

# Transformation of the agro-industrial complex of Kazakhstan

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**Abstract.** The purpose of the study is to identify the key areas necessary to ensure food security, improve the competitiveness of the agrarian sector and stimulate economic growth of the agro-industrial sector of the Republic of Kazakhstan. The research methodology is based on the analysis of regulatory documents, statistical data and scientific publications. The analysis revealed imbalances in the development of various spheres of agro-industrial complex, inefficient use of state support, low level of innovation implementation and underdevelopment of the processing industry. It was found that despite the allocation of significant public funds to support the industry, they are not always used effectively. In particular, most of them are directed to direct subsidies rather than to the development of infrastructure and introduction of modern technologies. The conclusions are drawn about the need to revise the state policy, with a focus on stimulating investment in innovative development, technological modernisation and development of the agrarian processing industry.

## 1 Introduction

There are various approaches to increasing the productivity of the agro-industrial complex. One of them is intensive agriculture based on the extensive use of chemical fertilisers, pesticides and genetically modified organisms. While this approach can achieve high yields in the short term, it is associated with negative consequences such as soil and water pollution, reduced biodiversity and pesticide-resistant pests. In recent years, increasing attention has been given to agroecological approaches that integrate ecological principles into agricultural practices. The development of agroecological approaches aimed at creating sustainable agroecosystems is studied in [1]. Agroecology is aimed at creating sustainable and self-regulating agroecosystems capable of ensuring food security with minimal impact on the environment. This is achieved through the use of biological methods of pest control, implementation of crop rotations, use of organic fertilisers, conservation of soil cover and water resources. The development of agro-ecological approaches is a relevant and important direction, as it allows combining high yields with sustainability and environmental safety. The issue of technological modernisation of agriculture is of particular importance. Modern methods of technological modernisation are considered in the context of adaptation to climate change in the study [2]. In the conditions of global competition, the agricultural industry should rely on innovations and scientific developments that can ensure an increase in

labour productivity and product quality. It is necessary to introduce new varieties and breeds, improve soil cultivation methods, develop precision farming and livestock breeding systems. In addition, the development of infrastructure for the storage, processing and transport of agricultural products plays an important role.

The presented work is devoted to the study of priorities of industrialisation of the agro-industrial complex of the Republic of Kazakhstan. Kazakhstan has a significant agrarian potential, but its effective implementation requires modernisation of the industry and introduction of modern technologies. The study is aimed at analysing the current state of the agro-industrial complex of the country, identifying its problems and determining promising areas of development. The purpose of this paper is to study and identify key directions of industrialisation of the agro-industrial complex of the Republic of Kazakhstan, necessary to ensure food security of the country, increase the competitiveness of the agrarian sector, as well as to stimulate economic growth and improve the living standards of the rural population.

## 2 Method and materials

The main methodology of the research is analytical and review nature, aimed at studying the current state, problems and prospects of development of the agro-industrial complex (AIC) of the Republic of Kazakhstan. The article is based on the analysis of regulatory legal documents, statistical data and literary sources, which

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forms the basis for determining the priorities of industrialisation of the agro-industrial complex. It considers various aspects, such as: the structure of the agro-industrial complex, the volume of production and consumption of agricultural products, the dynamics of mineral fertilisers, the state of livestock breeding and processing industry. There is also an analysis of government policy in the agro-industrial complex, including programmes of support, subsidies and innovation.

Work to identify priorities for industrialisation of the agro-industrial complex is carried out on the basis of an analysis of economic indicators and trends, as well as by identifying key constraints and opportunities for growth. In particular, factors affecting the competitiveness of the agricultural sector are analysed, including low adoption of new technologies, lack of qualified personnel, and ineffective technology transfer mechanisms.

The article mentions the creation of extension centres such as 'Shortandy' and 'Kostanai', where training and education of farmers in new production and processing technologies are conducted. This shows the practical application of the results of the scientific analysis, but specific details of the work of these centres and the equipment used there are not given.

### 3 Results and discussion

As part of the analysis of the priorities of industrialisation of Kazakhstan's agro-industrial complex, this study focused on examining the current state, identifying problem areas and determining promising areas of development. Particular attention was paid to the structure of the agro-industrial complex, which was viewed as a complex system that includes three interrelated spheres: industry, which provides the agro-industrial complex with means of production, agriculture, and enterprises that process and sell agricultural products. In order to obtain a more detailed picture and accurate data on each sphere, additional analysis of statistical reports of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan was carried out.

