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Organizational and Economic Measures to Improve the Efficiency of Using the Resource Potential of Agricultural Production

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ABSTRACT

Agriculture in Kazakhstan still faces a number of serious systemic problems that hinder the efficient use of the resource potential of the industry. These problems include: the predominance of small-scale production in certain subsectors, low rates of renewal of agricultural machinery, low energy intensity, high capital intensity, limited access to modern production resources, an ineffective system of product marketing and insufficient promotion of agricultural products to domestic and foreign markets. In addition, there remains a high dependence on imported resources, which reduces the industry's resilience to external economic shocks. The purpose of this study is to develop organizational and economic measures aimed at increasing the efficiency of using the resource potential of agricultural production in the Republic of Kazakhstan. To achieve this goal, the following tasks have been defined: to analyze the current state of the production potential of personal subsidiary farms (PSF) and assess the efficiency of agricultural cooperation; develop recommendations for strengthening the material and technical base of agricultural formations; assess the resource and production potential of the country's agricultural sector; identify factors hindering the development of private household plots and agricultural cooperation; formulate strategic directions for increasing the sustainability of agricultural production. Research hypothesis. It is assumed that the implementation of the developed

institutional development and placement of the deep processing system

organizational and economic recommendations will allow for a comprehensive solution to the problems of increasing the competitiveness of the domestic agricultural sector, increasing labor productivity, rationalizing the use of production resources and ensuring the formation of an effective infrastructure of the agro-industrial complex. Main results. The study included a comprehensive analysis of the state of the resource potential of agricultural production in Kazakhstan, assessed the rate of equipment renewal, provision of equipment and material and technical resources. Statistical and dynamic data on the development of agriculture are presented, key problems in the current system of state support for the industry are identified. An economic assessment of the production potential of private household plots is given, barriers limiting their development are identified, and possible ways of more efficient use of available resources are proposed. In addition, the market environment and competitive positions of the Kazakh agricultural sector are analyzed. A set of recommendations for eliminating the identified problems is formulated and a strategy for sustainable development of agricultural production is presented.

INTRODUCTION

The agricultural sector of Kazakhstan has significant resource potential and national competitive advantages compared to other countries, which, with an effective agricultural policy, can ensure its sustainable development and make a significant contribution to the country's economy and improve the well-being of the population. At the same time, there are still features and circumstances that hinder the efficient use of resource potential and accelerated development of the industry. These include, first of all, high risks associated with specific natural and climatic conditions;

- lack of effective methods of control over the processes of land use, distribution and redistribution of land resources;
- limited water resources and dependence on neighboring countries in water supply of the industry in the southern regions;
- high degree of degradation and desertification of pastures;
- significant remoteness from world transport corridors;
- low share of processing industries in the products of the agro-industrial complex;
- underdevelopment of trade and logistics infrastructure and wholesale link;
- low rates of renewal of agricultural machinery; - increasing shortage of qualified personnel at any level in the industry;
- high share of imported resources for production;
- insufficient level of social infrastructure of rural areas and much more.

The relevance of this study is that it examines ways to ensure the efficient use of limited resources in agriculture, their balance and optimality. In this regard, the main tasks are:

- assessment of the use of the production potential of personal subsidiary farms through agricultural cooperation and the effectiveness of their role in the development of the agro-industrial complex;
- organizational and economic measures to strengthen the material and technical means and equipment of agricultural formations;
- assessment of the resource and production potential of the food and processing industry of Kazakhstan.

The solution of these problems requires the implementation of measures in a system that includes economic, market, social, agrotechnical and biophysical components. In general, this study will provide recommendations that will facilitate a comprehensive solution to the problem of increasing the competitiveness of domestic products, labor productivity, rational use of resource potential, and the formation of the necessary infrastructure.

1. LITERATURE REVIEW

Currently, there is no single scientific approach to the study of such a multifaceted concept as "potential". In modern economic literature, the term is interpreted in different ways, and various levels of its analysis are distinguished. The most common classification is that the agro-resource potential is considered at four levels:

- the level of an individual enterprise;
- the level of an industry;
- the level of a region or state;
- at the global (world) level.

