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Jasurbek Abdushukurov
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OPTIMIZATION OF HORTICULTURAL PRODUCTION, PROCESSING AND PROCUREMENT CLUSTER IN UZBEKISTAN

Primary Supervisor: Dr. Attila Ombodi

Associate professor

Author: **Jasurbek Abdushukurov**

GWYHUZ

Institute/Department: Institute of Agronomy

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Table of Contents

1. Introduction

Agriculture is an essential industry that provides food and raw materials for processing globally. Among its many sectors, the fruit and vegetable industry has been rapidly growing in recent years, serving as a crucial source of nutrition and income for millions of people worldwide. Despite this growth and significance, there has been a lack of practical and scientific approaches in the use of cooperatives, agroclusters, and integration systems in the sector. To address this issue, efforts are being made to develop and expand agricultural products, improve competitiveness in world markets, and strengthen the concept of food security.

Uzbekistan, located in Central Asia, has a rich and diverse agricultural industry, with fruits and vegetables being some of its most important crops. However, Uzbekistan being a major producer and exporter of these products.

Despite its significance, the fruit and vegetable industry in Uzbekistan faces a number of challenges, including low productivity, outdated production methods, and poor quality control. Additionally, the industry has struggled to compete in the global marketplace due to a lack of branding, packaging, and marketing.

In recent years, the Uzbek government has been promoting the development of agroclusters in the fruit and vegetable industry as a way to address these challenges and improve the competitiveness of the sector. Agroclusters are specialized agricultural production areas that bring together small and medium-sized enterprises to promote collaboration, innovation, and efficiency. The private sector mostly grows fruits and vegetables, and there has been an increase in joint ventures in the horticulture field, resulting in competition between private vegetable growers. This presents an opportunity for small farms to participate by offering affordable, diverse, and seasonal fruit and vegetable products. To support this, fruit and vegetable cooperatives are being organized to meet the needs of its members. There are several regulatory-legal documents that outline the procedures, types, forms, legal and economic bases of cooperative activities, and conditions for membership and contributions. Several presidential decrees and resolutions have been issued to develop the fruit and vegetable industry, network clusters, and cooperation systems.

However, despite the existing regulatory-legal framework, implementation difficulties persist as various legal documents govern the operation of fruit and vegetable products. To address this, there is a need for a single normative-legal document that combines all the norms in the field to help achieve the country's agricultural goals. Scientific proposals and practical

recommendations for vegetable cooperatives and agroclusters are necessary to achieve these goals. Collaboration between the scientific community and industry experts is vital to developing innovative and sustainable solutions that drive growth and development in the sector.

Fruit and vegetable cooperatives are commercial organizations formed voluntarily by agricultural producers, such as farmers, private farmers, and farm owners, to conduct joint production activities that meet the needs of its members. Membership requires personal involvement in cooperative activities and unification of ownership shares. Legal documents such as decree of the president of the republic of Uzbekistan No. PF-5388 (Fruit and vegetable 2018) and No. PF-5853 (Agricultural strategy 2019) aim to develop the fruit and vegetable industry and agriculture in general, while Decision No. PQ-3978 of the President of the Republic of Uzbekistan (Export 2018). and No. PQ-4232 (Agricultural cooperation 2018) provide additional measures to increase efficiency in the production and development of agricultural cooperation. The importance of family farming in fruit and vegetable growing and viticulture is highlighted in the resolution of November 23, 2021 (No. PQ-52), which seeks to enhance the development of network clusters and cooperation systems in the industry. These legal documents are used to implement specific tasks related to fruit and vegetable production activities.

This research focuses on the socio-economic and organizational relations in improving the foundations of fruit and vegetable co-operation. Various research methods were employed, such as systematization, analysis and synthesis, and SWOT analysis. The study presents several scientific innovations, including a methodology for calculating performance indicators for different types of production, technical means to increase efficiency in co-operative enterprises, and a model for optimal placement of commercial relations. The research also developed scientific-theoretical definitions of economic categories and established the importance of fruit and vegetable co-operation. The study proposed an economic mechanism to improve efficiency in co-operative enterprises and provided scientific forecasts for the future development of fruit and vegetable co-operation.

2. Literature review

2.1. Theoretical basis of cluster and cooperation of fruit and vegetable products

The future development of Uzbekistan's economy, including the fruit and vegetable sector, is closely linked to globalization and integration into the world economy, which brings about the issue of international competition. As the domestic market expands, agricultural and vegetable production entities are growing, leading to a two-way competition between local and foreign manufacturers.

The main sectors of Uzbekistan's economy are interconnected with the development of the agricultural sector, which provides up to 70% of the direct share of agricultural production and produces over 90% of the country's food products (Gulyaev 2023). The processing of local agricultural products accounts for 35-40% of all industrial products or 7-7.8% of the GDP, due to the direct connection of cotton ginning, textile, knitting, tailoring, shoe production, food processing, fruit and vegetable processing, and oil and fat processing industries to the processing of agricultural products. Therefore, it is crucial to increase the competitiveness of the vegetable industry and ensure its compliance with global standards, particularly in the case of fruit.

The term "cluster" refers to the integration of related businesses or organizations in one geographical area or field, in order to improve efficiency. Agricultural enterprises must cover the costs of production and processing while also making a profit in order to ensure future success. Agroclusters are specialized agricultural production areas that are created by clustering together a number of small and medium-sized enterprises (Michael 1998). They are designed to promote innovation, collaboration, and efficiency in the production and processing of agricultural products. Agroclusters bring together producers, processors, researchers, and other stakeholders in a specific geographic area to work together to improve the competitiveness of their products in the global marketplace.The idea of agroclusters has been successfully implemented in many countries around the world, including Italy, Spain, and the Netherlands, where they have been used to promote the production of high-value crops such as wine, olive oil, and cheese. Now, Uzbekistan is also following this trend by promoting the development of agroclusters in the fruit and vegetable industry.

The concept of "cooperation" in economics has two main perspectives: cooperatives are either voluntary associations of joint economic activities or a process of pooling resources among similar cooperatives. Cooperation involves many people working together towards a

common goal, and can take various forms. In the agricultural sector, cooperative processes are aimed at improving interaction among users of fruit and vegetable products. According to Russian economist, cooperation is about combining the economic interests of businesses to achieve a common goal, and should prioritize integration over ownership, cooperative economist, has emphasized that in a cooperative, capital is not the owner but the servant. This highlights the importance of improving the knowledge and skills of farmers in addition to providing them with benefits. Cooperation is based on the voluntary participation of free individuals, democratic management of cooperative relations, and economic justice in distributing benefits. Even today, this definition of cooperation in agriculture remains relevant, as cooperatives retain their independence while striving for greater industrialization and efficiency. Economists have defined cooperation as a joint activity that combines personal, collective, and social interests, while also encouraging creativity and providing social protection. While some focus on the social aspects of cooperation as a movement, (Chayanov 1927) study of cooperation focuses on its economic aspects and the producers involved. Another economist (Ergashev 2018) defines agricultural cooperative as a system of cooperatives and their partners organized by agricultural producers to meet their economic and other needs. Agricultural cooperatives are a type of cooperative production and economic management organization that combines the contributions of agricultural producers to satisfy the material and other needs of its members. This definition fully covers the issue of agricultural cooperatives.

Agricultural cooperatives are unique in that they are organized by agricultural producers, and the term "agricultural producer" refers to the leader of the cooperative based on their involvement in agriculture, where agricultural products make up more than 50% of the production volume.

(Husanov 2000) focused on the economic content and essence of cooperation from the perspective of the socio-economic development of cooperation. Other scholars defined agricultural cooperation as a form of joint economic activity among producers of agricultural products that enables the achievement of results and economic benefits that are difficult to achieve individually (Allahverdiev 2003).

Based on the theoretical-scientific foundations of the cooperation process during the formation and development period, as well as the current tasks of the development of the country's economy, specific features of the economy of the cooperation system of fruit and

vegetable products should be taken into account. These features are illustrated collecting data in Figure 1.

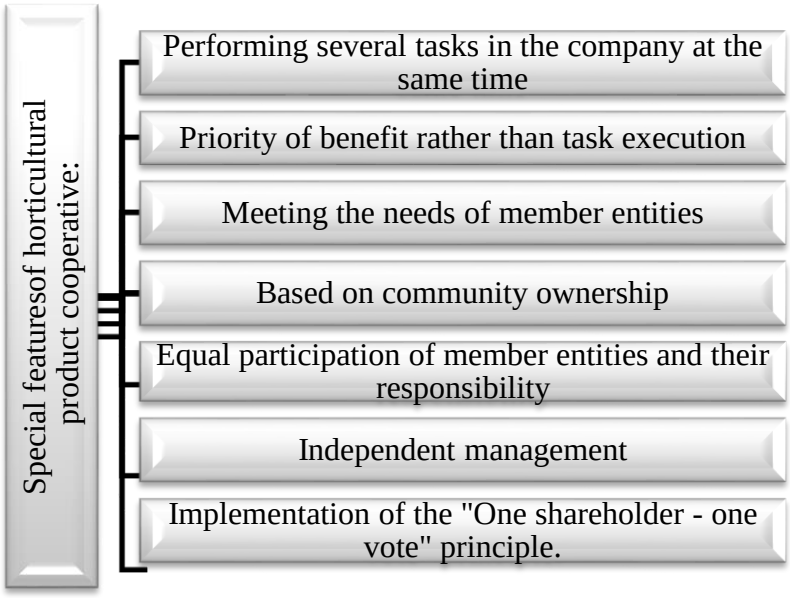

Figure 1.Classification of cluster-cooperatives operating in the field of fruit and vegetable (Based on Law of Cooperation of Uzbekistan 1991)

Fruit and vegetable product cooperation refers to the economic collaboration between partners to achieve mutual benefits and satisfy everyone's interests. It serves as a legal basis for the development of cooperatives and involves various aspects such as legal and organizational forms, resource allocation, relationship management, product marketing, taxation, state-cooperative relations, and legal guarantees for property rights.

Unlike independent agricultural enterprises that operate at a small scale, fruit and vegetable product cooperation aims to enhance profitability through voluntary collaboration within a specific field. This collaboration allows farmers to deliver products to consumers at a lower cost while maximizing profits.

Independent cooperation in fruit and vegetable production has several advantages, including the ability to overcome organizational and economic limitations by increasing the scale of production through concentration and specialization. This can be achieved by combining efforts in mutually beneficial cooperation. Additionally, optimal modes and sizes can be established for various mechanical, biological, and economic processes involved in fruit and vegetable production.

It should be noted that the optimal volume of a fruit and vegetable production enterprise may differ from that of an enterprise involved in processing agricultural raw materials, and depends on various factors including transportation logistics.

In the production of agricultural products, including fruit and vegetable production, different economic categories are used, such as production, processing, and marketing. These categories are distinct from each other and have their own unique characteristics. (Table 1)

Table 1.Comparative classification of concepts of cluster, cooperation and integration in the field of fruit and vegetable production (Based on Law on Agriculture of Uzbekistan 2021)

	Comparison criteria	Economic categories		
		Cluster	**Cooperation**	**Integration**
1	Role in society	Forms of organizing social work and production		
2	Concepts	**Cluster** - a combination of several elements	**Cooperation** - cooperation	**Integration** - recovery
3	Determining the essence	The combination of different products in the process of production	Voluntary development, integration of labor and resources	Adjustment of mutual cooperation in the association
4	The purpose	Integration into the chain of production, processing and mediation	Meeting the socio-economic needs of the population	Economic integration for the purpose of profit
5	Main characters	Consolidation of production chain around one entity	Organization of work in one field of activity	Interconnection of economic activity
6	Formation mechanism	According to the agreement on land and labor resources, all other resources are financed by a single entity (cluster)	Unification of labor resources and solving their tasks together	Organization of trade-based production, financial management and other relations
7	Subjects	Consolidation on the same product	Specializing in activities	Various activities
8	Organizational issues	Production, storage, processing and export of fruit and vegetable products is carried out on the basis of contracts	Decentralization of the consumer system of associations and societies	Integrated associations
9	The result	Unification of manufacturers of one type of product around a single subject of production continuity	Integration of border management into the cooperative system based on goals and tasks	Merger of financial, infrastructural and management bodies
10	Efficiency	Benefits of joint ventures		

According to the data in the table, if the individuals who participate in an operation work towards a common goal, such as producing, processing, and delivering products to consumers, they can maintain their legal independence and choose to cooperate voluntarily based on economic benefits, which can lead to lower costs and improved market efficiency for their products.

