Scheduling and forecasting trends in agricultural sector of economy in modern conditions: methodological approaches

O P Shakhbazova¹, M I Slozhenkina², O A Kholodov³, M A Kholodova⁴, N I Mosolova², A V Glushenko² and D A Mosolova²

¹ Don State Agrarian University, Persianovsky, Russia
² Volga Region Research Institute of Manufacture and Processing of Meat-and-Milk, Volgograd, Russia
³ Rostov State University of Economics, Rostov-on-Don, Russia
⁴ Federal Rostov Agrarian Research Center, Rassvet, Russia

Email: oldeler@yandex.ru

Abstract. The article presents scientific foundations for scheduling and forecasting methodology applicable to the agrarian sector of the economy. The purpose of the study was to summarize the experience of using the calculation and analytical tools for planning and forecasting in the development of main directions of the state agrarian policy in the context of a new economic reality and implementation of state programs. The practical relevance of the research lies in modern methodological approaches to the development and implementation of state programs for the development of agriculture, which were summarized in the article. Particular attention was paid to the design methods of program-target scheduling in the context of the Russian economic reality that open up new opportunities for certain priority areas of agricultural production.

1. Introduction

Due to specific functioning of the agrarian sector of the economy, scheduling and forecasting methodology holds a special place and is being improved in new conditions of Russian reality. Exploring a complex and multifaceted formation of the scientific methodology and organization of state strategic scheduling in the agricultural sector, we should point out that from year to year the economic scheduling system tends to consider scientific principles, forms, and methods of substantiating economic policy-making, pace, and development proportions of agriculture—a key sector of the national economy.

Improving the directions of state management of the real economy and active development of an indicative strategic planning system is a crucial task of the state’s socio-economic policy in the agricultural sphere in the context of global challenges and threats.

The scientific agricultural community has been developing methods for economic scheduling and forecasting the development of agricultural production for many decades. Their efforts are focused on working out methodological recommendations to organize an effective system of strategic public administration. Its instruments are forecasts, plans, programs, and projects that should have force of statutory regulations adopted and approved by authorities at all levels. However, the success in developing methodological provisions for managerial solutions, creation, and implementation of socio-
economic programs, projects, and concepts of the agricultural production development are rather small and require further scientific substantiation.

2. Results and discussion
The scheduling and forecasting methodology in agriculture is a set of complex and multifaceted research methods that reflect the specifics of the state economic policy, dynamism of economic processes, and conditions for its implementation at certain development stages of a society and are based on the knowledge of economic theory, including technology (logic), principles, methods, scope, content, and organization of planning. The methods are aimed at intensifying processes of expanded reproduction in the agro-industrial complex, increasing labor productivity, ensuring food security, and optimal combining the mechanism of indicative strategic scheduling in managing the agrarian sector of the economy with the economic independence of agribusiness entities (figure 1).

The most important structural element of the methodology of economic planning farm production is methods and methodological approaches, including calculation and analytical tools, that enable substantiating and interconnecting indices of the State Program for the Development of Agriculture.

Economic scheduling methods are a set of specific techniques and procedures for developing and justifying indicators of scheduling and forecast documents. Depending on formal goals, main approaches to the processing initial information, and coordination of plan indicators, economic scheduling and forecasting techniques can be divided into two main groups, i.e. intuitive and formal ones (figure 1).

The fundamental basis of intuitive (heuristic) methods of economic scheduling and forecasting the agricultural sector of the economy is intuitive logical experts’ thinking appropriate in the case when the object of forecasting and scheduling is quite simple and does not require serious calculations, the information is incomplete, or it is impossible to take into account the influence of many endogenous and exogenous factors due to a considerable complexity of the object. The group of intuitive methods includes widely used Delphi technique, interview, analytical method, scripting, brainstorming, and others. Without getting into specifics of these well-known methods, we should place emphasis on general importance of Delphi technique, when trends in the global and national economies are distorted by crisis periods amid turbulence in global financial, raw materials, and commodity markets, and the human factor coordinates and determines the key development directions of farming [1, 2, 3].

The formal techniques for calculating and justifying indices of scheduling and forecasting documents in agriculture are based on strict mathematical formulas, dependencies, and sequence algorithms. These involve predictive extrapolation methods, including the matching function method based on the least-square fit method and modified into the methods of exponential and adaptive smoothing and simulation methods—economic and mathematical models for describing an object of economic scheduling, using econometric dependencies and mathematical relations [1, 4].

In the practice of developing forecast scenarios for various sectors of the national economy, the above methods are used in the form of methodological approaches and recommendations that specify the methodology for calculating and evaluating the forecast and schedule indices, with all methods and methodological approaches to scheduling, forecasting, and programs being closely interrelated.

