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Cooperation of household plots as a factor in increasing the efficiency of agricultural production in Kazakhstan

Galiya U. Akimbekova[1], Altynbek B. Moldashev[1], Saule T. Zhumasheva[1]*, Gulzada A. Dzhambaeva[1], Askar K. Sharipov[2], Rimma Tazhibayeva[3]

[1] Kazakh Research Institute of Economics of Agro-Industrial Complex and Rural Development, Almaty, Kazakhstan
[2] Academy of Public Administration under the President of the Republic of Kazakhstan, Zhetysu Region, Taldykorgan, Kazakhstan
[3] LLP "Bal Halal", Almaty, Kazakhstan

***.Corresponding author's** E-mail: torehanoba@mail.ru

Perspective

ABSTRACT

This article analyzes the organizational and economic development of agricultural cooperation among small farms within Kazakhstan's agro-industrial complex. Utilizing data from the Bureau of National Statistics of the Republic of Kazakhstan and state agricultural programs, the study employs systemic, comparative, and economic-statistical methods to assess cooperative development, crop and livestock production structures, and farm participation levels. Results demonstrate a positive trend in the cooperative sector, increased agricultural production, and expanded marketing channels. The article substantiates organizational and economic mechanisms and cooperation models to enhance agricultural processing, resource efficiency, and agri-food value chains.

Keywords: Household plots, Agricultural cooperation, Agro-industrial complex, Agricultural product processing, Food security, Rural development.

1. INTRODUCTION

Small-scale farming, particularly family farms and household plots, is increasingly important in modern agriculture. These farms, comprising over 90% of the world's 570 million farms, significantly contribute to global food production, food security, and rural sustainability (Lowder et al. 2016). Family farms produce over 80% of the world's food, underpinning national food systems and rural employment (FAO 2019). Despite their vital role, small agricultural producers face challenges such as limited access to finance, markets, and technology, alongside high transaction costs. Agricultural cooperation offers a solution by enabling resource pooling and enhanced market competitiveness (Bizikovaa *et al.* 2014). Studies demonstrate that cooperative membership improves farmer income and access to credit, technology, and marketing channels (Jiang *et al.* 2024; He & Chen 2024).

Agricultural cooperatives effectively integrate small producers into agri-food value chains by enabling shared infrastructure for storage, processing, and transportation, thereby reducing costs (Ortmann & King 2007; Nowfal et al. 2025). Cooperation also fosters innovation adoption, boosts productivity, and enhances rural sustainability (Bijman & Iliopoulos 2014; Candemir *et al.* 2021).

In Central Asian transition economies like Kazakhstan, small-scale farms are crucial to agricultural production, with household plots providing employment, shaping local markets, and supporting food security. However, their

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potential remains underutilized due to limited market integration, investment access, infrastructure, and institutional support (Kaliyeva *et al.* 2020; Yesbolova *et al.* 2025).

In recent years, Kazakhstan's agricultural policy has placed special emphasis on the development of agricultural cooperation aimed at consolidating small producers, improving the efficiency of their production potential, and establishing sustainable chains for the production, processing, and marketing of agricultural products. The development of cooperation among household plots is therefore considered one of the key instruments for increasing the efficiency of the agro-industrial complex, raising rural incomes, and ensuring the sustainable development of rural areas.

Thus, the relevance of this study is determined by the need for a scientific justification of mechanisms for the effective utilization of the production potential of household plots and the development of organizational and economic measures to promote their cooperation within the agro-industrial complex of Kazakhstan.

The aim of this study is to assess the production potential of household plots and to develop organizational and economic mechanisms for strengthening their cooperation in the system of production, storage, processing, and marketing of agricultural products.

