

Prospects of Innovative Development of Agricultural Production on the Example of the Republic of Kazakhstan

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Abstract. The relevance of the study is conditioned by the need to revise the methods of farming with a focus on the use of innovative technologies to improve the quality and quantity of output. The purpose of the study is to analyse the problems and prospects of agricultural production in the Republic of Kazakhstan to create a comprehensive innovative model for the further development of the agro-industrial sector. The study of the prospects for the modernised improvement of the agro-industrial complex of the Republic of Kazakhstan was carried out in three stages based on the functional and logical, systemic, and structural approaches using methods of analysis, synthesis, comparison, systematisation, SWOT analysis, and statistical data processing. The analysis of research papers of Kazakhstani and foreign researchers was carried out to separate the problems and opportunities of agriculture of the Republic of Kazakhstan. It is determined that the agricultural complex of the state is represented by three forms of management, including farming, cooperatives, and the main business. The features of innovative activity and types of innovations in agriculture are considered. The possibilities and strengths of agriculture of the Republic of Kazakhstan are substantiated in accordance with the statistical data of gross output for 2012-2019. The organisational model of further development of the agro-industrial complex of the state in the context of the application of innovative technologies and the establishment of relationships with state information systems is proposed. The practical value of the study consists in providing a general analysis of both the problems and prospects of agriculture in the Republic of Kazakhstan, as a result of which a comprehensive model of innovative development was compiled

Keywords: innovative model, agro-industrial complex, monitoring, agricultural economy, economic growth

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Introduction

Agriculture, as one of the current global trends, is rapidly gaining momentum all over the world. Over the past 16 years, its area has grown eightfold, more than 2 million organic suppliers have been certified, more than three-quarters of which are located in developing countries [1]. Currently, about 1% of the world's agro-industrial land area is under organic production. The regularities of the development of organic production are significant in more than 170 countries of the world and this figure increases annually due to the fact that organic agricultural products are becoming in demand among many segments of the population for various reasons [1]. The improvement of organic production in Kazakhstan is in an intensive stage of operation. Currently, there are about 30 manufacturers certified according to international standards, which account for more than 300 thousand hectares of land developed for organic production [2]. At a particular time, this production is reoriented primarily for export, but if the desired conditions for innovative development are created, Kazakhstan can also manufacture products for its own domestic market.

Such activation of the search for solutions to the problems of agriculture of the Republic of Kazakhstan contributed to the development of the scientific activities, in particular, conducting both theoretical and empirical research. For example, N. Almuhamedova studied the problems of the operation of the agricultural sector of the Republic of Kazakhstan [3]. According to the researcher, during the years of the centralised economy, the state was one of the first producers of livestock and grain products, but after the collapse of the Soviet Union, these industries underwent a decline due to lack of technological readiness and lack of human resources [3]. N. Baranova suggests that at the moment there are a huge number of projects in Kazakhstan that contribute to the development of agriculture [2]. Thus, to simplify the export of grain to world markets, terminals in the ports of Aktau, Baku and Amirabad were put into operation. In addition, an elevator complex with a mill was put into operation in the Mangystau region, and the construction of the Uzen-Gorgan railway lines is also being carried out, which qualitatively affects the agro-industrial sector as a whole [3]. Yu. Vasyukova considered the potential of farming as part of agriculture [4]. The researcher believes that farms have received their maximum use in Kazakhstan. However, V. Krutilov argues that attracting investment in farming is one of the most important tasks for today, which is not taken into account to improve the agricultural sector of Kazakhstan [5]. The beliefs of E. Gridneva are of interest for this study [6]. The researcher suggests that the solution to the problems of agriculture should be sought in the use of innovative technical support. The high-quality modernised equipment and the introduction of academic developments are sources for improving agricultural products [7]. Kazakh researchers also suggest that the model of the organisational structure, which is based on the analysis of the results of the survey on the use of domestic or imported products by the population

of Kazakhstan, can not only increase the competitiveness of agriculture, but also ensure food security [8]. Based on this, the problem of agriculture of the Republic of Kazakhstan is relevant, but the research is aimed at solving single issues, which is the reason for the choice of the subject of the study.

The purpose of the study is to analyse the problems and prospects of agricultural production in the Republic of Kazakhstan to create a comprehensive innovative model for the further development of the agro-industrial sector. For the furtherance of this goal, the following *tasks* were performed: to determine the features of innovation activity in the context of the development of the agricultural sector as a whole; to define the current state of agriculture of the Republic of Kazakhstan: problems and prospects; to analyse the possibilities of introducing innovative technologies into the agro-industrial complex of the Republic of Kazakhstan.