At the enterprise level, economic potential is most often associated with production capabilities, resource security, market position or production capacity. In the sectoral context, potential is understood as either the availability of resources or the ability to function within a certain historical and economic situation. In our opinion, it is advisable to consider the analysis of the potential of a territory and a state as a single whole. Scientific literature also offers three key paradigms for interpreting the concept of "potential":

- as a set of resources concentrated in a specific territory;
- as a result of the functioning of economic relations in a given territory;
- as the ability of productive forces to achieve a certain economic effect.

In global analysis, the emphasis is usually placed on the availability of resources in the world economy or on potential production volumes achievable with their efficient use. In addition to these interpretations, there are also a number of concepts based on sustainable development approaches and process analysis.

Summarizing the existing approaches, two dominant ones can be distinguished:

- resource approach, where potential is interpreted as a set of available resources;
- performance approach, where it is defined as the ability to achieve certain economic results based on available resources and interaction mechanisms.

We are inclined to the performance interpretation of agro-resource potential, since it includes such important aspects as the level of technology and the management system. Even with significant labor, natural and material resources, the lack of modern technologies or effective management can significantly reduce the real potential of a territory. An important indicator of the efficiency of agro-resource potential is not only the volume, but also the structure of the manufactured products. These parameters allow us to judge the technological level, the efficiency of resource use and the quality of the management system.

Despite the preference for the results-based approach, the importance of the resource approach cannot be denied. Without a minimum set of resources, economic activity itself is impossible, which means that the potential itself is absent. It is through the use of natural and climatic and material and technical resources that the surplus product is formed and the development of the economy is ensured. Also, there is no consensus in scientific circles regarding the composition of the elements of agro-resource potential. There are various options - from three (natural and climatic, material and technical, labor) to ten or more components. Some researchers further differentiate these elements: for example, labor potential can include psychophysical, qualification and personal characteristics. We propose a comprehensive approach to the analysis of the resource potential of agricultural production, within the framework of which the following main elements are distinguished:

- natural and climatic potential, including natural and climatic resources of the territory;
- material and technical potential, covering not only equipment and technology, but also financial resources;
- labor potential, reflecting the availability and characteristics of labor resources.

These three components are basic and equal in the structure of the agro-resource potential. Their combined influence determines the level of production potential, that is, the possible volumes of output

with current resources and conditions. Thus, based on the scientific research of the authors in this area, it can be determined that the resource potential of agricultural production can be divided into several main categories (Table 1).

Table 1. Resource potential of agricultural production

Resources	*Components*
Land resources	Arable land Hayfields and pastures Irrigated and dry lands Soil fertility (natural and improved)
Labor resources	Permanent workers (agronomists, machine operators, etc.) Seasonal workers Staff qualifications Employment level and labor productivity
Material and technical resources	Agricultural machinery (tractors, combines, etc.) Equipment (irrigation, storage facilities, sorting and packaging lines) Fuels and lubricants (F&L) Spare parts, tools
Biological resources	Seeds, planting material Breeding cattle, young animals Fertilizers (organic and mineral) Plant protection products (pesticides, insecticides)
Financial resources	Own working capital Loans and subsidies Investments Insurance
Information and innovation resources	Agrotechnologies (AgTech, Smart Farming) Climate, weather, soil data Software (accounting, planning, monitoring) Education, access to scientific research

Source: compiled by the authors

Assessing the impact of individual indicators or factors of agricultural policy on the development of agriculture allows us to obtain clear results, but they are partial and do not reflect the simultaneous impact of all internal and external indicators and activities. Risk factors and their consideration in the analysis and development of effective solutions for state support of the agricultural sector in Kazakhstan represent a huge layer of unsolved problems. There are very few publications by domestic researchers on this topic. As for recent studies, such as the work of Ochilov Ilhom Sayitkulovich, et al (2024), Elena Krasnoperova (2020), a comprehensive methodology for assessing the organizational and economic efficiency of agro-clusters is proposed, taking into account various aspects of management, resource use and financial sustainability.

In their studies, Zhumakhan Mustafayev, Akhmetkal Medeu (2024) focus on the methodology for assessing the agro-resource potential of agricultural landscapes, based on the integration of knowledge from various fields of science. The issues of improving the organizational and economic management mechanisms in industrial enterprises based on the experience of agricultural production, with an emphasis on optimization and sustainable development strategies are the subject of the studies by G. Boykuzieva (2024) and Janker, J. & Mann, S. (2020). The team of authors A. Akhmetova, et al. (2025) in their works consider the methodological aspects of assessing the effectiveness of integrated production in agriculture in Kazakhstan, where a balanced system of indicators is proposed for assessing the productivity of agricultural enterprises. At the same time, an important aspect is providing farmers with training and autonomy in decision-making, which helps to increase technical efficiency in the face of economic shocks (Takeshima, et al. 2024).

