial condition of the enterprise is a broader concept than just liquidity. In addition, the issue of impacts on the financial condition was left out, ie what financial resources and financial security are needed to overcome the negative trends.

Yuskevich Ilya et al., (2021) proposes a novel model-based approach to technology planning and roadmapping, consisting of two complementary steps: technology forecasting and game-theoretic planning. The inherent uncertainty of target technology performances, timelines and risks impact the roadmapping process. Reducing this uncertainty is a major challenge and allows elaborating different options and scenarios. This paper proposes a new approach to technological planning and roadmap based on a model consisting of two complementary steps: technological forecasting and planning with game theory. Internal uncertainty of technological targets, deadlines and risks affects the roadmap process. Reducing this uncertainty is a major challenge and allows different options and scenarios to be developed.

Features of enterprise planning are considered by Moskalenko, K.I. (2015, 2016) which proposed economic and mathematical models (Hroznyi et al., 2018) for forecasting demand and planning production volumes, as well as the main approaches to strategic planning, which can be

used at the machine-building enterprise. It should be noted that the proposed forecasting models are based on different options for approximating the existing trend, ie do not take into account the possibility of changing the trend and the emergence of influential factors that did not exist before.

Abdoulmohammad Gholamzadeh Chofreh et al., (2020) the concept of sustainable enterprise resource planning systems is substantiated, and special attention is focused on the aspect of system implementation, namely on the proposal of the general plan, which can direct practitioners to the implementation of sustainable enterprise resource planning systems.

In a study by Feng Shen et al., (2020) takes into account two key characteristics of financial disaster data: unbalanced datasets and drift data flow concepts. This is made possible by the proposed DFDF approach and the adaptive approach of the SMOTE Recursive Neighborhood Ensemble (ANS-REA), which provides numerous forecast results from unbalanced data flows.

In the article Yin Yang, et al., (2021) investigated the mechanism of influence of the financial joint service regime on the competitive advantages of enterprises.

In the article Yubing Yu, et al., (2021) developed a conceptual model that captures the relationship between supply chain capital and financial performance of an enterprise.

Jeffrey Cheah research et al., (2019) created a basis for the study of the most significant external resources (ie financial and training support), which were mediated by official business planning, for the financial activities of enterprises.

Enterprise Resource Planning (ERP) has been a major advancement in production planning and control (PPC), building on material requirements planning (MRP) and manufacturing resource planning (MRP II) (Cornelis & Strandhagen, 2018; Syreyshchikova et al., 2020).

Johannes Cornelis de Man and Jan Ola Strandhagen (2018) describe cases where different decisions on capacity planning and production planning are supported by spreadsheets. At the same time, they do not have a continuation in the form of research in the economic and managerial sphere, ie the development of measures to target the

development of enterprises, assess the necessary resources, including financial, forecasting other components that affect development, other than operational needs enterprises.

M. Damaskin (2014) proposed to carry out financial planning at the machine-building enterprise with division into three types of budgets - operating (production budget), investment (fixed assets budget) and financial (working capital budget). Moreover, the formation of all these budgets should be carried out with the optimization of the target function of the final financial results and with restrictions on the level of financial stability. It should be noted that the developed model of optimization of financial plans focuses on the operating budget. In addition, although it was stated that financial planning was based on the strategic plan of enterprise development, this was not reflected in the target function.

In the study of G.G. Mikhailchenko (2015) considered the features of strategic planning, including financial, for machine-building enterprises, and proposed to implement it on the basis of SWOT-analysis. This determines the probability and importance of events that affect the plans of the machine-building enterprise, as well as builds a matrix with the strengths and weaknesses of the enterprise and opportunities and threats in terms of financial stabilization. It is argued that financial development should be based on indicators such as product profitability, profit sharing policy, financing policy and asset formation. It should be noted that in the aspect of financial management of agricultural machinery development this approach cannot be used due to the lack of consideration of domestic enterprises producing agricultural products, as well as the lack of connection of financial development indicators with overall development and justification of needs. financial security depending on environmental factors.

To effectively implement the sustainable development initiative, organizations need to integrate data, information and processes from all sustainable business functions into a consolidated database. This process of integration Abdoulmohammad Gholamzadeh Chofreh et al. (2018a) propose to implement the Sustainable Resource Planning System (S-ERP), which allows practitioners to centralize all sustainable business activities of the organization into a single system so that they can monitor their sustainability.

In the study by Abdoulmohammad Gholamzadeh Chofrehet al., (2018b) proposes an assessment of the structure of S-ERP using peer review methods.