The scientific novelty of the research lies in a comprehensive assessment of the production potential of household plots in Kazakhstan and in the development of a systemic approach to enhancing their cooperation within agri-food value chains. Unlike previous studies, this work combines an analysis of the recent statistical dynamics of agricultural cooperative development with the formulation of organizational and economic mechanisms for integrating household plots into the processes of production, storage, processing, and marketing of agricultural products. A structured system of cooperative mechanisms and models for household plot cooperation is proposed, aimed at improving resource efficiency, reducing transaction costs, and increasing the value added of agricultural products.

The obtained results contribute to clarifying the role of cooperative structures in the formation of sustainable agri-food value chains and the development of rural areas in the context of the transformation of the agricultural economy.

2. MATERIALS AND METHODS

This stdy uses quantitative and qualitative economic analyses to evaluate the production potential of household plots in Kazakhstan and identify factors influencing their cooperation within the agro-industrial complex. The research employs systemic, structural, and comparative analyses to examine household plots as part of the agri-food system and determine their role in agricultural production and food supply chains. Economic-statistical analysis, including descriptive statistics, time-series analysis, and structural analysis, assesses the dynamics of agricultural cooperative development and the production performance of the agricultural sector. Institutional analysis identifies organizational, economic, and infrastructural barriers limiting cooperation among household plots. Economic modeling and logical-structural analysis support prospective cooperation models, developing organizational and economic mechanisms to enhance household plot efficiency and integrate them into agri-food value chains. The study uses official statistical data from 2021-2024 from the Bureau of National Statistics of the Republic of Kazakhstan, materials from the Ministry of Agriculture, state rural development programs, and relevant scientific publications.

3. RESULTS

3.1. Key problems and constraints in the development of household plots

Cooperation among household plots holds significant potential for enhancing agricultural efficiency in Kazakhstan, given their crucial role in rural food security, livestock and crop production, and integration into organized marketing channels. However, this potential is underutilized due to limited access to finance, inadequate infrastructure, high transportation costs, and insufficient support.

In developed countries, cooperation ensures agricultural sustainability by enabling small producers to pool resources, reduce costs, and improve market access. This is particularly relevant for Kazakhstan, with its prevalence of small-scale farms. Yet, the development of such cooperation is hindered by the unclear legal status of household plots, limited government support, lack of initial capital, and weak interaction among producers.

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In 2024, Kazakhstan registered 4,465 agricultural cooperatives, a 1.7-fold increase compared to previous years. The highest concentration is in the southern regions, particularly Turkestan, Zhambyl, West Kazakhstan, and Almaty. As of January 1, 2025, these cooperatives comprised 18,624 household members, 16,189 individual entrepreneurs and peasant farms, and various legal entities, indicating a trend of small producers joining cooperative structures and household plots evolving into organized agricultural enterprises. Membership structure by farm category is detailed in Fig. 1.

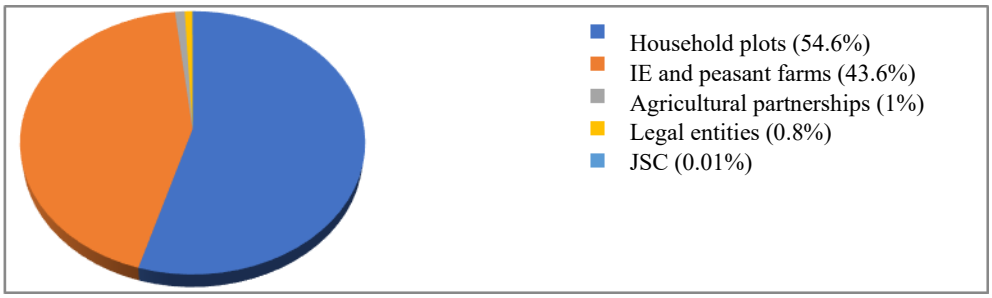

Fig. 1. Share of members of agricultural cooperatives in the Republic of Kazakhstan (%). Source: compiled by the authors based on data from the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, 2024.

