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DECISION MAKING IN AGRICULTURAL SECTOR IN VIEW OF THE ENVIRONMENT

Abstract. *The article deals with the main approaches to decision-making in the agrarian sector. The conceptual basis of decision-making is conducted. The peculiarities of national approaches to decision making are considered. The questions of management and peculiarities of its application in agrarian sphere are considered. The approach-analysis-assessment-diagnosis as a basic stage for further research is considered. Peculiarities of monitoring of objects of agrarian sphere are considered. The use of statistical methods of analysis and forecasting, in particular, multidimensional statistical methods during economic monitoring, is substantiated. The ability to determine the relationship between environmental and economic indicators by means of statistical methods is shown. The mutual influence of agriculture and ecological factors is considered, which determines the necessity of making decisions on increase of efficiency of use of natural resources and application of new approaches to agriculture.*

Keywords: agriculture; decision-making; ecology

Introduction

Providing food security, economic and social stability is a nationally important issue. That is why agriculture occupies a special place in the economy of any country. In the agrarian sector, the main features that should be taken into account when planning is dependence on natural conditions, the duration of the production cycle and seasonality. There are numerous studies of ways of development of the agrarian sector and its various aspects. One of the approaches is to strengthen the coordinating role of the state and improve the efficiency of functioning [1; 2]. Another approach is to turn the industry into a resource-saving way of development [3]. Diversification of the rural economy and the creation of a modern rural infrastructure are the third approach [4; 5]. A common approach for all is the need to ensure a high and sustainable rate of agricultural development. This is impossible without improving the methods of managing it.

It is also important to take into account the significant international experience of managing the agrarian sphere. In Germany, a subsidized approach is used to support the size of the population living in rural areas. Approximately 55% of farm incomes are related to state support [6]. In China, the development of production according to the order is applied. It also facilitates the exit of peasants directly to the city market [3]. In Europe and the United States there is a demand for environmentally friendly agricultural products, for which extensive technologies can be used. 1% of the arable land in the world is used for organic farming. Leaders in its use are Sweden and Switzerland – up to 7% [7].

Current research shows that the impact of agriculture on the environment can not be neglected [8]. Therefore, in the course of decision-making in agriculture it is necessary to take into account the correspondence of economic interests of agriculture and environmental requirements of environmental protection.

The most urgent is the problem of increasing the efficiency of agricultural production due to its ecologization. The first step is to plan the rational use of natural resources.

In order to improve the situation in agriculture, there is a need for new management methods based on system analysis.

The goal of the research

The purposes of the research are:

1. To conduct an overview of approaches to decision-making methods in the agrarian sector.

2. To review the influence of environmental factors on agrarian production.

3. To formulate, on the basis of the review of methods and technologies, research tasks that involve improving methods of decision-making in the agrarian sector, in particular on the basis of the application of the ecological approach.

Main results
Overview of agricultural management methods

Decision-making is a creative volitional action of the subject of management, aimed at solving a particular situation or problem. Decision making is the central element of any activity of an object. On a scale, all decision-making processes can be divided into 3 levels: strategic, administrative and operational decisions. Strategic decisions are related to external problems, administrative – with the creation of maximum production capacity based on the rational use of resources, operational – with maximizing the profitability of current operations.

Management is a set of techniques and methods of target impact on the object to achieve a certain result. The main functions of management are the preparation and adoption of managerial decisions, the organization and stimulation of their implementation, analysis and correction of progress.

Effective management is to foresee possible deviations of the functioning of the object of management and to take measures to eliminate them [9].

There are different approaches to decision-making that can be divided on a national basis [10].

The American School of Management Decision Making provides the following five-step technology [11]:

– Diagnosis of a problem is to identify the causes of the difficulties or the availability of opportunities that help determine the problem in general terms.

– Building restrictions and criteria for decision.

– Identification of alternatives.

– Evaluation of the alternatives.

– Choice of the alternatives.

The German School of Management Decision Making considers the decision making process as an integral part of the planning and control processes and includes the following steps:

– Formulation of the problem.

– Information search.

– Evaluation.

– Decision making.

The Japanese School of Management Decision-Making provides for the responsibility of decision-making, not individuals but groups. It is assumed that no person has the right to make personal decisions. It consists of three stages:

– Formulation of the problem.

– Development of alternative solutions

– Selection and implementation of the best solution.

