International Journal of Innovative Research and Scientific Studies, 8(6) 2025, pages: 113-127

IJIRSS
International Journal of Innovative Research & Scientific Studies

ISSN: 2617-6548

URL: www.ijirss.com

The present state of development of agricultural cooperatives in Kazakhstan: Problems and Prospects

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Abstract

Agricultural cooperatives of various types are currently operating successfully around the world and represent one of the key organizational and legal forms of economic relations in rural production. Nevertheless, despite the creation and consolidation of the legal framework for cooperation at the state level, as well as support of the agricultural cooperative movement within targeted programs, there is insufficient development in this sphere, thereby emphasizing the relevance of this study's topic. The establishment of cooperatives in agriculture is an effective form of cooperation among agricultural producers and is considered a priority for ensuring the sustainable growth of the agro-industrial complex in the Republic of Kazakhstan. The objective of this study is to analyze the current state of agricultural cooperatives and determine their development prospects. Data from the official website of the Committee on Statistics of the Republic of Kazakhstan were used as the information base. The study employs a multifaceted approach, encompassing monographic and logical analysis, complemented by economic and statistical methods, to comprehensively assess the state of agricultural cooperatives in the Republic of Kazakhstan. The article provides a comprehensive analysis of the evolution of agricultural cooperatives within the nation, exploring regional dimensions and the underlying principles that define their nature. It further examines international best practices and addresses the challenges associated with establishing and operating the cooperative sector within the region's agro-industrial framework. The article elucidates contemporary strategies and distinctive characteristics that characterize the advancement of consumer cooperatives in the agricultural sector. Additionally, it offers recommendations for enhancing the efficacy of governmental oversight in the development of agricultural cooperation. The study's findings suggest that collective management structures, such as cooperatives, can serve as significant catalysts for the advancement of the agrarian sector economy.

Keywords: Agrarian sector, Agricultural cooperatives, Competitiveness, Financial sustainability, Food security, Forecasting, Simulation model.

DOI: 10.53894/ijirss.v8i6.9512
Funding: This work is supported by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan (Grant number: IRN: AP23486198).
History: Received: 1 July 2025 / **Revised:** 4 August 2025 / **Accepted:** 6 August 2025 / **Published:** 27 August 2025

Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.
Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
Publisher: Innovative Research Publishing

1. Introduction

The efficient use of land, water, and other natural resources is a key task in the development of Kazakhstan's agro-industrial complex. This issue is especially salient in the context of the predominance of small farms, which collectively contribute a substantial share to the overall volume of agricultural production.

However, the financial constraints experienced by small-scale farmers, the absence of contemporary technology and equipment, the dilapidated state of irrigation and drainage systems, the constraints in storage, processing, and marketing opportunities, and the challenges in securing state support due to the absence of collateral, collectively impede the effective utilization of agricultural potential and the advancement of rural regions.

The necessity to address these issues is emphasized in the State Program for the Development of the Agro-Industrial Complex for 2017-2021 [1] the National Project for the Development of the Agro-Industrial Complex for 2021-2025 [2] and the Address of the Head of State to the People of Kazakhstan.

In order to surmount the present circumstances engendered by the diminutive scale of farms and financial constraints, there is a necessity to formulate comprehensive organizational and economic measures [3]

One potential solution to this issue is the establishment of agricultural cooperatives [4] . The concept of cooperation, as distinguished from mere collaboration, entails the amalgamation of efforts and resources with the objective of attaining a shared economic goal. Cooperation can be categorized as either simple, characterized by homogeneous activity, or complex, marked by division of labor and the execution of various processes [5].

The classification of agricultural cooperatives by functional, sectoral, and regional characteristics, proposed by G.U. Akimbekova, allows for the level of their specialization to be taken into account [6]. The classification of agricultural cooperatives can be categorized into three distinct types: production, consumer, and mixed.

The primary rationale for entrepreneurs to establish cooperatives, as posited by the expert, is the capacity to consolidate all facets of agricultural operations within a distinct group of legal entities. Agricultural cooperatives (ACs) play a pivotal role in supporting farmers at present, providing them with a comprehensive range of services. These include the supply of resources necessary for production, in addition to storage, processing, and marketing of their products.

The second reason: AC facilitates large-scale commodity production. The joint undertaking of large-scale production is expected to augment income from production and marketing activities. Furthermore, it has been demonstrated that AC can facilitate the effective utilization of working capital and the acquisition of diesel fuel, fertilizers, seeds, and chemicals at reduced costs. Thirdly, the favourable tax regime is a significant factor. Agricultural cooperatives (ACs) have an opportunity to work under a special tax regime. Consequently, AC is subject to a 70% tax exemption. The cooperative's tax liability is 10%, which is eligible for this benefit. The net income of the cooperative is distributed among its members according to their labour participation. To resolve these issues, it is essential to undertake an initial analysis of the present state of agricultural cooperatives.

As of 2024, there are more than 3,000 agricultural cooperatives registered in Kazakhstan, uniting farmers and small producers. The main areas of their activities are included in the following Figure 1.

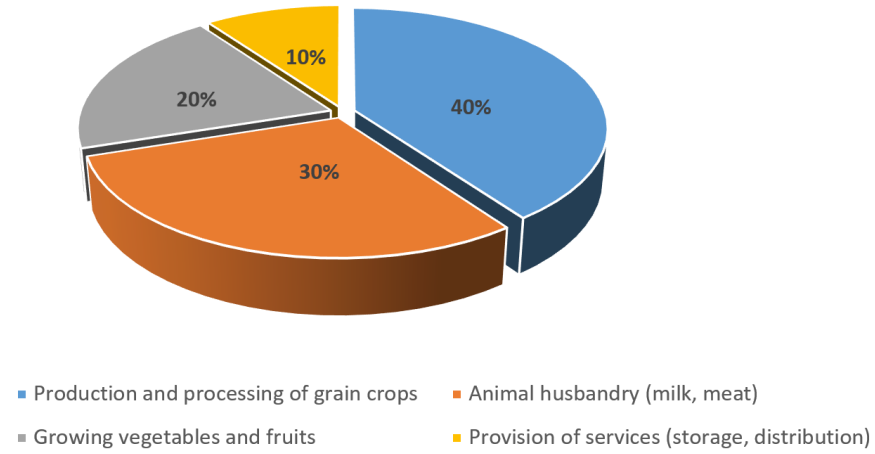

Figure 1.
Approximate share of cooperatives (%).

