

# Forecasting the state of agricultural enterprises based on the results of economic diagnostics

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## Abstract

This article is devoted to the study of information support and methodological tools for economic diagnostics of agricultural enterprises, based on the results of which the cost of resource potential is predicted. Determined the factors of influence of the internal and external environment on forecasting the cost resource potential of agricultural enterprises. The methodological toolkit for forecasting the cost resource potential of agricultural enterprises is used, taking into account the extrapolation of indicators and the coefficient of change. Built the economic-mathematical models for forecasting the general potential of agricultural enterprises in Ukraine. Proposed the scheme of forecasting the state of agricultural enterprises and complex information support the stages of making managerial decisions by the management of agricultural enterprises. For agricultural enterprises of Ukraine, promising directions for the development of economic activities are proposed.

**Keywords:** forecasting, resource potential, information support, economic diagnostics, agricultural enterprises.

## Introduction

In order to study the state and assess the effectiveness of economic diagnostics of agricultural enterprises, an analysis of the formation and use of resources of economic entities carried out with the help of appropriate methodological tools and information support, which subsequently serves as the main one for forecasting the state of agricultural enterprises. It should be noted that the functioning of agricultural enterprises is determined by the specifics and characteristics of the activities of economic entities in this area. Accordingly, this is reflected in the state, dynamics of the forecasting development of agricultural production and on the results of economic diagnostics of the activities of agricultural enterprises.

In market conditions and crisis phenomena the economic assessment of the results of economic diagnostics of agricultural enterprises

makes it possible to forecast further trends and propose ways to increase the efficiency of using the resource potential, to develop a strategy, as well as directions for the formation of an effective organizational-financial mechanism for economic diagnostics of agricultural enterprises.

Carrying out economic diagnostics of the economic activities of agricultural enterprises, they monitor the processes and phenomena occurring in the agricultural sector. The internal environment is a sphere in which specific decisions are made regarding agricultural production, the formation of the organizational structure and corporate culture of agricultural enterprises. The external environment is a set of economic entities, economic, social and natural conditions of national and interstate institutional structures, and other external economic entities in the agricultural sector,

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conditions and factors operating in the global environment.

Solving problems related to information support of economic diagnostics in the agricultural sector have found their scientific and practical application in research on management support of agricultural enterprises (Ensslin, L. et al., 2017); support services for

innovations in agriculture (Faure, G. et al., 2019); functioning information systems in agricultural enterprises (Látečková, A. et al., 2018); diagnostics and decision-making of the company management within the period of economic crisis and recession (Tomšík, P. et al., 2010) and others.

## Material and methods

To determine the economic condition of agricultural enterprises in the future, they use various forecasting methods and make forecasts based on the results of economic diagnostics. Our analysis of modern approaches to forecasting the state of agricultural enterprises shows that in modern conditions they use normative forecasts that determine the state of an object under the influence of purposeful economic activity. (Bezpartochna, O. et al., 2020). Search forecasts – possible prospects that describe the state of solving problems in the future, are not widely used by economic entities as a justification for the value of indicators economic activity of agricultural enterprises and their effective management decisions.

To carry out economic diagnostics agricultural enterprises must have appropriate information support in order to conduct qualitative and quantitative studies of indicators economic activity and monitoring the market environment. Information support of economic diagnostics agricultural enterprises is a system of data and methods of their processing, which make it possible to identify the real activities of an agricultural enterprise, the effect of factors

affecting the economic process or performance indicators, as well as the possibility of implementing the necessary management decisions.

An important part of the data for economic diagnostics is planned information used as baseline data for assessing the fulfillment of planned targets for agricultural enterprises as a whole and for individual structural units, monthly, quarterly, for a year and other periods.

For the studied agricultural enterprises, we propose the preparation of normative and search forecasts by the information and analytical department using such a forecasting method as determining the trend extrapolation.

The problems of using methodological tools for forecasting various objects of research at agricultural enterprises have been investigated in publications various scientists. The articles investigated forecasting livestock prices (David, A. et al., 1981), forecasting the demand for agricultural products (Haoxiong, Yang et al., 2019), forecasting sales of agricultural equipment (Krutz, G. et al., 1986), economic forecasting in agriculture (Geoffrey, P., Allen, 1994).

## Results and discussion

Agricultural enterprises in the process of economic diagnostics use planned information about the production program, costs production of agricultural products, the formation and use of resources, profitability, etc.