Materials and Methods

The theoretical and methodological basis of the study is the scientific provisions and definitions of economic theory, research papers of Kazakh and foreign researchers. The study of the prospects for innovative development of agricultural production on the example of the Republic of Kazakhstan was carried out in three stages. The first stage included an analysis of the specifics of innovation activity and the concept of innovation in the context of agriculture. The second stage was aimed at forming a general picture of the state of the agricultural industry in the Republic of Kazakhstan. At the third stage, a model of innovative development of agriculture was developed, which provides for the introduction of information technologies, and the establishment of a correlation with the state information system.

The research is based on functional and logical, systemic, and structural approaches. With the help of a functional and logical approach, agriculture was considered in the logic of its functional development and innovative improvement. The systematic approach contributed to a holistic study of agriculture based on a separate analysis of its components such as animal husbandry and agriculture. The structural approach helped analyse the development of agriculture based on the causal explanation of the relationships of its components, the relationships with external factors, including geographical, economic, cultural and political.

During the research of innovative development of agriculture of the Republic of Kazakhstan, a complex of general scientific research methods was used, including analysis, synthesis, comparison, systematisation, SWOT analysis, and processing of statistical data. Thus, the analysis method was used to analyse the research papers from the selected topics, as a result of which the features of innovative activity, in particular in the agricultural sector, the current state of development of the agro-industrial complex of the Republic of Kazakhstan and the prospects for further improvement of the agricultural industry were clarified. The synthesis was used for a combined study of agriculture, based on a separate analysis of crop production and animal

husbandry. The comparison was adopted during the study of the state of agriculture before the introduction of innovative technologies and after the active use of modernised technical support. The systematisation helped to organise the components of agricultural monitoring and the types of innovations in agriculture. SWOT analysis was used to analyse the agricultural sector of the Republic of Kazakhstan, in particular, to identify strengths and weaknesses, opportunities and threats, as a result of which the prospects of agriculture of the Republic of Kazakhstan were clarified, including the constant growth of the gross agricultural product, high production and export potential of organic products and the demand for organic food products. With the help of statistical data processing, the trend of gross output of the agricultural industry of the Republic of Kazakhstan, in particular for 2012-2019, was analysed.

Thus, analysing the example of regional development of agriculture, methodological changes were formulated, and the scientific element of their research in the system was determined.

Results and Discussion

Currently, three variants of economic forms have been developed in the agriculture of Kazakhstan: small business, indicated by small (peasant) farms; medium-sized business, represented by various partnerships, associations, cooperatives; and the main business, which is represented by a competitive enterprise. Various forms of management reflect the corresponding types of property relations and

form the economy as a whole. Diversity in agriculture is implied by an objective need, and initially, its development indicated the main goal and the main content of the agrarian reform in Kazakhstan. In the general methodological factor, this follows from the fundamental significance of building a multi-layered economy in the system of market transformation of the economy. The complexity of the industry under consideration is based on the relevant factors (conditions), which can be divided into two groups: non-economic and economic. The first group includes:

- differences in natural conditions;
- interregional features in population density;
- developed infrastructure;
- local, historical, religious, and other features of the region.

The second group of conditions provides for the technical modernisation and evaluation of agricultural enterprises to create the necessary conditions for the production of competitive products for the domestic equalisation market; integration of national agricultural production into the world space; improvement of trade between agricultural enterprises and industrial enterprises; ensuring an increase in production capacity to increase the level of employment of the population, which contributes to its profitability. At the same time, the diversity of the agricultural industry needs to be controlled, in particular, the use of land equipment and the implementation of the legal development process. One of the examples of such activities is the monitoring of the grain spectrum (Fig. 1).