Studies definitively show that the share of cooperatives accounts for almost 15% of total agricultural production. At the same time, the differentiation by regions is clearly noticeable. In North Kazakhstan and Akmola regions, cooperatives for grain are formed, and in the southern part of the Republic of Kazakhstan, fruit and vegetable cooperatives prevail. The dynamics of the number of agricultural cooperatives in the country are presented in Table 1.

Table 1.
Basic indicators of the dynamics of the number of cooperatives.

Period	Number of cooperatives, units	Absolute increase	Growth rate, %	Growth rate, %
2019	2840	-	-	100
2020	2919	79	2.78	102.78
2021	3147	307	10.81	110.81
2022	3284	444	15.63	115.63
2023	3911	1071	37.71	137.71

Source: The calculations were performed by the authors on the basis of official statistical data of the Republic of Kazakhstan Official site of the Ministry of National Economy of the Republic of Kazakhstan [7].

In 2023, the number of cooperatives increased by 37.7% compared to 2019, representing an increase of 1,071 units. The average absolute growth, which reflects the overall trend in the number of cooperatives over time, was 267.75 units per year. This indicates that, on average, the number of cooperatives increased by approximately 267.75 units each year between 2019 and 2023. The mean annual growth rate was calculated using the following formula:

$$\overline{dy} = \frac{y_n - y_1}{n-1} = \overline{dy} = \frac{3911-2840}{4} = 267.75$$

Every year, the number of cooperatives increases by an average of 267.75 units. A critical element in the effective operation of socially oriented cooperatives is the members' extensive knowledge and capacity for adaptation to the digital transformation of all facets of life (Table 2).

Table 2.
Basic indicators of a series of dynamics of the number of employees in cooperatives.

Period	Number of employees in cooperatives, people	Absolute increase	Growth rate, %	Growth rate, %
2019	7591	-	-	100
2020	7692	101	1.33	101.33
2021	7529	-62	-0.82	99.18
2022	7377	-214	-2.82	97.18
2023	7490	-101	-1.33	98.67

Source: The calculations were performed by the authors on the basis of official statistical data of the Republic of Kazakhstan Official site of the Ministry of National Economy of the Republic of Kazakhstan [7].

In 2023, compared to 2019, the number of employees in cooperatives decreased by 101 people or 1.3%. Average absolute increase: $\overline{dy} = \frac{y_n - y_1}{n-1} = \overline{dy} = \frac{7490-7591}{4} = -25.25$

Every year, the number of workers in cooperatives decreases by an average of 25.25 people. Different regions exhibit different dynamics. In some areas, growth remains stable, while in others, there may be fluctuations or even a decrease in the number of cooperatives, Table 3

Table 3.
An examination of the dynamics of cooperatives by region.

Periods	In the republic as a whole		Akmola region		Atyrau region		Zhambul region		Kyzylorda region		North Kazakhstan region		East Kazakhstan region	
	q	%	q	%	q	%	q	%	q	%	q	%	q	%
The quantity of cooperatives is hereby indicated.														
2019	2840	100	287	10.1	21	0.7	181	6.4	192	6.8	148	5.2	312	11.0
2020	2919	100	284	9.7	19	0.7	253	8.7	183	6.3	138	4.7	283	9.7
2021	3147	100	277	8.8	17	0.5	298	9.5	161	5.1	137	4.4	275	8.7
2022	3284	100	263	8.0	19	0.6	363	11.1	146	4.4	132	4.0	107	3.3
2023	3911	100	227	5.8	29	0.7	399	10.2	216	5.5	130	3.3	134	3.4
The following list enumerates the number of employees of the agricultural cooperative, persons														
2019	7591	100	414	5.5	104	1.4	263	3.5	595	7.8	251	3.3	567	7.5
2020	7692	100	415	5.4	80	1.0	345	4.5	562	7.3	247	3.2	537	7.0
2021	7529	100	382	5.1	74	1.0	300	4.0	451	6.0	261	3.5	536	7.1
2022	7377	100	348	4.7	48	0.7	514	7.0	415	5.6	247	3.3	188	2.5
2023	7490	100	287	3.8	52	0.7	531	7.1	413	5.5	236	3.2	174	2.3

Source: The calculations were performed by the authors on the basis of official statistical data of the Republic of Kazakhstan, Official site of the Ministry of National Economy of the Republic of Kazakhstan [7].

Table 4.
Dynamics of livestock and poultry in agricultural production cooperatives.

Periods	Cattle		Cows		Pigs		Sheep		Goats		Horses		Camels		Bird	
	q	%	q	%	q	%	q	%	q	%	q	%	q	%	q	%
	In the republic as a whole															
2019	107261	100	62577	100	680	100	92592	100	1403	100	8772	100	390	100	32339	100
2020	120447	100	64408	100	78	100	143964	100	2019	100	8915	100	555	100	16178	100
2021	117486	100	62621	100	58	100	152585	100	2375	100	11297	100	643	100	11585	100
2022	127458	100	64650	100	439	100	146750	100	1570	100	15329	100	659	100	18292	100
2023	145644	100	79360	100	204	100	156594	100	1706	100	23421	100	798	100	94105	100
Akmola region																
2019	21821	20	14711	24	45	6.6	4986	5.4	-	-	878	10	-	-	-	-
2020	20588	17	13134	20	45	58	11613	8.1	-	-	684	7.7	-	-	-	-
2021	15723	13	9936	16	-	-	13461	8.8	-	-	892	7.9	-	-	-	-
2022	15865	12	10213	16	0	-	16202	11	-	-	1019	6.6	-	-	-	-
2023	8600	5.9	4558	5.7	-	-	18759	12	84	4.92	1348	5.8	-	-	-	-
Atyrau region																
2019	180	0.2	-	-	-	-	-	-	-	-	-	-	-	-	0	0
2020	91	0.1	-	-	-	-	-	-	-	-	-	-	-	-	2843	18
2021	56	-	-	-	-	-	-	-	-	-	-	-	-	-	9460	82
2022	56	-	56	0.1	-	-	-	-	-	-	-	-	-	-	-	-