Information support for the economic diagnostics of the external environment agricultural enterprises are indicators that characterize the general economic development of the country, the conjuncture of internal and

external markets of agricultural products, the activities of counterparties and competitors. Consider the above indicators in more detail.

We divide the indicators characterizing the general economic development of the country into two groups:

– indicators of macroeconomic development (volume of revenues and expenditures of the state budget, budget deficit, money emission, inflation index, unemployment rate, minimum

wage and subsistence level, etc.);

– indicators of sectoral development (the volume of agricultural production, the total value of assets of agricultural enterprises, the total amount of capital, the amount of profit before taxation and net profit of the enterprises of the industry, the price index for agricultural products, the amount of subsidies to producers of agricultural products by their types, etc.).

The system of indicators of information support for economic diagnostics of this group, using agricultural enterprises, serve as the basis for assessing and forecasting the conditions of the external environment functioning of economic entities when making effective management decisions.

The indicators that characterize the conjuncture of the domestic and foreign markets of agricultural products and are used by agricultural enterprises of Ukraine include the following indicators: supply and demand for types of agricultural products, prices, level of quality of agricultural products, the volume of imports and exports of agricultural products by type, the volume of commodity futures exchanges. The system of indicators of this group used by agricultural enterprises of Ukraine to make informed management decisions in the field of forming their own production program and the volume of sales of agricultural products, determining the cost and selling prices of crop and livestock products.

Indicators characterizing the activities of counterparties and competitors and are used by agricultural enterprises include indicators of the activities of banking institutions, insurance companies, suppliers and buyers of agricultural products, competitors. Sources of information about these indicators and the use of agricultural enterprises are the publication of reporting materials in the press and the Internet (for certain types of economic entities), ratings (banks, insurance companies), and paid business information. They used by agricultural enterprises to make effective management decisions on operational economic activities.

The conducted studies have shown that in

modern conditions is extremely difficult for agricultural enterprises to form information support for economic diagnostics of the external environment, since economic entities experience a shortage of financial resources to collect relevant data, need specialists in analytical research, especially foreign markets for agricultural products, as well as accessibility to technical-communication support of the Internet.

Taking into account the practical activities of agricultural enterprises, we have identified the directions of using quantitative methods for the study of economic diagnostics, which manifested in the following:

– time series analysis is used by economic entities to take into account the time fluctuations of the studied quantities (study of the main indicators of economic activity by types of production resources);

– when using the analysis of cyclicity, entities reveal changes in the studied values associated with the business cycle, namely: determination of supply and demand for agricultural products within the marketing year;

– seasonality analysis is used when taking into account the period of sowing and harvesting, raising animals, etc.;

– the method of extrapolation trends is used when observing the dynamics of a certain indicator of the enterprise's activity, determining the trend of its development for the future period;

– the forecasting method based on the past is used to determine the volume of activity or other indicator based on the data of the past period to forecasting the likelihood in the future;

– the trend correlation method is used by entities in the study of relationship between various trends in order to establish their mutual influence;

– regression analysis is used to build a model of the dependence a certain quantity on another or several other quantities.

In order to improve the mechanism for assessing results of economic diagnostics the internal environment of agricultural enterprises

proposed to use economic-mathematical modeling in order to forecasting the total cost of potential taking into account changes in each of its elements, which will allow to reasonably determine the volume of activity and need for a particular production resource.

To forecast the resource potential of agricultural enterprises, we will define the main elements and their significance. We have referred to the elements of the resource potential of agricultural enterprises: production stocks, fixed assets, personnel cost, financial resources, which in general constitutes the general potential.

Specific features of the economic diagnostics of fixed assets of agricultural enterprises is the determination of optimal ratio between the active and passive parts. This is due to the belonging of agricultural enterprises to crop or livestock complexes. Accordingly, if economic entity of the agrarian sector is engaged in the cultivation of agricultural products, then the share of the active part of fixed assets (agricultural machinery, vehicles, inventory, etc.) must exceed the passive part (warehouses, repair and garage facilities). In the case of agricultural enterprises operating in a livestock complex, the share of fixed assets of the passive part (farms, storage facilities for feed, etc.) should not exceed the active part.

Specific features of the economic diagnostics of labor resources when using them in agricultural production are: 1) high proportion of labor operations in the livestock complex, and its gradual reduction in crop production through the introduction of modern progressive technologies in the cultivation of agricultural crops; 2) high proportion of the costs of living labor in the total costs of agricultural enterprises; 3) limiting the possibilities of a narrow professional and technological division of labor.