The cooperation of fruit and vegetable products can be classified into two forms: main and association. Members of the association form are individuals or entities who have invested in the cooperative and have the right to vote as specified in the cooperative's charter.

The cooperative of fruit and vegetable products is a commercial organization that works on cooperative activities related to the production, processing, and delivery of agricultural products to consumers on behalf of farmers. The cooperative also engages in activities based on the personal labor participation of its members, as long as they are not prohibited by law.

The cooperatives that produce fruit and vegetable products ensure that the volume of their products matches the technology used for their production, both in terms of quantity and quality. From an organizational and legal perspective, cooperatives operate as legal entities.

Financially and economically, cooperatives operate as independent branches of the fruit and vegetable products industry, following the principles of self-financing and self-management.

Cooperatives can be categorized based on their form of ownership, such as cooperatives organized by members of the ownership base, cooperatives organized on the basis of full private mixed ownership, and cooperatives operating based on state-private partnerships.

Due to small-scale production in farms and markets, transportation costs for delivering products to the market increase per unit of product. This can have a negative impact on the overall product price and affect the competitiveness of market prices.To address this issue, fruit and vegetable producers can join cooperatives, which can lead to economic benefits by reducing transportation costs for delivering products to consumers. This, in turn, can reduce costs for farms at a macro level.Considering the above, farms should have a storage system for their vegetable products and may need to increase their efforts to deliver their products to consumers. Specially equipped modern fruit and vegetable production systems are less economically efficient for small farms.

On the other hand, the cooperative system can attract investments in the production, processing, development, and cooperation of agricultural and vegetable products. This can also facilitate the training of qualified specialists, increase their expertise, develop science and

marketing strategies, and encourage agricultural equipment manufacturing, service, preparation, and processing enterprises to operate within the framework of fruit and vegetable production cooperatives. This, in turn, can stimulate the production of products.

2.2. Using foreign experiences to improve the development of cooperation between fruit and vegetable clusters.

Strong repression in developed countries has created problems for agricultural product sales, leading producers to join cooperatives to solve these issues. The agricultural cooperation system has been successful in countries such as the member states of the European Union, the USA, and Japan. In fact, during the 1970s and 1980s, 85-90% of fruits and vegetables delivered to US canneries were provided through cooperatives. Similarly, 78% of potatoes and 83% of citrus fruits from industrial farmers were also processed through cooperatives. In 2013, over 30,000 cooperatives were active in the US, including 2,000 in the agricultural sector. With over 350,000 members and an annual turnover exceeding 500 billion dollars, cooperatives have allowed for the sorting, processing, packaging, and sizing of agricultural products, which are then sent to trade networks. Through cooperatives, agricultural enterprises have been able to successfully market and process agrotechnics without the failure of the trade system (Kotomina 2018).

In the US, cooperatives that rely on contracts for the sale of food products are common, especially for fruit and vegetable products intended for processing. For instance, contracts account for 85% of the volume of fruits and vegetables supplied to the canning and food industry, as well as 100% of sugar beets.

Fruit and vegetable production provides farmers with necessary market information, transportation, and other services. The effectiveness of trade cooperatives depends on their ability to attract investments for product marketing development, which can be challenging in conditions of strong repression.

It is worth noting that the majority (25-30%) of the fruit and vegetable products produced by US farmers are contracted, with contracts being signed directly by farms or their trade cooperatives.

The development of cooperative systems in the processing and trading of perishable fruits and vegetables has allowed for the widespread adoption of product sorting, grouping, and standardization. As a result, transactions related to processing and trading can now be carried out quickly through telephone or internet connections. In the United States, processing and trade cooperatives are responsible for delivering over 75 percent of produce to

consumers, highlighting the advanced level of cooperation in manufacturing and trade. These cooperatives have also expanded into the "field-store" chain, which has increased the means of processing perishable fruit and vegetable products. For instance, 100 percent of vegetables intended for processing, 98 percent of milk, and 60 percent of fruit are delivered to processors and wholesale retail trade through this chain. Cooperatives engaged in the processing and trade of agricultural and vegetable products generate additional income and stabilize production and distribution volumes, thus preventing excess consumption. In Japan, the development of cooperative relations in agriculture focuses on the organization of highly specialized entities, as small-scale producers form the basis of agriculture. In the fruit and vegetable sector, cooperatives are organized into two forms: specialized cooperatives and multi-directional cooperatives. Specialized cooperatives mainly consist of farms that produce fruit and vegetable products, while they can also be members of multi-network cooperatives. Most cooperatives are focused on production and processing and operate on contracts with producers and sellers of products, with a commission calculation method used. A portion of the product received by the cooperative is transferred to the cooperative activity establishment fund to cover the costs of setting up cooperative trade and processing activities.

The cooperative system has been successful in developing and improving the processing and trade of agricultural products in various countries, such as the United States and Japan. The use of contracts for the sale of agricultural products through cooperatives has allowed for the standardization and sorting of products, making transactions faster and easier through telephone or internet connections. In the US, over 75% of produce is delivered to consumers through cooperatives, and in Japan, specialized and multi-directional cooperatives are organized to provide material and technical resources to farmers while engaging in trade and processing activities. The method of "ordering for development" is used to import necessary goods at low prices for member farms. In Uzbekistan, foreign experiences with fruit and vegetable cooperatives can be applied to improve the efficiency of delivering products to consumers, finding buyers and implementing quality control.

Cooperatives that process and trade fruit and vegetable products are widely developed in Scandinavian countries, where 75-80 percent of the products grown by farmers are processed through cooperatives. In Sweden, for example, 15 percent of the country's retail stores belong to cooperatives engaged in the distribution of farmers' products, and the cooperatives deliver agricultural products to consumers through the retail trade system.

In Sweden, all farms are 100 percent connected to various direction cooperatives, with each farm having 2 to 5-6 cooperatives. The development of fruit and vegetable cooperation in these countries is focused on the development of a highly specialized trade network that is equipped based on the strengthening of the quality of products in the market. In order to avoid competition, farmers are forced to join trade and production portfolios. Cooperatives supply 54 percent of agricultural products to the food industry.

In Uzbekistan, experiments are being carried out to develop fruit and vegetable cluster cooperation based on the experiences of foreign countries. These experiments include methods of processing and selling fruit and vegetable products grown on farms in cluster cooperatives, integrating farms specialized in fruit and vegetable production into cluster cooperatives, and allowing all fruit and vegetable growers in the regions to join cluster cooperatives at will.

Trade cooperatives are developing rapidly in these countries. In Denmark and Finland, almost 90% of livestock products are sold through cooperatives, while in Sweden and Norway, 100% of livestock products are organized through cooperatives. In France, Italy, Portugal and Germany, cooperatives are engaged in the production of wine products and their trade and processing. The share of cooperatives in these countries ranges from 35 to 46 percent, while the share of cooperatives in France is more than 70 percent. These cooperatives provide increased labor productivity due to the increase in product quality and the level of mechanization, as well as increased competitiveness of the manufacturer due to the use of waste-free and compact technologies (Kubansky 2019).

According to the analysis, developing the cooperative system in Russia can effectively organize the distribution of food products in rural areas, ensuring the delivery of fresh products to consumers without additional costs. This can accelerate product delivery, simplify payments, increase cooperation among participants, and add additional investments to the production area (Buzina 2015).

In Russia, agricultural companies based on cooperative principles are widely developed in Moscow, Rostov, and Bryansk Oblasts. For example, the agricultural company "BelayaDacha" in the Moscow region has several production lines, including a greenhouse (where 15% of the total vegetables in the region are grown), fruit and vegetable processing, and commercial activities to deliver freshly washed and processed products to consumers (Volodin 2005).

Agricultural cooperatives are typically divided into "consumer" and "production" cooperatives. While there are no theoretical differences in cooperative activities, practical differences exist.

Consumer cooperatives can effectively provide related services for their members, such as pest control, product processing, sales, packaging, and preservation, or transportation services. These services may not be economically viable for individual farms, but cooperatives can share the costs among their members. The cooperative's expenses are covered by the founders, who approve the budget every year, and any extraordinary expenses or damages are also covered by the founders. These issues can be discussed at the general meeting of the cooperative.

In Russia, the differences between production cooperatives and consumer cooperatives are not clearly defined in the Law "On Agricultural Cooperation." However, many economists emphasize the role of cooperatives in solving the employment problem in rural areas and creating markets (Abovoy 2013).

In the United States, large companies have cooperated with small producers and households to sell perishable agricultural products in supermarkets, resulting in increased productivity and decreased costs. According to statistic organization data, from 1998 to 2003, prices of bakery products from the USA decreased by 9%, dairy meat by 5-12%, and vegetable prices by 10%. Cooperative systems and relationships have been effective in developed countries, with a large portion of fruits and vegetables sold to canneries in the US being sold through cooperatives in the 1960s and 1970s (FAO world food price 2023). However, the competitiveness of small farms has decreased in some areas of the market, leading them to join production-trade cooperatives (Yegorov 2012). Agricultural cooperatives are supported by the state in many countries, with tax reductions and exemptions given to these enterprises. The need for financial resources to improve the trade process and equip with new technologies has also spurred the development of cooperatives. In Uzbekistan, cooperative farming has been shown to reduce costs of recycling and selling products. However, high costs associated with processing and trade can hinder cooperative development and negatively impact farmers' economic situations.

Cooperation in the fruit and vegetable processing and trade industry can attract investment in product marketing. However, small production volumes can complicate the farming process despite high technological efficiency. The perishable products trade system is improving through product selection and standardization, which speeds up transactions.

Cooperatives provide farmers with material and technical resources, using the "ordering for development" method. Developing trade cooperatives is important for adapting to changes in market demand and improving the processing and trading process with financial resources. Foreign experiences in developing fruit and vegetable cooperatives show that reducing product prices, finding buyers, and establishing quality control are important tasks. The changing demand of consumers and technological advancements lead to changes in the food industry and processing system. Large-scale industrial enterprises equipped with specialized technology can increase costs, so efficient use of enterprise capacity is necessary, and demand for raw materials is changing.

2.3. Challenges related to the collaboration and advancement of fruit and vegetable product clusters.

The production, transportation, storage, and processing of fruits and vegetables in Uzbekistan are more complicated than other agricultural products, as they need special attention to prevent spoilage. However, there is a clear specialization in the country's production, processing, and promotion of these products, with opportunities in all regions. Statistics indicates that vegetable production in the republic has increased by 171.1% from 2005 to 2021, with a rise in planted areas from 137.7 thousand hectares to 235.6 thousand hectares. As a result, the total crop production has increased from 2971.6 million tons to 7363.5 million tons, which is 2.5 times higher.

The trend of increasing vegetable production is also evident in the Kashkadarya region, located in the southern part of Uzbekistan. The total vegetable production area in the region grew from 28.1 thousand hectares in 2005 to 43.2 thousand hectares in 2021, which is a 153.7 percent increase. In the same period, the agricultural production also rose from 549.3 million tons to 1981.3 million tons, or a 196.9 percent increase. The high growth rate of the gross product led to a faster increase in crop yield than in the cultivated area. However, the productivity of vegetable crops in the region decreased to 37.6 s/ha compared to the national average, especially after 2005.

Table 2.Cultivation of vegetables in the republic and Kashkadar regiondynamics of indicators (Statistics Committee of Uzbekistan 2022)

Indicators		By years								In 2022 to 2005 (%)
		2005	2010	2015	2018	2019	2020	2021	2022	
By Republic	Crop area (thousands)	137,7	173,0	194,1	208,3	209,7	213,6	220,5	235,6	171,1
	gross, (thousand t)	2971,6	6346,4	1028,1	11433,6	6129,5	6481,2	6650,3	7363,5	247,8
	Productivity, (s/ha)	215,8	252,5	277,2	297,1	292,3	303,4	301,6	308,3	142,9
According to the Kashkadar region	Crop area (thousands)	28,1	28,6	29,1	34,6	24,6	36,2	38,1	43,2	153,7
	gross, (thousand t)	549,3	559,6	579,1	685,9	434,0	780,1	810,3	1081,3	196,9
	Productivity, (s/ha)	195,4	195,6	199,0	198,2	176,4	215,4	212,7	250,3	128,1
Productivity of the Kashka region to the indicator of the Republic relatively	(%)	90,5	77,5	71,8	66,7	60,3	71,0	70,5	81,2	X
	(+, -)	-20,4	-56,9	-78,2	-98,9	-115,9	-88,0	-88,9	-58,0	X

Fruits and vegetables are crucial for providing the population with food, making their production volumes essential to consider, especially with the population growth. It is vital to maintain the quality of these products according to medical standards and ensure proper processing and preservation.