Modern management methods are increasingly focused on improving the efficiency of regional governance. The potential of economic policy based on methods and tools of parity efficiency and even development is exhausted [12]. One of the methods of solving this problem is the choice of the points of perspective economic growth. It requires the development of a system of development indicators for monitoring and evaluating the development of the industry.

An evaluation is a quantitative characteristic of a state of a certain indicator or an integral characteristic of an object.

The main questions to be answered for effective management are "Will indicators be reached within a given time frame?", "What factors affect the indicators?"

A broader concept than analysis and evaluation is the diagnosis. It consists in qualitative identification of the state and prediction of the behavior of the object. Therefore, a chain of sequential actions should be considered: analysis – assessment – diagnostics. This approach allows us to conduct a set of studies to determine the goals of functioning, ways to achieve them, identify problems and options for their solution. Diagnosis is based on analysis and evaluation. Its result is a static model.

Monitoring of Agricultural Activities

From the point of view of the prospects of development of agricultural objects, there is a need to determine the laws of their development, to identify trends and to determine their parameters. To develop a regional development strategy for a region, a dynamic model is needed that characterizes the time course of the process. To achieve these goals, economic monitoring tools are the most convenient. Monitoring is a specific type of management activity carried out by the management subsystem by making managerial decisions based on the use of reliable, timely, sufficiently complete, relevant information about all changes occurring in the managed subsystems [13].

Monitoring is one of the essential elements of control over the implementation of various development programs of the management object, based on key indicators and allows for long-term development correction. Monitoring includes constant observation of the indicators of the object in order to study its development in relation to the initial state and expected result. On the basis of monitoring, objective information on the results of management decisions is formed, coordination and control over the organization of work, the use of results with further planning of the development of the managed object is provided.

Agricultural monitoring includes a number of indicators, such as: investment volume, household and farm resources, equipment updates, mineral fertilizers, etc. Formulating a set of such indicators is also an extremely important task.

Information component of the monitoring system are statistical indicators that characterize economic processes. In connection with this, in the course of economic monitoring, the use of statistical methods of analysis and forecasting, in particular, multidimensional statistical methods, is substantiated. Statistical methods allow to provide a depth analysis of phenomena and processes, more accurately determine objective trends and laws and ensure the adoption of sound management decisions.

Diagnostics of the agrarian sphere includes the forecasting of its parameters. There are two types of forecasting: trend and factor prediction. Factor forecasting is based on the study and quantitative measurement of the relationship between factors. Extrapolation of trends is the basis of time series forecasting methods [14]. It is based on trendy regression models. Construction of forecasts of indicators of state and development of agricultural production on the basis of trends of time series due to the fact that agriculture has a great inertia development it can not be changed in a short period. Another important argument for using the trend is its formation under the influence of all real factors of a natural and economic nature [15]. Therefore, trend models take into account the influence of all factors without complete and reliable information about them.

One of the effective tools of strategic planning is variant forecasting (forecasting by determinants). The determinant is a factor that causes a certain phenomenon. The effectiveness of agricultural production depends on many determinants. Determinants can be divided into 2 groups: natural and economic.

Gross collections of crops depend on the determinants of the first order – the size of the sown area and yield. At the same time, each of these determinants depends on the determinants of the second order – the loss of crops from unfavorable conditions, soil fertility, material and technical conditions, weather, etc. The yield is determined by the level of agricultural technology, the quality of the work of specialists, the seed material, etc. Livestock production depends on two determinants of the first order – livestock and its productivity. But each of these determinants depends on others – the diet, the conditions of retention, the level of veterinary care, etc.

The main guiding determinants affecting agricultural production can be found by the correlation-regression method.

Thus, economic monitoring is a universal instrument for managing the development of agriculture. Monitoring as a set of methods and processes that transform the source data allows the most complete use of available information resources to increase the effectiveness of regulatory influences aimed at the development of the agrarian economy.

The impact of environmental factors on agricultural production

To analyze the impact of environmental factors on the efficiency of agricultural production, it is necessary to determine the relationship between environmental and economic indicators by estimating various estimates and statistics.

In a statistical study, two main tasks need to be solved. The first is to establish the very fact of the presence or absence of statistical dependence between values. The second requires a prediction of the mean values of the results for the given value of the factor variables.