The specificity of the agrarian sector also reflected in features of the economic diagnostics formation of assets and the functioning of the capital agricultural enterprises. In modern conditions, capital

formation occurs precisely due to its concentration in the field of agricultural and industrial production, as well as due to investment resources. Most of the large agricultural enterprises are part of holding structures and are included in the integration links in the "production-processing-sale-consumption" chain. Other entities of the agrarian sphere seek to integrate or merge with large economic entities or industrial groups in order to attract working capital and use their own resource potential, etc.

The methodology for calculating the forecasting value indicators of the resource potential agricultural enterprises provides for the use of coefficient change, which we determined using the information tools of the Excel spreadsheet processor (TENDENCY function) by studying the change in indicators for the period 2015-2019 compared to the same indicator in 2019.

In order to study the state of economic diagnostics, we have selected 10 agricultural enterprises of Ukraine, which carry out the production of crop and livestock complexes, namely: Agricultural Consumer Society (ACS) "Krajany", LLC named after Vorovsky, Agricultural LLC (ALLC) named after Kalashnika, Subsidiary Research Facility (SRF) "Yuvileiny" PSAA, Agricultural LLC (ALLC) "Zlagoda", Research Enterprise (RE) "Vital-Agro", LLC "Poltava-Sad", Agricultural LLC (ALLC) "Vasilkovskoe", Subsidiary Research Facility (SRF) "Stepnoye", Private Agricultural Enterprise (PAE) "Promin".

It should be noted that at the studied agricultural enterprises of Ukraine, the state of economic diagnostics depends on the level of use of methodological tools, methods of conducting economic diagnostics, the possibility of processing accounting and statistical information, the use of modern computer technology, the availability of appropriately qualified personnel, the further use of the results of economic diagnostics in the process of making managerial solutions, etc. (Bezpartochna, O. *et al.*, 2019).

The influence of environmental factors on the studied agricultural enterprises of Ukraine negatively affects the production of agricultural products, therefore, the forecasting value of production stocks tends to decrease compared to 2019; the coefficient of change is in the range of 0.39-0.65.

For the forecast period, not all agricultural enterprises in Ukraine may have a growth trend in fixed assets. Thus, the largest growth rate in the cost of fixed assets is shown by the SRF "Yuvileiny" PSAA and the SRF "Stepnoye" – respectively by 73% and 2.8 times compared to 2019; the forecasted value of the cost fixed assets will amount to 3336 thousand UAH, respectively 32013 thousand UAH.

The difficult economic situation and the need to optimize the number of personnel agricultural enterprises in Ukraine can lead to a decrease in the cost of personnel, therefore, its forecast value tends to decrease compared to 2019; the coefficient of change is in the range of 0.38-0.91.

For the forecast period, not all agricultural enterprises in Ukraine may have a growth trend in the cost of financial resources. Thus, the highest growth rate of the cost financial resources is observed in the (RE) "Vital-Agro", ALLC "Vasilkovskoe", and the SRF "Stepnoye" – by 93%, 69% and 26%, respectively, compared to 2019; the forecasted value of the cost

financial resources will be, respectively, 118 thousand UAH, 182 thousand UAH and 129 thousand UAH.

For the forecast period, only one agricultural enterprise in Ukraine can have a positive dynamic of growth in the value of the total potential – SRF "Stepnoye". The growth rate will be 36.0% compared to 2019, and the forecast value will be 40764 thousand UAH.

We have built economic-mathematical models for forecasting the cost of elements and the general potential of agricultural enterprises in Ukraine (Table 1). The proposed economic-mathematical models will allow agricultural enterprises in Ukraine to forecasting the cost total potential, as well as adjust the cost each element when the external and internal environment changes. That is, by improving the mechanism for assessing the results of economic diagnostics by using a forecasting system and economic-mathematical modeling, agricultural enterprises are able to optimally determine the need for a particular production resource and calculate the volume of activity.

Improving the mechanism for assessing the results of economic diagnostics also allows agricultural enterprises to determine promising areas of economic activity in the future and the magnitude of the economic effect.