Kashkadarya region is a province located in the southern part of Uzbekistan, bordering Tajikistan and Turkmenistan. It is known for its fertile soil and favorable climate, making it an important region for agriculture.

Agricultural fields are a crucial factor in determining vegetable production in the Kashkadarya region. In 2020, the region's vegetable production area measured 38,100 hectares, which is 10,000 hectares higher than in 2005. This increase in vegetable production area contributes to a significant portion of the republic's total population, as shown in figure 2 (Statistics Committee of Uzbekistan 2022).

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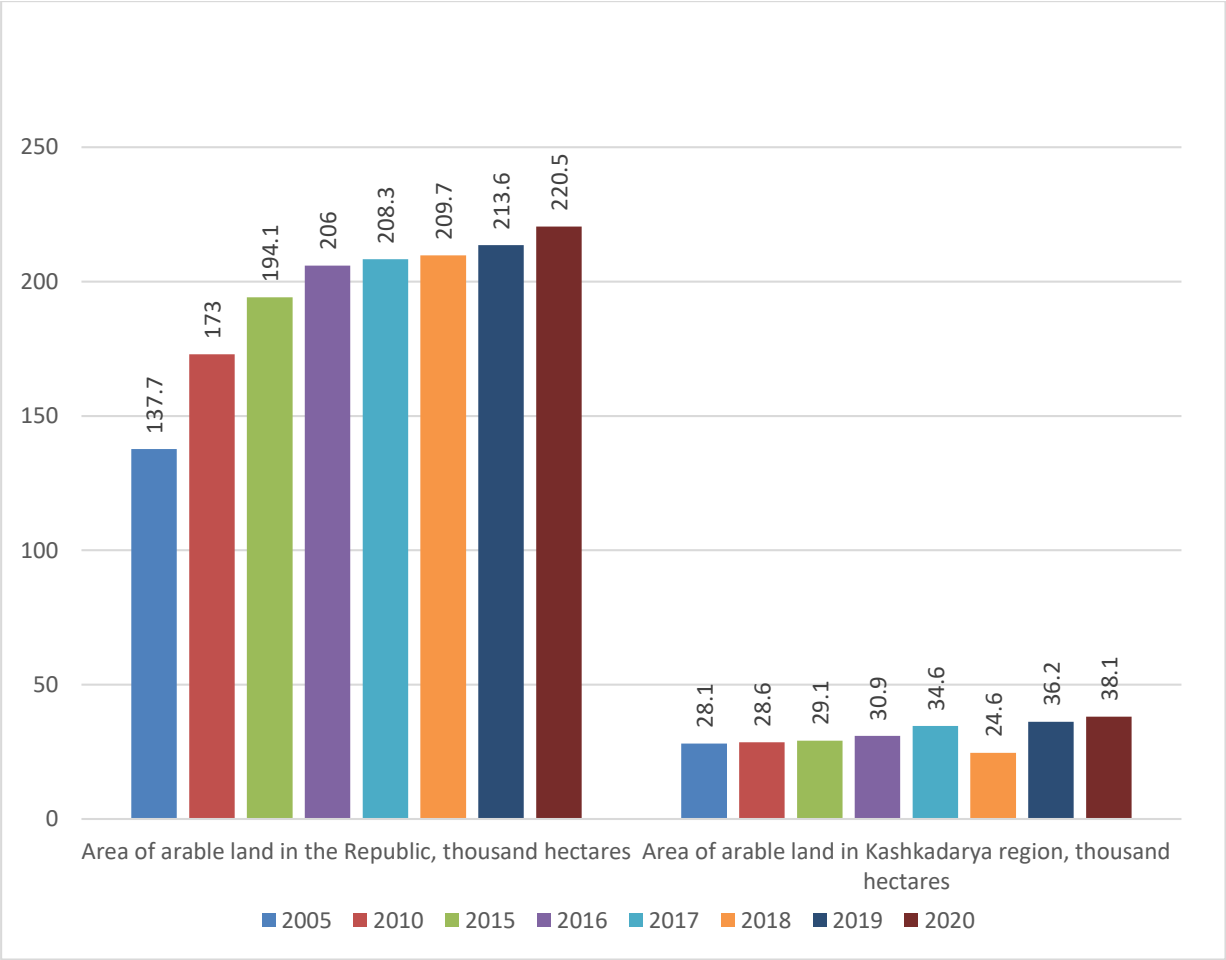

Figure 2.The dynamics of changes in the area of vegetable production in the Republic of Uzbekistan and Kashkadar region in all types of farms (Statistics Committee of Uzbekistan 2022)

The volume of fruit and vegetable production is mainly influenced by the convenience of farmers in terms of production, storage, and processing of products, as well as the stability of market demand. These factors are increasingly crucial nowadays. The primary fruits and vegetables are produced on agricultural farms where small investments can lead to production growth. However, challenges in the areas of production, storage, processing, and sales can cause a significant decrease in product volume.

Uzbekistan has immense potential for producing high-quality fruits that meet global market standards, as shown in Table 3.

Table 3.Dynamics of changes in indicators of fruit production in the Republic of Uzbekistan and Kashkadarya Province in all types of farms (Statistics Committee of Uzbekistan 2022)

Indicators		By years								in 2021 compared to 2005 (%)
		2005	2010	2015	2017	2018	2019	2020	2021	
According to the Republic of Uzbekistan	Cultivated area (thousands)	208,2	235,3	266,4	284,3	285,1	291,3	299,6	305,8	146,9
	gross, (thousand t)	1297,9	2178,8	3412,8	3735,0	3677,9	3932,5	3996,6	4440,2	342,1
	Productivity, (s/ha)	62,3	92,6	128,1	131,4	129,0	135,0	133,4	145,2	233,1
According to the Kashkadarya region	Crop area (thousand s)	17,3	18,2	19,6	22,1	22,6	23,3	24,6	26,1	150,9
	gross, (thousand t)	130,9	154,3	160,2	180,1	182,4	227,2	242,6	302,2	230,9
	Productivity, (s/ha)	75,6	84,7	81,7	81,4	80,7	97,5	98,6	115,8	153,2
To the indicator of productivity of the Kashka region of the Republic Relatively	(%)	121,35	91,47	63,78	61,95	62,56	72,22	73,91	79,8	x
	(+, -)	13,3	-7,9	-46,4	-50	-48,3	-37,5	-34,8	-29,4	x

In the past five years, the area of fruit orchards in our republic has expanded, with farms of all categories having 305.8 thousand hectares of fruit orchards in 2021, up from 208.2 thousand hectares in 2005, an increase of 146.9 percent. Although orchard productivity has increased from 62.3 quintal to 145.2 quintal or 2.3 times, productivity levels are still not very high. However, considering the fertile soil and climate in Uzbekistan's horticultural areas, along with the country's experience in fruit growing, trained specialists, and professional competence, it is possible to produce 200-250 quintal without significant investments. Additionally, it has been proven that yields of 400-500 quintal are achievable in small orchards.

In the Kashkadarya region, the productivity of gardens is significantly lower than the average in the republic. In 2005, farms in the region produced 75.6 quintal, which increased to an average yield of 115.8 quintal by 2021. Nonetheless, this indicator is still much lower than the republic's average of 20-22 percent.

According to the analysis, it has been observed that the cultivated area, which is the primary determinant of fruit production in the Kashkadar region and the Republic of Uzbekistan, has been gradually increasing each year. Specifically, the fruit cultivation area in the Republic of Uzbekistan is expected to reach 305.8 thousand hectares in 2021, which is significantly, 97.5 thousand hectares higher than the recorded in 2005. Moreover, the cultivated area for fruit production in the Kashkadar region is anticipated to increase by 8.8 thousand hectares, as indicated in figure 3.

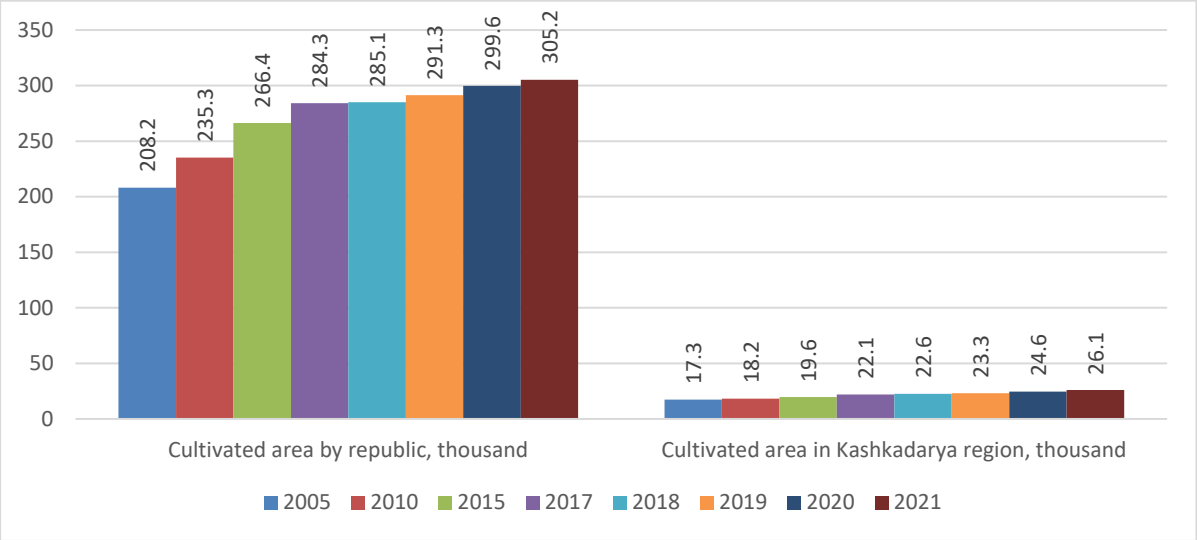

Figure 3.The dynamics of changes in the area of fruit cultivation in the Republic of Uzbekistan and Kashkadarya region in all types of farms (Statistics Committee of Uzbekistan 2022)

However, several reasons for the increase in productivity in the Kashkadarya region and the indicators of fruit and vegetable production in the republic. Firstly, the distance between horticulture and viticulture farms and traditional farming areas, combined with transportation issues, has reduced the appeal of investing in these industries. Additionally, horticulture and viticulture are labor-intensive industries that require specific soil and climate conditions, making it challenging to cultivate these crops in desert areas.

Furthermore, the development of horticulture and viticulture has been a focus for investment in the last 5-6 years, with the restoration and reconstruction of old gardens bearing fruit after a certain period of time. However, the location of most horticulture and viticulture sectors in the Kashkadarya region in arid and desert areas complicates the water problem and issue of water usage, with water shortages being a common problem in these areas.

Most of the existing gardens in Kashkadarya region are dying due to lack of water. Because most of the pumps are used to supply water to gardens in horticultural areas.

Therefore, along with the water shortage, high costs associated with the use of pumps (fuel, lubricants, electricity) also have a negative impact on water supply (Proportion of land statistic 2021).

Despite these challenges, there have been significant positive changes in fruit and vegetable production in the Kashkadarya region, with an increase in the area of vegetable crops and fruit cultivation between 2005 and 2020, as shown in Table 4.

