МРНТИ 06.71.07 **https://doi.org/10.58805/kazutb.v.4.25-624**

# CURRENT STATE OF AGRICULTURAL BUSINESSES IN THE REPUBLIC OF KAZAKHSTAN AND THEIR DEVELOPMENT TRENDS IN MODERN CONDITIONS

**[1]S. Saginova✉, [2]D. Saparova, [3]V. Stukach**

[1]K. Kulazhanov Kazakh University of Technology and Business, Astana, Kazakhstan,
[2]Turan-Astana University, Astana, Kazakhstan,
[3]Omsk State Agrarian University Named After P.A. Stolypin, Omsk, Russia
✉Corresponding author: saginova.s@gmail.com

The purpose of this article is to study the current state and prospects of development of agricultural formations in the Republic of Kazakhstan. The work sets short-term objectives aimed at analysing the current state of agricultural production, investment activity, crop and livestock production, as well as identifying the main factors affecting their development. The long-term objectives of the study are to forecast future trends, develop strategies to improve the sustainability and efficiency of the agro-industrial complex, and form recommendations for improving management decisions. This approach allows taking into account both existing problems and prospects for the transformation of the industry, including the introduction of innovative technologies and the transition to sustainable forms of management.

Methodology used to analyze the development of agricultural businesses in the Republic of Kazakhstan covers a comprehensive approach that includes both quantitative and qualitative methods of analysis, as well as a wide range of information sources to ensure reliability and objectivity of the results.

This work is based on econometric calculations stemming from the analysis of economic indicators affecting development of agricultural businesses with various forms of ownership in the Republic of Kazakhstan. Forecast analysis of their future development trends will improve planning in agro-industrial complex companies and enterprises, as well as in the process of making management decisions to improve the situation in agricultural sectors. The results obtained can be used both to exchange data and for the process of making management decisions, as well as to provide recommendations to improve the situation in the agro-industrial complex of the Republic of Kazakhstan.

**Keywords:** agricultural policy, agriculture, investments, agricultural business, trends, trend model, means of production.

# ҚАЗАҚСТАН РЕСПУБЛИКАСЫНДАҒЫ АУЫЛ ШАРУАШЫЛЫҒЫ ҚҰРЫЛЫМДАРЫНЫҢ ҚАЗІРГІ ЖАҒДАЙЫ ЖӘНЕ ОЛАРДЫҢ СОҢҒЫ ЖАҒДАЙДАҒЫ ДАМУ ТЕНДЕНЦИЯЛАРЫ

**[1]С.А. Сагинова✉, [2]Д.А. Сапарова, [3] В.Ф. Стукач**

[1]Қ. Құлажанов атындағы Қазақ технология және бизнес университеті, Астана, Казахстан,
[2]Тұран-Астана университеті, Астана, Қазақстан,
[3]П.А. Столыпин атындағы Омбы мемлекеттік аграрлық университеті, Омбы, Ресей,
e-mail: saginova.s@gmail.com

Бұл мақаланың мақсаты – Қазақстан Республикасындағы ауылшаруашылық құрылымдарының қазіргі жағдайы мен даму болашағын зерттеу. Жұмыс аясында ауыл шаруашылығы өндірісінің, инвестициялық белсенділіктің, өсімдік шаруашылығы мен мал шаруашылығының ағымдағы жағдайын талдауға, сондай-ақ олардың дамуына әсер ететін негізгі факторларды анықтауға бағытталған қысқа мерзімді міндеттер белгіленді. Зерттеудің ұзақ мерзімді мақсаттары болашақ тенденцияларды болжау, аграрлық сектордың тұрақтылығы мен тиімділігін арттыру стратегияларын әзірлеу және басқару шешімдерін жетілдіру бойынша ұсыныстарды қалыптастыру болып табылады. Бұл тәсіл инновациялық технологияларды енгізуді және экономиканы басқарудың тұрақты нысандарына көшуді қоса алғанда, саланы қайта құрудың бар проблемаларын да, перспективаларын да ескеруге мүмкіндік береді.

Қазақстан Республикасында ауыл шаруашылығы кәсіпорындарының дамуын талдау үшін қолданылатын әдістеме сандық және сапалық талдау әдістерін, сондай-ақ нәтижелердің сенімділігі мен объективтілігін қамтамасыз ету үшін ақпарат көздерінің кең спектрін қамтитын кешенді тәсілді қамтиды.

Бұл жұмыс Қазақстан Республикасында меншіктің әртүрлі нысандары бар ауылшаруашылық кәсіпорындарының дамуына әсер ететін экономикалық көрсеткіштерді талдаудан туындайтын эконометрикалық есептеулерге негізделген. Олардың болашақтағы даму тенденцияларын болжамды талдау агроөнеркәсіптік кешендегі компаниялар мен кәсіпорындарда, сондай-ақ агроөнеркәсіптік кешендегі жағдайды жақсарту бойынша басқарушылық шешімдер қабылдау процесінде жоспарлауды жақсартуға мүмкіндік береді. Алынған нәтижелер деректер алмасу үшін де, басқару шешімдерін қабылдау процесі үшін де. Сондай-ақ Қазақстан Республикасының агроөнеркәсіптік кешеніндегі жағдайды жақсарту бойынша ұсыныстар беру үшін де пайдаланылуы мүмкін.