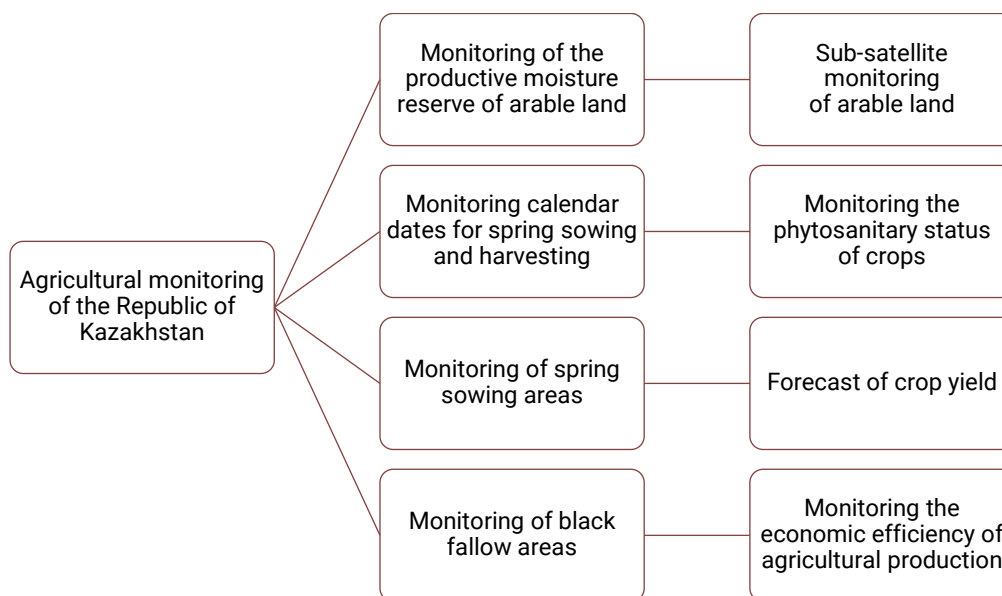


Figure 1. Agricultural monitoring scheme

One way or another, the presence of multistructurality and monitoring of the agricultural sector is not an exhaustive condition for the modernised functioning of agro-industrial production, and therefore there is a need for innovative activities. Innovative activity is understood as the innovative process of economic development of the country or the satisfaction of the needs for innovation of

individual sectors of industry. In this context, it is important to determine the advantages of the agrarian strategy of innovative development, including high-quality products, modernised mechanisation, potential producers and consumers [9].

Innovations take the form of fundamental results and the application of patents of inventions, licenses,

trademarks, documentation of new technologies, innovative projects, national, regional, and industry programmes [10]. Innovations related to agriculture should be considered as a process of creating new and unique products, improving

technologies and organisational work based on the use of scientific research. In the scientific community, there is a classification of types of innovations in agriculture, which provides for the following (Table 1).

Table 1. Classification of types of innovations in agriculture

Selection and genetic	New varieties and hybrids of agricultural plants, new breeds, types of animals and bird crosses. Breeding of plants and animals resistant to diseases and pests, adverse environmental factors
Technical and technological production	The use of new equipment Resource-saving new technologies in agriculture and animal husbandry. New waste-free technologies for the production and storage of food products aimed at improving their nutritional qualities
Organisational, managerial, and economic	Development of cooperation and formation of integrated structures in agriculture. Progressive forms of maintenance and provision of agricultural resources. New forms of organisation and management in agriculture. Formation of innovation and advisory systems in the field of scientific, technical, and innovative activities. Modern forms and mechanisms of innovative development
Socio-ecological	Creation of a new personnel training system. Provision of better working conditions, solution of the problems of health, education, and culture of farmers. Improvement of health and quality of the environment. Establishment of favourable environmental conditions for the life, work, and recreation of the population in rural areas

Based on Table 1, the classification of types of innovations in agriculture consists of four elements. The first type of innovation is used only for agriculture. The choice of agrotechnical innovations is a special type of innovation that is characteristic only of agro-industrial production. These include the results of scientific and technical studies in the fields of crop production and animal husbandry, to attract new varieties of animal breed selection. The second type of innovation includes the main new technologies for carrying out work, methods used in keeping and feeding animals, technologies for storing and processing agricultural products, ensuring the increase and preservation of biologically valuable product characteristics, reducing production costs [11]. The third type, that is, organisational, provides for the management, institutional innovations, establishment of new information cells. This type of innovation is especially important in the restructuring and

modernisation of the entire economic system. The last type of innovation, namely socio-ecological, is aimed at maintaining environmental safety. The decline of arable land, the threat of water shortage, and the depletion of natural sources show signs of the former economic complex, as a result of which there is a need to improve the agro-industrial production, in particular the Republic of Kazakhstan [12].

Notably, the agriculture of the Republic of Kazakhstan has a huge potential for the introduction of an innovative complex. Various climatic conditions of the state allow producing almost all agricultural crops [13]. According to the Ministry of Agriculture, 2018 was extremely favourable for the cultivation of such crops, in particular grain. Thus, agriculture accounted for about 5% of the country's total GDP that year [1]. The total agricultural output was 4 trillion tonnes, which is definitely higher than in previous years (Table 2) [1].