Karachyna, N.P., Grebenyok, I.V., Lazarchuk, O.V. (2014) studied the development trends of agricultural engineering in Ukraine, identified external competitors in the field of agricultural engineering, identified the main problems of the industry and developed conclusions on the growth of demand for domestic agricultural enterprises mechanical engineering under the condition of realization of the state investment projects. At the same time, the conclusions are general, without specifying in the form of quantitative values of indicators that affect the development of machine-building enterprises and without developing the necessary methodological support for regular forecasting of prospects for agricultural machinery.

G.V, Klymyk (2014) analyzed the development trends of agricultural machinery in terms of foreign economic activity, arguing that the main obstacles to the development of machine-building enterprises producing agricultural products are lack of investment, high depreciation of fixed assets, use of obsolete equipment and technologies, high cost of credit resources. As a result, domestic enterprises have insufficient competitiveness, non-compliance with international quality standards, have an insufficient range of products. In general, the conclusions about the low profitability and high cost of attracting financial resources for modernization of production confirm the importance of financial management. But further conclusions and developments on methods of financial management of agricultural machinery in modern conditions are not given.

Also, the study of trends in Ukrainian agricultural engineering in terms of integration into world markets was carried out in the work of S.O, Mashchenko and O.V, Ivanyuk (2018). It is concluded that domestic demand for agricultural machinery products is met by imports of Western machinery, both new and used, and domestic enterprises mostly do not provide products of the required quality and with the characteristics required by domestic farmers. At the same time, the industry has prospects both within the country and in the export of its products. As in

other studies, this does not pay attention to methods of forecasting the factors that affect the need for financial security for individual enterprises.

Thus, we can conclude that despite the popularity of planning in the industrial enterprise, there are no studies that would consider the features of forecasting and financial planning in the agricultural machinery industry and which would develop a system of methods to justify financial indicators needed for machine building development enterprises. There are also no studies on the relationship between the planned financial indicators and the indicators of development of the industrial enterprise as a whole.

Methodology

Development of forecast-planned system of financial support for the development of agricultural machinery enterprises that would meet the following requirements:

- to provide forecasting of the factors of internal and external environment influencing needs in financial resources of the enterprise of agricultural mechanical engineering;
- to provide planning of expenses of the machine-building enterprise producing agricultural products on directions of development;
- take into account the peculiarities of the transformation of technological systems and the development of the information economy;
- based on formalized methods of forecasting and planning that allow to investigate the sequence and justification of management decisions.

When building a forecasting module in the forecast-planning system of financial support for the development of agricultural machinery enterprises it is necessary to combine methods of quantitative forecasting based on approximation of existing trends with quantitative-qualitative approaches based on expert assessments. This is due to the peculiarities of the subject area, because not all indicators that need forecasting have a sufficient statistical base, and there are indicators that are irregular and dependent on poorly formalized phenomena and processes. Therefore, these indicators can only be analyzed using a sufficient pool of expert assessments are shown in Figure 1.