Table 4.Proportion of land in the Kashka river region that is designated for growing vegetables and maintaining gardens. (Directorate of statistics of Kashkadarya 2021)

Indicators		By years								2021 to 2005 (%)
		2005	2010	2015	2017	2018	2019	2020	2021	
Fields (thousand ha)		337,7	337,9	332,7	332,8	338,6	416,0	418,1	421,7	124,9
Vegetables	Total	28,1	28,6	29,1	34,6	24,6	36,2	38,1	43,2	153,7
	Weight in the field, (%)	8,32	8,46	8,75	10,40	7,27	8,70	9,11	10,2	x
Gardens	Total	17,3	18,2	19,6	22,1	22,6	23,3	24,6	26,1	150,9
	Weight in the field, (%)	5,12	5,39	5,89	6,64	6,67	5,60	5,88	6,2	x
Resulting gardens	Total	15,2	17,2	17,7	19,4	18,3	18,9	18,9	20,1	132,2
	Total square, (%)	87,9	94,5	90,3	87,8	81,0	81,1	76,8	77,2	xx

The cultivation of vegetable crops has increased significantly in the Kashkadarya region, with the area of vegetable crops increasing from 8.3% in 2005 to 10.2% in 2021. This provides an opportunity for the region to develop its vegetable sector further. Additionally, an increase in the amount of orchards produced in the region has accelerated the return on investments made in the horticulture network.

Improving fruit and vegetable productivity in the Kashkadarya region is a vital step towards ensuring socio-economic efficiency. To achieve this, measures such as encouraging selection work in fruit and vegetable farming, improving the material and technical support of economic entities, and enhancing the quality of agrotechnical measures can be introduced.

These measures can take into account the soil conditions, climate, and characteristics of the vegetable varieties.

Analysis indicates that fruit and vegetable productivity in the Kashkadarya region has increased between 2005 and 2021. In particular, the productivity of vegetable crops increased by 128.1% from an average of 195.4 quintal to 250.3 quintal across all categories of farms in the region. Similarly, the productivity of gardens increased by 153.2 percent, from 75.6 quintal in 2005 to 115.8 quintal in 2021. However, there are variations in productivity indicators and dynamics of change across farms, agricultural holdings, and data centers (table 5).

Table 5.Changes in performance indicators of fruit and vegetable production in Kashkaraya region (Directorate of statistics of Kashkadarya 2021)

Indicators	Kashkadarya province according to the average fruit and vegetable sector		According to							
			Farms				Peasant farming			
	Vegetable yield (s/ha)	Productivity of orchards and fields (s/ha)	Vegetable yield (s/ha)	Compared to the average (%)	Orchard productivity (s/ha)	Compared to the average (%)	Vegetable yield (s/ha)	Compared to the average (%)	Productivity of orchards and fields (s/ha)	Compared to the average (%)
2005 year	195,4	75,6	187	95,70	95	125,66	190	97,24	125,6	166,1
2010 year	195,6	84,7	190	97,14	98	115,70	195	99,69	128,1	151,2
2015 year	199,0	81,7	195	97,99	99	121,18	200	100,50	150,3	183,9
2017 year	198,2	81,4	200	100,91	100	122,85	210	105,95	153,4	187,8
2018 year	176,4	80,7	220	124,72	102	126,39	225	127,55	159,9	198,1
2019 year	215,4	97,5	235	109,10	135	138,46	240	111,42	161,0	165,1
2020 year	212,7	98,6	236	110,95	107	108,52	241	113,31	145,3	147
2021 year	250,3	115,8	237	105,2	109	122,7	249	107,9	155	171,3
in 2021 compared to 2005 (%)	128,1	153,2	126,7	X	114,7	X	131,1	X	123,4	X

Despite the significant experience and opportunities in producing fruit and vegetable products in the Kashkadarya region, there are still challenges in ensuring local market availability and meeting the population's needs for products that meet medical standards. The

region's per capita production of vegetables and vegetable products is currently below medical standards. In 2005, the per capita fruit production in Kashkadarya region was 35.6 kilograms, which was only 62.6 percent of the established medical standard. However, by 2021, per capita fruit production increased to 91.2 kilograms, which represents 160.5 percent of the medical norms (Table 6).

Table 6.Changes in the amount of fruit and vegetable production per capita in the Kashkadarya region (Directorate of statistics of Kashkadarya 2021)

Analysis	Total production volume (tonnes)		Average per capita (kg)		Production per capita to medical standards compared to (%)	
	Fruits	Vegetable	Fruits	Vegetable	Fruits	Vegetable
2005 year	130,9	549,3	70,1	90,2	70,1	64,4
2010 year	154,3	559,6	70,2	90,1	70,2	64,3
2015 year	160,2	579,1	71	90,5	71	64,6
2017 year	180,1	685,9	72,0	92,4	72,0	66,0
2018 year	182,4	434,0	70,3	92,4	70,3	66,0
2019 year	227,2	780,1	73,1	92,9	73,1	66,3
2020 year	242,6	810,3	75,0	93,1	75,0	66,5
2021 year	244,1	820,2	75,3	94,0	76,0	67,8
in 2021 compared to 2005 (%)	186,5	149,3	107,4	104,2		

Additionally, the per capita production of vegetable products increased to 75.0 kilograms in 2021, up from 70.1 kilograms in 2005. Moreover, the level of supply compared to medical standards was 113.6 percent in 2005 and 181.1 percent in 2021, according to figure 4.

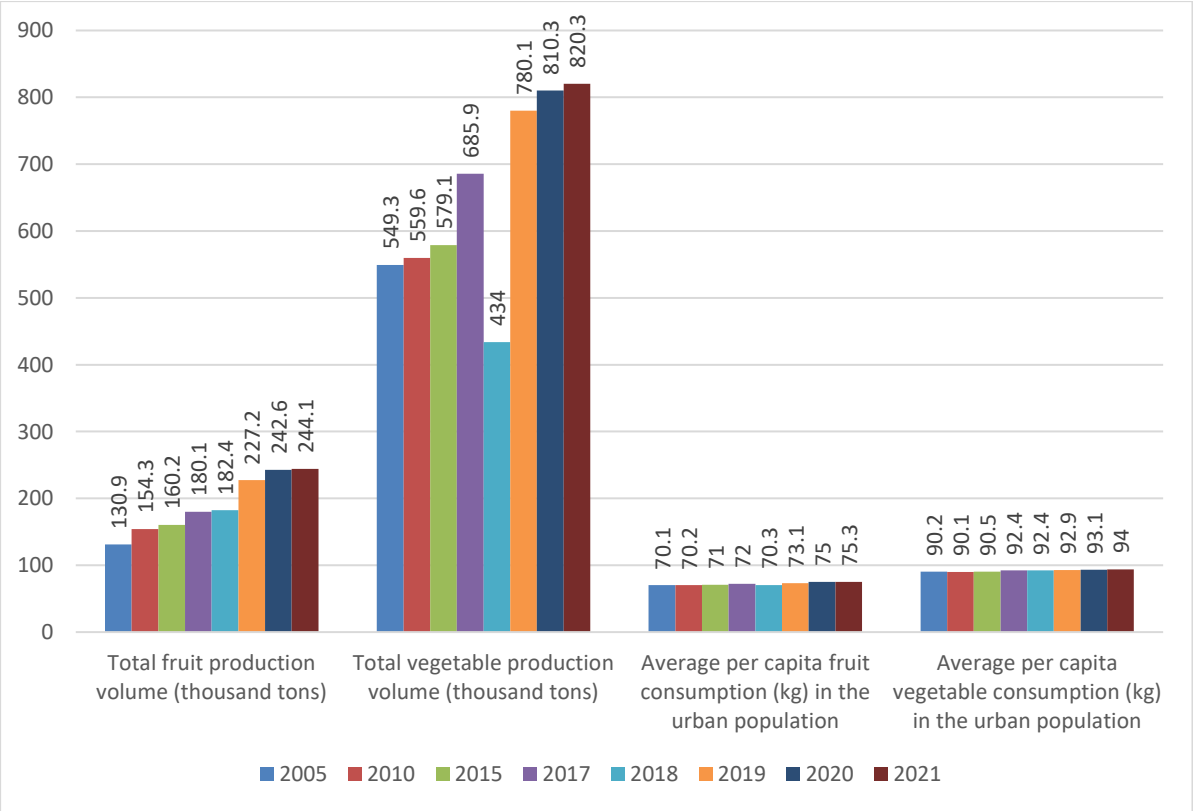

Figure 4.Per capita production of vegetables and fruits in the Kashkadarya province across all types of farms (Directorate of statistics of Kashkadarya 2021)

It is important to note that accurate statistical calculations of agricultural and livestock farm products are not always possible due to defects in the mechanism. This may lead to some production being excluded from the data. In the Kashka region, company farms specializing in horticulture and viticulture were reorganized into farms in 2006, but it took 5 years for the profitability of these farms to start changing. Fruit production damage rates in farms also varied over the years, with a rate of 40.9% in 2005, 6.0% in 2017, 14.5% in 2019, and 53.3% in 2021 (Table 7).

Table 7.Indicators of the economic efficiency of the farms operating in Kashkadarya region (Directorate of statistics of Kashkadarya 2021)

Indicators	Dimensionality	Years								In 2021 to 2005 (%)
		2005	2010	2015	2017	2018	2019	2020	2021	
Produced field	hectares	17,2	17,7	17,8	19,4	18,3	18,9	19,6	20,1	116,86
Development	tons	147	149	151	197,2	198,2	199,5	201,2	209,3	142,38
Product sales	tons	65	77	85	100	110	115	121	132	203,08
Average productivity	s\ha	85,4	84,1	86,7	88,2	101,6	108,3	105,	106,3	124,47
Total costs	mln soum	97,5	115,5	126,3	147,1	150,3	165,5	172,5	176,3	180,82
Better than selling	mln soum	45,5	53,9	60,8	68,3	70,1	77,3	80,5	82,4	181,10
Profit, harm(-)	mln soum	-39,9	-30,2	-65,5	-9,6	-31,6	-31,3	-25,0	-93,9	235,34
One quintal product cost	mln soum	66,3	77,5	83,6	97,9	76,2	83,5	86,5	87,6	132,13
One quintal product price	mln soum	70	70	72	70	70	70	70	68	97,14
Rate of return	%	-40,9	-26,1	-51,9	-6,5	-21,0	-18,9	-14,5	-53,3	130,32

Based on these figures, it is clear that the horticulture and viticulture sector in the Kashkadarya region is suffering from significant annual losses. The average farm size for horticulture and viticulture is 3.1 hectares, and the annual loss for a farm in 2021 is calculated to be 93.9 million uzbek soums (1euro equal to 12000 soums). Without a preferential credit system for farms, it is difficult for farmers to organize the purchase and production of resources for the next year. To cover expenses, farmers need to have independent funds that account for 60-70 percent of the expenses required for one hectare. This leaves a funding gap that can be filled by commercial credit or advance payments under contracts with buyers such as fruit and vegetable agro-firms. The low productivity of orchards and vineyards, along with non-yielding varieties and the need to restore partially abundant trees, are all contributing factors to the decrease in agricultural crop yield per hectare and in the economy as a whole.

Between 2005 and 2021, the area of orchards and vineyards in Kashkadarya region increased, however, a significant number of these gardens and vineyards were in need of restoration. In 2005, there were 17.3 thousand hectares of such gardens and vineyards, which

increased to 19.6 thousand hectares in 2015, 22.6 thousand hectares in 2017, and 26.1 thousand hectares in 2021. The large number of gardens and vineyards in need of restoration has led to decreased productivity and profitability in fruit growing.

3. Materials and Methods

The majority of fruits and vegetables produced in Uzbekistan are currently sold directly to consumers through agricultural trade systems and farmers' markets. This trend is likely to continue in the near future. However, improvements in the storage and processing of these products have only been made in the past 5-6 years.

To further develop the production, storage, and processing of fruits and vegetables, it is important to align production with market demands. Most of these products are grown by individual farms and gardens, which allows for high-quality products with relatively small investments. The economic efficiency of fruit and vegetable production is heavily dependent on meeting market demand and maintaining high product quality.

3.1. Fundamentals of cultivation and methods of cluster-cooperation and efficiency of fruit and vegetable production.

The economic efficiency of producing fruit and vegetable products can be determined by comparing the results obtained from the use of land, labor, equipment, and other resources against the costs incurred during production. Meanwhile, the social efficiency of these products aims to improve the working conditions of rural laborers, provide social and cultural services, increase employment opportunities, and enhance the overall well-being of people. To evaluate the production efficiency of fruit and vegetable products, various types of efficiency can be identified based on Figure 5.

