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TRANSFORMATION OF THE AGRICULTURAL SECTOR AND ITS IMPACT ON FOOD SECURITY IN KAZAKHSTAN

Abstract. *The article examines the relationship between the dynamics of the agricultural sector and ensuring food security in the Republic of Kazakhstan. The macroeconomic and sectoral indicators for 2010-2024 are analyzed, including the growth rates of gross domestic product and gross agricultural output, as well as labor productivity in the agricultural sector in comparison with the economy as a whole and other sectors. Positive trends have been identified in increasing agricultural production while reducing its share in the GDP structure, which indicates the structural vulnerability of the sector. It is determined that the level of labor productivity in agriculture remains significantly lower compared to other sectors of the economy, despite its growth, which indicates a technological and organizational lag. It is shown that the lag of the agricultural sector in key indicators limits its contribution to ensuring domestic food demand and achieving sustainable food security. The necessity of modernizing the agricultural infrastructure, increasing the efficiency of resource use and developing human capital is substantiated. Methods of comparative and dynamic analysis, as well as elements of structural*

comparison are used. Recommendations for improving the state agrarian policy and directions for further research in the field of increasing the efficiency and sustainability of agricultural production in Kazakhstan are formulated. The significance of the results obtained is determined by their practical applicability for the development of strategic measures to support the agricultural sector in the context of external and internal challenges.

Keywords: *agricultural sector, agriculture, labor productivity, food security, economic development, sustainable development, agricultural policy, structural constraints.*

Introduction. Ensuring food security is one of the key priorities of a state's socio-economic development, especially amid external economic instability, population growth, and escalating climate risks. The agricultural sector is the principal source of food resources, and its development has a direct impact on the resilience of domestic supply systems, food price levels, and the country's independence from external deliveries. The relevance of this study is driven by the need for a quantitative and structural assessment of the agricultural sector's contribution to food security, as well as the identification of factors constraining its potential.

The purpose of the study is to determine the nature of the relationship between the dynamics of agricultural production indicators and the level of food security, with an emphasis on analyzing growth rates of gross output and labor productivity in Kazakhstan's agriculture.

To achieve this goal, the following tasks were set: to analyze the retrospective growth rates of gross domestic product and agriculture; to assess labor productivity in the agricultural sector against the backdrop of other sectors of the economy; to identify constraints and imbalances affecting the efficiency of the agricultural sector; and to substantiate avenues for increasing its contribution to achieving food security objectives.

The study draws on comparative and dynamic analysis of macroeconomic and sectoral statistical indicators for 2010–2024. Data for the analysis were obtained from official sources of the Bureau of National Statistics of the Republic of Kazakhstan. The results are visualized using data-processing software tools. Conventional methods of descriptive statistics and structural comparison were applied to ensure the reliability and replicability of the findings.

The choice of topic is motivated by the need to develop evidence-based recommendations to enhance the resilience of the agricultural sector as a foundational element of the national food system and to strengthen its contribution to Kazakhstan's economic security.

Literature Review. Contemporary research in agricultural economics underscores agriculture's role as a key driver of sustainable development and food security. Studies show that the high dependence of agricultural production on natural conditions, the investment climate, and the institutional environment leads to volatility and vulnerability to external shocks [1]. The literature indicates that

sustainable growth in agriculture is possible provided that labor productivity increases, the technical base is modernized, and the output structure is diversified [2].

A number of publications stress the need to compare macroeconomic and sectoral indicators to identify strategic priorities for agricultural policy [3]. In this research stream, food security is viewed not only through the prism of production volumes but also through dimensions of accessibility, quality, supply stability, and equitable distribution of food [4]. Particular attention is paid to the role of state support and subsidies, the effectiveness of technical modernization programs, and mechanisms for transforming the agricultural sector at the regional level [5].