An analysis of cooperative membership reveals that as peasant farms and individual entrepreneurs increase, household plots are decreasing in some regions. This is due to both a decline in the number of household plots and their transition to more formalized agricultural production. Surveys suggest rural residents view household plots as labor-intensive and insufficiently profitable, citing limited financial resources, difficulty acquiring inputs and machinery, water shortages, marketing challenges, and high transportation costs as key constraints.

3.2. The role and production potential of household plots in the agro-industrial complex

Agricultural cooperatives show positive development in livestock production. As of January 1, 2025, they held 131.9 thousand head of cattle (including 80.8 thousand cows), 168.6 thousand sheep, 29.1 thousand horses, and 129.5 thousand poultry. Compared to 2021, cattle, sheep, horses, and especially poultry (which increased elevenfold) have grown in number. The West Kazakhstan and Turkestan regions have the highest livestock concentration. Livestock number dynamics in agricultural cooperatives of the Republic of Kazakhstan for 2021-2024 are presented in Fig. 2.

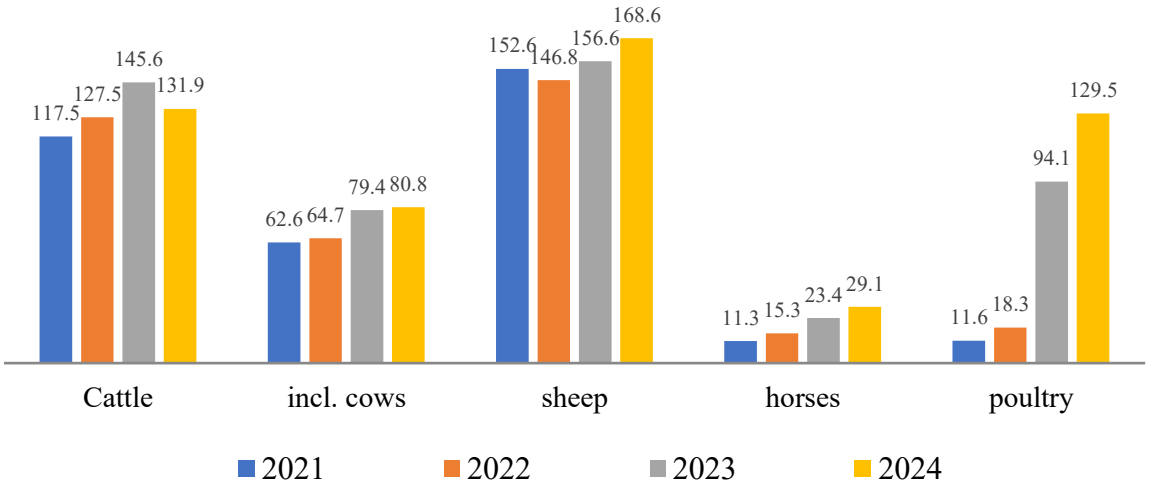

Fig. 2. Dynamics of livestock numbers in agricultural cooperatives of the Republic of Kazakhstan, 2021-2024 (thousand head).

In 2024, agricultural cooperatives cultivated 102,372 hectares, with 68,835 hectares dedicated to cereals and legumes. Wheat dominated at 41,440 hectares, highlighting the sector's grain specialization. Significant areas

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were also sown with oilseed crops, open-field vegetables, melons and gourds, potatoes, and feed maize. The Zhambyl, Turkestan, and Pavlodar regions had the largest sown areas. Crop area structures in Kazakhstan's agricultural cooperatives from 2021-2024 are detailed in Table 1.

Table 1. Sown area of major agricultural crops in agricultural cooperatives of the Republic of Kazakhstan, 2021-2024 (ha).

Indicator	**2021**	**2022**	**2023**	**2024**
Total sown area (ha)	838	1 294	118 042	102 372
including cereals and legumes	838	1 294	76 772	68 835
of which wheat	348	400	23 088	41 440
Oilseed crops	n/a	n/a	9 698	8 754
of which sunflower seeds	n/a	n/a	4 019	3 803
Open-field vegetables	n/a	n/a	779	685
Melons and gourds	n/a	n/a	835	670
Potatoes	n/a	n/a	367	646
Maize for feed	n/a	n/a	948	621

Source: compiled by the authors based on data from the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan (Activity of agricultural cooperatives in the Republic of Kazakhstan 2025).