**Түйін сөздер:** аграрлық саясат, ауыл шаруашылығы, инвестициялар, аграрлық формация, тенденциялар, тренд моделі, өндіріс құралдары.

## НЫНЕШНЕЕ СОСТОЯНИЕ СЕЛЬХОЗФОРМИРОВАНИЙ В РЕСПУБЛИКЕ КАЗАХСТАН И ТЕНДЕНЦИИ ИХ РАЗВИТИЯ В СОВРЕМЕННЫХ УСЛОВИЯХ

**[1]С.А. Сагинова✉, [2]Д.А. Сапарова, [3]В.Ф. Стукач**

[1]Казахский университет технологии и бизнеса им. К. Кулажанова, Астана, Казахстан,
[2]Университет «Туран-Астана», Астана, Казахстан,
[3]Омский государственный аграный университет им. П.А. Столыпина, Омск, Россия,
e-mail: saginova.s@gmail.com

Целью данной статьи является исследование современного состояния и перспектив развития сельскохозяйственных формирований в Республике Казахстан на основе прогнозов. В работе проводится анализ основных аспектов сельского хозяйства, таких как производство, инвестиции, развитие растениеводства и животноводства, и рассматриваются перспективы их трансформации в современных условиях.

Применяемая методология для анализа развития сельскохозяйственных формирований в Республике Казахстан охватывает комплексный подход, который включает в себя как количественные, так и качественные методы анализа, а также широкий спектр информационных источников для обеспечения достоверности и объективности получаемых результатов.

Базой данной работы являются эконометрические вычисления на основе анализа экономических показателей, влияющих на развитие сельскохозяйственных формирований с различными формами собственности в Республике Казахстан. Прогнозный анализ будущих трендов их развития позволит совершенствовать планирование в организациях и предприятиях АПК, а также в процессе принятия управленческих решений по улучшению ситуаций в отраслях сельского хозяйства. Полученные результаты могут быть использованы для обмена информацией и в процессе принятия управленческих решений, а также для предоставления рекомендаций по улучшению ситуации в отраслях АПК Республики Казахстан.

**Ключевые слова:** аграрная политика, сельское хозяйство, инвестиции, сельскохозяйственное формирование, тенденции, трендовая модель, средства производства.

**Introduction.** Kazakhstan's state agricultural policy proactively engages with agricultural producers to develop an agro-industrial complex. Proper communication between producers of various forms of ownership is essential if we are to avoid gaps in providing basic production resources, which, if implemented properly, helps to reduce costs and ensure efficient delivery of products to

the consumer's table, ultimately contributing to the balanced development of an entire agricultural sector and agro-industrial complex altogether [1].

However, ill-considered actions to quickly replace methods and processes following innovations and global trends can make an already difficult situation in industries even worse. Accordingly, we require a comprehensive analysis, we need to involve both domestic and international scientific experts to transform agro-industrial complex industries into sustainable production (using the principles of a green economy, circular economy, bioeconomy, and other new economic models). Furthermore, the best international practices in these areas might prove beneficial as well. In this context, it is useful to calculate fundamental base of analytical and forecast data, including, but not limited to, mathematical, statistical, and econometric models.

Statistics over the last decades show a period of intense integration, redistribution of property, changes in land use, and restructuring of production the agro-industrial sector had to undergo. This has led abandoning activities requiring a significant amount of labor and resource costs.

In the process of natural agriculture reform, affected by external and internal factors, areas intended for agricultural crops suffered a partial reduction. The rapid decrease in potential is due to poor resource management, negative environmental footprint, and insufficient modernization of equipment and production processes.

Another negative consequence lowering export potential of our agricultural products is non-compliance with international quality standards in general and standards of "clean" organic products in particular. It is no secret that presently the world pays great attention to the food product contents. Should certain goods meet the parameters of organic products, oftentimes their supply volumes are not enough for exporting. Meaning, conditions for generating large volumes of high-quality agricultural products are still to be created.

One of the points that need urgent changes is creation of effective agribusinesses for further scaling and intensification of production [2].

In light of this, studying issues and prospects for the development of an agro-industrial complex in the Republic of Kazakhstan requires an in-depth analysis of the activities of agricultural enterprises. This will allow disclosure of hidden reserves and their use in new types of activities and methods that will be used to organize labor in the country's agricultural sector.

The international experience shows that transitioning to a sustainable development in the long term helps to significantly improve the quality of natural resources, agricultural raw materials, and finished products of the agricultural sector, as well as increase labor productivity. A preliminary regional analysis of the agro-industrial complex's development problems and agricultural formations of the country is required if we are to choose the most suitable and most effective way to address them [3].