Kazakhstani researchers highlight problems of low labor productivity, limited access to modern agrotechnologies, and weak integration of farming households into market value chains [6]. Separate works address land degradation and limited water availability, which directly affect the level of the country's food self-sufficiency [7].

A synthesis of existing studies reveals tensions between the positive macro-dynamics of the agricultural sector and its structural constraints. Despite growth in agricultural output, there remains a substantial lag behind economy-wide efficiency indicators, which holds back the sector's potential in the context of achieving sustainable development goals. Unresolved issues include narrowing interregional productivity gaps, ensuring technological sovereignty, and sustainably managing the resource base. These aspects confirm the relevance of conducting a comprehensive analysis of sectoral dynamics and the validity of the present research focus.

Methodology. Building sustainable food security requires a systemic analysis of the agricultural sector as one of the key components of the national economy. Given the intensifying influence of climatic, demographic, and geoeconomic factors, examining agriculture's production potential, efficiency, and development dynamics is of particular importance. Kazakhstan's agriculture possesses substantial resource potential; however, its actual contribution to the national economy is characterized by relative instability and high sensitivity to external and internal shocks.

The main constraints on sectoral development include a heavily depreciated material and technical base, uneven water availability, weak cooperation among agricultural producers, and insufficient labor productivity. Despite government support measures and institutional reforms aimed at improving the sector's competitiveness, the effectiveness of agriculture in meeting domestic food demand remains limited. These structural features are reflected both in the industry's growth dynamics and in its contribution to the country's gross domestic product.

To determine agriculture's current position in the macroeconomic context and to identify its role in ensuring food security, we analyze the dynamics of gross agricultural output and its ratio to Kazakhstan's total GDP over 2010–2024. The results are presented in Figure 1.

The data in Figure 1 indicate that the growth rates of gross domestic product (GDP) and agriculture in the Republic of Kazakhstan over 2010–2024 show a positive trajectory, reflecting features of the national economy's structural transformation. Over fifteen years, GDP increased by more than sixfold—from 21.8

trillion tenge in 2010 to 134.3 trillion tenge in 2024—while gross agricultural output rose from 984 billion tenge to 5.27 trillion tenge, equivalent to a 5.4-fold increase.

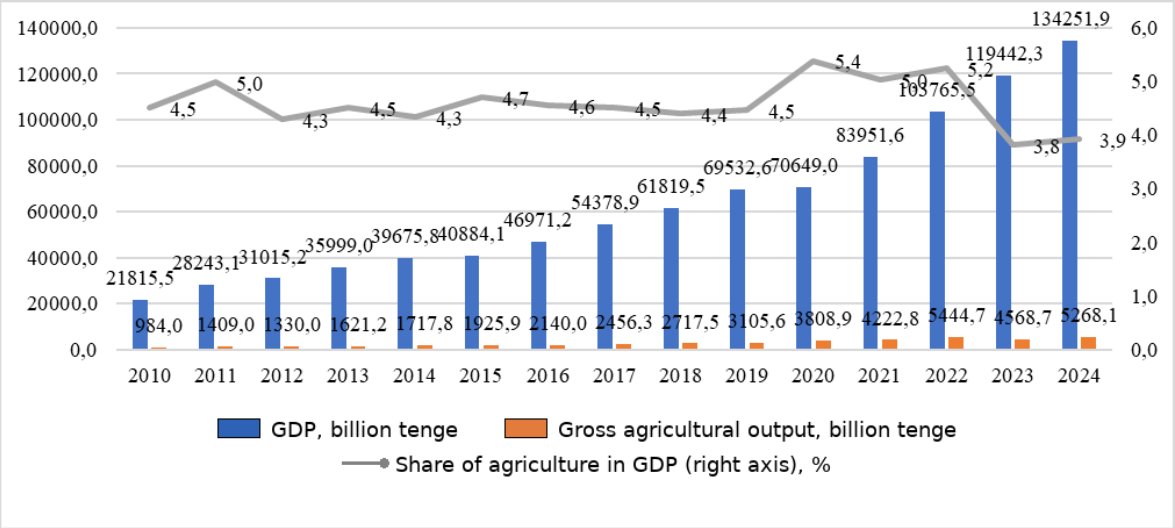

Figure 1 – Growth rates of GDP and agriculture*
*Note – compiled by the authors based on data from [8].