Table 2 presents the detailed production and sales dynamics of major agricultural products by cooperatives.

Table 2. Production and sales of agricultural products in agricultural cooperatives of the Republic of Kazakhstan, 2021-2024

Product	**2021**		**2022**		**2023**		**2024**	
	Production	**Sales**	**Production**	**Sales**	**Production**	**Sales**	**Production**	**Sales**
Wheat (thousand tons)	10.8	5.8	32.7	27.7	24.2	20.9	58.2	26.0
Maize (thousand tons)	5.0	6.2	10.0	8.8	8.8	7.6	12.9	6.2
Barley (thousand tons)	3.2	3.1	17.8	14.7	9.3	6.3	28.0	2.8
Sunflower seeds (thousand tons)	0.6	1.2	3.9	3.0	2.9	2.8	6.0	5.5
Fodder crops (thousand tons)	128.8	24.7	89.2	26.4	64.1	29.4	92.4	44.7
Potatoes (thousand tons)	6.5	5.6	11.1	7.3	7.0	1.4	12.1	1.9
Melons and gourds (thousand tons)	12.2	-	12.3	10.5	16.4	14.7	14.6	13.2
Cotton (thousand tons)	1.7	1.7	2.2	2.2	2.3	2.3	5.9	5.9
Meat (tons)	19485.6	23620.1	11417.6	11692.5	13094.8	12405.3	19743.3	23154.7
Milk (tons)	102476.3	180743.1	111430	159543.1	121869.8	200214	175292.8	245300.6
Wool (tons)	-	-	113.8	70.2	138.3	52.3	166.9	78.9

Source: compiled by the authors based on data from the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan (Activity of agricultural cooperatives in the Republic of Kazakhstan 2025).

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Crop production and sales showed a strong positive trend from 2021 to 2024. Wheat production rose from 10.8 to 58.2 thousand tons, barley from 3.2 to 28.0 thousand tons, maize from 5.0 to 12.9 thousand tons, sunflower seeds from 0.6 to 6.0 thousand tons, and cotton from 1.7 to 5.9 thousand tons. Potato production nearly doubled. Increased sales volumes, particularly for sunflower, melons and gourds, and cotton, accompanied the production growth, reflecting higher market activity and expanded marketing channels.

From 2021-2024, agricultural cooperatives in Kazakhstan saw positive trends in livestock production. In 2024, milk production reached 175,292.8 tons with sales of 245,300.6 tons, while meat production totaled 19,743.3 tons with sales of 23,154.7 tons. Wool production also increased. These results demonstrate the cooperative farming model's contribution to strengthening the agricultural sector's raw material base, expanding agricultural producers' activities, and improving livestock product marketing efficiency. Government support, including investment subsidies, preferential lending, agricultural machinery leasing, tax incentives, and educational programs, significantly aids the development of household plot cooperation. The "Auyl amanaty" state program, allocating 100 billion tenge in 2024 for rural development and cooperative support, is particularly important, contributing to job creation and increased access to microcredit for rural residents.

3.3. Organizational and economic mechanisms and models of cooperation among household plots

Analysis of factors limiting household plot production identified organizational and economic mechanisms to enhance cooperation (Table 3), leading to the proposal of prospective cooperation models (Table 4).

Table 3. Organizational and economic mechanisms for improving the efficiency of household plots through the development of cooperation.