**Materials and Methods.** In order to analyse the prospects for the development of the agro-industrial complex of the Republic of Kazakhstan, this study has chosen a trend model, in particular the linear trend model, which allows to effectively approximate historical data and forecast future changes in key agricultural factors. The choice of this method is due to several circumstances, including stability and predictability of changes in the agricultural sphere, availability of data and ease of interpretation of results, which makes the linear trend an optimal tool for solving the set tasks. In the following, the rationale for the choice of this model is given, as well as its applicability in the context of analysing the factors affecting the development of the agro-industrial complex of Kazakhstan.

The choice of the trend model, in particular the linear trend model, for forecasting the development of factors of the agro-industrial complex (AIC) of the Republic of Kazakhstan is justified by a number of factors that reflect the specific conditions of agriculture and the data available for analysis.

Firstly, the linear trend allows us to effectively approximate data showing stable, predictable changes, such as long-term fluctuations in yields,

production volumes and prices characteristic of the agricultural sector. In an agricultural economy where changes are gradual and subject to certain patterns, a linear model makes it possible to forecast these changes based on historical data with a reasonably high accuracy.

Secondly, the linear model is easy to apply and interpret, which is especially important for making operational decisions in conditions of limited data, which are often present in the agricultural sector. This approach allows not only to make forecasts based on available statistics, but also to assess long-term development trends without the need for complex computational resources.

Third, the linear model works well when factors of change - such as the economic situation, natural conditions or changes in government policy - do not fluctuate significantly and abruptly, which is often the case in Kazakhstan' s agriculture. Although more sophisticated models can offer greater accuracy in the face of variable and unstable factors, the linear trend represents the best means for an initial assessment of the prospects for the development of the agro-industrial complex on the basis of available data. Thus, the trend model, and in particular the linear trend, is a reliable tool for building forecasts in the agricultural sector, providing the necessary results with minimal data requirements and complex calculations, which is especially important when resources for more sophisticated methods are limited.

Kazakhstan's agro-industrial sector is presented by the following main forms of management: large agricultural enterprises, medium-sized farms/peasant farms, and small personal subsidiary farms. Large farms are registered as legal entities while farms, in terms of organizational and legal form, are individual entrepreneurships not bearing legal entity status. Individual entrepreneurs or peasant farms cultivate approximately 30% of agricultural land. Farm households vary in scale and can be large, medium, or small. Larger farms are most common up north where the land is more than 5,000 hectares. Accordingly, medium and small farms are mainly concentrated down south. Medium-sized farms in the southern regions can vary between 3 and 500 hectares making about a third of their area. Although we have excluded personal subsidiary farms as a form of management from the point of view of economic organization, they remain significant producers of agricultural products, especially livestock. As a rule, personal subsidiary households (hereinafter referred to as PSF) are small home farms keeping one to three cows, sheep, and goats, sometimes poultry. They may also keep a small vegetable garden between several hundred square meters and 0.25-1 ha.

Just as elsewhere in the world, in Kazakhstan's modern conditions, the role of limited liability partnerships, agriholdings, etc. is showing a growing trend. "Green" clusters' role is increasing just as well [4]. Investing in Kazakhstan's agricultural sector will contribute to development of small and medium-sized businesses in livestock and crop production sectors. However, being competitive means producers must go organic and switch over to "green" technologies [5].

Over the past five years, agriculture has been enjoying significant investments amounting to approx. 1.7 trillion tenge in subsidies. This includes 486.7 billion tenge for livestock farming, 366.8 billion tenge for crop production, and 729.3 billion tenge as financial instruments.

Table 1 shows Kazakhstan's main economic statistics for the past period of time. Studying its trend allows us to get an idea of the organizational form development in our agriculture.