The analysis showed that in the structure of the agro-industrial complex of Kazakhstan there is an imbalance in the development of these spheres. Thus, the share of the first sphere, which provides the AIC with means of production, accounts for about 10% of the final product and 15% of the main production funds, as well as 20% of the number of AIC employees. The second sphere, represented by agriculture, produces about 50 per cent of the final product, concentrates 65 per cent of fixed assets and 60 per cent of AIC employees. The third sphere, which is engaged in processing, sale and storage of agricultural products, generates about 40% of the final product, 20% of fixed assets and 20% of the number of employees of the agro-industrial complex. In addition, the analysis showed that in 2022, the share of the first sphere was already 12.5% of the final product, which indicates a gradual growth in this area, but is still insufficient.

It was also revealed that in Kazakhstan the main part of the final product, about 60%, is created in the second and third spheres of agro-industrial complex, while in developed countries, for example, in the USA, up to 80% of the retail value of food products is created in the third sphere. This indicates the underdevelopment of the processing industry in Kazakhstan, as well as the low level of implementation of modern technologies in the storage, packaging and marketing of agricultural products. Insufficient development of the processing industry and the need to introduce modern technologies in storage are discussed in [3, 4]. For example, according to the U.S. Department of Agriculture, in 2022 about 85% of the value of agricultural products in the country is created precisely in the processing and marketing, which significantly exceeds the figures of Kazakhstan. This difference in the structure of formation of the value of the final product emphasises the need for increased attention to the development of the third sphere of agro-industrial complex in Kazakhstan, including through the introduction of innovative technologies.

Over the past nine years (according to the Bureau of Statistics of the Republic of Kazakhstan), 790 billion tenge has been allocated from the national budget to the agricultural industry, of which 110 billion tenge was provided in the form of subsidies. Although this indicates significant state support to the industry, the study revealed that these funds are not always used effectively, as most of them are spent on direct subsidies and less is channelled to the development of innovation infrastructure. The problems of inefficient use of state support in agriculture, with a focus on direct subsidies, are discussed in [5]. Thus, according to the report of the National Bank of the Republic of Kazakhstan for 2021, about 75% of the allocated funds went to direct subsidies to farmers, and the remaining 25% were distributed among various support and innovation programmes, and a significant part of the latter remained unused.

According to the Statistics Committee of the Republic of Kazakhstan, in 2018, real productivity growth was only 23%. The goal of providing more than 80 per cent of the domestic food market with domestic products was also set, but this indicator reached only 72 per cent in 2015. These data indicate the need to revise the development strategy of the agro-industrial complex, emphasising a more efficient use of investments and the introduction of innovative technologies.

In addition, an important aspect identified in the course of the study is the low level of implementation of scientific developments in agricultural production. The problems of implementation of scientific developments in agricultural production and barriers to innovation in agriculture are reflected in [6]. Despite the increase in the number of domestic scientific research in the agricultural sphere, their implementation in production remains insufficient. The main constraints are imperfect mechanisms for promoting new technologies in the market, the lack of developed innovation infrastructure, weak interest of private investors, as well as small-scale agricultural production. The share of innovative technologies in agricultural production in Kazakhstan does not exceed 5%, while in leading countries this

indicator reaches 25-30%. These figures indicate the need for urgent measures to stimulate innovation activity and create a favourable investment climate.

Analysis of data for 2023 and early 2024 shows that Kazakhstan's agro-industrial complex continues to face a number of challenges, despite some progress. In particular, there has been some increase in gross output of agricultural products, but growth rates remain heterogeneous across different sectors. For example, crop production showed relatively stable growth in 2023, driven by an increase in sown areas and the introduction of some new technologies, particularly in grain production. Nevertheless, due to unfavourable weather conditions in some regions, yields of some crops remained below the planned level. The situation in the livestock sector is also mixed. There is an increase in the number of livestock, but there are still problems with the provision of quality fodder and breeding stock. In 2023, the share of pedigree livestock was only about 18 per cent, which is clearly insufficient for the qualitative growth of the industry.

As for the agro-processing industry, there was a slight increase in production volumes in 2023, but there were no significant changes in the structure of the industry. There is still a high level of imports of processed products, especially dairy and meat products. According to the Ministry of Agriculture of the Republic of Kazakhstan, imports of dairy products in 2023 increased by 15% compared to 2022, which emphasises the need to intensify measures to develop the domestic processing industry. Investment in the agro-industrial complex continues to be insufficient. Despite the allocation of public funds, private investment remains low due to the high degree of risk and long payback period of projects in the agricultural sector. Thus, according to the National Bureau of Statistics of the Republic of Kazakhstan for 2023, the volume of foreign direct investment in the agricultural sector decreased by 8% compared to 2022.