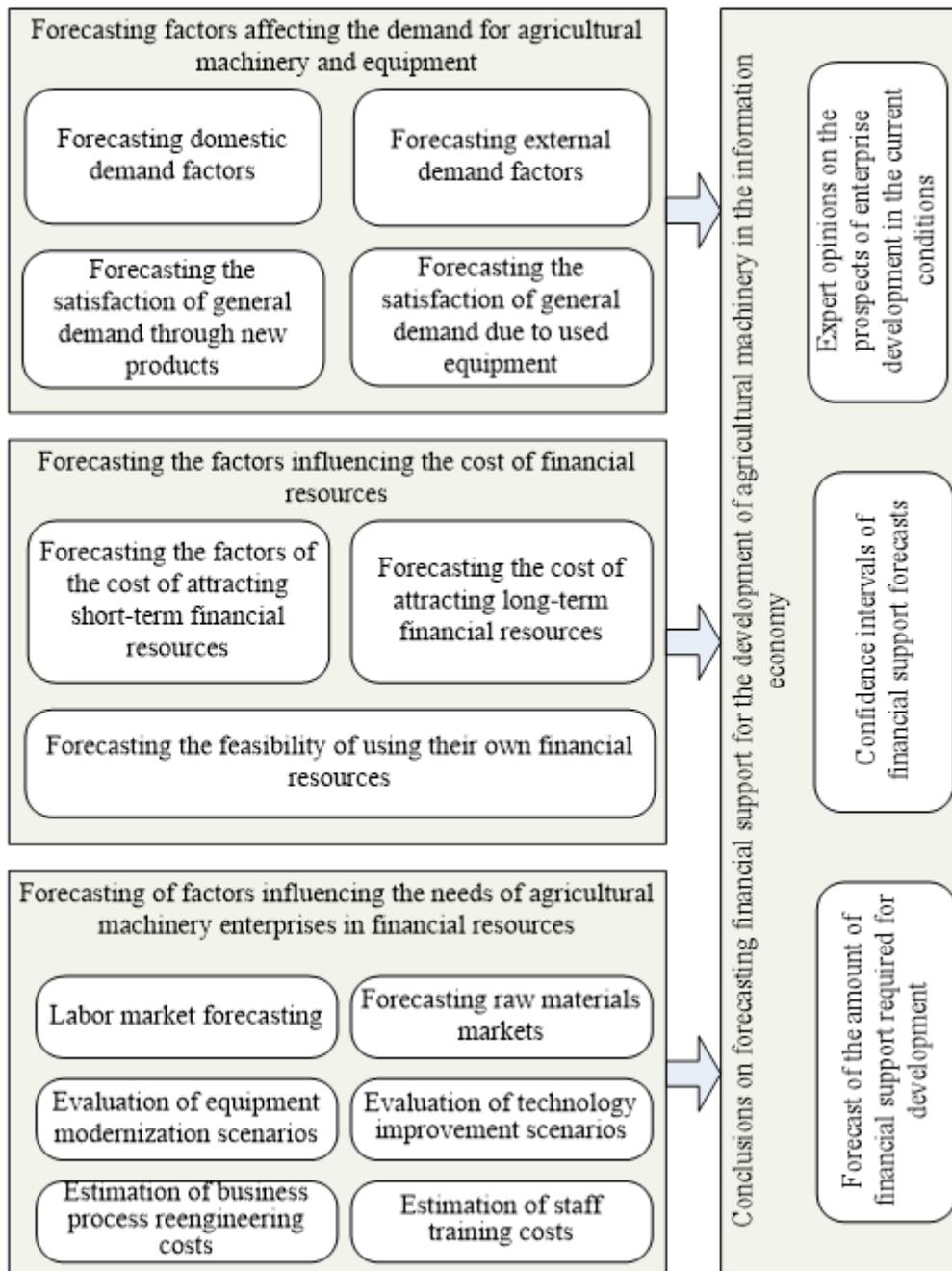


Figure 1. Forecasting module in the forecast-planning system of financial support of agricultural machinery enterprises.

In general, the forecasting module of the forecast-planned financial management system of the agricultural machinery enterprise proposes to make forecasts for three groups of forecasts:

- forecasting the factors influencing the demand for agricultural machinery and equipment;
- forecasting factors that affect the cost of financial resources;
- forecasting the factors influencing the needs of the agricultural machinery enterprise in financial resources.

The result of processing these groups of forecasts is the conclusions on the forecasting of financial support for the development of agricultural machinery.

In turn, forecasting the factors influencing the demand for agricultural machinery and equipment includes forecasting the factors of internal and external demand and forecasting the satisfaction of aggregate demand from new products or from used machinery and equipment. The main factors for forecasting are:

expected yields and world food prices, which directly affect the need and ability of agricultural enterprises to purchase machinery; the quality of the company's products in comparison with the world's leading manufacturers, which is associated with the possibility of entering foreign markets; profitability of agricultural producers and the hryvnia exchange rate, which affect the possibility of purchasing new modern equipment;

expected customs barriers and promising food crops that influence decisions to purchase used machinery (for example, almost half of grain harvesters sold in Ukraine are used, while for tractors this share is much lower).

For each group of factors it is advisable to use appropriate forecasting methods are shown in Table 1.

Table 1.
Methods of forecasting the demand for agricultural machinery products.

Directions of forecasting	Key factors	Forecasting methods
Internal demand	Yields, world food prices	Trend extrapolation models, correlation-regression analysis, seasonality research methods, external forecasts
External demand	The quality of the company's products in comparison with the world's leading manufacturers	Expert assessments through questionnaires
Satisfaction of demand at the expense of new products of agricultural engineering	Profitability of agricultural producers, hryvnia exchange rate	Trend extrapolation models, correlation-regression analysis
Satisfaction of demand due to used agricultural machinery	Customs barriers, promising food crops	Expert assessments using analytical notes

Source: own research

Forecasting the factors influencing the cost of attracting financial resources for manufacturers of agricultural machinery and equipment, as well as the cost of lending to consumers of such machinery consists of forecasting factors costing

short-term financial resources, forecasting factors costing long-term financial resources, assessing the feasibility of own financial resources are shown in Table 2.

Table 2.
Methods of forecasting the cost of attracting financial resources.