**Table 1 - Main Indicators of the Republic of Kazakhstan's Agro-Industrial Complex Between 2020 and 2023**

| Indicators | 2020 | 2021 | 2022 | 2023 | 2023 to 2022 Change, Per Cent |
|---|---|---|---|---|---|
| Gross Output of Agricultural Products (Services), Billion Tenge | 6,364.0 | 7,549.8 | 9,521.0 | 7,625.2 | –19.93 |
| Gross Livestock Production in the RK, Million Tenge | 3,687,310.3 | 4,387,236.5 | 5,808,259.8 | 7,218,965.5 | 24.28 |
| Region-Wise, Million Tenge | | | | | |
| Akmola | 202,790.8 | 264,476.3 | 321,137.9 | 358,160.61 | 11.54 |
| Aktobe | 202,120.1 | 242,888.8 | 259,290.5 | 292,278.92 | 12.73 |
| Almaty | 430,331.6 | 475,467.6 | 376,980.4 | 444,495.00 | 17.92 |
| Atyrau | 48,764.2 | 70,076.1 | 81,324.7 | 89,457.86 | 10.00 |
| West Kazakhstan | 127,066.5 | 146,379.9 | 167,183.6 | 185,025.57 | 10.67 |
| Zhambyl | 161,919.3 | 175,418.4 | 215,045.4 | 229,674.79 | 6.80 |
| Karaganda | 215,670.5 | 275,683.8 | 225,605.3 | 279,172.76 | 23.75 |
| Kostanay | 160,750.3 | 188,280.0 | 207,066.0 | 231,400.73 | 11.77 |
| Kyzylorda | 52,888.5 | 60,882.3 | 68,282.2 | 75,249.63 | 10.19 |
| Mangystau | 15,417.8 | 18,057.3 | 23,208.8 | 24,105.43 | 3.86 |
| Pavlodar | 147,999.6 | 167,474.1 | 203,273.3 | 216,632.56 | 6.56 |
| North Kazakhstan | 178,087.7 | 219,863.2 | 263,024.8 | 280,949.95 | 6.80 |
| Turkestan | 304,785.1 | 362,230.9 | 401,717.6 | 434,228.12 | 8.09 |
| East Kazakhstan | 365,954.5 | 421,154.3 | 255,844.4 | 338,722.86 | 32.36 |
| The City of Astana | 151.7 | 148.9 | 157.8 | 140.26 | –11.13 |
| The City of Almaty | 826.3 | 658.0 | 705.4 | 267.25 | –62.12 |
| The City of Shymkent | 21,936.2 | 27,833.8 | 26,120.8 | 30,659.71 | 17.37 |
| | | | | | |
| Gross Crop Production in the RK, Million Tenge | 2,637,460.7 | 3,116,973.5 | 3,658,757.6 | 4,227,405.9 | 15.53 |
| | | | | | |
| Akmola | 468,740.5 | 475,525.0 | 770,299.9 | 808,414.53 | 4.95 |
| Aktobe | 123,040.1 | 132,008.1 | 196,735.8 | 204,241.09 | 3.81 |
| Almaty | 531,894.2 | 610,353.1 | 391,848.6 | 528,890.79 | 34.97 |
| Atyrau | 36,286.8 | 42,241.8 | 52,902.8 | 56,891.53 | 7.53 |
| West Kazakhstan | 69,650.8 | 94,765.2 | 131,714.4 | 141,130.49 | 7.15 |
| Zhambyl | 229,015.6 | 302,261.7 | 363,509.1 | 410,694.51 | 12.98 |
| Karaganda | 167,721.0 | 217,338.7 | 254,301.4 | 283,819.49 | 11.61 |
| Kostanay | 430,972.8 | 415,585.4 | 811,647.3 | 810,008.53 | –0.20 |
| Kyzylorda | 89,524.2 | 108,578.3 | 117,693.8 | 133,345.34 | 13.29 |
| Mangystau | 3,579.7 | 3,465.0 | 5,136.4 | 4,941.05 | –3.81 |

| Indicators | 2020 | 2021 | 2022 | 2023 | 2023 to 2022 Change, Per Cent |
|---|---|---|---|---|---|
| Pavlodar | 154,089.4 | 260,633.1 | 314,082.3 | 356,741.13 | 13.60 |
| North Kazakhstan | 598,313.9 | 679,297.0 | 909,326.2 | 995,276.45 | 9.45 |
| Turkestan | 438,023.1 | 567,578.9 | 648,470.7 | 738,890.48 | 13.96 |
| East Kazakhstan | 325,022.8 | 454,045.6 | 288,634.0 | 407,674.73 | 41.28 |
| The City of Astana | 345.4 | 354.2 | 412.3 | 352.34 | –14.54 |
| The City of Almaty | 6,662.9 | 7,077.6 | 4,338.8 | 5,816.01 | 34.03 |
| The City of Shymkent | 14,426.9 | 16,127.9 | 17,572.4 | 17,259.90 | –1.78 |
| Fixed Investment, Billion Tenge | 12,270.1 | 13,242.2 | 15,251.1 | 17,649.3 | 15.72 |
| Registered Legal Entities of the RK by Economic Sectors (Agriculture, Forestry, and Fisheries), Units | 18,843 | 19,991 | 20,327 | 20,990 | 3.26 |
| Note: Compiled by the authors based on data from the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan | | | | | |

Table 1 shows that in 2023 compared to 2022, gross livestock output rose by 24.3% and gross crop output rose by 15.5%. However, there is a reduction in gross livestock production in rural areas of Akmola and Almaty regions and a reduction in gross crop production in Akmola and Shymkent regions.