**Table1 – Economic-mathematical models for forecasting the total potential of agricultural enterprises in Ukraine**

Agricultural enterprises	Economic-mathematical models	2019	2020	Deviation 2020 from 2019, (+, -)
ACS "Krajany"	$y = 0,56x_1 + 0,38x_2 + 0,50x_3 + 0,18x_4$	10250	4361	-5889
LLC named after Vorovsky	$y = 0,65x_1 + 0,62x_2 + 0,91x_3 + 0,13x_4$	7758	4661	-3097
ALLC named after Kalashnika	$y = 0,39x_1 + 0,62x_2 + 0,62x_3 + 0,52x_4$	35194	17374	-17820
SRF "Yuvileiny" PSAA	$y = 0,76x_1 + 1,73x_2 + 0,68x_3 - 70,85x_4$	8416	7851	-565
ALLC "Zlagoda"	$y = 0,61x_1 + 1,07x_2 + 0,60x_3 - 0,04x_4$	26321	14299	-12022
RE "Vital-Agro"	$y = 0,45x_1 + 1,00x_2 + 0,38x_3 + 1,93x_4$	5326	3225	-2101
LLC "Poltava-Sad"	$y = 0,53x_1 + 0,67x_2 + 0,67x_3 + 0,48x_4$	34143	20460	-13683
ALLC "Vasilkovskoe"	$y = 0,57x_1 + 0,81x_2 + 0,71x_3 + 1,69x_4$	2511	1690	-821
SRF "Stepnoye"	$y = 0,48x_1 + 2,80x_2 + 0,43x_3 + 1,26x_4$	29962	40764	10802
PAE "Promin"	$y = 0,58x_1 + 1,03x_2 + 0,68x_3 + 0,22x_4$	10674	6839	-3835

Source: built by the author

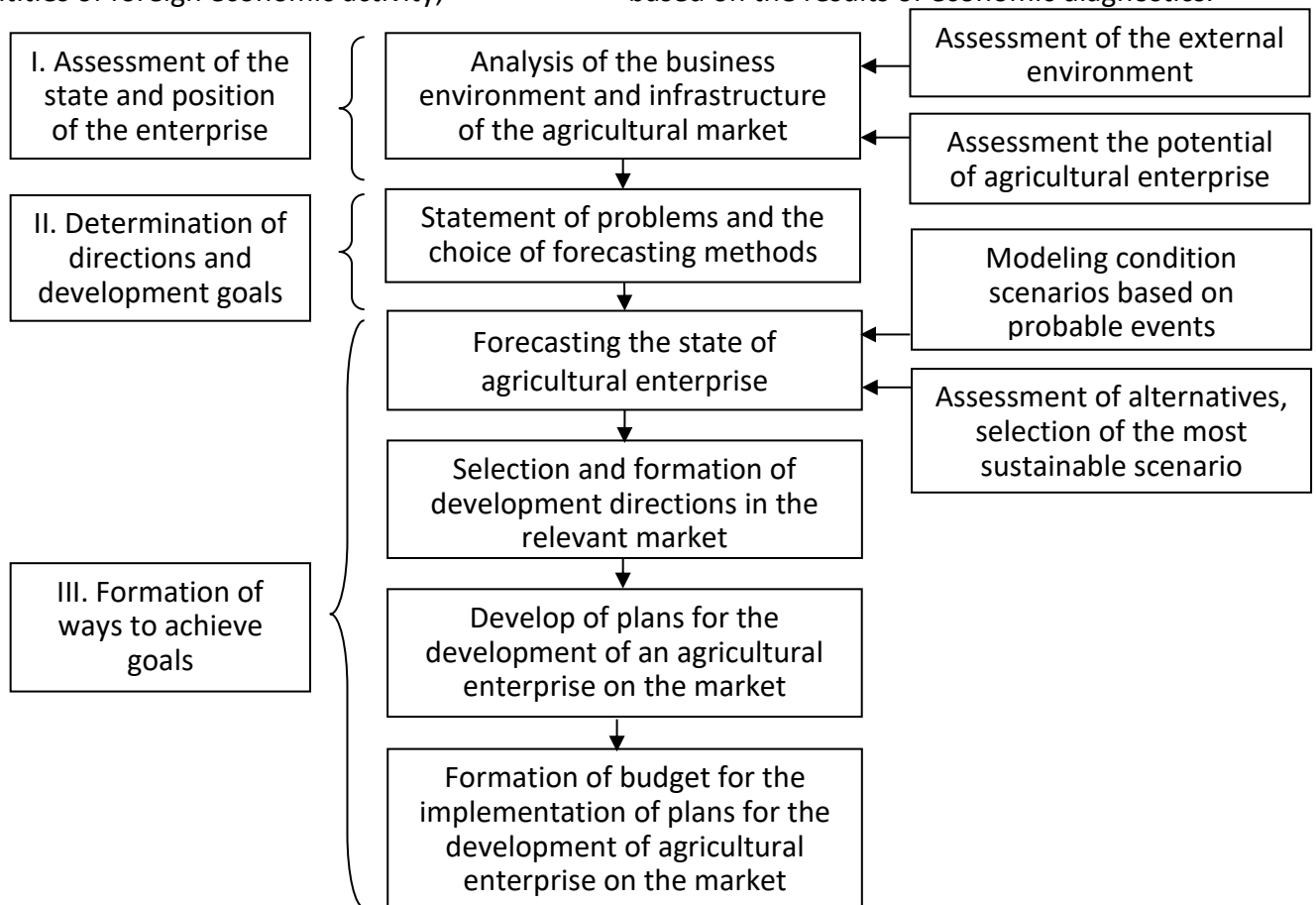
Legend:  $x_1$  – the cost inventories, thousand UAH;  $x_2$  – the cost fixed assets, thousand UAH;  
 $x_3$  – personnel cost, thousand UAH;  $x_4$  – the cost of financial resources, thousand UAH.