Identified problem of household plots	Cooperative mechanism for addressing the problem	Expected economic effect
Limited access to stable markets and dependence on intermediaries	Establishment of marketing cooperatives (collection, sorting, packaging, and collective marketing of products)	Reduction of transaction costs, expansion of marketing channels, and increased farm income
Insufficient storage and primary processing infrastructure	Establishment of processing cooperatives and cooperative infrastructure (milk collection points, vegetable storage facilities, mini-processing units)	Increased value added of products and reduced post-harvest losses
Low efficiency of livestock production and high production costs	Organization of livestock fattening cooperatives with shared feed resources and collective product marketing	Lower production costs and higher profitability
Limited access to machinery, resources, and agricultural technologies	Establishment of service cooperatives (provision of machinery, veterinary services, seeds, fertilizers, and feed)	Increased productivity and reduced production costs
Limited access to financial resources	Use of government support mechanisms (preferential lending, investment subsidies, agricultural machinery leasing)	Increased investment activity and modernization of agricultural production
Weak integration of household plots into agri-food value chains	Formation of vertically integrated cooperative structures (production – storage – processing – marketing)	Strengthening of agri-food value chains and improved stability of rural incomes

Source: compiled by the authors based on the results of the study.

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Table 4. Models of cooperation among household plots.

Cooperation model	Main functions	Expected outcomes
Marketing cooperative	Collection of products, sorting, packaging, transportation, and organization of collective sales	Improved market access and increased sales volumes
Processing cooperative	Primary processing of agricultural raw materials (cooling, cleaning, storage, preparation for sale)	Increased value added and reduced product losses
Livestock fattening cooperative	Joint fattening facilities, shared feed resources, and collective marketing of livestock products	Increased productivity and profitability of livestock production
Service cooperative	Provision of machinery, veterinary services, and supply of seeds, fertilizers, and feed	Reduced costs and improved technological level of production
Integrated cooperative structure	Integration of production, storage, processing, and marketing of products	Greater sustainability of agri-food value chains

Source: compiled by the authors based on the results of the study.

DISCUSSION

Cooperation among household plots can improve agricultural production efficiency and promote sustainable rural development. While household plots in Kazakhstan have significant production potential, institutional and infrastructural barriers limit their integration into agri-food value chains. This aligns with international studies showing that small agricultural producers globally face challenges like limited access to markets, finance, and technology. Research indicates that collective agricultural organizations integrate small farmers into value chains and reduce transaction costs (Markelova *et al.* 2009; Fischer & Qaim, 2012). Similarly, agricultural cooperatives improve smallholder farm productivity and profitability through economies of scale and collective resource use (Abate *et al.* 2014). Cooperation also enhances the sustainability of agricultural systems by enabling efficient use of infrastructure, reducing post-harvest losses, and increasing value added (Bernard *et al.* 2010).

International experience suggests that cooperatives universally enhance the competitiveness of small producers. Trebbin (2014) highlights their crucial role in transition economies, fostering market infrastructure and stable agricultural marketing channels. Similarly, Grashuis & Su (2019) link cooperative participation to increased farmer incomes, innovation access, and financial resources. Developing cooperative models for agricultural processing and value-added chains is especially vital. Ma & Abdulai (2017) argue that integrating small producers into agri-food value chains boosts production efficiency and promotes sustainable rural development. Ito et al. (2012) further emphasize cooperatives as effective mechanisms for diffusing new technologies and improving agricultural productivity.

This study reinforces the critical role of government support in agricultural cooperative development. Empirical evidence indicates that effective cooperatives require a conducive institutional environment, access to finance, and robust external support. For example, Dhakal & Mueser (2023) found that Nepalese cooperatives need coordinated government support to achieve agricultural commercialization, with both cooperatives and rural households viewing public support as essential for market orientation and income growth. Similarly, Nyawo *et al.* (2023) showed that weak financial links, insufficient sectoral agency support, and limited advisory service interaction undermine cooperative effectiveness in assisting small farmers. These findings align with this study's identification of institutional and financial constraints as major impediments to household plot cooperation.