**Table 2 - Region Shares in the Total Gross Livestock Output Between 2021 and 2023**

| Indicators | 2021 | 2022 | 2023 | 2023 to 2021 Ratio, Per Cent |
|---|---|---|---|---|
| Gross Livestock Output in the RK, Million Tenge | 2,411,486.7 | 3,687,310.3 | 5,808,259.8 | 58.48 |
| Region-Wise, Million Tenge | | | | |
| Akmola | 264,476.3 | 321,137.9 | 358,160.61 | 26.16 |
| Aktobe | 242,888.8 | 259,290.5 | 292,278.92 | 16.90 |
| Almaty | 475,467.6 | 376,980.4 | 444,495.00 | –6.97 |
| Atyrau | 70,076.1 | 81,324.7 | 89,457.86 | 21.67 |
| West Kazakhstan | 146,379.9 | 167,183.6 | 185,025.57 | 20.89 |
| Zhambyl | 175,418.4 | 215,045.4 | 229,674.79 | 23.62 |
| Karaganda | 275,683.8 | 225,605.3 | 279,172.76 | 1.25 |
| Kostanay | 188,280.0 | 207,066.0 | 231,400.73 | 18.63 |
| Kyzylorda | 60,882.3 | 68,282.2 | 75,249.63 | 19.09 |
| Mangystau | 18,057.3 | 23,208.8 | 24,105.43 | 25.09 |
| Pavlodar | 167,474.1 | 203,273.3 | 216,632.56 | 22.69 |
| North Kazakhstan | 219,863.2 | 263,024.8 | 280,949.95 | 21.74 |
| Turkestan | 362,230.9 | 401,717.6 | 434,228.12 | 16.58 |
| East Kazakhstan | 421,154.3 | 255,844.4 | 338,722.86 | –24.34 |
| The City of Astana | 148.9 | 157.8 | 140.26 | –6.16 |
| The City of Almaty | 658.0 | 705.4 | 267.25 | –146.21 |

| Indicators | 2021 | 2022 | 2023 | 2023 to 2021 Ratio, Per Cent |
|---|---|---|---|---|
| The City of Shymkent | 27,833.8 | 26,120.8 | 30,659.71 | 9.22 |

Gross livestock output has shown changes in regional specific weights. Case in point, 2023 compared to previous years (2021 and 2022), as evidenced by the data in Table 2.

**Table 3 - Region Shares in the Total Gross Crop Production Output Between 2021 and 2023**

| Indicators | 2021 | 2022 | 2023 | 2023 to 2021 Ratio, Per Cent |
|---|---|---|---|---|
| Gross Crop Production Output in the RK, Million Tenge | 2,050,455.8 | 2,637,460.7 | 3,658,757.6 | 43.96 |
| Region-Wise, Million Tenge | | | | |
| Akmola | 475,525.0 | 770,299.9 | 808,414.53 | 41.18 |
| Aktobe | 132,008.1 | 196,735.8 | 204,241.09 | 35.37 |
| Almaty | 610,353.1 | 391,848.6 | 528,890.79 | –15.40 |
| Atyrau | 42,241.8 | 52,902.8 | 56,891.53 | 25.75 |
| West Kazakhstan | 94,765.2 | 131,714.4 | 141,130.49 | 32.85 |
| Zhambyl | 302,261.7 | 363,509.1 | 410,694.51 | 26.40 |
| Karaganda | 217,338.7 | 254,301.4 | 283,819.49 | 23.42 |
| Kostanay | 415,585.4 | 811,647.3 | 810,008.53 | 48.69 |
| Kyzylorda | 108,578.3 | 117,693.8 | 133,345.34 | 18.57 |
| Mangystau | 3,465.0 | 5,136.4 | 4,941.05 | 29.87 |
| Pavlodar | 260,633.1 | 314,082.3 | 356,741.13 | 26.94 |
| North Kazakhstan | 679,297.0 | 909,326.2 | 995,276.45 | 31.75 |
| Turkestan | 567,578.9 | 648,470.7 | 738,890.48 | 23.18 |
| East Kazakhstan | 454,045.6 | 288,634.0 | 407,674.73 | –11.37 |
| The City of Astana | 354.2 | 412.3 | 352.34 | –0.53 |
| The City of Almaty | 7,077.6 | 4,338.8 | 5,816.01 | –21.69 |
| The City of Shymkent | 16,127.9 | 17,572.4 | 17,259.90 | 6.56 |

Table 3 data analysis also shows a reduction in the share of gross crop production in the total volume in 2023 compared to previous years. This affected heavily the Almaty, Zhambyl, and East Kazakhstan regions (please refer to Table).

Table 1 shows an increase in the total number of large and medium-sized farms that are legal entities, ultimately reaching 20,090 units in 2023, which makes 4% of the total number of registered enterprises and legal entities operating in other sectors.

The growth in gross output, investment volume, and the number of registered legal entities indicate a clear progress. These changes are likely the result of integrated efforts in agriculture and increased investor interest in the agro-industrial sector. Additionally, state support can play an important role in these economic indicators' growth since over the specified period, agricultural subsidies from the state budget grew to reach 408.7 billion tenge in 2022 (226.2 billion tenge in 2018, 356.3 billion tenge in 2019, 384.8 billion tenge in 2020, and 450 billion tenge in 2021).

Let us analyze evolution of key quantitative indicators of legal entity development in the Republic of Kazakhstan in the agricultural, forestry, and fishery sector. We shall look at various types of ownership, too. Based on the statistical data

presented in Table 4, this will allow us to understand development trends of agricultural structures in the country and their contribution to the economy and food security.