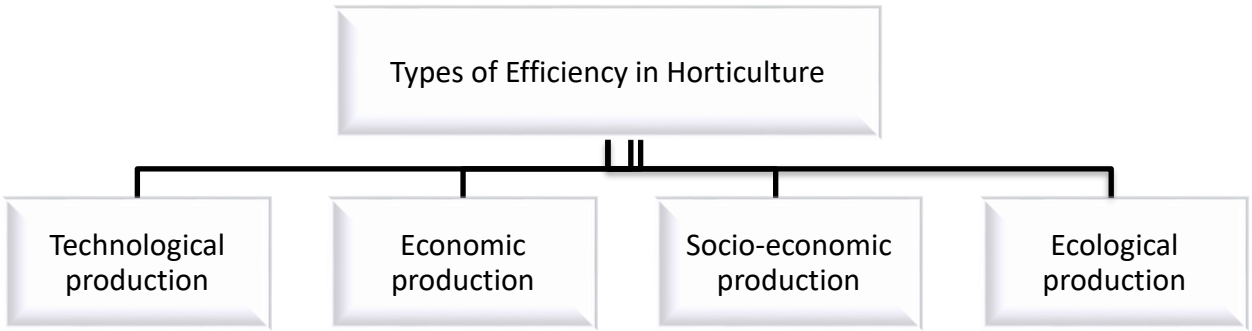

Figure 5.Various types of productivity in fruit and vegetable farming

The types of productivity indicated in the above classification can be further explained as follows:

1. Technical productivity: This type reflects the efficiency of using technological and production resources in fruit and vegetable farming. It is measured by a set of indicators that show the level of land, material, and labor resources used during the development process.

2. Economic and technological productivity: This type describes the overall impact of the economic mechanism on productivity and is measured using value indicators such as production costs, gross profit, profit, and others.

3. Socio-economic productivity: This type is derived from economic efficiency and describes the general efficiency of fruit and vegetable farming. Indicators such as production value per unit of land area, profit rate, rate of return, and others are used to measure this type of productivity.

4. Ecological productivity: This type describes the efficiency of producing agricultural products while taking into account the health of the agrofirm and the ecological impact on the environment.

The economic efficiency of fruit and vegetable products can be measured through production criteria and indicators. Criterion performance is a property that needs to be evaluated, where alternative options for the development of production are measured and assessed to achieve the desired goal.

In the market economy, the most important criteria for evaluating the effective performance of fruit and vegetable agro-industrial associations are illustrated in Figure 6.

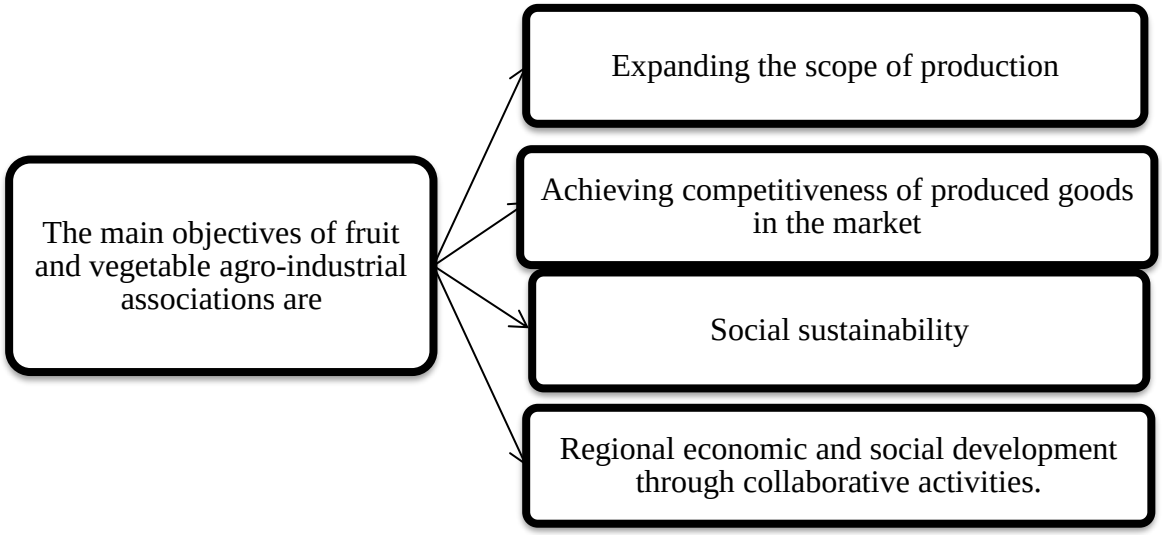

Figure 6.Primary factors considered by agro-industrial associations.

A methodology for assessing the economic efficiency of processing fruits and vegetables has been developed during this research, as outlined in Figure 7 and Table 8. This

methodology utilizes indicators as a means of supporting performance criteria, with economic efficiency being determined by comparing the impact and resources, while also taking into account other costs and impacts. Two distinct groups of descriptive indicators are used, one for the efficiency of practical resources (such as generalizing-resources, private-management, fund return, and labor productivity), and one for the efficiency of consumed resources (including current production costs, overall profitability, private costs, material intensity, and labor intensity).

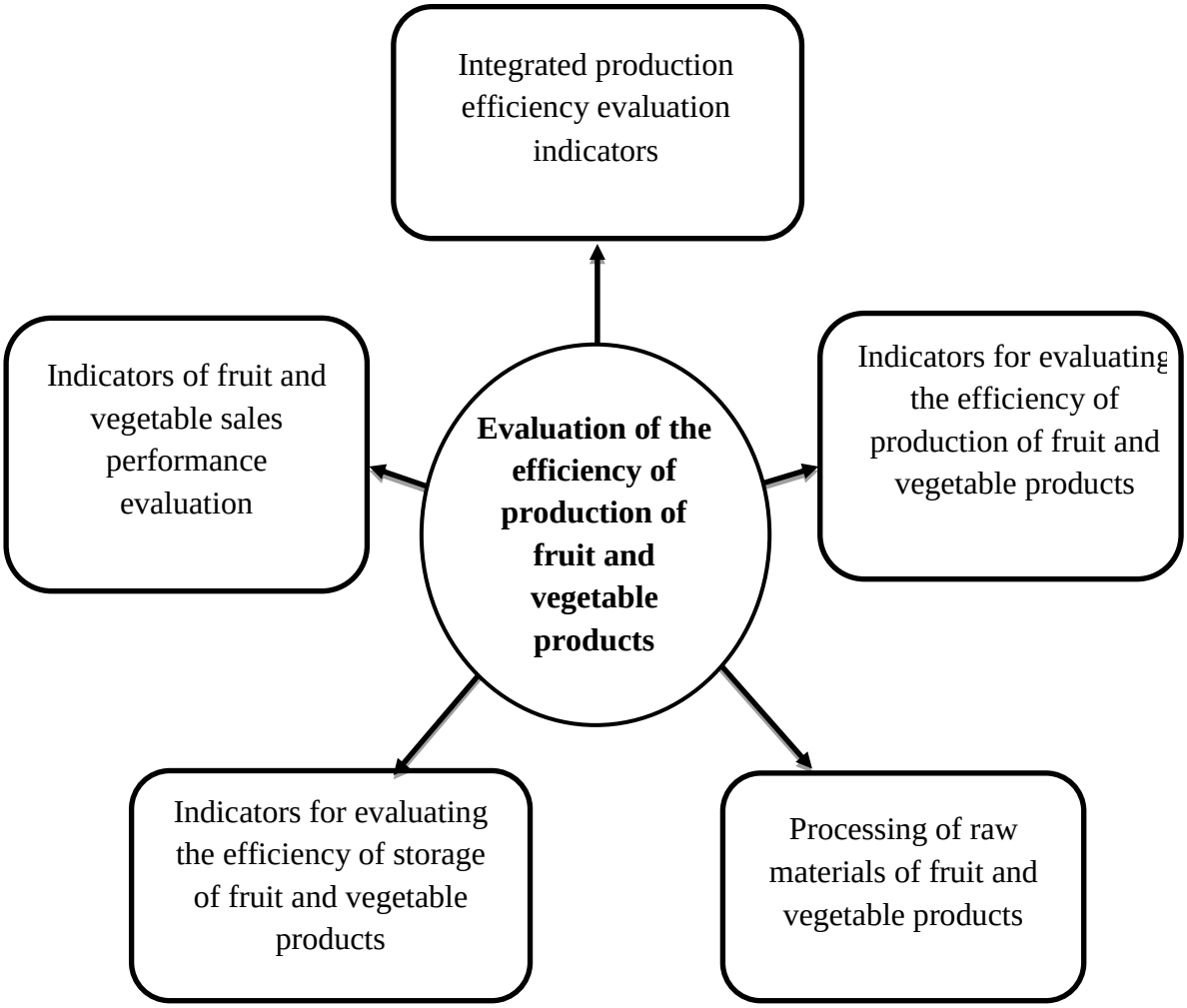

Figure 7.Indicators for evaluating the efficiency of production of fruit and vegetable products

Table 8 provides indicators for evaluating the efficiency of agro-industrial production in the fields of fruits and vegetables. Based on these indicators, a methodology for evaluating the efficiency of fruit and vegetable products has been developed. This methodology serves as an example of an algorithm and indicator system that can be used to determine the economic efficiency of various stages of integrated production, such as the production of fruit and vegetable products, raw materials, finished product production, and processing, specifically within the context of fruit and vegetable farming.

Table 8.Indicators for evaluating the efficiency of production of fruit and vegetable products

Indicators	**Indicators of results**
1. Integrated production efficiency evaluation indicators:	
gross income; profit in the reporting period, profit from sales; net profit; profitability; level of cost savings, profitability of fixed assets and others.	
2. Indicators for evaluating the production efficiency of fruit and vegetable products:	
Land use	volume of production of gross (commodity) products, profit, purity, cultivated area, crop productivity and others.
Use of development funds	fund return, fund capacity, capital intensity, working capital turnover ratio, working capital turnover continuity, material capacity.
Use of labor resources	Annual, daily performance, labor and productivity, utilization of labor resources and others.
Production of fruit and vegetable products	commodity-crop productivity, labor consumption for 1 ton of products, profit from 1 ton of products, profit from 1 hectare, level of profitability.
3. Indicators for evaluating the efficiency of processing raw materials of fruit and vegetable products:	
Consumption of raw materials per unit of final product, volume of raw materials of the final product, cost of producing 1 ton of products, profit from sales, level of net profitability.	
4. Indicators for evaluating the efficiency of storage of fruit and vegetable products:	
Coefficients of utilization of storage capacity, losses in the volume of stored products, material and technical costs, costs of product unit storage, profit from sales, profitability after storage.	
5. Indicators for evaluating the efficiency of heating fruit and vegetable products:	
The volume of fruit and vegetable products sales, the average hours worked by an employee, the labor capacity of the work performed, and the services provided in the field of product distribution; price of one product; average employee benefits.	

To improve the efficiency of fruit and vegetable farming, several measures can be taken. These include increasing production intensification capacity, adopting resource-saving production technologies, improving seed production, utilizing high-yielding medicinal plant varieties, optimizing the raw material zones around fruit and vegetable processing, and

reducing losses of fruit and vegetable products. Additionally, creating new varieties, complex processing of fruit and vegetable raw materials, improving marketing activities, rational placement of fruits and vegetables, cost-saving on raw materials, forming an integrated financial and settlement center, and optimizing the composition of participants in the fruit and vegetable sector are also important directions to consider.

3.2. Possibilities of increasing efficiency cluster and cooperetion of fruit and vegetable production.

In Uzbekistan, the government is investing in fruit and vegetable production to improve the agricultural economy and increase food security. The regulatory and legal bases for their activity are being improved, and a strategy of actions has been implemented to ensure stable and high growth rates of production. The development of fruits and vegetables, establishment of a cluster system for processing, and expanding effective mechanisms for organizing the sales market are important for increasing investment attractiveness and export capacity of the industry.

The area of vegetable crops is 189.7 thousand hectares, while the area of fruit and vegetable crops is 271.6 thousand hectares, and the area of vineyards is 114.5 thousand hectares. Most of the vineyards in the country belong to farms, and the average yield of vineyards is 138.2 centners per hectare. In many regions, the productivity of vegetable crops remains low due to insufficient use of modern agro-technologies. The concept of agricultural cooperatives has been adopted, and large-scale specialized cooperatives and clusters are being created to increase production and export of fruit and vegetable products, establish market gardens, and expand processing facilities.