Despite this positive nominal trend, the share of agriculture in GDP fluctuated over the period. From 2010 to 2015 it stood within 4.3–5.0%, then stabilized in the 4.4–4.7% range through 2019. The peak value was recorded in 2020 at 5.4%, explained by the sector's outpacing growth against the backdrop of an economy-wide slowdown during the pandemic. In 2021–2022 the share remained at 5.0–5.2%, but in 2023 it fell sharply to 3.8%, partly offset in 2024 (3.9%). This points to an imbalance in sectoral development and the agricultural sector's dependence on short-term external factors.

Analysis of these trends suggests that, despite active government support, agriculture remains a vulnerable domain with limited structural returns. Fluctuations in agriculture's share of GDP amid steady nominal output growth point to issues with productivity, resource-use efficiency, and technological upgrading. Lagging behind overall economic growth constrains the sector's potential to ensure food security, particularly amid demographic expansion and climate risks.

Given the agricultural sector's role in supplying the domestic market with food, its stability and sustainable development are key conditions for building food security. To gain a deeper understanding of internal constraints and the sector's potential, we turn to labor-productivity analysis in agriculture, presented in Figure 2.

From the data in Figure 2 it is evident that labor-productivity indicators in Kazakhstan's economy as a whole—and in the agricultural sector in particular—show steady growth over 2010–2024, while a substantial gap persists between agriculture and the rest of the economy. In 2010, labor productivity in the economy amounted to 2,437.3 thousand tenge per employed person, whereas in agriculture it was only 428.8 thousand tenge, i.e., more than 5.7 times lower. Despite the positive

trend in absolute terms, this gap remains in 2024—12,631.1 thousand tenge for the economy overall versus 4,996.8 thousand tenge in agriculture, or nearly 2.5 times lower.