The assessment of the significance of communication is evaluated according to the t-criterion of Student. The verification of the significance of the regression equation is carried out in accordance with the F-criterion of Fisher. Estimates of the statistical law are indicators of correlation communication, to determine the strength of the relationship between the indicators, calculate the Spirman correlation coefficient.

A list of signs of the state of the agrarian sector is described by a large set of indicators. The economic indicators of agricultural production are influenced by such environmental factors as: ecological stability of the territory; anthropogenic loading of the territory; soil erosion, introduction of organic fertilizers, introduction of mineral fertilizers, use of pesticides, humus content, etc. These indicators reflect the overall ecological state of crop production. The resultant indicator characterizing the efficiency of agricultural production is the volume of gross agricultural output per unit area of agricultural land.

Impact of agrarian production on environmental factors

Each of the branches of agriculture is characterized by its influence on the environment, for example, agriculture is characterized by the introduction of mineral fertilizers, the use of pest control and landscaping as a result of plowing under sowing. The introduction of mineral fertilizers changes the composition of soils. It also causes pollution of sewage. As a result, eutrophication of reservoirs, enhanced phytoplankton development, water blooms, and the like. This causes the lack of oxygen in the water, the death of the fish. Accumulation of ammonia and hydrogen sulfide makes it impossible to use water. The use of pesticides is threatened not only by changes in the flora and fauna and the possibility of their accumulation with further poisoning of animals and humans.

Creation of large animal complexes is accompanied by pollution of the environment by excrement. There is a problem of utilization of agricultural waste, slaughterhouses, meat processing and dairy enterprises.

The main ecological problems of agriculture are [16]:

– plowing of agricultural lands, landslides and natural ecosystems;

– crease of sown areas due to deforestation and drainage of mires;

– unreasonable use of plant protection products and fertilizers;

– deterioration of soil fertility and their natural structure from water and wind e;

– irrational use of fresh water for irrigation of land and other agricultural needs;

– groundwater contamination, deterioration of the quality of drinking water (increase in the content of nitrates, phosphorus, organic compounds, bacteriological contamination).

Obviously, the further growth of these problems can lead to a catastrophe. It is necessary to replace the traditional production, which is aimed at maximizing the harvest at the lowest cost of labor, on alternative (organic) agriculture. The idea of organic production consists in the complete refusal to use antibiotics, agrochemicals and mineral fertilizers. This leads to an increase in natural biological activity in soils, the restoration of nutrient balance, increases the restorative properties, normalizes the work of living organisms, increases humus and increases the yield of agricultural crops.

Natural resources are components of the agricultural ecosystem. In order for land and water to remain a constant source of wealth of people, the means of agricultural production, the concept of achieving the optimal balance between economic growth, the normalization of the quality state of natural resources and satisfaction of the needs of the population is needed.

Conclusions

Consequently, we can conclude that there is a need to develop decision-making systems in the agrarian sector, which increase the efficiency of their functioning. It is shown that monitoring and diagnostics are the basis for the functioning of such a system. Determining monitoring parameters is an important task. The mutual influence of agriculture and environmental factors necessitates both the adoption of decisions that promote the increase of the efficiency of the use of natural resources. It also determines the application of new approaches to farming.

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ПРИЙНЯТТЯ РІШЕНЬ В АГРАРНОМУ СЕКТОРІ З УРАХУВАННЯМ СТАНУ НАВКОЛИШНЬОГО СЕРЕДОВИЩА

Анотація. *Розглянуто основні підходи до прийняття рішень в аграрному секторі. Введено понятійний базис прийняття рішень. Розглянуто особливості національних підходів до прийняття рішень. Розглянуто питання управління та особливості його застосування в аграрній сфері, а також підхід: аналіз – оцінка – діагностика, як базового етапу для подальших досліджень. Розглянуто особливості моніторингу об'єктів аграрної сфери. Обґрунтовано застосування статистичних методів аналізу і прогнозування, зокрема багатовимірних статистичних методів при проведенні економічного моніторингу. Показано можливість визначення залежності між екологічними та економічними показниками за допомогою статистичних методів. Розглянуто взаємний вплив сільського господарства та екологічних факторів, що зумовлює необхідність прийняття рішень з підвищення ефективності використання природних ресурсів та застосування нових підходів до ведення сільського господарства.*

Ключові слова: сільське господарство; прийняття рішень; екологія

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