The country is expanding its export capacity and developing new markets by transitioning to a cluster-cooperation system, which has been successful in other countries. A total of 47 fruit and vegetable clusters have been organized throughout the republic, and 13,500 hectares of land have been allocated to them. The clusters have facilities for freezer storage, sorting, calibration, processing, and sorting and packing shops. Some examples of successful clusters include "Shakhrisabzmeva-sabzavotagrofirma" LLC in Kashkadarya region and "Darmonfarma" fruit and vegetable private enterprise in Yakkabog district.

The main goal of creating fruit and vegetable cluster cooperatives in our country is to ensure the development of fruit and vegetable production and expand the production of high-quality and sustainable products. Uzbekistan has opportunities to increase the export of fruits

and vegetables to 2.5 billion dollars in 2023, and to 5 billion dollars in 2025. To achieve this, we need to focus on straightening crops, increasing productivity and income, avoiding wastages, storage of products, logistics issues, and export adjustment.

To develop the fruit and vegetable cluster-cooperative system, we need to implement agreements on the organization of fruit and vegetable clusters for production, processing, and export of fruit and vegetable products. We should choose processing and exporting organizations based on their experience and capabilities and employ untrained forces on product customization and processing. Connecting fruit and vegetable producers to fruit and vegetable cluster cooperatives and implementing product supply contracts between them, processing and exporting organizations, and the government is also important. Fruit-vegetable cluster cooperatives should arrange relations between producers, processing and exporting organizations through product supply contracts.

To support the production of fruit and vegetable products and the creation of their fruit and vegetable cluster cooperation, we should allocate loans to farmers, farms, and other producers for a period of 12 months with a preferential period of 6 months at an annual rate of 14 percent (including 2 percent bank margin) for the production of fruit and vegetable products. A 12-month "revolver" credit should also be allocated to fruit and vegetable processors, storage and exporters at an annual rate of 14 percent (including 2 percent bank margin) to replenish non-revolving funds required for the purchase of cultivated agricultural products.

Fruit and vegetable clusters (cooperatives) and farms without an export contract should have 50 percent of the calculated insurance premium, but not more than 1 percent of the insurance money used in the fruit and vegetable crop risk insurance service, covered. In this case, the insurance premium cannot exceed 70 percent of the value of the insured product. We should also attract qualified agronomists, entomologists, and laboratory specialists from abroad to fruit and vegetable clusters (cooperatives) and establish orchards for producers attached to fruit and vegetable clusters. Conducting seminars and training on the production of fruit and vegetable products is also important.

Finally, we need to implement a system connecting the developer-cluster-cooperation-storage enterprise-manufacturing enterprise-refiner and exporter to ensure the competitiveness of our country's fruit and vegetable industry.

Table 9.Organization of fruit and vegetable clusters in the Republic of Uzbekistan, investment projects on the organization of refrigeration capacities to be implemented in 2022 (Decision No. PQ-52 of the President of the Republic of Uzbekistan 2022)

№	Name of territories	Investment projects		*From this:*					
				II quarter		*III quarter*		*IV quarter*	
		the number	*thousand t*	*the number*	*thousand t*	*the number*	*thousand t*	*the number*	*thousand t*
1.	Republic of Karakalpakstan	5	2,6					5	2,6
2.	Andijan region	7	10,2					7	10,2
3.	Bukhara Province	4	3,5			1	1	3	2,5
4.	Jizzakhviloyati	6	5,6			2	1,4	4	4,2
5.	Kashkadar province	3	2,6					3	2,6
6.	Navoi province	5	7					5	7
7.	Namangan Province	12	12,2					12	12,2
8.	Samarkand province	3	3					3	3
9.	Surkhandarya province	13	14,1	4	4,6	4	4,2	5	5,3
10.	Syrdarya province	2	1,7	1	1	1	0,7		
11.	Tashkent region	4	6,1	2	3,7	2	2,4		
12.	Ferghana province	6	6,8	3	3,3	2	2	1	1,5
13.	Khorezm region	3	2,6			1	1	2	1,6
Total		**73**	**78**	**10**	**12,6**	**13**	**12,7**	**50**	**52,7**

The following are scientific proposals and recommendations for the development of fruit and vegetable cluster cooperation in Uzbekistan:

1. Renewal of productive orchards.

2. Cultivation of soil-climatic intensive fruit trees and saplings to support agricultural development.

3. Encouragement of fruit and vegetable innovators and organizers, protection of business entities engaged in seed and horticulture, and creation of a mechanism for the certification of sprouts and seedlings.

4. Importation of varieties of vegetables suitable for the soil and climate conditions of the republic from countries with developed seed production.

5. Creation of highly productive, cold-resistant, and seedless varieties of fruits and vegetables, and introduction of promising varieties.

6. Development of a procedure aimed at improving the fruit and vegetable farming system.

7. Localization of production of special techniques used in vineyards in the republic for the purpose of improving agrotechnical activities in fruit and vegetable cultivation, and creation of a delivery contract based on leasing under long-term preferential conditions.

8. Ensuring that newly organized orchards are created on the basis of clean and virus-free plants.

9. Ensuring quality production of fruit and vegetable farms with the implementation of modern agrotechnical measures.

The main directions for the development of fruit and vegetable cultivation in Uzbekistan are:

1. Identifying the most suitable fields in favorable areas for specialization in fruit and vegetable cultivation.

2. Developing grape growing as a national culture based on the national agricultural culture and values of the Uzbek people formed over the centuries.

3. Encouraging the creation of added value chains in the field of fruit and vegetable cultivation in large areas, cluster and cooperation methods, grape storage, sorting, and processing.

4. Creating national brands of fruit and vegetable varieties and expanding exports to new markets.

5. Establishing the Republican Competition held in the fruit and vegetable field in the following categories: "best grape variety", "best intensive vineyard", "best green grape variety", "best wine product", "best vegetable variety", "best intensive vegetable variety", and "best vegetable variety".

6. Establishing business plans or technical-economic based on the implementation of investment projects on fruit and vegetable cultivation, packaging, sorting, processing, and resource-saving technologies.

7. Ensuring availability and financial stability of infrastructure facilities necessary for operation (on the basis of ownership or use or full ownership), as well as qualified personnel and other means.

8. Developing a fruit and vegetable scientific school with the goal of creating new productive, grain-free varieties of fruit and vegetables in a scientifically based manner, and establishing an organic integration of science and production.

9. Organizing viticulture and vegetable clusters for the purpose of creating a full cycle of fruit and vegetable cultivation, drying, packaging, processing, production, and export of finished products based on the soil and climate conditions of the regions.

10. Creating business-planning or technical-economic foundations from the implementation of investment projects on fruit and vegetable cultivation, packaging, sorting, processing, and introduction of resource-saving technologies.

11. Ensuring availability of infrastructure facilities (on the basis of ownership or use or full ownership), as well as qualified personnel and other means, and financial stability for operation.

4. Results and Discussion

4.1. Analysis of fruit and vegetable cluster-cooperation and indicators for evaluating its efficiency.

In the Kashkadarya region, some farmers and LLC owners who specialize in vegetable growing have achieved notable economic results. For instance, "ArsenalNurBaraka" LLC began its operations in the fall of 2005 with just a 1-hectare orchard. However, by 2010, the company's revenue had increased to 19 thousand soums, and by 2015, it had reached 158.7 thousand soums. In 2019, the company's revenue had grown to 1,417 thousand soums, thanks to the expansion of its orchard to 2.5 hectares. In 2021, the company achieved a profit of 4,741.6 thousand soums, with a profitability level of 3.16%. The company also received 2,804.1 thousand soums from its 0.5-hectare vegetable plot. (Table 10 and Table 11)

Table 10.Economic indicators of the cultivation of Yakkabog in Kashkadarya region by "ArsenalNurBaraka" LLC (Statistical Department of Yakkabog District 2022)

Indicators	Years								2021 year 2005 %
	2005	2010	2015	2017	2018	2019	2020	2021	
Gardens and Vineyards (ha)	1,0	1,2	1,5	2,0	2,2	2,5	2,5	3,0	300,00
Productivity (s/ha)	115,6	123	125,0	130,0	132,3	135,0	136,1	137,2	118,69
Gross yield (tons)	11,56	14,76	18,75	26,0	29,116	33,75	34,02	41,16	356,06
Gross product value (thousand soums)	3818,27	7636,54	17628,38	29120	3796,726	70875	108864	197568	5.2 times
Total costs amount (thousand soums)	3627,357	7101,982	16041,83	25334,4	3265,184	56700	86982,34	150151,7	4.1 times increased
Reported on product sales pure (thousand soums)	19,09	53,46	158,66	378,56	53,15	1417,50	2188,17	4741,63	2.5 times increased
Cost-effectiveness ratio (%)	0,53	0,75	0,99	1,49	1,63	2,50	2,52	3,16	XX

Table 11.Economic indicators of vegetable production at "ArsenalNurBaraka" LLC in Yakkabog, Kashkadar region (Statistical Department of Yakkabog District 2022)

Indicators	Years								2021 year 2005 %
	2005	2010	2015	2017	2018	2019	2020	2021	
Vegetable garden	0,5	1,0	2,0	2,5	2,5	2,7	2,8	2,8	5.6 is tired
Productivity (s/ha)	160,5	180,6	200,7	225	226,8	230,3	231,4	235,6	1.5 times
Gross yield (tons)	8,03	18,06	40,14	56,25	56,7	62,18	64,79	65,97	8.2 times increased
Gross product value (thousand soums)	2810,5	13725,6	44154	64687,5	68607	81455,8	93945,5	102253,5	3.6 times increased
Total costs amount (thousand soums)	6,42	13,55	29,70	41,06	40,82	43,53	44,06	44,20	6.9 times increased
Reported on product sales pure (thousand soums)	2804,08	13712,06	44124,30	64646,44	68566,18	81412,27	93901,44	102209,30	3.6 times increased
Cost effectiveness rate (%)	0,23	0,10	0,07	0,06	0,06	0,05	0,05	0,04	XX

The amount of fruit and vegetables consumed by a family during their annual holiday in a 2.8-hectare vegetable garden owned by "ArsenalNurBaraka" LLC cannot be calculated. However, including this business as an additional source of income may contribute to its financial stability.

Fruit and vegetable markets are saturated, and despite the population's demand for these products, prices at farmers' markets often do not cover production costs. Therefore, there is a need to explore opportunities to export locally-grown products and create value chains for fruit and vegetable farms through production and processing.

Processing companies are currently facing difficulties in selling fruit and vegetable products due to low prices, inconsistent product acceptance, and delays in product orders. This leads to a decrease in the effective use of production capacities and dissatisfaction among product manufacturers.

To reduce the price of vegetable products, processing plant managers are selling products cheaper than farmers, which may be economically beneficial in the short term. However, it can reduce the reliability of farmers as long-term suppliers. Therefore, evaluation indicators for fruit and vegetable products have been developed to determine their economic efficiency.