Directions of forecasting	Key factors	Forecasting methods
The cost of short-term financial resources	Rates of short-term bank loans	Trend extrapolation models, correlation-regression analysis
Cost of attracting long-term financial resources	Rates of long-term bank loans, the cost of raising capital through the placement of securities	Trend extrapolation models, correlation-regression analysis
Expediency of using own financial resources	Bank deposit rates, profitability of financial instruments, primarily IGLBs	Expert assessments through questionnaires, expert assessments using analytical notes, financial flow models

Source: own research

Short-term resources that can attract Ukrainian machine-building enterprises for development are bank loans. This is a well-studied subject area, forecasting should be carried out using correlation and regression analysis to determine the impact of enterprise performance on the perception of banks' lending risks and

extrapolation models to determine overall trends in the cost of attracting financial resources.

Forecasting long-term financial resources contains more uncertainties. These can be both bank loans and the placement of bonds by the company for borrowing in the financial markets.

Correlation-regression models in the latter case allow us to assess the interest of investors in the company's securities, whether they will be in demand and at what price they can be placed.

The expediency of using own financial resources is carried out with the forecasting of alternative directions, based on expert assessments of different types and modeling of financial flows of the enterprise to determine the dynamics of

free own financial resources and possible ways to use them.

Forecasting the factors influencing the needs of agricultural machinery in financial resources consists of forecasting the labor market and markets for raw materials, as well as assessing scenarios of equipment upgrades, scenarios of technology improvement, estimating the cost of business process reengineering, estimating the cost of staff training are shown in Table 3.

Table 3.
Methods of forecasting the factors influencing the needs of agricultural machinery enterprises in financial resources

Directions of forecasting	Key factors	Forecasting methods
Labor market forecasting	Wage growth indices of qualified specialists in the field of mechanical engineering	Trend extrapolation models, correlation-regression analysis
Forecasting raw materials markets	Price indices for metal, fuel, electricity	Trend extrapolation models, correlation-regression analysis, cyclicity research methods
Evaluation of equipment modernization scenarios	Price indices for engineering products	Expert methods through interviews
Evaluation of technology improvement scenarios	The cost of patents for technologies and products	Methods of technology forecasting
Estimation of business process reengineering costs	Cost of consulting services	Expert methods through interviews
Estimation of staff training costs	Cost of educational courses, qualification indices of available staff	Expert methods through interviews

Source: own research

Forecasting of labor markets, materials, raw materials, et al. is proposed to be carried out using classical extrapolation models and methods of cyclical research to identify the impact of long economic waves. It is also advisable to use correlation-regression analysis to establish relationships between market development indicators and their impact on the performance of the machine-building enterprise.

In turn, the evaluation of scenarios of equipment modernization, costs of business process reengineering, staff training costs is proposed to be carried out through expert methods through interviews, ie surveys of internal experts and external contractors who provide relevant services. Evaluations of technology improvement scenarios should be carried out using a set of technology forecasting methods

(forecasting by analogy, growth curves, component forecasts).

Thus, using the developed structure of the forecasting module in the forecast-planning system of financial support of agricultural machinery, based on identifying key factors that affect the financial security of the company and comparing the most effective forecasting methods, the company is able to provide quality and accurate forecasting of external and internal factors necessary for further planning.

The planning module forecast-planning system of financial support for the development of agricultural machinery enterprises solves problems related to planning costs in the areas of development and determining the necessary financial support are shown in Figure 2.