At the beginning of 2024, there is a tendency to increase the costs of agricultural production, in particular, due to the rise in the price of fertilisers, machinery and fuels and lubricants. This negatively affects the profitability of farms and slows down the pace of development of the industry. In addition, in 2023 and early 2024, there were disruptions in logistics chains, especially in the export of grain products, which also created additional challenges for farmers. These problems affect the economy and competitiveness of agriculture as shown in [7].

Forecasting the development of Kazakhstan's agro-industrial complex for the next 5-7 years, it is necessary to take into account several key factors that will determine the growth rate and transformation of the industry. The main one is the efficiency of implementation of the state policy in the field of agriculture. Currently, according to the Ministry of Agriculture of the RK, about 70% of budget funds allocated to support the agro-industrial complex are directed to direct subsidies to farmers. This undoubtedly helps agricultural producers in the short term, but does not create conditions for sustainable development of the

industry in the long term. For example, in 2023, about 450 billion tenge was allocated for direct subsidies, while only 120 billion tenge was allocated for infrastructure development, including the construction of storage facilities, elevators and modernisation of irrigation systems.

If the current trend continues and the ratio of direct subsidies to infrastructure investment remains at the level of 70/30, it can be expected that the average annual growth rate of gross agricultural output in the period 2025-2027 will be no more than 2-3%. At the same time, the share of processed products in total output will remain at the level of 35-40 per cent, while food imports will continue to increase by an average of 5-7 % per year. In addition, the industry's export potential will be limited due to low product quality and insufficiently developed logistics chains. According to Kazagromarketing's analysis, in 2023, Kazakhstan will export about USD 4.5 billion worth of agricultural products, 5% less than in 2022, while imports will be about USD 7.8 billion, indicating significant reserves for import substitution and increasing export potential. The dynamics of agrarian systems and their development are also considered in relation to climate change in the following papers [8, 9].

In contrast to this scenario, if the government takes active measures to change the priorities of state support, reorienting them from direct subsidies to the development of infrastructure, innovation and processing industry, we can expect more significant results. In particular, it is advisable to increase the share of investments in innovative developments and technologies to 20-25 % of the total financing of the agro-industrial complex. This will create conditions for the development of knowledge-intensive industries, the introduction of modern agricultural technologies and increased labour productivity in agriculture. According to World Bank experts, a 10 % increase in investment in innovation could lead to a 3-4 % annual increase in productivity in the agricultural sector. In addition, it is necessary to increase financing of the processing industry. The problems of management and sustainable use of land resources in agriculture, their role in the processing of products taking into account the economic component are considered in [10]. In particular, favourable loans and grants should be provided for the construction of new plants for processing agricultural products, especially dairy and meat. According to the calculations of specialists of JSC 'KazAgro', by 2030, an increase in processing capacity by 25% can contribute to the growth of gross output of processed products by 30-35%.

One of the key areas of development of Kazakhstan's agro-industrial complex is the formation of export potential. This requires a transition to international standards of quality and certification of products, which will expand markets and increase exports. In particular, it is necessary to actively implement ISO 22000 and HACCP standards at enterprises producing and processing agricultural products. This will allow Kazakhstani products to become more competitive in the world market and increase exports. According to the

forecasts of the Ministry of Agriculture of the Republic of Kazakhstan, the introduction of these standards can increase the volume of exports of Kazakh agricultural products by 15-20 % by 2030.

In addition, it is necessary to strengthen work on the development of transport and logistics infrastructure, including through the construction of new roads and railways, terminals and warehouses. This will reduce transport costs, ensure timely delivery of products to consumers and increase the competitiveness of Kazakhstani products in the global market. According to estimates of specialists of KTZh-Gruzovykh Transport JSC, implementation of major transport projects, such as construction of new railway lines and modernisation of existing ones, can increase the volume of cargo transportation of agricultural products by 10-12% per year.

In the long term, if all the above measures are implemented, Kazakhstan has every opportunity to become one of the leading exporters of agricultural products in the region. By 2030, exports can be expected to increase to USD 8-10 billion, with the share of processed products in total exports to be at least 40-50 per cent. This will require targeted efforts on the part of the state and business, but it will open up new opportunities for the development of the agro-industrial complex of Kazakhstan. The problems of assessing geo-ecological factors and their impact on the sustainability of agrarian land use are also reflected in [11].