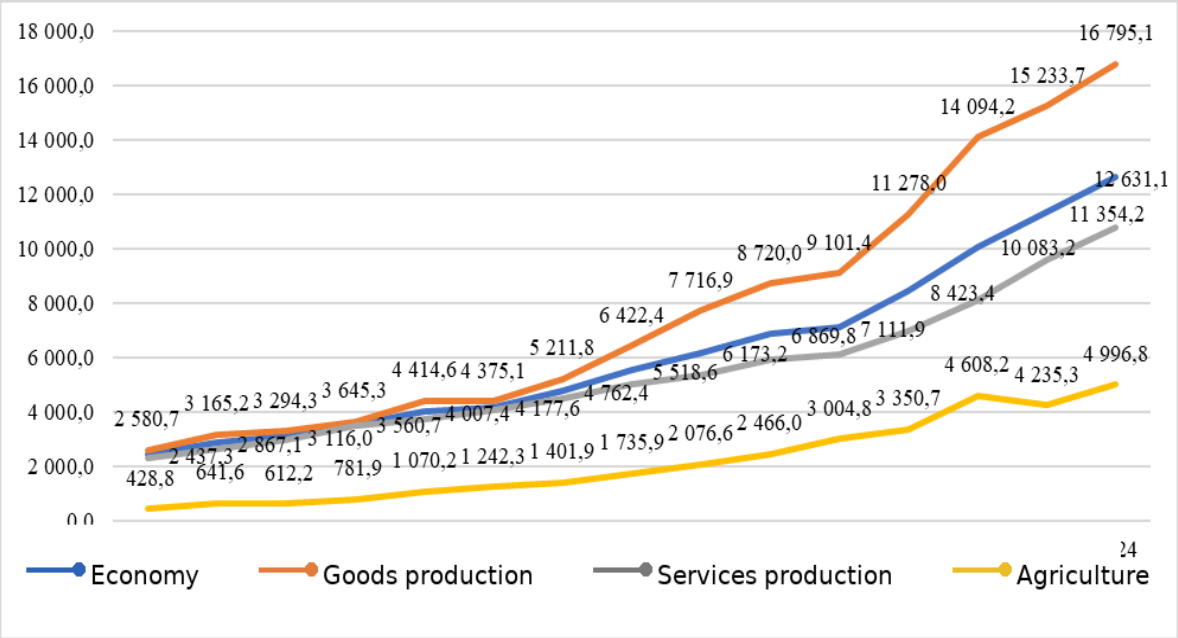

Figure 2 – Labor productivity in the economy and agriculture, thousand tenge*
*Note – compiled by the authors based on data from [8].

Within the economic structure, the fastest productivity growth is observed in the goods-producing sector. By 2024 this indicator reached 16,795.1 thousand tenge, while in services it stood at 10,762.1 thousand tenge. In agriculture—despite an 11.7-fold increase versus 2010—the level of labor productivity remains below all other sectors, indicating technological and organizational lag in the agricultural sector.

The evidence confirms a persistent problem of low labor efficiency in agriculture, driven by several factors: a high share of manual labor, worn-out machinery, insufficient mechanization and digitalization, weak workforce training, and limited access to modern agrotechnologies. The sector's sustained underperformance on this metric constrains its contribution to overall economic growth and hampers the formation of sustainable food security.

Raising labor productivity in agriculture is a key priority for sectoral transformation. With systemic government support focused on technical re-equipment, human-capital development, and institutional reforms, a shift from an extensive to an intensive production model is possible—one that delivers higher value added and sustainable growth. Narrowing the productivity gap between agriculture and other sectors should be a priority within Kazakhstan's food-security strategy and sustainable agricultural-development agenda.

Results. The analysis of the agricultural sector's dynamics in the Republic of Kazakhstan over 2010–2024 reveals the key patterns of its development and assesses its impact on food-security formation. It is found that, despite positive growth in

gross agricultural output, the industry remains vulnerable across several structural indicators, including an unstable GDP share, low labor productivity, and limited technological modernization. Of particular concern is the persistent productivity gap between agriculture and other sectors, which hinders the full realization of agriculture's potential as a driver of sustainable economic growth and food independence.

Conclusions. The results demonstrate scholarly novelty in the comprehensive assessment of linkages between macroeconomic indicators, labor productivity, and food-security levels. The established relationship between structural instability in agricultural production and risks in the food-supply system underscores the need to recalibrate policy instruments and emphasize institutional reforms aimed at technological upgrading, improving the efficiency of market participants, and developing human capital in rural areas.

The practical value of the findings lies in their applicability to the development of regional strategies for sustainable agricultural development, the adjustment of subsidy policy, and investment planning within the national food-security agenda. Promising avenues for further research include: quantitative assessment of the impact of natural-resource degradation on agricultural production capacity; scenario modeling of growth under rising labor productivity; and analysis of regional differences in agricultural-production efficiency.

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ҚАЗАҚСТАНДАҒЫ АГРООНЕРКӘСІПТІК СЕКТОРДЫ ТРАНСФОРМАЦИЯЛАУ ЖӘНЕ ОНЫҢ АЗЫҚ-ТҮЛІК ҚАУІПСІЗДІГІНЕ ӘСЕРІ