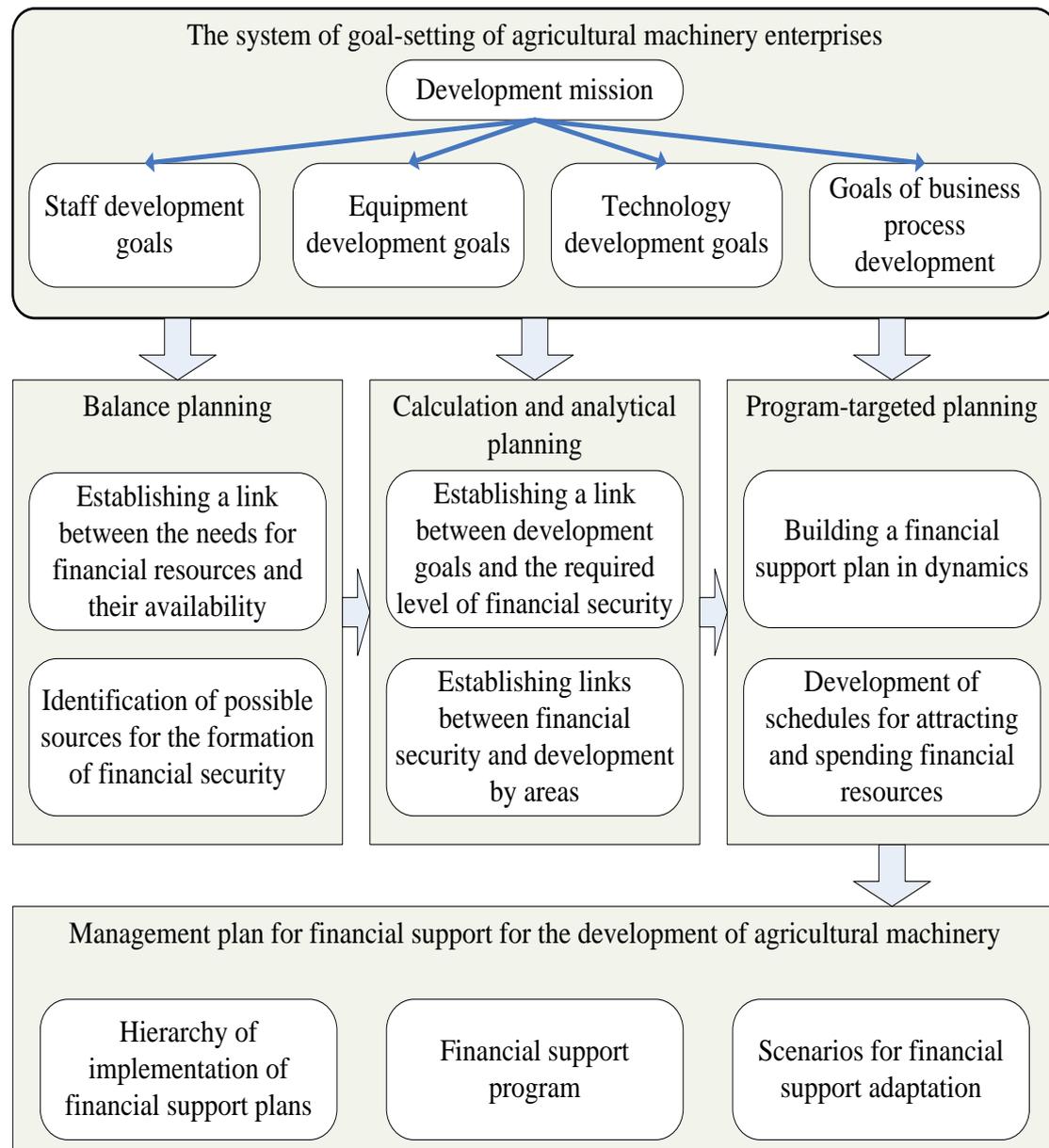


Figure 2. Planning module in the forecast-planning system of financial support management of agricultural machinery enterprises.

In this module, the external element in relation to the financial management system is the goal-setting system of the agricultural machinery enterprise, which determines the mission and goals of the enterprise in the areas of development. In terms of development of the enterprise of agricultural engineering and management of the necessary financial support, it is advisable to distinguish the following types of development:

development of business processes, including management business processes related to the collection of information necessary for the operation of the enterprise, with the introduction of domestic agricultural machinery to foreign

markets, quality management, improving consumer performance and competitiveness; development of equipment, which implies the renewal of fixed assets for the development of new products or improvement of traditional products of the enterprise; development of technologies necessary for the functioning of the machine-building enterprise in modern conditions in compliance with modern requirements for product quality and environmental friendliness; development of personnel who need to master the latest equipment and modern engineering technologies.

It is proposed to plan financial support using three approaches - balance sheet, calculation-analytical and program-target.

With the help of balance planning, the connection between the needs for financial resources and their availability is established, as well as the identification of possible sources for the formation of financial security. At the same time:

balance of production capacities, which reflects what capacities are available and which are necessary for the implementation of the production program to meet the expected demand for agricultural machinery and equipment;

balance of fixed assets, reflecting the depreciation, disposal and renewal of fixed assets of agricultural machinery;

cost balance, which reflects the creation of enterprise revenues by sources of income and distribution of costs by areas of development, which allows to assess the importance and payback of the areas of development of agricultural machinery;

Calculation and analytical planning is based on the analysis of the achieved values of the planned indicator and indices of its change in the planning period. This method is effective in cases where there are no clear technical and economic standards, so the connection should be established on indirect grounds, by factor analysis or expert evaluation. Therefore, it is expedient to use calculation and analytical planning to establish a link between development goals and the required level of financial support, as well as to calculate the strength of the links between financial support and development of the machine-building enterprise by areas.

A feature of program-target planning is the construction of a comprehensive program of action to achieve goals. At the same time, measures to manage financial security are determined, first of all, measures to attract financial resources and measures to direct resources to achieve the planned goals. This is the last stage of planning in the management of financial support of the agricultural machinery company, which is the construction of the financial support plan in the dynamics and the development of schedules for attracting and spending financial resources.