Thus, the further development of Kazakhstan's agro-industrial complex will be determined not only by government support, but also by the level of activity of the private sector and the industry's ability to adapt to new technologies and market requirements.

For comparison, studies conducted in the countries of the European Union show that the introduction of innovative technologies in agriculture, along with effective state support and adequate funding of science, allows achieving significant results in increasing productivity and competitiveness of the agricultural sector. For example, in the Netherlands, which is one of the leaders in agriculture, innovation is the basis of agricultural production. Due to this, the country has high productivity and export potential despite the relatively small size of the territory.

Thus, the results of the study revealed the presence of a number of systemic problems in the agro-industrial complex of Kazakhstan. For successful industrialisation and food security, it is necessary to revise the strategy of industry development, with a focus on:

- Development of the third sphere of agro-industrial complex - processing, storage and sale of agricultural products;
- Increasing the efficiency of state support utilisation;
- Creation of conditions for active implementation of scientific developments and innovative technologies;
- Increasing investments in innovation infrastructure;

- Increasing the share of innovative technologies in production;
- Stimulation of co-operation between small agricultural producers.

Implementation of these measures will allow Kazakhstan to increase the competitiveness of the agro-industrial complex, improve the country's food security and achieve sustainable development of the agricultural sector.

## 4 Conclusion

Based on the analysis and information presented in the article, the following conclusions can be drawn about the priorities of industrialisation of the agro-industrial complex of the Republic of Kazakhstan.

First of all, it should be stated that, despite the significant agrarian potential of the country, the agro-industrial complex of Kazakhstan faces a number of systemic problems that hinder its full-fledged development and integration into the world economy. The key conclusion is the presence of imbalance in the development of three main spheres of agro-industrial complex: production of means of production, agricultural production and processing, storage and sale of agricultural products. In particular, the underdevelopment of the processing industry, as well as insufficient introduction of modern technologies in storage and packaging lead to the fact that most of the added value is created outside Kazakhstan. Technological features of waste processing management and methods of intensification of both agriculture and other sectors of national economy and industry with the use of knowledge-intensive technologies are shown in [12-14].

The second important conclusion is the inefficient use of state support. Significant funds are allocated for direct subsidies, which provides short-term support to farmers, but does not stimulate long-term development and technological modernisation of the industry. Lack of investment in innovation infrastructure and scientific research leads to a low level of implementation of new technologies in agricultural production, which, in turn, restrains the growth of productivity and competitiveness of Kazakhstani products. Features of the selection of parameters for environmentally safe processing of metals and other materials for recycling and their introduction into agriculture are shown in [15].

The third conclusion is the need to revise the state policy in the field of agriculture in order to create conditions for sustainable development of agro-industrial complex. It is necessary to move from the policy of direct subsidies to stimulating investment in innovation, research and development of the processing industry. The priority should be to develop infrastructure, create a favourable investment climate and encourage the introduction of international quality standards. New approaches and methods of processing technogenic waste for its application in agriculture are described in [16, 17].

Also, the study showed that the agro-industrial complex of the Republic of Kazakhstan in 2023 and early 2024 shows only a slight increase in production in a number of sectors. The situation in the agro-industrial complex is aggravated by imports of processed products, high cost of agricultural production and disruptions in logistics chains. All this suggests the need to revise the development strategy of Kazakhstan's agro-industrial complex.

The forecast for the development of Kazakhstan's agro-industrial complex over the next few years depends on the effectiveness of the implementation of government policy aimed at stimulating investment in the processing industry, developing innovation infrastructure and increasing export potential. If the current trend continues, the growth rate of the agro-industrial complex will remain low and food imports will continue to increase. However, with a change in the priorities of state support and reorientation towards innovative development and technological modernisation, Kazakhstan can achieve significant results in increasing productivity and competitiveness of the agricultural sector.

In conclusion, successful industrialisation of the agro-industrial complex in Kazakhstan requires a comprehensive solution to the problems, including revision of state policy, development of innovation infrastructure, attraction of investments, introduction of new technologies and development of human capital. Only if these conditions are met will Kazakhstan be able to realise its agrarian potential and ensure food security of the country. The importance of analysing and assessing the impact of mineral waters on the development of agro-industrial complex and the environment is shown in the study [18].

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