2023	56	-	56	0.1	-	-	-	-	-	-	-	-	-	-	-	-
Zhambul region																
2019	2497	2.3	1508	2.4	-	-	1064	1.1	-	-	-	-	-	-	-	-
2020	6625	5.5	811	1.3	-	-	2117	1.5	-	-	-	-	-	-	-	-
2021	9666	8.2	130	0.2	-	-	721	0.5	-	-	40	0.4	-	-	-	-
2022	8352	6.6	370	0.6	-	-	945	0.6	-	-	100	0.7	650	99	-	-
2023	8079	5.5	450	0.6	-	-	5784	3.7	-	-	178	0.8	-	-	-	-
Kyzylorda region																
2019	613	0.6	90	0.1	-	-	4324	4.7	0	0	0	0	-	-	10100	31
2020	632	0.5	181	0.3	-	-	5502	3.8	223	11	0	0	-	-	-	-
2021	570	0.5	105	0.2	-	-	3376	2.2	10	0.42	0	0	-	-	-	-
2022	782	0.6	78	0.1	-	-	3748	2.6	10	0.64	109	0.7	-	-	-	-
2023	593	0.4	88	0.1	-	-	3898	2.5	10	0.59	242	1	-	-	-	-
North Kazakhstan region																
2019	10080	9.4	5594	8.9	-	-	56	0.1	-	-	209	2.4	-	-	1854	5.7
2020	9640	8	5283	8.2	-	-	279	0.2	-	-	77	0.9	-	-	600	3.7
2021	10265	8.7	6101	9.7	-	-	250	0.2	-	-	105	0.9	-	-	600	5.2
2022	11473	9	5832	9	-	-	250	0.2	-	-	82	0.5	-	-	0	0
2023	11721	8	6710	8.5	-	-	40	0	-	-	267	1.1	-	-	0	0
East Kazakhstan region																
2019	9386	8.8	4059	6.5	33	4.9	1723	1.9	221	15.8	1580	18	-	-	-	-
2020	10359	8.6	3391	5.3	33	42	1369	1	195	9.66	1300	15	-	-	-	-
2021	8577	7.3	3097	4.9	58	100	2566	1.7	181	7.62	1672	15	-	-	-	-
2022	3038	2.4	983	1.5	23	5.2	829	0.6	38	2.42	1525	9.9	-	-	-	-
2023	3147	2.2	736	0.9	180	88	1004	0.6	3	0.18	1874	8	-	-	-	-

Source: The calculations were performed by the authors on the basis of official statistical data of the Republic of Kazakhstan, Official site of the Ministry of National Economy of the Republic of Kazakhstan [7].

Notwithstanding the growth in the total number of cooperatives, it should be noted that their role in the procurement of basic commodity products remains negligible, with current figures standing at no more than 4%. Furthermore, the level of involvement of small farms in cooperatives is a mere 2%.

In regions such as Akmola, East Kazakhstan, and North Kazakhstan, there has been a decline in the growth rate of cooperatives, suggesting potential factors contributing to this phenomenon, including economic challenges, human resource limitations, and shifts in government policy, Table 4.

In a number of territories where the number of cooperatives is decreasing, there is also a reduction in the number of livestock and poultry. The data presented in Table 4 demonstrate that in certain regions, the number of cattle has decreased by more than fourfold, while the number of cows and pigs has decreased by five times, and the number of sheep, goats, and poultry has decreased by twofold.

Today, Kazakhstan's agricultural sector is characterized by small-scale commodity production, which is usually based on small plots of land and a weak material and technical infrastructure Table 5.

Table 5.
Condition of equipment in the cooperatives for 2018-2024.

Years	Tractors (Units)	Combines (Units)	Tractor wear and tear (%)	Wear and tear of combines (%)	Tractor renewal rate (%)	Harvester renewal rate (%)
2018	442	90	60	60	—	—
2019	426	90	63	60	-3.62	0
2020	413	86	66	63	-3.05	-4.44
2021	379	68	70	68	-8.23	-20.93
2022	342	64	74	71	-9.74	-5.88
2023	340	49	77	76	-0.58	-23.44
2024	269	38	82	80	-20.88	-22.45

Source: The calculations were performed by the authors on the basis of official statistical data of the Republic of Kazakhstan Official site of the Ministry of National Economy of the Republic of Kazakhstan [7].

A recent study has revealed that as of 2024, 82% of tractors and 80% of combines were over 10 years old [8].

The present circumstances impede the augmentation of revenues for small and medium-sized enterprises, consequently decelerating their progression in rural regions. The average income of peasant farms in the country is low, at 2.63 million tenge, of which only 850,000 tenge is profit.

As of the end of 2023, the number of agricultural cooperatives in Kazakhstan stood at 3,911, uniting approximately 39.4 thousand individuals engaged in agricultural activities. Of these, households constituted more than half, followed by peasant and farm households, and individual entrepreneurs (combined accounting for about 44%), with only 1% being agricultural enterprises. The total number of agricultural producers in Kazakhstan surpassed 1.9 million by the conclusion of 2023. According to Table 6 [9], a mere 2% of farmers engaged in agricultural production are members.

Table 6.
Data on cooperatives in different countries.