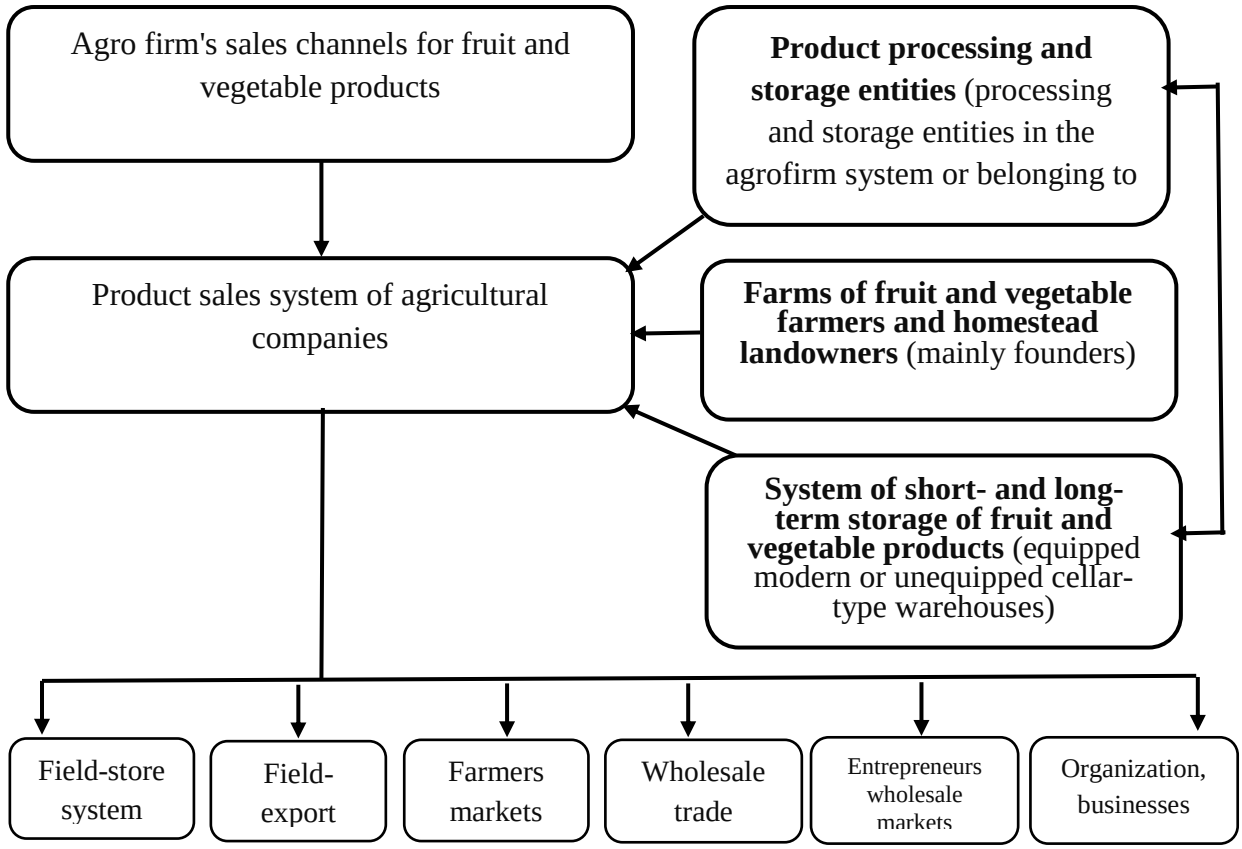

Figure 2.Sales channels of fruit and vegetable products formed in the framework of agro-firms

The evaluation indicators for fruit and vegetable products consist of five stages: fruit and vegetable production, economic performance indicators during product storage, fruit and vegetable processing, sale of fruit and vegetable products, and vegetable cooperation. These indicators were determined using both traditional and cooperative methods.

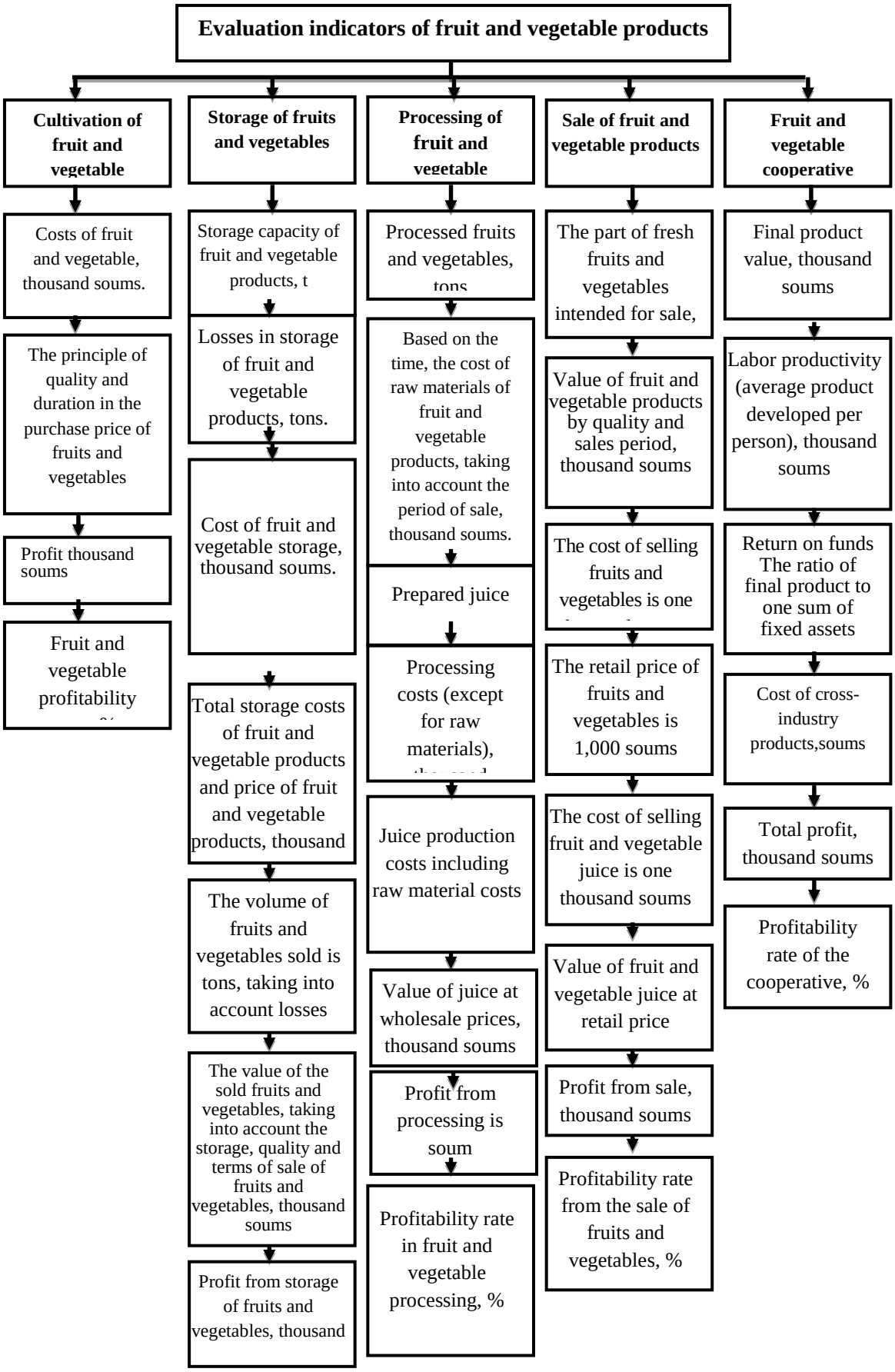

Figure 3.Evaluation indicators of fruit and vegetable products

Table 12.Analysis of indicators of fruit and vegetable cluster-cooperation and its effectiveness in Kashkadarya region (2023)

№	Indicators	Methods		Difference (+; -)
		Traditional	Cluster-cooperation	
1. Production of fruit and vegetable products:				
1.1	Production costs (million soums)	192,7	1280,0	1087,3
1.2	Taking into account the principle of quality and timeliness of the income reported in the product sales account (million soums)	480,3	5184,0	4703,7
1.3	Profit (**+)** (million soums) Loss **(-)** (million soums)	287,6	3904,0	3616,4
1.4	Profitability %	149,2	305,0	2.0 times increased
2. Storage of fruit and vegetable products:				
2.1	Product storage capacity (tons)	80,0	720,0	640
2.2	Product storage losses (tons)	1,2	11,5	10,3
2.3	Product storage costs, million soums.	3,2	36	32,8
2.4.	Product cost of products stored (mln soum)	320,0	3600,0	3280
2.5	Costs of product assembly and value of fruit and vegetable products (thousands)	323,2	3636,0	3312,8
2.6	Total of products sold after taking into account losses during the intervening period	78,8	708,5	629,7
2.7	Taking into account the periods of price reduction and quality improvement of sold products, thousand soms	630,4	10627,5	9997,1
2.8	Profits from product storage, thousands	307,2	6991,5	640
2.9	Profitability %	95,0	192,3	2 times more
3. Recycling of fruit and vegetable products:				

3.1.	Tons of recycled products	40	160	120
3.2	The raw value of the products, taking into account the period of sale, mlns.	60,0	208,0	148
3.3	Tons of prepared juices	12,0	48,0	36
3.4	Processing costs (excluding raw materials), mln.	21,1	84,4	63,3
3.5	Juice production costs after taking into account the costs of raw materials	81,1	292,4	211,3
3.6	Price of juice at wholesale prices, million	192,0	768	576
3.7	If you benefit from recycling	110,9	475,6	364,7
3.8	Rate of return, %	136,7	162,6	1.19 times increased
4. Sale of fruit and vegetable products				
4.1.	Is it intended for sale of new products, million tons	38,8	548,5	509,7
4.2.	The price of products according to the terms of product quality, mlns	620,8	8776,0	8155,2
4.3	Costs of selling products.	19,8	279,7	259,9
4.4.	Information on the terms of retail pricing of products	310,4	4388,0	4077,6
4.5	The juice of the products is the cost of production	3,4	9,6	6,2
4.6	The retail value of the juice of the products	168,0	672,0	504
4.7	Profit from the sale of products, million	374,1	4478,3	4104,2
4.8	Rate of return, %	51,6	769,8	14.9 times increased

5. Fruit and vegetable cooperative				
5.1	Final product value, mln. soum	478,4	5060,0	4581,6
5.2	Labor productivity (average output per person), mln. soum	68,3	88,8	20,5
5.3	Return on investment is the ratio of the capital to the actual product	1,51	1,62	0,11
5.4	Cost of network products, thousands	540,2	1689,7	1149,5
5.5	Total profit, mln. soum	238,2	3370,3	3132,1
5.6	The level of profitability of cooperation, %	99,6	199,4	2 times more

By analyzing the operational principles and status of fruit and vegetable farms in Kashkadarya province, it can be observed that in 2017 there were a total of 23,846 farms operating in the region. In 2018, this number increased to 26,682, and in 2019 it further rose to 28,332 farms. However, in 2020, the number of farms operating in the region drastically increased to 21,283 according to Table 13.

Table 13.The dynamics of changes in the number of fruit and vegetable farms operating in the Kashkadarya region

Name of districts	Years										2021 year as of 2017, %
	2017	Total, %	**2018**	Total, %	**2019**	Total, %	**2020**	Total, %	**2021**	Total, %	
Guzor	924	3,87	1016	3,81	1248	4,40	1218	5,72	1381	5,32	149,5
Kashka	1593	6,68	1678	6,29	1970	6,95	1425	6,70	1698	6,55	106,6
Koson	2192	9,19	2752	10,31	3228	11,39	2358	11,08	3187	12,28	145,4
Kamashi	1596	6,69	1709	6,41	1754	6,19	1234	5,80	1447	5,58	90,7
Kitob	3961	16,61	3900	14,62	3580	12,64	3031	14,24	3573	13,77	90,2
Mirishkor	1532	6,42	1762	6,60	1874	6,61	1276	6,00	2021	7,79	131,9
Muborak	664	2,78	748	2,80	807	2,85	652	3,06	819	3,16	123,3
Nishon	1691	7,09	1953	7,32	1773	6,26	1319	6,20	1847	7,12	109,2
Kasbi	1626	6,82	1790	6,71	1982	7,00	897	4,21	1117	4,31	68,7
Chiroqchi	1843	7,73	2252	8,44	2597	9,17	2278	10,70	2605	10,04	141,3
Shahrisabz	3301	13,84	3417	12,81	3363	11,87	2480	11,65	2736	10,55	82,9
Yakkabog	1871	7,85	2402	9,00	2676	9,45	1404	6,60	1637	6,31	87,5
Dehqonobod	985	4,13	1207	4,52	1297	4,58	1443	6,78	1362	5,25	138,3
Shaxrisabz			96	0,36	86	0,30	128	0,60	149	0,57	
Total	**23846**	100	**26682**	100	**28332**	100	**21283**	100	**25943**	100	108,8

If we analyze the cross-section of the Kashka region, it can be observed that in 2017 there were 1,871 farms operating in the Yakkabog district. However, by 2021, this number had decreased to 1,637 organizations, marking a decrease of 87.5%. In the Kitab district, there were 3,961 farms active in 2017, but by 2021, the number had decreased to 3,575 farms, which is a decrease of 90.2%.

In coordinating the activity of fruit and vegetable production, processing, and improvement entities, the trade sector plays a crucial role as the closest link to the consumer. It is necessary to implement a cooperation system that can place orders for new or recycled quality products from producers and deliver the products to the buyers.