In light of the digital transformation, the development of an economic management model in the agricultural sector of Kazakhstan is the subject of works (Durmanov, et al. 2024; Beketova, et al. 2024), in which the integration of production with digital technologies contributes to increased productivity, reduced costs and improved technical efficiency, provides economic opportunities for the use of renewable energy sources using artificial intelligence technologies (Durmanov et al. 2024; Beketova K. et al, 2024). Y. Kenzheali & A. Makhmetova (2024) analyze the key economic and climatic indicators of sustainable development of agriculture in Kazakhstan, offering recommendations for improving the use of resource potential. O. Abraliyev et al. (2024). consider some popular definitions of sustainable agriculture and believe that they primarily focus on resource conservation at the farm level and profitability as the main components of sustainability.

2. RESEARCH METHODS

The study will be based on the principles of systems analysis, which will allow studying the relevant agrotechnical, biophysical, social and market processes in their unity and interrelation. Abstract-logical, calculation-constructive, economic-mathematical, economic-statistical and digital modeling methods will be used.

The work will use the Solow model - a macroeconomic model that explains long-term economic growth taking into account capital accumulation, population growth (or labor force), technological progress and productivity. The use of economic-mathematical models to assess the impact of agricultural policy on the development of agriculture allows us to avoid these shortcomings. In the models, a change in one variable affects the value of other variables, and the supply of not only this but also all other products, the limited general resources, current prices in world markets, and the values of exogenous variables are taken into account. The economic literature provides a description of many models that, with varying degrees of detail, describe the impact of agricultural policy on the development of agriculture. Official open sources of government agencies are used as sources of primary statistical information.

3. ANALYSIS AND RESULTS

A significant share (70% of fruit and vegetable, 50% of meat and dairy products) is produced in private subsidiary farms (PSF) of the country, which indicates the key role of household plots in ensuring food security of the country. However, there are a number of circumstances that do not allow to fully realize the potential of PSF: the regulatory framework for their functioning, the principles and mechanisms of state regulation and support for their activities have not been defined - despite the attempts to adopt the draft law of the Republic of Kazakhstan "On Personal Subsidiary Farming" in 2003, 2017, 2021. There is a need to legislatively consolidate the concept of PSF, determine the criteria for classifying farms into this category, develop recommendations for the formation of a new regulatory framework for their activities, change the legal status of PSF, the mechanism for the creation and effective functioning of promising models of PSF cooperatives.

Data of the Ministry of Agriculture of the Republic of Kazakhstan as of 01.01. 2025 show that of the total number of available agricultural machinery, only 30% of tractors, 39% of grain harvesters and about 25% of mounted and trailed machines have a service life within the standard of up to 10 years. With the required technological renewal level of 10 ÷ 12.5% per year, today the renewal occurs only within 1 ÷ 3%. The volumes of domestic production of agricultural machinery in quantitative terms over the past 5 years amounted to 18-38% of the total supply volumes, depending on the type of equipment. In fact, the country is faced with the task of rebuilding issues of technical support. At present, the use of new environmental, practically proven resource-saving mechanized and other effective technologies puts forward the need to assess the real need for technical means and equipment, forms the prerequisites for economic justification of the quantitative and qualitative characteristics of the modernized technical base for the production of agricultural crops. In addition, it should be taken into account that a multi-level system of technical equipment formation has developed in agricultural production (production unit, farm, organizational and economic structure for the provision of mechanized services).

Government measures taken to regulate economic processes in agriculture do not always and do not necessarily lead to positive effects. This is explained mainly by two groups of reasons. Firstly, economic,

social, environmental and political goals often contradict each other. Secondly, attempts at state regulation of economic relations inevitably lead to distortion of market signals about the actual efficiency of agricultural production in different natural and economic conditions (Table 2).