**Table 4 - The number of the RK's Active Legal Entities of Various Types of Ownership by Economic Sectors (Agriculture, Forestry, and Fisheries) for the Period between 2018 and 2023**

| Indicators | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2023 in Per Cent to 2018 |
|---|---|---|---|---|---|---|---|
| Registered, privately owned, legal entities by sectors, units | 17,007 | 17,582 | 18,497 | 19,632 | 19,935 | 20,720 | 121.8 |
| Active, state owned, legal entities by sectors, units | 72 | 72 | 65 | 67 | 63 | 61 | 84.7 |
| Active, foreign owned, legal entities, units | 236 | 263 | 281 | 292 | 314 | 332 | 140.6 |
| Active small and medium-sized businesses, peasant, or farm enterprises, units | 231,312 | 252,264 | 260,781 | 261,071 | 275,776 | 285,561 | 123.4 |
| Note: Compiled by the authors based on data from the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan | | | | | | | |

The above table shows an increase in the number of registered agribusinesses for all forms of ownership, except for the state-owned ones.

Account must be taken of the fact that registered, private-owned, legal entities in the Republic of Kazakhstan's agricultural sector include agricultural cooperatives. There were 3,284 of those at the end of 2022, employing over 7.3 thousand people [6].

Quantitative forecasting analysis that uses a structured trend method based on actual economic growth data will show promising areas for the development of agribusinesses [7, 8]. In this case, trend forecasting method was used in an attempt to calculate the trend in changes in the number of Kazakhstan's agribusinesses until 2026.

We use statistical time series to analyze dynamics of economic phenomena. Levels of these series are determined by various factors affecting both long-term and short-term, including random effects. Changes in the conditions for the development of these phenomena are reflected in the level of phenomena in question over time [9, 10].

To demonstrate application of the extrapolation method, we shall use time series data reflecting the activities of legal entities operating in agriculture, forestry, and fisheries in the Republic of Kazakhstan for the period between 2018 and 2023 as shown in Table 4.

To start with, we determine parameters of the equation calculated by the least squares method.

For the calculated data, the system of equations is as follows:

$$\begin{cases} 6a + 21b = 113373 \\ 21a + 91b = 410185 \end{cases}$$

From the first equation, we express a and substitute it into the second equation. For the result, we get a = 764.543, b = 16,219.6.

Calculation table 5 shows quality assessment values of the equation parameters.

**Table 5- Calculated quality assessment of the equation parameters**

| t | y | y(t) | $(yi-ycp)^2$ | $(yi-y(t))^2$ | $(t-tp)^2$ |
|---|---|---|---|---|---|
| 1 | 17,007 | 16,984.143 | 3,566,432.25 | 522.449 | 6.25 |
| 2 | 17,582 | 16,984.143 | 1,725,282.25 | 27,784.127 | 2.25 |
| 3 | 18,497 | 18,513.229 | 158,802.25 | 263.367 | 0.25 |
| 4 | 19,632 | 19,277.771 | 542,432.25 | 125,477.881 | 0.25 |
| 5 | 19,935 | 20,042.314 | 1,080,560.25 | 11,516.356 | 2.25 |
| 6 | 20,720 | 20,806.857 | 3,328,800.25 | 7,544.163 | 6.25 |
| | | 113,373 | 10,402,309.5 | 173,108.343 | 17.5 |
| Note: Compiled by the authors based on calculations | | | | | |

Let us perform an evaluation check of the accuracy of the trend model equation's calculated parameters and test the hypotheses regarding

$$R^2 = 1 - \frac{\sum (y_i - y_t)^2}{\sum (y_i - \overline{y})^2} = 0.9834$$

The calculated value characterizes 98.34% of cases of *t*-influence on the change of the result factor *y*. Otherwise speaking, trend equation modeling accuracy is high.

**Results and Discussions.** The study analyzed the relationship between the indicator "Number of Registered Legal Entities of the Republic of Kazakhstan by Sectors of the Economy with Private Ownership" and the time factor. In the process of defining the model, we selected a linear trend and analyzed its parameters using the least squares method.

According to the research results, it was found that 98.34% of the total variability of the factor indicator value is associated with a change in the time parameter. In addition, it was found that the model parameters have statistical significance. It is possible to carry out an economic interpretation of these parameters, which shows that the average increase in the factor indicator value is 764.543 units with each change in the time factor.

The model used for forecasting based on selected key factors with $R^2$ probability levels clearly shows that if current development trends are maintained, the forecast value is consistent with the calculated value of the identified dynamics of change in indicators (Table 6).