Countries	France	Italy	United States of America	Kazakhstan	United Kingdom	Norway
Quantity cooperatives, units	14 429	6 741	1 953	3 911	625	16
Number of cooperative members, people	451 230	792 092	190 418	39 367	157 235	40,000
The share of cooperative members among agricultural producers	96.0 %	78.0 %	92.0 %	2.0 %	86.0 %	92.0 %

In the United States of America, the number of farmers who are members of agricultural cooperatives is approximately 1.9 million, with a total of 1,900 such cooperatives. In Norway, the number of agricultural cooperatives is 16, and the number of active peasant enterprises is approximately 40,000. In the United Kingdom, 157,000 farmers are listed as members of 625 agricultural cooperatives.

In Kazakhstan, despite the presence of a developed network of cooperative organizations comparable to those found in developed countries, a significant issue has been identified concerning member involvement. While in Europe and America, cooperatives unite the vast majority of agricultural enterprises (more than 90%), in Kazakhstan, coverage remains negligible. Western farmers demonstrate a high level of engagement with the cooperative movement, evidenced by their participation in multiple cooperatives concurrently. This observation underscores the significance of cooperatives in their agricultural practices.

2. Literature Review

A more detailed description of the proposed approach, based on a synthesis of various theories, commences with the observation that the conceptualization of the phenomenon of "cooperatives" occupies a central place in theoretical research. This phenomenon has remained an enigma to cooperation specialists since the time of I. Emelyanov (author of Economic

Theory of Cooperation, 1942), who viewed a cooperative not as a separate firm but as a collection of firms. Contemporary researchers seek to provide a more accurate definition of this complex organization, characterized by the multifaceted roles of its members (customer, owner, investor, manager) and diverse, often contradictory goals. In the contemporary scientific discourse, a cooperative is regarded as either an extension of a farm, an association of independent agricultural enterprises, or an independent firm. The present study seeks to demonstrate the significant potential of institutional theory in defining the modern essence of a cooperative. Its primary provisions are currently being utilized in research on agricultural cooperation by both Russian and foreign scientists [10-16]. To proceed with a detailed review, it is first necessary to consider the contributions of individual studies.

Agricultural cooperatives are regarded as pivotal instruments for enhancing the competitiveness and sustainability of the agricultural sector. According to Kurishbaev et al. [16], cooperation of private subsidiary farms is a new opportunity for the agro-industrial complex, especially during the return of the republic to normal life. Moreover, before the introduction of the quarantine regime, the developed countries used this mechanism of cooperation in agriculture very successfully. This development enabled the enhancement of agricultural labour efficiency and the establishment of a reliable supply of high-quality food products to urban areas. Additionally, it facilitated the provision of permanent and systematic employment opportunities in rural regions [17].

Kusainov [18] believes that cooperation is a social-voluntary association of people to improve their economic situation. To cooperation, enterprises are cooperatives, and the cooperative is based on the combination of forms of ownership and socio-economic and social through the mutual benefit of its members, voluntary participation of people in management to achieve the goals of the association [18].

Abroad, the term "cooperation" was first used in the X^{I}X century by R.

Profit in the works of Owen, but his ideas could not be developed further. The present theory of modern cooperation, R. Owen's disciple, Ch. Fourier continued his system of vision in agriculture and had a great influence on cooperation. He, as a result of his study and control of peasants and activities, noticed that they were doing their work slowly and suggested the creation of a form of collective ownership [19].

By providing technical assistance and reducing transaction costs, agricultural cooperatives can also help farmers increase their productivity and profits [20], reduce production costs [21], or adapt to specific quality requirements [22]. Most studies are applied to developing countries, as mentioned by Grashuis [23]. By reviewing the literature, they show that cooperative membership increases farm income through better access to resources and technical expertise [24-26]. Cooperatives, especially in developing countries, can help farmers adopt innovations that reduce production costs or increase productivity at the farm level. However, this can have adverse consequences in terms of environmental impacts due to agricultural intensification.

This is highlighted, for example, by Abebo and Haile [27] in the case of Ethiopian cooperatives that help farmers to use fertilizers, improved seeds, and pesticides to improve their production; this can lead to adverse environmental impacts. In this regard, it can even be argued that membership in a cooperative can lead to a deterioration in the environmental quality of the produce when chemical fertilizers and pesticides are used [28].

Among the main studies, special attention is paid to the work of Dashkovskiy [29], who notes the relevance and advantages of the revival of agricultural cooperation, authorized to lead agro-production state in the conditions of import substitution and others [29].

However, in Kazakhstan, which specializes in agriculture, there are few scientific studies demonstrating the opportunities that agricultural cooperatives can obtain through risk insurance, income guarantees, using digital methods of income distribution among cooperative members, and merging small farms into cooperatives. The paucity of research in this area may impede the development of agricultural cooperatives. Consequently, the researchers' opinion corroborates the pertinence of the topic and underscores the necessity for further study of the activities of agricultural cooperatives as a means for the advancement of the agricultural sector in Kazakhstan.

For farmers and villagers alike, any kind of activity is fraught with great difficulties. The evolution of independent farms has highlighted the necessity for consolidation into cooperatives, emphasising the benefits of specialisation and the optimisation of workloads. Mergers facilitate the acquisition of equipment for joint use and enhance the efficiency of technology, leading to a reduction in the cost of production. Farmers can achieve analogous outcomes by combining their efforts in various activities, including the provision of material resources, the organisation of storage, drying, and additional processing of agricultural products, or the sale of products and services.

Alibek A.O. and other researchers [14, 15] posit that agricultural cooperatives are a pivotal instrument in the resolution of several significant issues in Kazakhstan, including the assurance of resource availability for agricultural production, the promotion of exports, the entry into international markets, the development of rural infrastructure, and the enhancement of living standards and incomes of the rural population.

A prevailing viewpoint among scholars is that the effective functioning of cooperatives is contingent on ensuring profitability [30]. This, in turn, is believed to contribute to enhancing the financial stability of agricultural production.