Table 2. Main problems of agricultural production development in the Republic of Kazakhstan

Factors	*Problems*
Small-scale nature of agricultural production	- high share of households in the total volume of gross agricultural output, especially livestock products (75%); - a trend towards a decrease in land allotments of agricultural producers: 65% of farms have land up to 50 hectares, the average size of land use of agricultural enterprises (JSC, LLC, PC) has decreased, especially in the eastern region by 2.8 times, in the central region - 2.3 and in the south - 6 times.
Underdevelopment of infrastructure in the system of purchasing, storing, processing and marketing of agricultural products:	- many intermediaries in the process of moving products from the producer to the consumer; - low purchase prices that do not cover the invested costs of agricultural producers and do not stimulate an increase in the volume of agricultural production and their quality; - low share of processing of agricultural products (milk - 21.8%, meat - 21.4%, fruits and vegetables 7.8%), the consequence is the underutilization of production capacities of processing enterprises, low competitiveness of domestic products compared to imported ones.
Financial insolvency of small businesses	- weak material and technical base (lack of own agricultural machinery, financial resources for purchasing seeds, fertilizers, feed, fuel and lubricants, etc.); - inaccessibility for most small farms of state support measures in the form of subsidies, preferential loans due to the lack of collateral, etc.

Source: compiled by the authors

The main target indicators for the development of the agro-industrial complex, outlined in state programs, are the following criteria: the share of gross output in GDP, the volume of gross agricultural output, investments in fixed capital of agriculture, export of processed agricultural products, import and labor productivity per person employed in agriculture (Table 3).

Table 3. Key indicators of the development of the agro-industrial complex of Kazakhstan for 2019-2024

Indicators	2019	2020	2021	2022	2023	2024
Share of gross output in GDP,%	7,5	9,0	9,0	8,1	6,4	7,0
Volume of gross agricultural output, billion tenge	5177,9	6 334,7	7 549,8	8 407,5	7 625,2	8233,0
Volume of investments in fixed capital of agriculture, billion tenge	494,9	565,4	772,5	850,3	904,3	829,8
Volume of exports of processed agricultural products and food industry, million dollars	2479,1	2700,0	3126,0	3000,0	1960,0	2500,0
Volume of imports of agricultural products and food industry, million dollars	4107,7	4200,0	5000,0	5100,0	4350,0	4670,0
Labor productivity per person employed in agriculture, million tenge	2,4	2,6	2,8	2,8	2,9	2,8

Source: compiled by the authors according to https://www.stat.gov.k

The data in Table 3 show that the gross agricultural output increased (compared to the 2019 level) by almost 2.3 times;

- the volume of investments in fixed capital of agriculture (compared to the 2019 level) increased by almost 1.7 times;
- the volume of exports of processed agricultural products (compared to the 2019 level) increased by 1.0 times;
- the volume of imports of processed agricultural products (compared to the 2019 level) increased by 1.1 times;
- labor productivity per person employed in agriculture (compared to the 2019 level) remained almost at the same level.

However, despite the growth of the main indicators of the development of the agro-industrial complex, the share of gross output in GDP decreased from 7.5 to 7.0%. For these purposes, in order to ensure agro-food security of our republic, it is necessary to implement a state policy that shows the priority of the agricultural sector. Based on the objectives of stabilization and further sustainable development of agricultural production, it is necessary to take measures of state support for agricultural production taking into account compliance with the rules of the World Trade Organization. Not the least important place should be occupied by the solution of issues of improving financial levers for supporting and developing agricultural production.

Measures to promote investment in the regional economy should include assisting investors in obtaining investment preferences, creating infrastructure facilities (industrial zones, business incubators, technology parks, engineering centers) in order to attract potential investors. Creation and development of rural cooperation and large farms. In this direction, the following measures should be implemented: promoting the unification of small producers into cooperatives by providing the state with preferential loans for the purchase of special technological equipment, vehicles, mini-shops for primary processing of livestock products and raw materials, participation in subsidizing the cost of compound feed, involving the livestock industry in a leasing program for technical and technological re-equipment.

Difficulties in introducing innovative technologies into agricultural production are caused by the fragmentation and small-scale nature of agricultural formations. More than 250.9 thousand agricultural formations and 1.6 million households are engaged in agricultural production in the country. Of the total number of agricultural formations, 94% (285.3 thousand units) are peasant (farm) households, of which 40% have no more than 10 hectares of agricultural land (Table 4, Fig. 1). Grouping of peasant, farm households, by the availability of land shows that 63% of them have up to 50 hectares of agricultural land and 81% have no more than 50 hectares of arable land.