**Table 6 - Forecast Values of the Indicators "Number of Operating Legal Entities of Various Types of Ownership in the Republic of Kazakhstan by Economic Sectors (Agriculture, Forestry, and Fisheries)" for the Period Between 2024 and 2026**

| Indicators | 2024 | 2025 | 2026 |
|---|---|---|---|
| Registered, privately owned, legal entities by sectors, units | 21,571 | 22,336 | 23,100 |
| Active, state owned, legal entities by sectors, units | 59 | 56 | 54 |
| Active, foreign owned, legal entities, units | 351 | 369 | 388 |
| Active small and medium-sized businesses, peasant, or farm enterprises, units | 295,335 | 305,108 | 314,882 |
| Note: Compiled by the authors based on calculations | | | |

The study focused on quantitative data, which allowed us to formulate accurate and tangible forecasts for Kazakhstan' s agro-industrial complex. It should be emphasised that the impact of qualitative factors, such as climate change or access to technology, does not pose a significant risk

to the accuracy of the forecasts in this analysis. The influence of these factors, although important for long-term development, does not currently have a significant effect on general trends in agriculture, especially in the short term, which is confirmed by the stability of historical data. Moreover, quantitative data based on current trends allow for a fairly accurate forecast of the main directions of the industry' s development, as many of these qualitative factors have not yet shown sharp fluctuations that could significantly change the dynamics. In the future, it will be possible to take these factors into account in case of their more pronounced influence, but at the moment their impact on the forecasted indicators remains limited.

The results of forecasting economic processes using a model based on data dynamics as shown in studies by various authors, turned out quite convincing.

Based on the modeling results, we can formulate a comprehensive idea of the current state and prospects for the development of agricultural businesses in Kazakhstan. These findings may be useful for strategy development, decision-making, and planning future activities in agricultural sector.

The practical value of the results obtained is that the forecast data can be used to optimise management decisions in the agro-industrial complex of Kazakhstan. In particular, the following aspects of management can be improved on the basis of the proposed forecasting model:

- Production planning, due to the fact that forecasts based on historical data can help agricultural enterprises to plan production volumes more accurately and minimise the risks of overproduction or shortage of products. This is important for efficient resource utilisation and loss prevention;

- Building pricing policy and marketing, by forecasting the dynamics of prices for agricultural products, which allows to optimise pricing strategy and increase the competitiveness of products in domestic and foreign markets. Companies will be able to calculate more accurately when it is more profitable to sell products and when to hold them for sale in the future;

- Resource and inventory management also needs predictive data to help plan resource requirements (fertiliser, seed, fuel, etc.) more accurately, and to optimise logistics and inventory management, which will reduce procurement and storage costs;

- Investment decision-making relies directly on forecasts, in the agricultural sector, which can help enterprises to better justify long-term investments, for example, in expanding production capacity, purchasing new machinery or introducing innovative technologies such as precision farming systems;

- Using forecasts to assess possible risks associated with climate change, global price fluctuations and other external factors will allow enterprises to take early action to minimise risks and adjust long-term strategies.

The chosen research method is unequivocally based on modeling economic indicators. In this case, it is based on development trends in GDP data for agriculture and quantitative data of the research object and investments. It does not reflect qualitative indicators and other factors affecting the current situation and further development of agribusinesses in the country. However, as a basis for an in-depth subject study of this topic, we consider the results of this study both relevant and applicable.

Recognizing positive trends in the development of agribusinesses, we feel important to note that at the moment, agriculture's development level and its contribution to the national GDP remain low compared to previous decades.

We believe that transitioning to an economic model focused on the effective development of all forms of agricultural enterprises analyzed in this study will effectively address issues of developing the agro-industrial complex, growing agricultural production, which will ultimately contribute to ensuring food security and improving living standards.

**Conclusions.** As a result of the study aimed at analysing the development of the agro-industrial complex of Kazakhstan, it was revealed that the

transition to an economic model focused on the effective development of all forms of agrarian enterprises is a key step in solving the existing problems of agriculture. This, in turn, will have a positive impact on the growth of agricultural production, which contributes to improving food security and improving the quality of life of the country' s population.

Based on the findings and analysis of the current situation in the agro-industrial complex, several important recommendations for public policy and private business to support sustainable agricultural development can be identified.

Recommendations for public policy:

- Development of agricultural infrastructure: To improve the conditions for agriculture in remote areas of Kazakhstan, it is necessary to increase investment in infrastructure, including transport networks, product storage, water supply and electricity. Creation of modern logistics chains will help to reduce costs and increase the competitiveness of agro-producers;

- Support for the introduction of innovative technologies: It is necessary to develop programmes that stimulate the introduction of new technologies in agriculture. The inclusion of subsidies for the purchase of machinery, the creation of educational centres to train farmers in modern agricultural methods, and tax incentives for those using innovative and environmentally friendly technologies can help to increase the productivity and sustainability of the sector;

- Ensuring access to finance for small and medium-sized agricultural producers: Creating more accessible financial instruments for small and medium-sized agricultural producers, such as soft loans, state support programmes and loan rate subsidies, will increase investment in the development of small agribusinesses and improve their competitiveness;

- State support for green technologies: State support mechanisms should be developed and implemented to promote sustainable and environmentally friendly technologies such as organic farming, water conservation and carbon reduction technologies. This could include both direct financial support and certification programmes for environmentally friendly products.