A task allocation model is proposed to determine the start date of the financial security management task. Each problem Z_k is characterized by the set:

$$Z_k(W_k, Z_k^E, R_k, D_k),$$

where W_k – weight in the hierarchy of goals of the k-th task (the more important, the greater the weight);

Z_k^E – the set of tasks that must be completed before the k-th task;

R_k – change of financial resources when performing the k-th task (costs or involvement);

D_k – the start date of the k-th task.

The weight in the hierarchy of goals is determined depending on the direction of development to which the event relates and the mission of the enterprise. The objective function of the model is:

$$\sum_k W_k / D'_k \rightarrow \max,$$

$$D'_k = D_k - D_0, k = 1, \dots, K,$$

where D_0 – zero start date of the strategy for the development of agricultural machinery.

A task cannot start earlier than related tasks Z_k^E

$$D_k > D_k^e, e = 1, \dots, E,$$

where D_k^e – task start date Z_k^e from the set Z_k^E .

In each planning period, it is necessary that the income of resources was not less than their costs:

$$\sum_i R_i \geq 0, D^u < D_i < D^{u+1},$$

where R_i – change of resources due to the implementation of the i-th task, the start date of which D_i is between the start and end dates of the u-th planning period.

Thus, using the developed structure of the planning module in the forecast-planning system of financial management of agricultural machinery, based on a combination of balance, calculation-analytical and program-target planning and formalization of the choice of start date for financial management depending on the importance of the event, an agricultural machine-building enterprise can carry out sound planning with maximization of compliance of financial support with the goals of enterprise development.

Results and Discussion

Practical approbation of the developed approaches was carried out at domestic agricultural machinery enterprises of PJSC "Berdyansk Harvesters".

The basis of the agricultural machinery market in Ukraine is occupied by tractors and combines with harvesters, the share of which in 2019 was 38% and 29%, respectively. All, such as seeders, livestock machinery, haymaking, tillage and fertilizers in total do not exceed 33%.

The goals of the general development of PJSC "Berdyansk Harvesters", set at the level of senior management, include the development of a new range of products, reducing costs and expanding markets. Currently, the main consumers of Berdyansk Harvesters are domestic enterprises. At the same time, there is a possible demand in

the markets of Belarus and Kazakhstan, as well as the potential to enter the Turkish market. The cost of production of PJSC "Berdyansk Harvesters" depends on the prices of materials and components, 75% of the purchase of raw materials and supplies are purchases of rolled metal, the rest - components. The suppliers of components are mostly foreign companies, suppliers of rolled metal - domestic. But both for metal and for components, the purchase price depends on the hryvnia exchange rate. Therefore, when planning financial support, the hryvnia exchange rate is one of the main factors. In addition, it is advisable to forecast the discount rate of the NBU, which depends on the cost of lending to both agricultural producers and directly to agricultural machinery. Forecasts of the main indicators of environmental factors influencing the development of PJSC "Berdyansk Harvesters" are shown in Table. 4.

Table 4.

Forecasts of the main factors of the external environment influencing development of the enterprises of agricultural mechanical engineering.

Forecast factor	Year		
	2022	2023	2024
NBU discount rate	5%-10%	5%-8%	5%-8%
Volume of demand for combines, UAH million	5720	6240	6760
Volume of demand for tractors, UAH million	15600	16380	18200
Volume of demand for attachments, UAH million	1400	1470	1520
Volume of demand for spare parts for agricultural machinery and equipment, UAH million	2300	2340	2370
Prices for rolled metal, thousand UAH / t	23	19	22
Hryvnia exchange rate, UAH / \$	26	27	27,5

Source: own research

The development strategy of PJSC "Berdyansk Harvesters" plans to open offices in other countries to develop new markets, reduce costs by improving the procurement system and expanding the range of products. Belarus, Kazakhstan and Turkey are planned as countries to open representative offices. Relations already exist with these countries, mainly in the supply of spare parts, but the lack of representative offices and regular dealers does not allow to use the full potential of the market. Improving the

procurement system involves long-term planning of needs for raw materials and their purchase at minimum prices, in times of cyclical price reductions and taking into account possible losses due to the freezing of working capital. The expansion of the product range involves the development of new types of attachments for agricultural combines and tractors. The amount of costs and deadlines for the implementation of measures for the development of PJSC "Berdyansk Harvesters" are shown in Table. 5.

Table 5.
Planned measures for the development of PJSC "Berdyansk Harvesters".