Table 4. Number of agricultural formations for 2019-2024, units.

Year	*Peasant (farm) households*	*Individual entrepreneurs*	*Legal entities*	*Total number of agro-formations*
2019	265000	20000	17000	302000
2020	260000	19800	17500	297300
2021	255000	19500	18000	292500
2022	250000	19000	18300	287300
2023	265300	19900	18400	303600
2024	250900	15700	18700	285300

Source: compiled by the authors according to https://www.stat.gov.k

Despite such a large share in the number of agricultural formations, peasant (farm) households produce more than 31% of gross output. It is the small-scale structure of agricultural production that has led to a decrease in competition between agricultural producers.

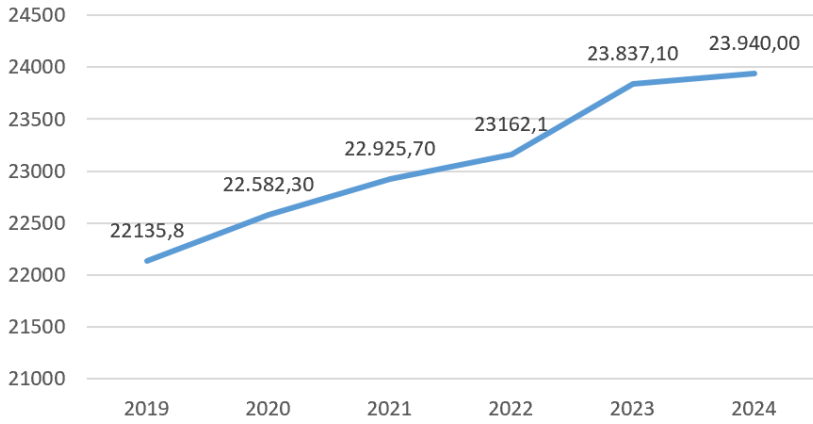

Figure 1. Adjusted sown area of agricultural crops, thousand hectares
Source: compiled by the authors

Today, large-scale farming is not being properly developed in Kazakhstan's agriculture, which should guarantee the provision of planned food volumes. The lack of a long-term development strategy also affects the development of cooperation and integration between the spheres of agricultural production. Today, a strategic plan is drawn up for five to seven years, although a rational period would be ten years. Defining a ten-year period serves as a forecast for the development of certain sectors of agricultural production, allows for the regulation and redistribution of financial resources in problem areas.

The measures taken in the republic to unite peasant and farm households, personal subsidiary farms in reality do not fully reflect the principles of cooperation that should stimulate rural producers to increase agricultural output, and not receive only subsidies under the guise of cooperative forms of farms. At the same time, such work should take into account the specific features of certain sectors of the agro-industrial complex. The concept of development of the agro-industrial complex of the Republic of Kazakhstan for 2021-2030 (December 30, 2021) reflects that:

- it is necessary to start with the formation of private household farm cooperatives, which should be created in each rural district, the creation of pilot cooperatives in 30-60 rural districts of 3-6 districts of 2-3 regions;
- at the second stage, cooperatives of small peasant (farmer) farms will be created at the level of rural districts, district associations of rural private household farm cooperatives will be created;
- at the third stage - the creation of cooperatives of medium and large agricultural producers at the regional level and the creation of regional associations of district cooperatives.

However, to stimulate cooperation, state support measures are necessary: investment subsidies for the cost of equipment, subsidies for the cost of services provided by cooperatives to their members; budget financing of knowledge dissemination activities. When implementing strategic goals, it is necessary to develop an effective mechanism for public-private partnership, which will ensure the implementation of all adopted state programs and increase the competitiveness of agricultural enterprises. As the President of the country noted in his message, the solution to this problem is seen in the creation of large, commodity farms based on vertical and horizontal cooperation. The vertical form of cooperation of peasant farms in the form of integration processes will expand the capabilities of the marketing service, study the capacity of the domestic and foreign market in certain regions of the republic, introduce innovative technologies into production, as well as rationally use the main means of production, including land, labor and material resources, reduce the costs of building effective channels of goods distribution.