However, despite the prioritization of agriculture in Kazakhstan, research on the potential of insurance, income guarantees, digital technologies for resource allocation, and the merging of farms into cooperatives remains under-researched. This dearth of research may act as a significant impediment to the large-scale development of agricultural cooperatives in the country.

The primary research conclusion that emerged from a thorough examination of the informal environment in which domestic agricultural cooperatives operate pertains to the identification and analysis of the underlying causes of their suboptimal performance. This encompasses their limited scale, suboptimal efficiency, and their constrained market share in

the domains of agricultural products and services [31-34]. The following aspects have been substantiated as contributing factors.: The following factors were identified as contributing to the challenges experienced during the perestroika period:

1) A negative experience of cooperation
2) A weak predisposition of agricultural producers to carry out transactions on a cooperative basis
3) A low level of trust of cooperative participants in partners and colleagues
4) lack of experience (as well as desire) of cooperative members to participate in the democratic management of cooperative organizations.

In this regard, scientists have observed that in conditions when the establishment of agricultural cooperatives is predominantly initiated "from above" (as evidenced in domestic economic practice), it is imperative for the state to implement not only specific measures related to the enhancement of cooperative legislation and instruments of financial support for cooperatives, but also proactive initiatives aimed at fostering trust, cultivating a positive attitude towards equality, solidarity, and mutual assistance. These initiatives are designed to optimize the collaboration between the state and cooperative organisations [14].

No less substantial in terms of the results obtained (their theoretical and practical significance) are the publications on the peculiarities of agricultural cooperation in developing countries and countries in transition, including China [35-37] Bulgaria [38] Romania [39] Albania [40] Nigeria [10] Kenya [41] Zimbabwe [42] Morocco [43] Ethiopia [44]. Analyzing the conclusions formulated by scientists, let us highlight the most significant of them, in particular: 1) the expansion of cooperative activities up and down the technological (vertical) chain enhances the welfare of both the cooperative and its members [45]; 2) membership in cooperatives gives agricultural producers certain competitive advantages (optimal size, access to financial resources, the possibility of joint investment, additional lobbying forces) [23, 42] 3) the choice of forms of contractual relations and the organization of transactions with products and resources depend on the state of the environment [46] 4) a favorable institutional environment is of great importance for the development of cooperation, in which the state plays an important coordinating and normative role [48]. Despite the obvious positive externalities that encourage the association of farmers into agrarian cooperatives, many former socialist countries still face numerous formal and informal factors that limit the active development of cooperation [47].

Consequently, the necessity for further research has been emphasized by experts, who have underscored the importance of investigating the role of agricultural cooperatives as a strategic instrument for the advancement of the agricultural sector in Kazakhstan.

3. Materials and Methods

3.1. Statistical Methods

Statistical methods such as summarization and absolute and relative statistical values were used to determine the general features and patterns of the phenomena under study from statistical official data. Summarization is a process of processing certain single facts, which form the total set of data collected during observation. The large amount of single data on individual objects of observation used in the study was transformed into a comprehensive set of statistical tables and results.

3.2. Multiple Regression Equation

The multiple regression model aims to establish a relationship between a dependent variable (Y) and a set of independent variables (X_1, X_2, ..., X_m). This relationship is expressed through an equation:

Theoretical Equation: $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + ... + \beta_mX_m + \varepsilon$

Where:

- Y represents the dependent variable.
- X_1, X_2,..., X_m are the independent variables.
- β_0, β_1, β_2,..., βm are regression coefficients representing the impact of each independent variable on Y.
- ε is the random error term accounting for unexplained variation.

Empirical Equation: $Y = b_0 + b_1X_1 + b_1X_1 + ... + b_mX_m + e$

In practice, we estimate the theoretical regression coefficients (β) with empirical coefficients (b). 'e' represents the estimated error.

The strength of the collective influence of independent variables on the dependent variable is measured by the multiple correlation coefficient (R). Unlike pairwise correlation coefficients, which can be negative, R ranges from 0 to 1. This index quantifies the degree of fit between the observed data and the predicted values from the regression equation.

A higher R value (closer to 1) indicates a stronger relationship between the independent variables and the dependent variable, suggesting that the regression model effectively captures the underlying patterns in the data. Conversely, an R value closer to 0 implies a weaker relationship and less predictive power of the model.

3.3. Structured interview

In order to collect data, participants were surveyed (survey, structured interview) using a specially designed questionnaire that included (i) eight multiple-choice questions and (ii) two open-ended questions to which participants formulated their own responses. The questionnaire was developed through the utilization of a focus group method, with contributions from agricultural specialists, encompassing scientists and production representatives.

The survey was conducted in two ways: (i) on paper, and (ii) by emailing the questionnaire to participants. Personal interviews were conducted in the presence of one of the authors, who was available to answer respondents' questions and

record their comments relevant to the study. To ensure the maintenance of confidentiality, no personal data was collected, and respondents were informed about the purpose of the study, the confidentiality conditions, and their right to refuse participation. During farm visits, interviews were conducted, and the information provided was verified by reviewing documentation. All data obtained, both from surveys and farm visits, was aggregated and anonymized to ensure confidentiality.

3.4. SWOT- Analysis

To summarize the information collected through the survey of participants, we applied SWOT analysis, which is an algorithm for studying the current situation, identifying strengths and weaknesses, opportunities, and threats. This will help to understand the cause of the problem and how to solve it.

3.5. Material

For the scientific substantiation of judgments affecting the dynamics of the development of agricultural cooperatives, the initial data on the Republic of Kazakhstan as a whole and its regions were summarized. The official statistics covered the period from 2019 to 2024.

4. Results

An econometric analysis was conducted between 2018 and 2024 in order to ascertain the impact of agricultural cooperation on the standard of living of the rural population of the Republic of Kazakhstan. The analysis was grounded in official statistical data. The objective of the analysis was to ascertain the extent to which key factors, including the unemployment rate, the proportion of the rural population, the density of cooperatives, employment in them, and the burden on cooperatives, influence the poverty level in rural areas.