Table 2. Gross output of products (services) of agriculture, forestry, and fishery of the Republic of Kazakhstan (in current prices, KZT one million)

2012	2013	2014	2015	2016	2017	2018	2019
1. Agriculture, forestry and fishery							
1,832,335.4	2,733,474.7	2,407,939.3	2,963,938.2	3,158,758.6	3,321,718.5	3,701,415.4	4,092,333.0
2. Animal production, hunting, and other services							
1,823,364.8	2,721,663.2	2,394,710.0	2,950,614.7	3,144,773.5	3,308,019.2	3,685,439.7	4,071,820.6
3. Agricultural industry							
1,822,074.1	2,720,453.4	2,393,619.0	2,949,485.0	3,143,678.1	3,307,009.6	3,684,393.2	4,070,916.8
4. Crop production							
895,425.2	1,654,428.5	1,241,517.0	1,683,851.4	1,739,436.4	1,825,236.7	2,047,580.8	2,249,166.9
5. Farming							
920,777.3	1,059,561.3	1,145,437.3	1,256,871.7	1,393,762.0	1,469,923.0	1,621,541.4	1,810,914.1
6. Forestry							
6,050.7	7,786.8	8,931.7	8,892.8	8,751.1	7,534.9	9,237.3	12,731.8
7. Fishery and aquaculture							
2,919.9	4,024.7	4,297.7	4,430.7	5,234.0	6,164.4	6,738.4	7,780.5

Such data indicate the presence of promising areas in the field of agricultural development of the Republic of Kazakhstan, in connection with which it was appropriate to

conduct a SWOT analysis of the agricultural sector of the state (Table 3).

Table 3. SWOT analysis of the agricultural sector of the Republic of Kazakhstan

Strengths	Weaknesses
Kazakhstan is one of the nine largest countries in the world by area; By the area of arable land per capita, Kazakhstan ranks second in the world; Kazakhstan is one of the largest exporters of grain and flour; A large number of the rural population (43% of the total population), a high share of employment (18% of the employed population); High potential demand for food products in the CIS and Central Asian markets; Constant growth of the gross agricultural product; High production and export potential of organic products	Low share of GDP (4.8%); Lack of trade development, including exports; Low level of research and development implementation; Insufficient level of veterinary and food safety; High capital intensity; Long payback period; Dependence on climatic conditions; Low performance; Low level of profitability of agriculture
Opportunities	Threats
The possibility of increasing the volume of all types of agricultural products due to the growing number and changing structure of the population nutrition; Establishment of effective state support for agricultural cooperatives; Expansion of supplies and export volume in advanced industries	Adverse changes in natural and climatic conditions, instability of weather conditions; The spread of animal and plant diseases, environmental pollution; Increasing competition in international markets for certain products; The risk of inefficient state regulation of industry

Based on the analysis of the geographical location of Kazakhstan, the opportunities of the agricultural products market, transport accessibility, it can be concluded that the potential partners are the countries of the EAEU, the CIS, China, Iran, Afghanistan, and the United Arab Emirates. Based on the analysis of the volume of exported products at the end of 2018, wheat, barley, corn, and oilseeds were the leading among plants; beef, pork, lamb, and poultry among animals. In general, in the structure of imports of countries such as Russia, Uzbekistan, Kyrgyzstan, and Tajikistan, for certain types of crop products, products from Kazakhstan account for more than 86% [14]. Thus, in 2018, the share of wheat from Kazakhstan amounted to 86.6% of the total volume of imported wheat in Russia. In the import of wheat, flour and oilseeds of Uzbekistan, the share of products from Kazakhstan is 100%, 99.2%, and 98.7%, respectively [15]. According to the study results, the introduction of information technologies in agriculture, the development of information systems, and integration with the systems of state bodies in the following processes were offered: subsidies and other state support measures; traceability of livestock products; monitoring of the turnover of fish products; water resources management, monitoring, and accounting; registration of agricultural machinery, issuance of driver's licenses; monitoring and accounting of forest resources and prevention of forest fires; monitoring and management of land resources; accounting, production, movement of agricultural products for agricultural enterprises, processing enterprises, cooperatives. Due to these measures, the transfer of public services to electronic form will be ensured;

increasing transparency and efficiency in the provision of public services; increasing the level of information saturation of industry; creating prerequisites for the export of agricultural products [16]. The financial and economic mechanism for implementing innovative projects in the agro-industrial sector should include the use of reverse financing of highly effective scientific and technical developments of commercial significance, state subventions, subsidies and grants; support for interregional high-tech innovation programmes and projects of state entities; stimulation of investors who invest in high-tech production, organisation of various entities for the development of innovations; development of leasing of high technologies and unique equipment; introduction of non-linear depreciation of foreign investors (when in the first years after the acquisition of fixed assets, most of their cost is written off), creating innovative products under international commercial contracts; providing financial support for patent and inventive activities assistance in the protection of property and protection of rights; improvement of the competitive system for selecting innovative projects and performers; creation and development of a contract system aimed at implementing innovative projects carried out at the expense of the budget and extra-budgetary sources [9]. Modernisation of the agricultural sector should be carried out in stages and with the correct target orientation. It is proposed to use a comprehensive, systematic approach to the innovative modernisation of industrial relations and productive forces of the agricultural sector of Kazakhstan. In this case, the innovative direction of agribusiness development would