Methodological approaches widespread in Russia in the period of centralized scheduling have been improved in market conditions; they have received a fundamentally new development in integrated normative, balance, and program-target oriented methods (figure 1).

The integrated approach requires a comprehensive solution of a wide range of interrelated tasks, problems, and processes, including pace and proportions of the development of the agricultural sector of the economy, balanced development of its industries, and trends in digital transformation and material and technical modernization in all sections and forecast and schedule indices; interconnection of schedules for a sustainable development of rural areas to increase the rural standard of living and income of farm people, improve staffing of the industry, and develop rural infrastructure; preservation of fertility of agricultural lands; planning investments in priority activities; ensuring sustainable development of related sectors of the agro-industrial complex; identification of the reserves of economic growth in the
agricultural sector, and others [5, 16]. In the context of global turbulence of the world economy and unstable macroeconomic situation in the country that requires taking into account the upcoming changes in the long term, there is an increasing need to develop and substantiate the economic base of norms and standards that can be used in economic (strategic) scheduling to solve the following tasks:

Figure 1. Classification of techniques for scheduling and forecasting agricultural development in elaboration and implementation of state programs.
• to analyze the current state of the agricultural sector of the economy, highlighting the optimal ratio and proportions of factors and results of the economic activity;
• develop and substantiate multivariate forecasts for the development of the industry, taking into account forecast standards based on innovative and digital technologies in agriculture and other parameters;
• establish main indicators for schedule and forecast documents at all levels of management; and
• identify economic benchmarks in developing a strategy and effectiveness criteria for agricultural producers’ activities [5, 6].

For example, in the context of the state socio-economic policy in the agricultural sector of the economy, scheduling aimed at ensuring the food independence of the state was widely applied in planning the consumption rate of basic types of food, including the dietary intake recommended by the Ministry of Health.

In the economic planning system, the balance method makes it possible to obtain an adequate quantitative assessment of the most important economic processes of a high-intensity reproduction in agriculture and their material and cost proportions. Therefore, balances of food, financial and labor resources, fixed assets, production capacities, incomes, and expenditures of the population enable determining the key indicators and proportions of production, distribution of consumption and accumulation of agricultural products and resources necessary for their manufacture. In general, the balance method in planning involves solving the problem of balanced development of the agricultural sector of the economy and is based on a scientific substantiation of the strategic plan sections.

In most cases, when the scheduling and forecasting must objectively respond to changes in the macroeconomic situation and market conditions, the balance method based on a system of norms and standards allows assessing receipts and disbursement of resources due to balance comparison, determining the needs and sources of their satisfaction, setting up a correspondence between the industry development targets and opportunities to achieve them, connecting together all the elements of a production cycle.

In the conditions of modern Russian reality, of great importance is the program-targeted approach to state programs that are developed and implemented to solve pressing socio-economic, material, technical, scientific, and technological problems in agriculture, which contributes to the formation of optimal proportions of the agrarian sector structure and takes into account the tasks of breakthrough scientific, technological, and socio-economic development of the Russian economy enshrined in the May Decrees of the President of the Russian Federation [1, 2].

In the context of deregulation of foreign trade, the role of the state in ensuring the competitiveness of agricultural production should be considered not from the perspective of the Keynesian school, but from the modern institutional and sociological point of view. In this case, the role of the state is reduced to active participation in the formation of the institutional environment through the development and improvement of socio-economic programs, since natural selection of institutions does not always leave the best and optimal options. The economic policy of the USSR and ill-considered spontaneous economic reforms in modern Russia clearly demonstrated facts of that kind [5, 6].

The evidence from practice shows that the development and implementation of long-term socio-economic programs in the agricultural sector make it possible to strengthen target-orientated scheduling, develop problem-oriented planning, identify certain priorities in solving food security problems, predict truthful overview of the agriculture development, wisely invest in priority sectors, and ensure sustainable development of the farmers’ (raw materials and food) market and the national economy as a whole.

Indicative program schedules are developed as assigned by the government. The state designates the ways and means that are necessary to obtain the planned results of the development of the agrarian sector of the economy. Levers and incentives for achieving goals in the programs are concessional lending, preferential taxation, accelerated depreciation, government orders, leasing, crop insurance, and financial support for rural producers.
The program-target method widespread in scheduling at the present stage of agricultural development has become essential for improving planning and forecasting work at the macroeconomic level. In particular, the transition to project-based methods of program-target planning opens up new opportunities for certain priority areas of agricultural production. The project format of program-target scheduling is a mechanism for managing large-scale tasks, which allows coordinating the activities of economic entities in agriculture to achieve certain goals of obtaining unique results in conditions of time and resource constraints and pursuing strategic benefits. At the same time, the priority goals of project management in the industry must correspond to the SMART procedure, that is, be specific, measurable, achievable, relevant, and have a deadline to be achieved [7, 8].