The methodological basis for the calculations is a multiple linear regression model constructed using the least squares method (LSM). This methodological approach enables the quantitative determination of the contribution of each factor to the formation of poverty levels, thus facilitating the identification of the most significant factors.

The analysis employed empirical data reflecting the dynamics of economic and social indicators in Kazakhstan's rural sector. A particular focus was placed on the role of cooperatives, as they are regarded as a means for the sustainable development of rural areas, the enhancement of incomes, and the reduction of poverty.

The results obtained can serve as a basis for developing recommendations for improving state policy in the field of support for agricultural cooperatives and regional development, Table 7.

Table 7.
Living standards of rural population of RK (2018-2024).

Years	Poverty rate %	Unemployment %	Share of rural areas in the total population %	Share of cooperatives per 1000 rural inhabitants%	Share of the employed in cooperatives. %	Load on cooperatives. %
2018	6.7	4.8	41.7	0.37	0.110	2.98
2019	6.6	4.7	41.4	0.37	0.100	2.67
2020	7.6	4.8	41.3	0.38	0.100	2.63
2021	7.2	4.8	41.2	0.41	0.100	2.39
2022	7.3	4.8	41.0	0.44	0.098	2.25
2023	7.0	4.8	40.9	0.52	0.099	1.91
2024	6.9	4.8	41.5	0.49	0.094	1.91

Source: The calculations were performed by the authors on the basis of official statistical data of the Republic of Kazakhstan, Official site of the Ministry of National Economy of the Republic of Kazakhstan [7].

From 2018 to 2023, there was an increase of more than 40% in the number of cooperatives per 1,000 rural residents, from 0.37 to 0.52. It is evident that the number of cooperatives per 1,000 villagers has increased, surpassing the levels observed previously. Notwithstanding the increase in the aggregate number of cooperatives, rural population growth has outpaced it, and the indicator has fallen to 0.49. In parallel with the increase in cooperative density, there has been a steady rise in income (by approximately 84% from 2018 to 2024) and a moderate decline in poverty (to 6.9%, assuming it continues to decline slightly in 2024). However, despite these developments, employment remains low due to a lack of skills: less than 0.1% of the rural population is employed in cooperatives. The data demonstrate a decline in the burden on cooperatives, as evidenced by a decrease in the average number of employees per cooperative from approximately three to approximately 1.9. This decline could be indicative of two distinct possibilities: an increase in the number of small cooperatives or a decrease in their operational activity. This is a critically low figure, and it is essential that cooperatives are able to function as a key instrument for employment and income growth.

As illustrated in Table 8, the regression coefficients that demonstrate the relationship between the poverty rate and the aforementioned factors (unemployment, rural share, employment share, and cooperative load) can be determined. To ascertain the vector s that minimizes the sum of squared errors, the least squares method is employed. This method results in the expression $s = (X^TX)^{-1}X^TY$, where the crucial step is the calculation of the inverse matrix $(X^TX)^{-1}$.

Table 8.
Poverty regression coefficients.

8606.8851	-717.8183	-129.8048	-240.2195	3894.4344	-41.8658	The vector of estimates of regression coefficients is equal to $Y(X) = (X^TX)^{-1}X^TY =$	4.818
-717.8183	174.9681	-2.3707	169.715	-2173.231	51.74		8.8915
-129.8048	-2.3707	3.7394	-40.6424	285.3054	-10.2457		-0.8684
-240.2195	169.715	-40.6424	4058.4019	-26907.4459	866.7755		5.6603
3894.4344	-2173.231	285.3054	-26907.4459	206476.3763	-6061.3387		-130.0458
-41.8658	51.74	-10.2457	866.7755	-6061.3387	190.3701		2.5678

Following the implementation of multiple regression analysis, a model was obtained that describes the dependence of poverty level (Y) on several factors. The equation can be expressed as follows:

$Y = 4.818 + 8.8915X1 - 0.8684X2 + 5.6603X3 - 130.0458X4 + 2.5678X5.$

This model facilitates the assessment of the impact of each factor on the poverty level. Specifically, an increase in the unemployment rate by one unit (X1) has been shown to result in an average increase in the poverty level of 8.892 units. Concurrently, an augmentation of one unit in the rural population share (X2) has been demonstrated to be concomitant with a mean diminution in the poverty level of 0.868 units. A one-unit increase in the number of cooperatives per 1,000 rural residents (X3) has been shown to result in an average increase in the poverty level of 5.66 units. The most significant influence is exerted by the proportion of the population employed in cooperatives (X4): an increase in this indicator by one unit leads to a decrease in the poverty level by an average of 130.046 units.

Consequently, an increase in the burden on cooperatives (X5) by one unit has been demonstrated to result in an average increase in the poverty level of 2.568 units. The regression analysis indicates that the factor representing the burden on cooperatives (X5) exerts the most significant influence on poverty levels ($\beta5 = 2.937$). The high statistical significance of the model is confirmed by the coefficient of determination (97.02%) and Fisher's criterion, which indicates that 97.02% of the variation in the poverty level is explained by changes in the factors under consideration (Xj).

The factor x_1 ($r = 0.5571$) exerts the most significant influence on the resultant attribute.

In addition, the establishment of such cooperatives will solve the problems of unemployment, which will, in turn, affect the poverty level of the population, thus addressing more social problems.

5. Discussion

Prior to conducting the survey, a comprehensive analysis of extant literature and expert assessments was conducted in order to ascertain the optimal conditions for the development of agricultural cooperatives. The following are included:

(i) A high level of awareness of cooperatives; (ii) Unhindered access to information on all aspects of their activities; (iii) the prioritisation of consumer interests, and (iv) the adequate provision of financial and human resources.

The results of the respondents' assessment of the actual conditions for the development of agricultural cooperatives (ACs) are presented in Table 9.

Table 9.
The primary outcomes of the awareness survey on cooperatives.