Аңдатпа. *Мақалада аграрлық сектордың серпіні мен Қазақстан Республикасының азық-түлік қауіпсіздігін қамтамасыз ету арасындағы өзара байланыс қарастырылған. Жалпы ішкі өнімнің және ауыл шаруашылығының жалпы өнімінің өсу қарқынын, сондай-ақ жалпы экономикамен және басқа секторлармен салыстырғанда аграрлық саладағы еңбек өнімділігін қоса алғанда, 2010-2024 жылдардағы макроэкономикалық және салалық көрсеткіштерге талдау жасалды. Аграрлық өндіріс көлемінің ұлғаюында оның ЖІӨ құрылымындағы үлесінің бір мезгілде төмендеуінде оң үрдістер анықталды, бұл сектордың құрылымдық осалдығын көрсетеді. Ауыл шаруашылығындағы еңбек өнімділігінің деңгейі оның өсуіне қарамастан экономиканың басқа секторларымен салыстырғанда айтарлықтай төмен болып қалатыны анықталды, бұл технологиялық және ұйымдастырушылық артта қалушылықты көрсетеді. Аграрлық сектордың негізгі көрсеткіштер бойынша артта қалуы оның ішкі азық-түлік сұранысын қамтамасыз етуге және тұрақты азық-түлік қауіпсіздігіне қол жеткізуге қосқан үлесін шектейтіні көрсетілген. Аграрлық инфрақұрылымды жаңғырту, ресурстарды пайдалану тиімділігін арттыру және адами капиталды дамыту қажеттілігі негізделген. Салыстырмалы және динамикалық талдау әдістері, сондай-ақ құрылымдық салыстыру элементтері қолданылады. Мемлекеттік аграрлық саясатты жетілдіру және Қазақстандағы аграрлық өндірістің тиімділігі мен тұрақтылығын арттыру саласындағы одан әрі зерттеу бағыттары бойынша ұсынымдар тұжырымдалған. Алынған нәтижелердің маңыздылығы олардың сыртқы және ішкі сын-қатерлер жағдайында аграрлық секторды қолдаудың стратегиялық шараларын әзірлеу үшін практикалық қолданылуымен анықталады.*

Түйінді сөздер: *аграрлық сектор, ауыл шаруашылығы, еңбек өнімділігі, азық-түлік қауіпсіздігі, экономикалық даму, тұрақты даму, аграрлық саясат, құрылымдық шектеулер.*

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ТРАНСФОРМАЦИЯ АГРАРНОГО СЕКТОРА И ЕЕ ВЛИЯНИЕ НА ПРОДОВОЛЬСТВЕННУЮ БЕЗОПАСНОСТЬ КАЗАХСТАНА

Аннотация. *В статье рассмотрена взаимосвязь между динамикой аграрного сектора и обеспечением продовольственной безопасности Республики Казахстан. Проанализированы макроэкономические и отраслевые показатели за 2010–2024 гг., включая темпы роста валового внутреннего продукта и валового выпуска сельского хозяйства, а также производительность труда в аграрной отрасли по сравнению с экономикой в целом и другими секторами. Выявлены положительные тенденции в увеличении объемов аграрного производства при одновременном снижении его доли в структуре ВВП, что указывает на структурную уязвимость сектора. Определено, что уровень производительности труда в сельском хозяйстве остается значительно ниже по сравнению с другими секторами экономики, несмотря на его рост, что свидетельствует о технологическом и организационном отставании.*

Показано, что отставание аграрного сектора по ключевым показателям ограничивает его вклад в обеспечение внутреннего продовольственного спроса и достижение устойчивой продовольственной безопасности. Обоснована необходимость модернизации аграрной инфраструктуры, повышения эффективности использования ресурсов и развития человеческого капитала. Использованы методы сравнительного и динамического анализа, а также элементы структурного сопоставления. Сформулированы рекомендации по совершенствованию государственной аграрной политики и направления дальнейших исследований в области повышения эффективности и устойчивости аграрного производства в Казахстане. Значимость полученных результатов определяется их практической применимостью для выработки стратегических мер поддержки аграрного сектора в условиях внешних и внутренних вызовов.

Ключевые слова: *аграрный сектор, сельское хозяйство, производительность труда, продовольственная безопасность, экономическое развитие, устойчивое развитие, аграрная политика, структурные ограничения.*