become a real and effective direction. However, for the economy of Kazakhstan, when conducting such a policy, it is necessary to note the double effect of its implementation. The negative effect, in this case, would be a decrease in the ability of enterprises to innovate in business, which does not contribute to increasing labour productivity in this sector [17]. At the same time, innovation policy in the agricultural sector is necessary objectivity and it is, therefore, appropriate to note its expediency. At first glance, this situation looks economically unprofitable. This is true when social benefits exceed economic benefits, but, nevertheless, contribute to the competitiveness of agriculture and the country as a whole in modern conditions. Similarly, obtaining economic benefits will be the task of the second stage of the implementation of state programmes. This applies to productivity, innovation, etc., since innovation itself cannot be an end in itself, but only a consequence of the development of a system that has internal incentives for innovation. The approach proposed in the reform of the agricultural sector of management assumes the need to take into account the peculiarities of the industry operation, the epistemological roots and impulses of its development. At the present stage, the innovative vector of modernisation of agriculture is very important. However, in developing the concept of the development of the agricultural sector, it is necessary to correctly place emphasis, both in the long and short term. It is proposed to gradually modernise the sphere of operation of the agricultural sector and with the correct orientation to the goal. With this approach to the innovative modernisation of industrial relations and productive forces of the agricultural sector of Kazakhstan, this direction would

become a real, effective sector of competitive development of the national economy.

Conclusions

Thus, the study analysed the problem field and prospects of the agricultural sector in the Republic of Kazakhstan to create an improved set of methods for further innovative development of the agro-industrial sector. The authors processed the theoretical base in the form of various research papers to determine the features of agriculture of the Republic of Kazakhstan. It was found out that the decline in the efficiency and productivity of the agro-industrial sector is associated with the lack of adequate technical support and lack of human resources. SWOT analysis and processing of statistical data were carried out, as a result of which the strengths and weaknesses, opportunities and threats of the agriculture of the Republic of Kazakhstan were identified. The specifics of innovative activity in the agricultural sector were considered, which helped to form a list of innovative methods for the development of agro-industrial production. A model of innovative improvement of the agricultural complex is proposed, which provides for the introduction of information technologies, integration with state information systems, and updating the financial and economic mechanism. The phased introduction of such an innovative model in the agro-industrial sector of the Republic of Kazakhstan is substantiated. The prospect of further study consists in the practical implementation of the developed innovative methods of agricultural development in the Republic of Kazakhstan.

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Перспективи інноваційного розвитку сільськогосподарського виробництва на прикладі Республіки Казахстан

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Анотація. Актуальність дослідження полягає в потребі перегляду методів ведення сільського господарства з орієнтацією на застосування інноваційних технологій для підвищення рівня якості та кількості виготовленої продукції. Метою роботи є аналіз проблем і перспектив сільськогосподарського виробництва в Республіці Казахстан для створення комплексної інноваційної моделі подальшого розвитку агропромислового сектору. Дослідження перспектив модернізованого удосконалення агропромислового комплексу Республіки Казахстан проводилось в три етапи на основі функціонально-логічного, системного та структурного підходів із використанням методів аналізу, синтезу, порівняння, систематизації, SWOT-аналізу та обробки статистичних даних. Проведено аналіз наукових робіт казахстанських і зарубіжних дослідників з метою виокремлення проблем та можливостей сільського господарства Республіки Казахстан. Визначено, що сільськогосподарський комплекс держави представлено у вигляді трьох форм господарювання, серед яких фермерство, кооперативи й основний бізнес. Розглянуто особливості інноваційної діяльності та типи інновацій у сільському господарстві. Обґрунтовані можливості та сильні сторони сільського господарства Республіки Казахстан відповідно до статистичних даних валової продукції за 2012–2019 роки. Запропоновано організаційну модель подальшого розвитку агропромислового комплексу держави в контексті застосування інноваційних технологій і встановлення взаємозв'язків з державними інформаційними системами. Практична цінність роботи полягає в наданні загального аналізу як проблем, так і перспектив сільського господарства Республіки Казахстан, внаслідок чого була складена комплексна модель інноваційного розвитку

Ключові слова: інноваційна модель, агропромисловий комплекс, моніторинг, аграрна економіка, економічний ріст