No.	Questions, Answer Options	Number of Responses	
		Person	%
1.	To what extent are you acquainted with the notion of an agricultural cooperative (AC)?		
1.1.	Basic level: knowledge was practically absent	19	16.7
1.2.	Intermediate level: have a little understanding	39	33.3
1.3.	Advanced level: have a good understanding of the concept of an agricultural cooperative	58	50
2.	What are the main factors that motivate rural populations to join agricultural cooperatives?		
2.1.	Development of rural infrastructure and state support	44	38.1
2.2.	Facilitating access to resources (Equipment, materials)	38	32.4
2.3.	Access to higher incomes	34	29.5
3.	What measures could motivate you to join a cooperative?		
3.1.	Government subsidies and benefits	57	49.4
3.2.	Increasing trust in cooperatives	42	36.1
3.3.	Improving the management system	12	10.3
3.4.	Simplification of legislative requirements	5	4.2
4.	If you have not joined agricultural cooperatives, what is the reason?		
4.1.	Financial difficulties	30	26.1
4.2.	Lack of information about cooperation	29	25.3
4.3.	Fear of losing independence and difficulties in managing	29	25
	Fear of losing independence in income distribution	27	23.6
5.	What factors, in your opinion, are hindering the development of agricultural cooperatives in your region?		
5.1.	Lack of financial support	40	34.4
5.2.	Population migration	26	22.8

5.3.	High risk and distrust of partners	26	22.2
5.4	Ineffective management	24	20.6
6	What do you think are the advantages of cooperatives?		
6.1.	Joint procurement of materials at reduced prices	50	42.8
6.2.	Increased income through cooperation	30	26.1
6.3.	Joint processing and marketing of products	21	17.8
6.4.	Preferential lending and subsidies	15	13.3
7	What measures, in your opinion, could improve motivation to join agricultural cooperatives?		
7.1	Improving infrastructure in rural areas	48	41.1
7.2	Training and support programs could improve motivation	28	24.4
7.3	Increase in government subsidies	25	21.7
7.4	Raising awareness	15	12.8
8	Are you willing to consider participating in agricultural cooperatives in the future?		
8.1.	Yes	58	50
8.2.	No	26	22.2
8.3.	Difficult to answer	32	27.8

Based on the questionnaire survey of rural residents of the regions, here is a SWOT analysis of cooperatives, Table 10.

Table 10.
SWOT analysis of cooperatives.

Advantages of cooperatives	
Advantage	**Description**
Economies of scale	Farmers' association reduces the cost of purchasing seeds, fertilizers and machinery
Improving access to markets	Cooperatives provide more favorable conditions for marketing products
Improving product quality	Sharing technology improves manufacturing processes
Government support	Kazakhstan provides subsidies and soft loans for cooperatives
Problems and challenges	
Advantage	Description
Lack of qualified personnel	Shortage of cooperative management specialists in rural areas.
Development of educational programs	Courses on cooperative management and modern production technologies
Improving access to finance	Lack of collateral to obtain loans.
	Establishment of special funds and simplification of lending procedures
Low level of trust	Farmers' concerns about infringement of their interests within the cooperative framework
Infrastructure problems	Lack of warehouses and logistics networks limits opportunities

As is evident from the data, the majority of small farms do not have access to state support in the form of subsidies. There are also problems with the marketing of products, which promotes the development of intermediaries. In the context of Kazakhstan, the cooperative structure grapples with challenges emanating from a dearth of public comprehension and confidence, a phenomenon that is predominantly ascribed to the lingering negative perceptions of collective agriculture that have persisted since the Soviet era. The reconstruction of this trust necessitates an augmentation of public education concerning cooperatives, with a particular emphasis on rural communities, through a variety of educational and outreach initiatives.

These challenges, among others, underscore the imperative for small-scale producers to congregate through contemporary agricultural cooperatives. These organizations can protect the interests of their members, enable collaborative production and sales, manage initial processing, supply essential inputs (e.g., fuel, seeds, and fertilisers), and provide technical assistance to farmers, among other advantages. This approach has been widely adopted on a global scale. For instance, in Belgium, cooperatives process 50% of the milk supply. In Germany and France, the Figure 1 is approximately 55-60%, while in Denmark, it reaches about 90%. Across Europe, the prevalence of cooperative production of fruits and vegetables varies from 30% to 50%. In certain nations, such as Denmark, the proportion of meat produced via cooperatives can reach 60-70%. A substantial proportion of cooperatives in these countries are instrumental in delivering crucial material and technical resources to farmers.

It is noteworthy that up to 50-60% of farmers are served by cooperative structures, underscoring the significant impact of cooperative systems in facilitating agricultural sustainability and resilience [48].

Evidence from Europe, the USA, Canada, and Japan indicates that agricultural producers who are affiliated with cooperatives demonstrate a high level of efficiency. As demonstrated by the experience of these countries, the structure of Kazakhstan's cooperative sector is illustrated in Figure 2.