The main purpose of the project management in the agrarian sector is to transfer countless different types of agricultural enterprises to the best-practice standard by providing them with budgetary support. The project management tools combined with the state support mechanism will make it possible to concentrate the efforts of authorities at all levels on achieving specific results (figure 2). At the same time, the budgetary support will be provided for projects corresponding to the rates of outstripping economic development of agricultural production in accordance with the ranking procedure by priority, stimulating the achievement of the target indicators of the State Program (figure 2) [7, 9].

![Diagram](image)

**Figure 2.** Model for assessing the principles of project management in agriculture.

The new management toolkit for state regulation of the agricultural sector is based on the considerable experience of large commercial Russian and foreign corporations in solving complex problems of production development while initiating the preparation, developing, and implementation of a project that has its own organizational structure, a coordination center with distribution of roles and responsibilities, and an appropriate development schedule. The project mechanisms at the state level imply the integration of the activities of government officials and agribusiness on the basis of public-private collaboration. The government officials, combining work at their departments and activity as members of a project management coordination team, help agricultural producers interested in the
projects to expand their capacity to innovate and market their products due to a combination of design and functional approaches.

Innovative activities in producing unique agricultural products or products of new quality produced using modern technologies, including elite seed farming and livestock breeding, production and sale of products within the framework of agricultural cooperation and large-scale modernization of the material and technical platform of farmers should become the key element of the project management system in the agricultural sector.

On the basis of the project management, the organizational and economic mechanism for the distribution of budgetary funds in the sector of agricultural production will unite not only agricultural producers and public authorities at all levels, but also credit and financial organizations, universities, scientific institutions, industry unions, and associations. The latter in cooperation with authorities can initiate the development of a portfolio of priority projects, a mechanism for allocating resources, documenting the main stages of design, training personnel, implemeting software, improving the organizational structure of management of economic entities in agriculture that involves implementation of innovative investment projects along with the main activity at the departments temporarily created. For example, “Tsentrosoyuz” can play an important role in the development of cooperative production and economic relations in the countryside, increasing the importance of small agribusiness in ensuring the country's food security [8, 9].

If past experience is any guide, an insufficiently high level of organization of on-farm management, poor provision of agricultural producers with computer equipment, a lack of access to information resources, including the Internet, the delay in obtaining the necessary information, and the outflow of qualified specialists from rural areas severely complicate the process of switching of Russian economic entities of agricultural production to project planning methods. As a result, the quantitative substantiation of the national strategic goals is not always reflected in the measures to achieve them at the economic level [8].

3. Conclusions

Created scientific and methodological support for a strategic scheduling system in the agricultural sector of the economy (the development of the support is related to the responsibilities of the relevant departments of the agricultural sector management bodies and science) will contribute to a more effective development and mutual coordination of federal and regional programs based on the project approach. In this regard, it becomes necessary to scientifically substantiate the key directions of the state regulation of agricultural production, which allows combining them into a certain system of methodological approaches and making effective changes in the content of the existing State Program for the Development of Agriculture or the development of new ones.

Acknowledgments

This work was carried out under the grant of the President of the Russian Federation to support leading scientific schools HIII-2542.2020.11. Grant sponsors were not directly involved in the development, analysis, or writing of this article.

References

[1] Kosolapova M 2018 System-reproductive methodology for assessing and forecasting the development of the agrarian economic system Agro-industrial complex: economics and management 1 22-7
[2] Boldyrev A V and Shepitko R S 2016 Planning in the agricultural regulation system Agrarian scientific journal 1 90-3
[3] Wegren S K 2012 Institutional impact and agricultural change in Russia Journal of Eurasian Studies 3(2) 193-202
[4] Uzun V, Shagaida N and Lerman Z 2019 Russian agriculture: growth and institutional challenges Land Use Policy 83 475-87
[5] Mikheeva N N 2018 Long-term forecasts of regional development: analysis of results and problems of development Problems of forecasting 5 24-38
[6] Chekalin V and Serkov A Scientific aspects of choosing a strategy for the development of the agro-industrial complex of Russia 2015 Agro-industrial complex: economics and management 10 24-30
[7] Bespakhotny G V 2018 Target planning and project management in agriculture Models systems networks in the economy technology nature and society 2(26) 3-15
[8] Kuprava T A 2008 On the application of project management methodology in the agro-industrial complex Vestnik RUDN 3 14-9
[9] Bespakhotny G V 2019 Planning the development of the agro-industrial complex and cooperation Fundamental and applied research of the cooperative sector of the economy 2 3-14