Direction	Period	Volume of expenses, thousand UAH
Development of a new market in Belarus	2022	1340
Cost reduction due to long-term planning of procurement of raw materials and supplies	2022	230
Expansion of the product range	2023	450
Development of a new market in Kazakhstan	2023	1200
Development of a new market in Turkey	2023	1400

Source: own research

To cover development costs and other operating costs of PJSC "Berdyansk Harvesters" it is advisable to raise funds in 2022 in the amount of 680 thousand UAH, in 2023 in the amount of 540 thousand UAH, in 2024 raising funds is not planned, it is expected to cover all costs own sources.

Thus, due to the forecasting of the main factors influencing the development of PJSC "Berdyansk Harvesters" developed a management plan for the necessary financial support for development, which corresponds to the development strategy of the enterprise and provides the necessary financial resources for all stages of development.

Conclusions

It is established that in managing the financial support of agricultural machinery enterprises the priority is to forecast the external and internal environment, and the feature of agricultural machinery enterprises is the close relationship with the agricultural sector, which is the main consumer of specialized engineering products. Global forecasts of agricultural development in terms of financial management of agricultural machinery in the information economy eventually turn into forecasts of the need for financial resources for the machine-building enterprise.

It is concluded that there are no studies that would consider the features of financial planning in agricultural machinery and which would develop a system of methods to justify the financial support required for the development of machine building in the information economy. There are also no studies on the relationship between planned financial indicators and indicators of development of the agricultural machinery industry as a whole.

The forecast-planned system of financial support of development of the enterprises of agricultural

machine-building which carries out forecasting of the factors of internal and external environment influencing needs in financial resources of the enterprise of agricultural machine-building is developed; provides cost planning of a machine-building enterprise producing agricultural products by areas of development; takes into account the peculiarities of the transformation of technological systems and the development of the information economy; is based on formalized methods of forecasting and planning that allow to investigate the sequence and justification of management decisions. We believe that the forecast-planned system of financial support for enterprise development is necessary to coordinate the management of financial support for development with the development of the enterprise and to improve the management system of the enterprise in general and financial support in particular.

The approbation of the forecast-planning system at PJSC "Berdyansk Harvesters" was carried out, it was suggested to pay attention to the development of sales. In addition, the segment of attracting financial resources, which needs to improve planning, is unsatisfactory. Due to the forecasting of the main factors influencing the development of PJSC "Berdyansk Harvesters" developed a management plan for the necessary financial support for development, which corresponds to the development strategy of the enterprise and provides the necessary financial resources for all stages of development.

Bibliographic references

- Cheah, J., Amran, A., & Yahya, S. (2019). External oriented resources and social enterprises' performance: The dominant mediating role of formal business planning, *Journal of Cleaner Production*, Vol. 236, 117693. ISSN 0959-6526, <https://doi.org/10.1016/j.jclepro.2019.117693>.