For agricultural enterprises of Ukraine, promising areas of economic activity are:

- 1) expansion of sales channels and an increase in sales of agricultural products through the formation a portfolio of orders sellers in the wholesale and retail markets;
- 2) cooperation with financial-credit structures for the leasing of agricultural machinery and replenishment of working capital;
- 3) development of export potential through entities of foreign economic activity;

4) mediation with manufacturers and retailers on cooperation in the processing of raw materials and the sale of finished products under its own trademark, etc.

The results of study allowed us to develop a scheme for forecasting the state of agricultural enterprises based on the results of economic diagnostics (Fig. 1). With the help of the proposed forecasting system, agricultural enterprises can make various forecasts of the state and development of their own activities based on the results of economic diagnostics.



**Figure 1 – Scheme of the process of forecasting the state of economic activity and the development of agricultural enterprises**

Source: suggested by the author

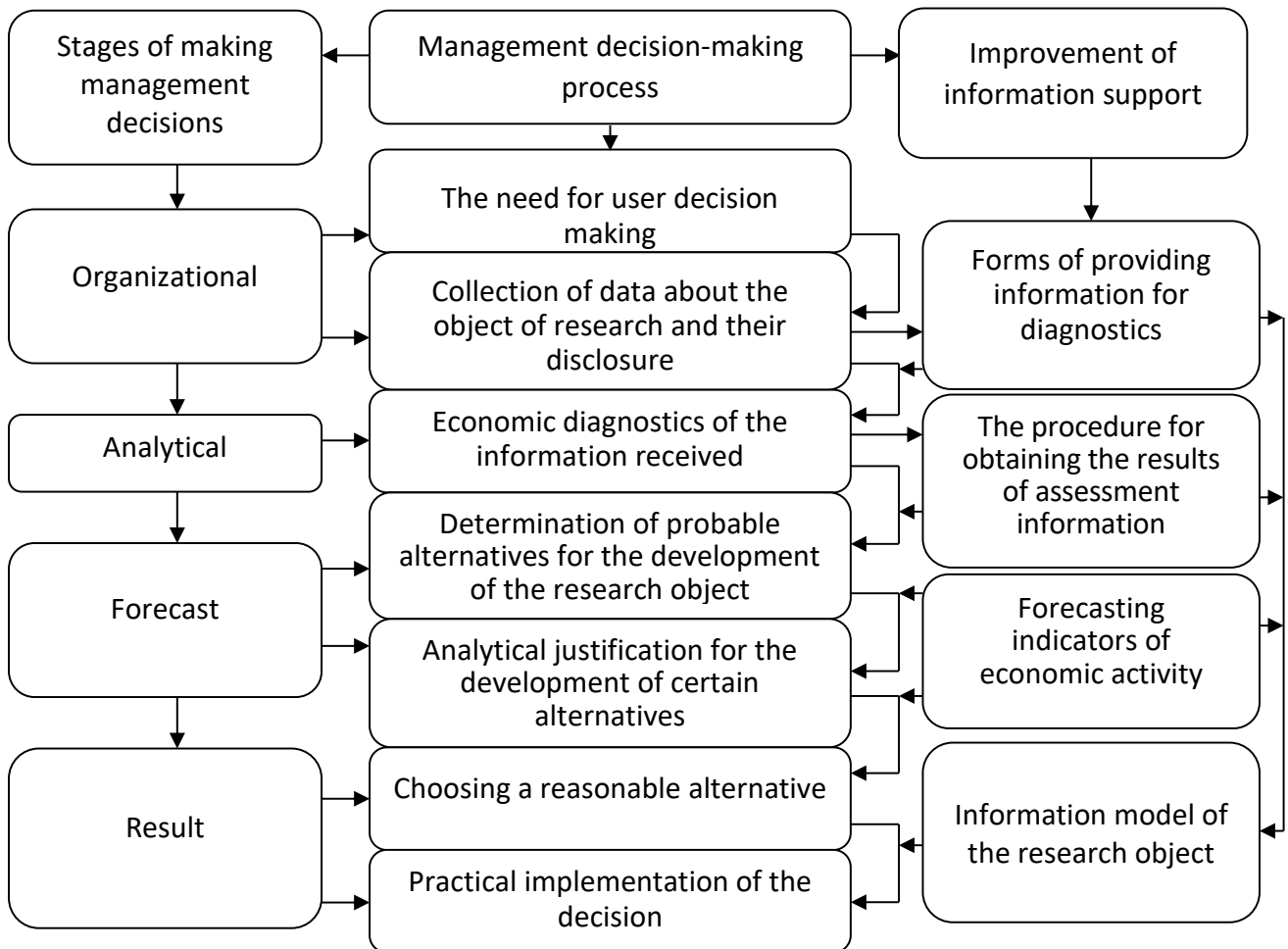
In order to improve the organization and methodology of information support for economic diagnostics of agricultural enterprise about the process of making managerial decisions based on the results of forecasting, we