Recommendations for private business:

- Invest in green technologies: Private agricultural enterprises should focus on long-term investments in environmentally friendly technologies. The introduction of organic farming, energy efficient irrigation methods, use of renewable energy sources (solar panels, biogas) will not only improve environmental sustainability, but also create a competitive advantage in international markets where consumers are increasingly oriented towards environmentally friendly products;

- Optimisation of business processes: It is recommended to optimise internal processes to improve efficiency and reduce costs. This includes implementing inventory management systems, improving logistics and automating business processes. Developing and implementing digital platforms for trade and marketing of agricultural products will help entrepreneurs enter new markets and provide more accurate control over processes;

- Training and professional development of employees: To improve the quality of work and competitiveness in agribusiness, it is necessary to organise courses and trainings for employees aimed at teaching modern farming methods, use of new technologies and innovative approaches in agro-production. This will help to create a more skilled labour force and increase productivity;

- Co-operation with scientific institutions and public authorities: Private business should actively co-operate with scientific institutions to develop and implement innovative solutions, as well as with public authorities to obtain affordable financial support and implement subsidies. This co-operation can help to improve product quality and introduce advanced agricultural technologies.

## References

1. Moldashev A.B., Nikitina G.A., Guseva G.YA. Povyshenie roli agropromyshlennogo proizvodstva

Kazahstana na obshchem rynke stran-uchastnic EAES: rekomendacii.- Almaty, 2017. - 35 s. [in Russian]

2 Saparova G.K., Sultanova G.T. Problemy i perspektivy razvitiya agrarnogo proizvodstva v RK v sovremennyh usloviyah: monografiya. -Atyrau: red.izd. centr Atyrauskij universitet nefti i gaza imeni S.Utebaeva, 2020. -218 s. [in Russian]

3. Ishfaq, M., Wang, Y., Xu, J. et al. Improvement of nutritional quality of food crops with fertilizer: a global meta-analysis //Agron. Sustain.-2023. -Vol. 43(74). DOI 10.1007/s13593-023-00923-7

4. LavrikovaYU.G., Malysh E.V. Zelenaya ekonomika v klasternom razvitii // Regional' naya ekonomika: teoriya i praktika. -2014. -№ 36(363). -S. 48-58. URL: https://cyberleninka.ru [in Russian]

5. YAnovskaya O.A., Saginova S.A. Prodovol' stvennaya bezopasnost' Kazahstana v usloviyah integracii: problemy i perspektivy: Monografiya. – Karaganda: TOO «Tengri ltd». 2020. - 210 s. ISBN 978-601-7950-91-0 [in Russian]

6. ElDala – novosti i analitika agrarnogo bizneza Kazahstana.- 2023. - URL: https://eldala.kz (Extracted on May 26th, 2024) [in Russian]

7. Babich, T.N. Prognozirovanie i planirovanie v usloviyah rynka: Uchebnoe posobie / T.N. Babich, I.A. Koz'eva, YU.V. Vertakova, E.N. Kuz'bozhev. - M.: NIC INFRA-M, 2013.- 336 c. [in Russian]

8. Zamkov O.O., Tolstopyatenko A.V., CHeremnyh YU.N. Matematicheskie metody v ekonomike.– M.: Delo i Servis, 2001.- 368 s. ISBN 5-86509-054-2 [in Russian]

9. Malyhin V.I. Matematika v ekonomike. – M.: INFRA-M, 1999.- 355 s. ISBN 5-86225-867-1. [in Russian]

10. Garmash A. N. Ekonomiko-matematicheskie metody i prikladnye modeli: uchebnik dlya bakalavriata i magistratury / A. N. Garmash, I. V. Orlova, V. V. Fedoseev; pod redakciej V. V. Fedoseeva. - 4-e izd., pererab. i dop.- Moskva: Izdatel'stvo YUrajt, 2022. - 328 s. ISBN 978-5-9916-3698-8 [in Russian]

***Information about the authors***

Saginova S.- PhD, Associate Professor,K. Kulazhanov Kazakh University of Technology and Business, Astana, Kazakhstan, e-mail: saginova.s@gmail.com;

Saparova D.- PhD, Turan-Astana University, Astana, Kazakhstan, e-mail: saparova.ok@ mail.ru;

Stukach V. - Doctor of Economics, Professor, P. A. Stolypin Omsk State Agrarian University, Omsk, Russian Federation, e-mail: vic.econ@mail.ru.

***Сведения об авторах***

Сагинова С.А. - доктор PhD, ассоциированный профессор,Казахский университет технологии и бизнеса им. К. Кулажанова, Астана, Казахстан, e-mail: saginova.s@gmail.com;

Сапарова Д.А. - докторант PhD, «Туран-Астана», Астана, Казахстан, e-mail: saparova.ok@mail.ru;

Стукач В.Ф. – доктор экономических наук, профессор, Омский государственный аграрный университет им. П.А. Столыпина, Омск, Российская Федерация, e-mail: vic.econ@mail.ru.