Horizontal cooperation is a form of integration of agricultural enterprises, in which enterprises specialize in the production of a certain product or type of activity in order to make the most complete use of resources and, as a rule, do not affect the status of a legal entity and economic independence. Competitive struggle, the need for accelerated economic development force us to look for ways to effectively organize production, apply innovative technologies. It is not possible to implement them in small farms. As of 2024, the number of operating agricultural cooperatives was 3911 units (Figure 2).

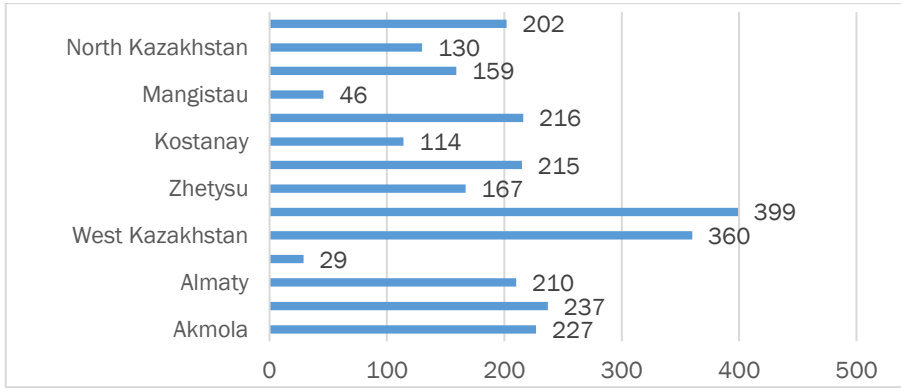

Figure 2. Number of operating agricultural cooperatives in 2024
Source: compiled by the authors

Production cooperatives are aimed at the production, processing of agricultural products, as well as joint cultivation of land, use of agricultural machinery. Marketing cooperatives are engaged in the procurement, storage and sale of products manufactured by cooperative members. Marketing activities also include the collection, storage, sorting, drying and sale of raw materials in fresh or processed form wholesale or retail and transportation of products of cooperative members. Processing cooperatives are engaged in the processing of agricultural products and their sale through the wholesale and retail trade system, including the organization of their own trade network.

Supply cooperatives provide agricultural producers with the resources and materials necessary in the production process: equipment, fuel and lubricants, seeds, fertilizers, pesticides, feed, spare parts, construction and other materials associated with agricultural production; Service cooperatives provide their members with services related to the process of production and sale of agricultural products (agrochemical services, water supply, electricity supply, repair and maintenance of equipment, telephones, breeding and selection activities, etc.). At the present stage, with the vector of development of Kazakhstan to enter the number of the most developed countries of the world, in the prism of which the main and responsible task of the state is to achieve high-quality new indicators of development of the industry in agriculture, is to increase the competitiveness of the industry. The transition of agriculture to the industrial-innovative path of development based on strengthening its material and technical base, improving the quality of agricultural products requires the effectiveness of financing and the efficiency of agricultural production.

Efficiency indicators can be determined both for the entire agricultural industry as a whole, and for crop production and livestock farming, by categories of farms, as well as by sources and types of financing of the industry. The following indicators can be taken as the result of production:

- at the state level GDP - gross output;
- at the regional level GRP - gross regional product;
- at the level of industries and enterprises GVA - gross added value.

The following are considered as production resources (hereinafter referred to as PR) or factors of production: fixed production assets (hereinafter referred to as FA), working capital (hereinafter referred to as WC) in the form of inventory items (I&M) and stocks, labor, land and natural resources. To study the impact of such main factors of production as capital, labor and technological progress on economic growth, the Solow model is most often used, in which output is described by the production function according to formula (1):

$$Y=F(K,L,E); \quad (1)$$

where

Y – volume of output or gross domestic product GDP,
K – capital or production assets,
L– real living labor,
E – labor efficiency of one worker.