- Chofreh, A.G., Goni, F.A., & Klemeš, J.J. (2018a). Sustainable enterprise resource planning systems implementation: A framework development, *Journal of Cleaner Production*, Vol. 198, 1345-1354. ISSN 0959-6526, <https://doi.org/10.1016/j.jclepro.2018.07.096>
- Chofreh, A.G., Goni, F.A., & Klemeš, J.J. (2018b). Evaluation of a framework for sustainable Enterprise Resource Planning systems implementation, *Journal of Cleaner Production*, Vol. 190, 778-786. ISSN 0959-6526, <https://doi.org/10.1016/j.jclepro.2018.04.182>
- Chofreh, A.G., Goni, F.A., Klemeš, J.J., Malik, M.N., & Khan, H.H. (2020). Development of guidelines for the implementation of sustainable enterprise resource planning systems, *Journal of Cleaner Production*, Vol. 244, 118655. ISSN 0959-6526, <https://doi.org/10.1016/j.jclepro.2019.118655>
- Cornelis de Man, J., & Strandhagen, J.O. (2018). Spreadsheet Application still dominates Enterprise Resource Planning and Advanced Planning Systems. *IFAC-PapersOnLine*, 51(11), pages 1224-1229. ISSN 2405-8963, <https://doi.org/10.1016/j.ifacol.2018.08.423>
- Damaskin, M. (2014). Financial planning in the scientific and technological development of machine-building enterprises. *Scientific Bulletin Odessa National University of Economics*, № 5(213), 7-51 Access mode: [http://n-visnik.oneu.edu.ua/files/archive/nv_5_\(213\)_2014.pdf](http://n-visnik.oneu.edu.ua/files/archive/nv_5_(213)_2014.pdf)
- Hroznyi, I., Kuzmak, O., Kuzmak, O., & Rusinova, O. (2018). Modeling management of diversification of foreign economic interactions. *Problems and Perspectives in Management*, 16(1), 155-165. [http://dx.doi.org/10.21511/ppm.16\(1\).2018.15](http://dx.doi.org/10.21511/ppm.16(1).2018.15)
- Karachyna, N.P., Grebenyok, I.V., & Lazarchuk, O.V. (2014). Trends and the state of socio-economic development of Ukrainian agricultural engineering. *Economics. Management. Innovation*, № 1. Access mode: http://nbuv.gov.ua/UJRN/eui_2014_1_46
- Klymyk, G.V. (2014). The main trends in the development of agricultural engineering in Ukraine in the context of foreign economic activity. *Modern issues of economics and law*, Vol. 1, 83-87. [In Ukrainian]
- Lin, J. (2021). Design of enterprise financial early warning model based on complex embedded system, *Microprocessors and Microsystems*, Vol. 80, 103532. ISSN 0141-9331, <https://doi.org/10.1016/j.micpro.2020.103532>
- Mashchenko, S.O., & Ivanyuk, O.V. (2018). Modern trends in the development of Ukrainian enterprises in the market of agricultural engineering and the main obstacles to increase their international competitiveness. *Economic space*, № 138, 183-191. [In Ukrainian]
- Mikhailchenko, G.G. (2015). Necessity and features of strategic planning of machine-building enterprises. *Bulletin of Transport Economics and Industry*, 52, 52-61. [In Ukrainian]
- Moskalenko, K. (2016). Conceptual approach to planning foreign economic activity of the machine-building complex. *Collection of scientific works of Cherkasy State Technological University. Series: Economic Sciences*, Issue. 43(2), 119-127. [In Ukrainian]
- Moskalenko, K.I. (2015). Economic and mathematical model of planning of foreign economic activity of the machine-building complex of Ukraine. *Investments: practice and experience*, № 20, 118-123.
- Reshetnyak, T.V. (2016). Forecasting the level of financial condition of the machine-building enterprise with the help of Markov processes. *Economic Bulletin of Donbass*, № 3, 146-148. [In Ukrainian]
- Reshetnyak, T.V., Ivchenkova, O.Yu., Krikunenko, K.M. (2017). Diagnostics and forecasting of the financial condition of the machine-building enterprise. *Scientific Bulletin of the Donbass State Engineering Academy*, № 3, 133-138. [In Ukrainian]
- Shen, F., Liu, Y., Wang, R., & Zhou, W. (2020). A dynamic financial distress forecast model with multiple forecast results under unbalanced data environment, *Knowledge-Based Systems*, Vol. 192, 105365. ISSN 0950-7051, <https://doi.org/10.1016/j.knosys.2019.105365>
- Syreishchikova, N.V., Pimenov, D.Y., Mikolajczyk, T., & Moldovan, L. (2020). Automation of Production Activities of an Industrial Enterprise based on the ERP System, *Procedia Manufacturing*, Vol. 46, pp. 525-532, ISSN 2351-9789, <https://doi.org/10.1016/j.promfg.2020.03.075>
- Tarasova, H., Kondrashova, L., Chuvasova, N., Kondrashov, M., & Tsikh, H. (2021). A combination of forecasting internal and external crises in managing the development of educational institution. *Amazonia*



- investiga, 10(47), 35-46.
<https://doi.org/10.34069/AI/2021.47.11.4>
- Tarasova, H., Kuzmak, O., Kuzmak, O., & Buchkovska, Y. (2018). Modern realities of risk management in the activities of Ukrainian banks. *Banks and Bank System*, 13(1), 150-161. Access date: <https://businessperspectives.org/journals/banks-and-bank-systems/issue-277/present-day-realities-of-risk-management-in-the-activity-of-ukrainian-banks>.
- Yang, Y., Liu, Q., Song, J., & Zhou, M. (2021). The influence mechanism of financial shared service mode on the competitive advantage of enterprises from the perspective of organizational complexity: A force field analysis. *International Journal of Accounting Information Systems*, Vol. 42, 100525, ISSN 1467-0895, <https://doi.org/10.1016/j.accinf.2021.100525>
- Yu, Y., Zhang, J.Z., Cao, Y., & Kazancoglu, Y. (2021). Intelligent transformation of the manufacturing industry for Industry 4.0: Seizing financial benefits from supply chain relationship capital through enterprise green management. *Technological Forecasting and Social Change*, Vol. 172, 120999, ISSN 0040-1625, <https://doi.org/10.1016/j.techfore.2021.120999>.
- Yuskevich, I., Smirnova, K., Vingerhoeds, R., & Golkar, A. (2021). Model-based approaches for technology planning and roadmapping: Technology forecasting and game-theoretic modeling. *Technological Forecasting and Social Change*, Vol. 168, 120761. ISSN 0040-1625, <https://doi.org/10.1016/j.techfore.2021.120761>.