proposed the stages of decision-making as organizational, analytical, predictive and effective. The allocation of these stages makes it possible to effectively implement the mechanism for formation and functioning of the information

support system for economic diagnostics of agricultural enterprise in the forecasting process (Fig. 2).

Figure 2 indicate that for the practical implementation of the approach we have presented at agricultural enterprises, appropriate forms of information provision (documentary, electronic) must be developed, suitable for its analysis (organizational stage),

the procedure for obtaining the results of information assessment (analytical and forecast stages) must be carried out. In general, this will allow agricultural enterprises to form an information model of the research object (productive stage), which provides favorable conditions for the practical application of substantiation methods and effective management decision-making.



**Figure 2 – Comprehensive information support for the stages of management decision-making of agricultural enterprises**

Source: suggested by the author

## Conclusions

Thus, the information support economic diagnostics of agricultural enterprises includes data from the internal and external environment of activity. When using the appropriate methodological tools, the main indicators of the activity agricultural enterprises assessed. Information support of the external

environment is an appropriate system of indicators that allow agricultural enterprises to study the state of the national economy and macroeconomic indicators, analyze the state and changes in the regulatory framework of activities in the agricultural sector, navigate the

markets of agricultural products and monitor counterparties and competitors.

Based on the results of economic diagnostics using information support, agricultural enterprises forecasting the cost of resource potential. The proposed methodological toolkit for forecasting the state of agricultural enterprises in Ukraine based on the method of extrapolating these resources and the coefficient of their change for the corresponding period.

The proposed scheme for formation and functioning of the information support system for economic diagnostics of agricultural enterprise allows you to obtain relevant information, analyze it, determine the quality and sufficiency of information, provide it to the management system for making informed and effective decision-making. Comprehensive information support for the stages of managerial decision-making by the management of agricultural enterprises serves as a tool for tracing the stages and the decision-making process in order to improve information support.

The information support system of agricultural enterprise is factor of direct influence on the effectiveness of management decision-making. An important direction in the functioning of information support system is the search for effective ways to ensure the efficiency of economic activity agricultural enterprise based on continuous processing of information flows in order to make informed management decision-making.

In general, the improvement organizational-financial mechanism of economic diagnostics agricultural enterprises based on the use of methodological tools for studying the factors of the external and internal environment. On the basis of obtained results of forecasting the state and further activities of agricultural enterprises, the effective formation and use of resource potential, optimization of individual elements the resource potential of economic entities, prospects for further development, which will ensure the management decision-making and obtain a positive financial result in the future.

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