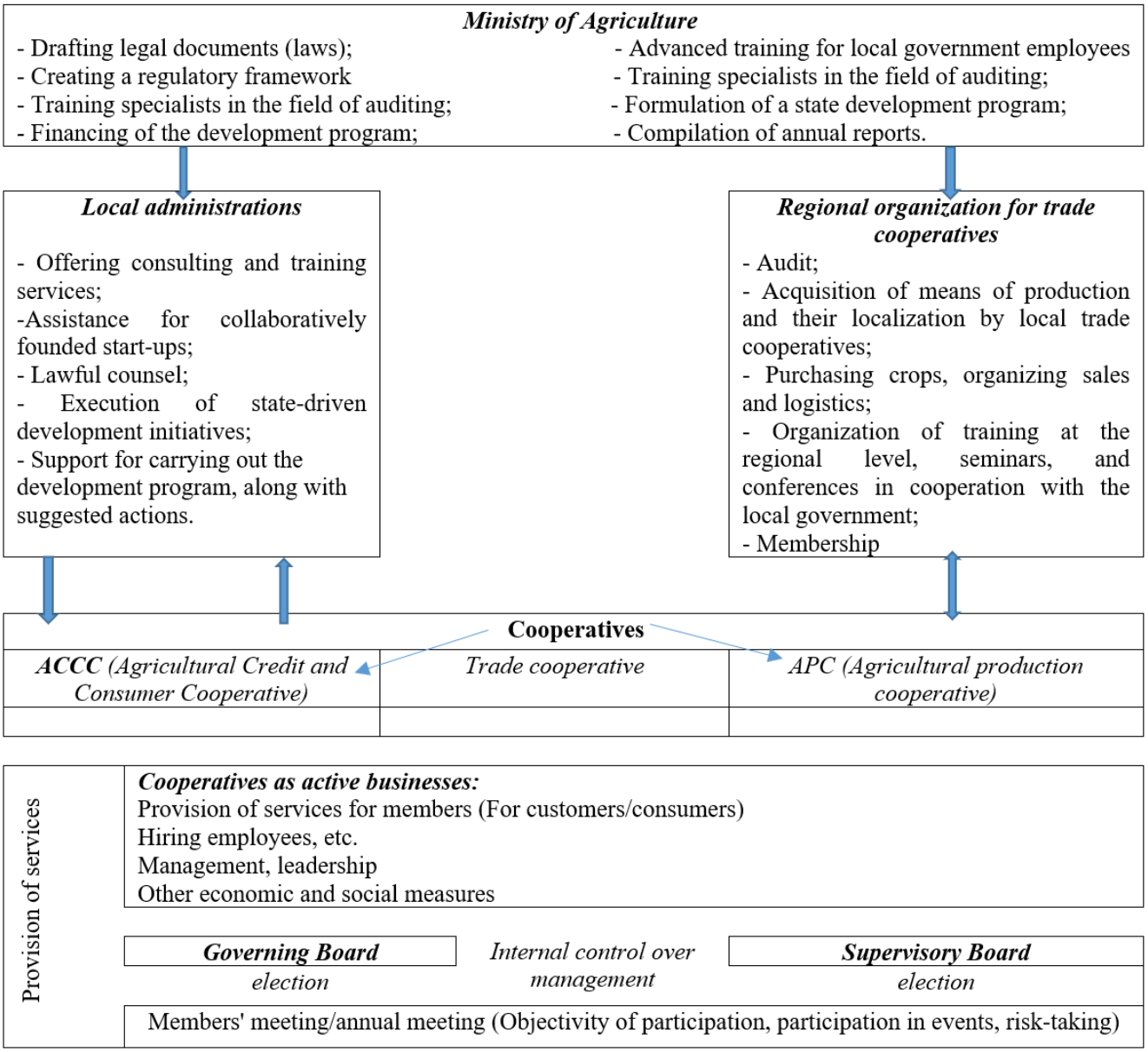

Figure 2.
The structure of the corporate sector.

1) Farmers must be given core training regarding cooperatives, instruction on forming new agricultural groups, alongside legal backing and counsel concerning the diverse aid options for these groups. To encourage cooperative expansion in Kazakhstan, it is vital to craft schemes supporting community-led projects.

2) Moreover, it is crucial to broaden public understanding, particularly in the countryside, through the creation of learning and informative projects.

3) Within Kazakhstan, small farms often struggle to join supply networks and contend with extensive agricultural operations.

4) Moreover, there are higher expenses per yield and delivery, potential food safety concerns, variable product standards, restricted access to farming expertise and guidance, an inadequate loan system, and poor connection with food manufacturers.

5) The establishment of a marketing system and logistics infrastructure facilitates the successful sale of agricultural cooperatives' products to urban residents, thereby improving the standard of living of rural residents and the rural community as a whole.

This phenomenon has the potential to attract a greater number of individuals to rural areas, thereby reducing the imbalance between urban and rural populations.

It is evident that the evolution of agricultural cooperation necessitates a close collaboration between the state, local authorities, and the cooperatives themselves. This collaboration aims to achieve an optimal balance of economic benefits and the social well-being of villagers. It is only through such a comprehensive approach that the creation of sustainable structures capable of effectively addressing their objectives and contributing to the enhancement of the region's welfare can be realized.

6. Conclusion

The analysis shows that agricultural cooperatives in Kazakhstan are experiencing steady growth and making a significant contribution to the country's economy. The development of cooperatives helps solve socio-economic problems in rural areas and strengthen food security. According to Bektenov and East-Fruit [51], the Prime Minister of Kazakhstan, the formation of agricultural cooperatives is a key strategy for developing private subsidiary and small farms. These organizations can interact strategically with medium and large entities in the agro-industrial complex, thus contributing to the solution of several important strategic tasks at the state or regional level.

Firstly, it is evident that the process of rural development necessitates the allocation of financial resources and the provision of assistance from the state. The establishment of such collaborative initiatives serves to mitigate this issue to a certain extent, as it facilitates the return of financial flows to rural regions.

Secondly, the chain of various intermediaries in wholesale and retail trade in the city market will be eliminated. The functions of intermediaries will be consolidated into the remit of a single agricultural cooperative, which will guarantee the repatriation of cash flows to the village level and its members, as well as to other projects.

Thirdly, the price of products may decrease for consumers who purchase the agricultural cooperative's goods.

Fourthly, it will increase interaction between urban and rural populations.

Fifthly, the issue of rural unemployment is addressed, and there is an increase in income levels. The integration of agricultural cooperatives in various aspects of production, storage, marketing, processing of products, material and technical assistance, and provision of services to agricultural producers will result in a multiplier effect on the socio-economic situation of the village and its development. This will lead to an expansion of employment opportunities for the rural population, thus creating new employment prospects.

Therefore, governmental support ought to focus on fostering favorable financial, communal, and judicial environments, enacting impactful collaborative strategies, and unifying scientific alongside practical insights within cooperative endeavors.

This approach is expected to contribute to the sustainable development of industry and rural areas.

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