The variable E reflects the level of "knowledge" accumulated in society, or the labor-saving type of scientific and technological progress (hereinafter referred to as STP), under the influence of which the labor efficiency of one worker or the quality of human capital increases. Output Y can change over time only when the factors of production change over time. Changes in the number of workers and labor efficiency E are always considered together, since at each moment in time the economy has L workers with increased labor efficiency or an increased number of workers with constant initial labor efficiency (*L·E*). Thus, the output is described by the production function *Y=F(K,L·E)*. With respect to the production function, it is assumed that:

A) it is not significantly influenced by other factors;
B) there is a constant return to scale, which allows for a transition to a production function in an intensive form per unit of labor with constant efficiency; $F'_K > 0, F'_L > 0$, i.e. as resources grow, output grows;

C. $F''_K < 0, F''_L < 0$, i.e., with an increase in resources, the rate of growth of output slows down.

D. The most frequently used is the multiplicative production function with the listed properties according to formula (2):

$$Y = A \cdot K^{\alpha} \cdot L^{\beta}; \quad (2)$$

where *A* - coefficient of neutral scientific and technological progress;

α, β – coefficients of elasticity of output by fixed assets and labor, respectively.

A special case is the Cobb-Douglas production function, first proposed by the Swedish economist Knut Wicksell. It has the form shown in formula (3):

$$Y = A \cdot K^{\alpha} \cdot L^{1-\alpha}; \quad 0 < \alpha < 1 \quad (3)$$

The multiplicative production function is determined by a time series of outputs and resource inputs (Y_t, K_t, L_t), t =1,...,T, where T – length of the time series. Since this function is linear in logarithms, we obtain a linear multiple regression model using formula (4):

$$\ln Y = \ln A + \alpha \cdot \ln K + \beta \cdot \ln L + \varepsilon; \quad (4)$$

where ε – an adjustment random component that matches actual and estimated output and reflects fluctuations in output due to other factors. The parameters of this function can be determined using the least squares method using standard Statictica application packages.

To obtain function (4), we use the data of the Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan on the gross output of goods (services), on investments in fixed capital and the number of people employed in the economy by type of economic activity Agriculture, forestry and fisheries for the period 2015-2024 (Table 5).

Table 5. Data for constructing the Solow Model

Indicator	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Gross agricultural output, billion tenge (Y)	3307,0	3684,4	4070,9	4474,1	5177,9	6 334,7	7 549,8	8 407,5	7 625,2	8233,0
Fixed capital, billion tenge K(t)	2604,5	3150,0	3572,9	4130,2	4785,8	5673,5	6500,8	7641,5	8100,2	8234,2
Labor productivity, billion tenge L/Y	1,2	1,5	1,7	2,0	2,4	3,0	3,3	4,6	4,3	4,5
Labor, million people (L)	2755,8	2456,3	2394,7	2237,1	2157,5	2111,6	2287,8	1827,7	1772,1	1829,6

Y/ L - output per 1 employee	1,20	1,50	1,70	2,0	2,40	3,0	3,30	4,60	4,30	4,50
K/ L – capital per 1 worker	0,95	1,28	1,49	1,85	2,22	2,69	2,84	4,18	4,57	4,50
log(k) Ln(K/ L) – logarithms used in regression to estimate the parameter α	-0,57	0,247	0,400	0,613	0,796	0,988	1,045	1,429	1,519	1,504
log(y)Ln (Y / L)	0,182	0,405	0,531	0,693	0,875	1,099	1,194	1,526	1,458	1,504

Source: calculated by the authors

$$y=A\cdot k\alpha \Rightarrow \log(y)=\log(A)+\alpha\cdot\log(k)$$
$$\log(y)=a+\alpha\cdot\log(k)$$

Indicator α reflects the elasticity of output with respect to capital — если $\alpha \approx 0.88$, as in the graph, this means that capital explains 88% of the growth in output. Thus, the Solow calculation model (Table 5) shows the relationship between output and the volume of fixed capital per worker using statistical data as an example. Based on the transformed Cobb-Douglas production function in logarithmic form, a regression was conducted between the logarithm of output per worker and the logarithm of capital per worker. The results of the regression analysis made it possible to estimate the parameter of elasticity of output by capital (α) at the level of 0.88, which significantly exceeds the classical value (about 0.3-0.4), typical for neoclassical growth models. This may indicate the importance of capital-intensive factors in the development of agricultural production and can serve as a basis for the formation of organizational and economic measures to improve the efficiency of using the resource potential of the industry.

Despite the average annual growth rate of agriculture at the level of 2-3%, there is no active mobilization of resources in the sector and there is no significant activation of qualitative factors of economic dynamics. The current state of the industry is characterized as backward and uneven, with an obvious deficit in the field of technological and innovative solutions. Thus, in 2024, the official inflow of funds into agriculture amounted to only 16 million US dollars, which indicates limited external investment.