Serviceand processing cooperatives are an important avenue for fostering collaboration. Research indicates that farmer participation in cooperatives improves access to production services and reduces barriers to collective action (Zhang *et al.* 2024). Cooperative development increases farmers' agricultural revenue by strengthening bargaining power, improving market access, lowering transaction costs, and promoting investment in technology and infrastructure (He & Chen 2024). Furthermore, participation in rural cooperatives reduces the vulnerability of smallholder households to poverty, especially when cooperatives ensure stable access to resources, services,

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and markets (Liu *et al.* 2023). These findings suggest that service, marketing, and processing cooperatives effectively integrate household plots into agri-food value chains and enhance rural income stability.

5. **Policy implications**

This stdy's findings suggest key policy changes for Kazakhstan's agricultural sector. Institutional support for agricultural cooperatives should be strengthened to integrate household plots into organized production and marketing channels. Prioritizing cooperative infrastructure development for storage, processing, and logistics, alongside expanded access to credit, subsidies, and training for small producers, will improve rural household resilience, strengthen agri-food value chains, and optimize resource utilization.

6. CONCLUSION

Household plots are important to agricultural production in Kazakhstan, but their potential is limited by institutional, financial, and infrastructural constraints. Developing agricultural cooperation can improve the efficiency of these plots and integrate them into agri-food value chains. Organizational and economic mechanisms and cooperation models can improve market access for small producers, reduce costs, and increase the value added of agricultural products, contributing to higher rural incomes and the sustainable development of Kazakhstan's agricultural sector.

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Full data of the authors:

Galiya Uysimbekovna Akimbekova [1]

Doctor of Sciences, Professor

Deputy Chairman of the Board for Science and Implementation

Kazakh Research Institute of Economics of Agro-Industrial Complex and Rural Development

30B Satpayev Str, Almaty, Kazakhstan, 050057

ORCID: 0009-0008-1956-3774

Scopus ID: 56195220400

e-mail: akimbekova_g@mailru

Tel: +7 701 786 9194

Altynbek Bakirovich Moldashev [2]

Doctor of Economics, Professor

Chief Researcher of the Agricultural Market Department

Kazakh Research Institute of Economics of Agro-Industrial Complex and Rural Development

30B Satpayev Str, Almaty, Kazakhstan, 050057

ORCID 0000-0003-3987-4648

Scopus ID: 56983018900

e-mail: moldashev48@mailru

Tel: +7 777 236 3531

Saule Tokanovna Zhumasheva *[3] (corresponding author)

Candidate of Economics, Associated Professor

Scientific Secretary

Kazakh Research Institute of Economics of Agro-Industrial Complex and Rural Development

30B Satpayev Str, Almaty, Kazakhstan, 050057

Caspian J. Environ. Sci. Received:
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ORCID: 0000-0003-0559-5608

Scopus ID: 57365492900

e-mail: torehanoba@mailru

Tel: +7 705 905 5328

Gulzada Aldabergenovna Dzhambaeva [4]

Head of the Department of Economic Regulation of the Agro-industrial complex

Kazakh Research Institute of Economics of Agro-Industrial Complex and Rural Development

30B Satpayev Str, Almaty, Kazakhstan, 050057

ORCID: 0000-0003-1031-5199

e-mail: gulzada49@mailru

Tel: +7 777 657 5589

Askar Kalievich Sharipov [5]

Doctor of Economics, Associate Professor

Academy of Public Administration under the President of the Republic of Kazakhstan for the Zhetysu region

2 Аксуская Str, Taldykorgan, 040000

ORCID https://orcidorg/0000-0003-0510-4629

Scopus ID: 57203155678

e-mail: sharipov_askar@bkru

Tel: +7 7019308490

Rimma Tazhibayeva [6]

Director

"Bal halal" Limited Liability Partnership

8A Gardening Association «Kazakhfilm», Almaty, Kazakhstan, 050000
ORCID: https://orcidorg/0009-0007-5287-5035

e-mail: bal_barmak@mailru

Tel: 87770859843

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