An analysis of the current state showed that the current mechanism for managing economic growth in agriculture is focused primarily on the use of natural resources and labor, but does not fully correspond to the key determinants and drivers of industry growth. The decline in the contribution of agriculture to overall GDP growth, high volatility and low dynamic rates of production indicate a discrepancy between the current growth rates and the resource-intensive potential of the sector. In this regard, in order to ensure sustainable and effective development of national agriculture, it is necessary to implement the proposed tools for forming a mechanism for managing economic growth in the agricultural sector (Figure 3).

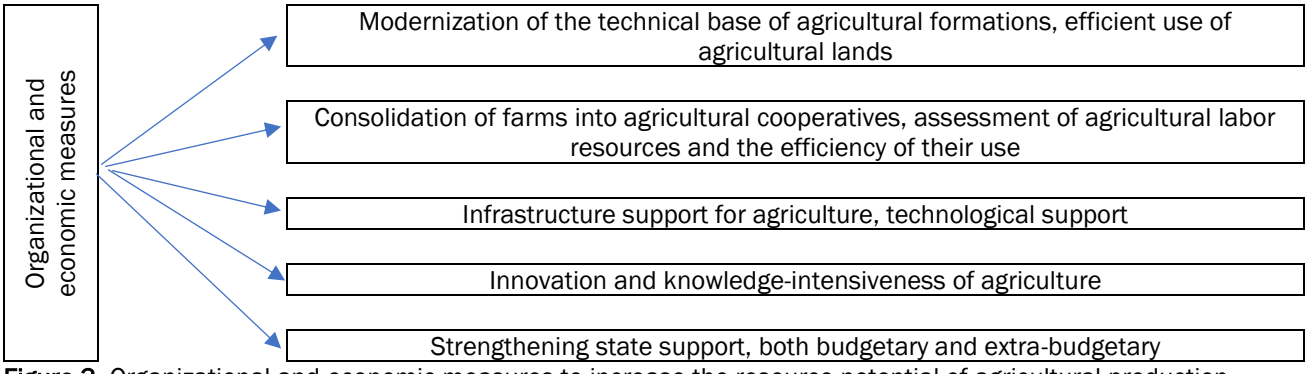

Figure 3. Organizational and economic measures to increase the resource potential of agricultural production
Source: Compiled by the authors

In order to stabilize and sustainably develop agricultural production, it is necessary to develop and implement measures of state support that will comply with the rules of the World Trade Organization. It is also important to focus on improving the financial support for the development of the agricultural sector. One of the key areas is attracting investment in agriculture. To do this, it is necessary to create incentives for investors, including assistance in obtaining investment preferences, as well as develop infrastructure such as industrial zones, business incubators, technology parks and engineering centers. These measures will help attract potential investors and create favorable conditions for the development of the agro-industrial complex. Particular attention should be paid to the creation and development of rural cooperation and large farms. In this direction, it is necessary to implement the following measures: support for the unification of small producers into cooperatives with the provision of preferential loans for the purchase of special technological equipment, vehicles, mini-shops for the primary processing of livestock products, as well as participation in subsidizing the cost of compound feed. An important component is the involvement of livestock farming in the leasing program for technical and technological re-equipment.

CONCLUSION

Agricultural production is a promising sector of the economy of Kazakhstan, demonstrating growth in production volumes. Tools for ensuring the quality of economic growth in agriculture have a number of specific industry features, such as seasonality and dependence on natural factors. One of the key areas of development is the need to increase public funding and investment in the agricultural sector.

In addition, an important factor is the importance of agriculture for the socio-economic development of the country, as well as the role of rural areas in overall economic progress. The efficiency of using the production potential of personal subsidiary farms through agricultural cooperation also contributes to the development of the agro-industrial complex.

To strengthen the material and technical base of agricultural formations, organizational and economic measures should be taken to improve the equipment and facilities.

An increase in gross added value in the agricultural sector will have the most significant impact on employment growth, improving the quality of life, increasing income and well-being of the population. To achieve sustainable development, it is necessary to introduce advanced technologies and innovations in the production and processing of agricultural products, as well as expand export opportunities through marketing development. Improving product quality, creating new and branded products will become important tools for increasing the competitiveness of the sector and improving the quality of life of the population.

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