Today, cooperatives for fruit and vegetable products are achieving excellent results in production, storage, and processing. The emergence of such cooperatives can be facilitated through economic tools in the field of cooperative cooperation.

In analyzing the production, storage, and processing of fruit and vegetable products, several issues were identified. The lack of control and enforcement mechanisms among cooperative entities during the production, processing, and sale of these products results in low-quality goods and reduced profits. To address this, agro-industrial companies should establish an economic mechanism that fosters beneficial connections between fruit and vegetable growing, storage, and processing facilities, as well as structures that serve these sectors and product exporting sectors. However, the monopolization of processing enterprises hampers the economic efficiency of these companies. Additionally, half of the fruit and vegetable farms are not interested in cooperative relationships, which further reduces the efficiency of these activities. The quality assurance system for transportation and logistics is also crucial for producing sustainable products. These findings were incorporated into a SWOT analysis (Fig. 10) as part of the economic evaluation of cooperation relations between agricultural and vegetable products in the country.

INTERIOR		EXTERIOR
	S **POWER SUPPLIES**	**OPPORTUNITIES**
POSITIVE	• fruit and vegetable cultivation is carried out by entities based on private property; • introduction of free market mechanisms in the production of fruit and vegetable products; • Adoption of the Presidential Resolution in 2019 on the organization of cooperatives in the field of fruit and vegetable production (March 14, 2019, No. PQ-4239); • Adoption of the Presidential Resolution in 2021 on the development of family business in fruit and vegetable growing and viticulture, increasing the share of farms in agricultural production (October 23, 2021, PQ-20) • Adoption of the Presidential Decree in 2021 on state support of the fruit and vegetable sector, development of the cluster and cooperation system in the network (December 15, 2021, Resolution No. PQ-52) • due to the large number of farms producing fruit and vegetables and the economic resilience of the region, it is necessary to carry out a simple operation for cooperation; • the rich experience of our farmers in the production of fruit and vegetable products.	✓ to increase the area of vegetable plants and orchards, vineyards to stimulate the development of production due to the decrease of cotton and small cultivated areas; ✓ adoption of many legal documents aimed at developing the fruit and vegetable industry; ✓ Establishment of the "Horticulture and Horticulture Development Agency" under the Ministry of Agriculture (March 20, 2019, PQ-4246); ✓ expansion of practical activities aimed at the development of science and commercialization of preparations in the field of vegetable crops and horticulture.
	W **THE WEAK**	T **THREATS**
NEGATIVE	• the organizational and economic complexity of involving them in cooperation with farms and orchards growing the main part of fruits and vegetables; • the scattered location of fruit-vegetable farms and farmers and the small volume of the product make the product preparation system difficult; • complexity of implementation of modern science and innovative technologies of small-scale farms and farms; • lack of practical experience in organizing the cooperation process based on free market principles and mechanisms.	✓ the possibility of reducing the importance of the food industry due to participation in the administrative interventions on the activity of agriculture and cooperatives; ✓ due to the lack of the necessary market infrastructure, the trust of the founders of cooperatives and other entities in cooperatives and their membership; ✓ the lack of development of contractual relations in terms of content and essence, the weakening of internal and external organizational-economic and social relations in the operational system, the possibility of a decrease in the socio-economic efficiency of cooperatives, the existence

Figure 4.Evaluating the sales of fruit and vegetable products, as well as the conditions for developing operations in this sector

According to research, the development of cooperative relationships between fruit and vegetable producers is facing several challenges. Administrative interventions, inadequate market infrastructure, and decreasing trust and membership among founders are threatening the nutritional content and overall health of the industry.

Additionally, the complexity of involving small-scale farmers in cooperation with larger farms, the scattered location of fruit and vegetable farms, and the difficulty of implementing modern technologies further complicate the situation. However, it is crucial to establish cooperatives for the production, storage, processing, and sale of fruit and vegetable products to increase productivity and benefit the agricultural sector, individual producers, and society as a whole.

4.2. Directions to advance of fruit and vegetable production and enhance resources in the upcoming period

Our country has favorable natural and climatic conditions for producing agricultural products that are import-substituting, export-oriented, environmentally friendly, renewable, and rich in beneficial elements for human health. This has become a priority issue in the transition to a free market economy, as it improves the country's foreign exchange reserves through production, processing, and sale of these products. To achieve this, a cooperative chain for fruit and vegetable production needs to be established, covering all stages from seed production to marketing. However, seasonal and vegetable producers are facing various challenges, as shown in Figure 11. The government has been implementing measures to improve the management system of horticultural farms, provide effective state support, encourage cooperation in fruit and vegetable growing, and increase the production of high-quality, export-oriented products using resource-saving technologies. These efforts have been supported by several decrees and resolutions.

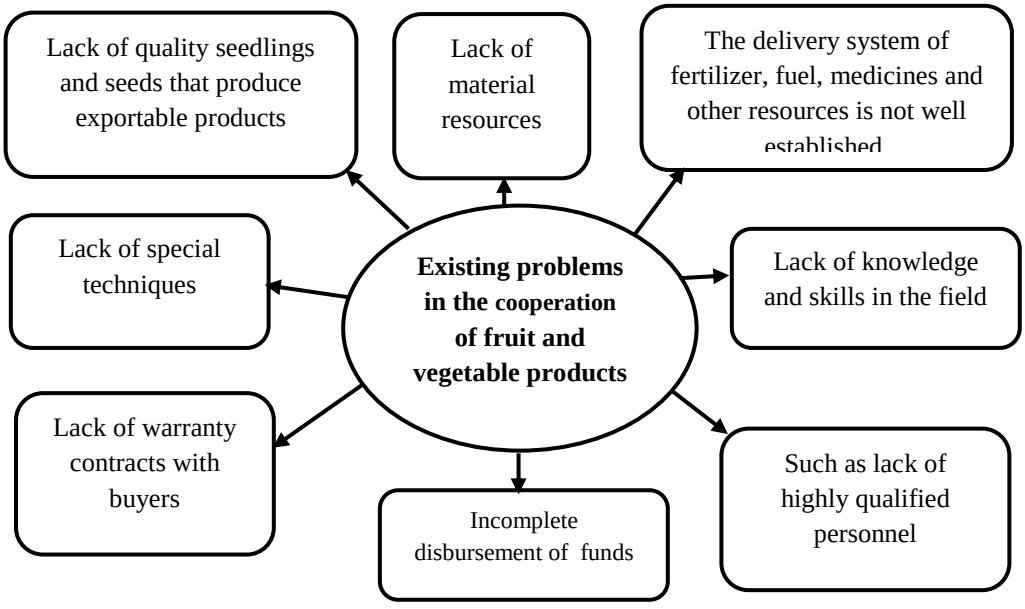

Figure 5.Problems in cooperation of fruit and vegetable products

There are significant shortcomings in the storage, processing, and export of seasonal and vegetable products in our country (Fig. 12). To address this, we can look at the percentage of fruit and vegetable production and processing cooperatives in other countries. For instance, Denmark has an indicator of 47-90%, the Netherlands has 65-82%, Germany has 30-65%, France has 35-75%, and Great Britain has 19-55% percentages of fruit and vegetable production and processing by cooperatives. Currently, cherries, apricots, plums, pomegranates, grapes, almonds, and citrus fruits are in high demand in world markets and contribute significantly to our country's export revenue. To further develop our efforts in Busoha, we should consider transitioning to a cooperative system, which has proven effective in other countries. The ongoing reforms in our republic have resulted in the formation of 47 fruit and vegetable clusters and the allocation of 13,500 hectares of land to them.

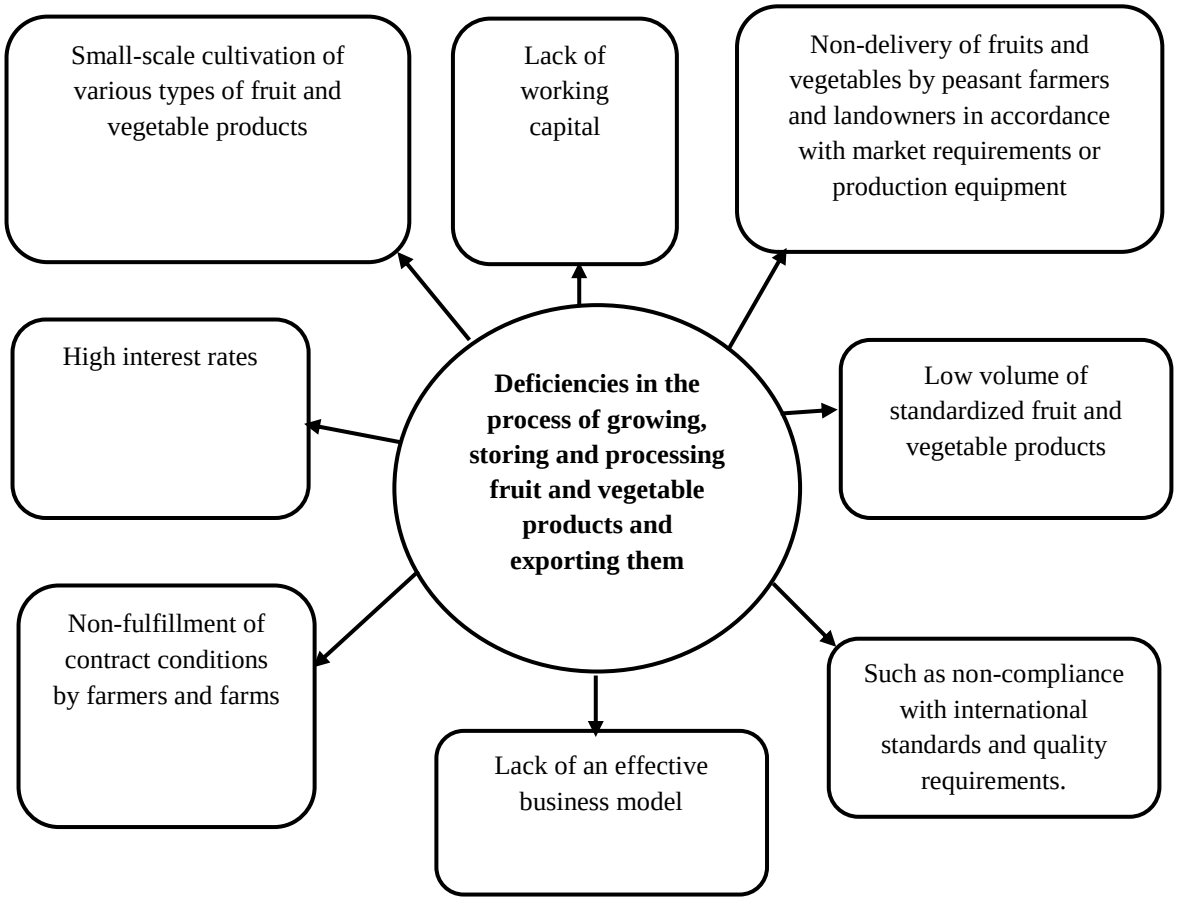

Figure 6.Shortcomings in the process of production, storage, processing and export of fruit and vegetable products

The specialized cluster includes various facilities such as cold storage, sorting, calibration, laboratories, and fruit and vegetable processing farm. Additionally, there are

examples of specific companies with varying amounts of land, such as "Shahrisabzmeva-sabzavotagrofirma" LLC with 70 hectares, "Darmonfarma" fruit and vegetable private enterprise with 1048 hectares, and "Kamashitomorkhaizmati" LLC with 70 hectares. The goal of establishing these clusters in all districts is to support the adoption of the decision "on activities," which aims to increase the added value estimate for inter-processing and export. Cooperatives are being formed by competent export processing and processing enterprises within this framework, which will provide the infrastructure for placing, processing, and storing high-yielding export orchards, replacing unproductive ones.The proposed actions to facilitate the production, storage, processing, and export of fruit and vegetable products are:

1. Implement the organization of fruit and vegetable cluster cooperation based on contracts.
2. Select storage, processing, and exporting organizations based on their experience and capabilities. Prioritize utilizing under-utilized capacities for product customization and processing.
3. Establish fruit and vegetable cooperatives with producers of these products, and implement product supply contracts between them, processing and exporting organizations, and the government.

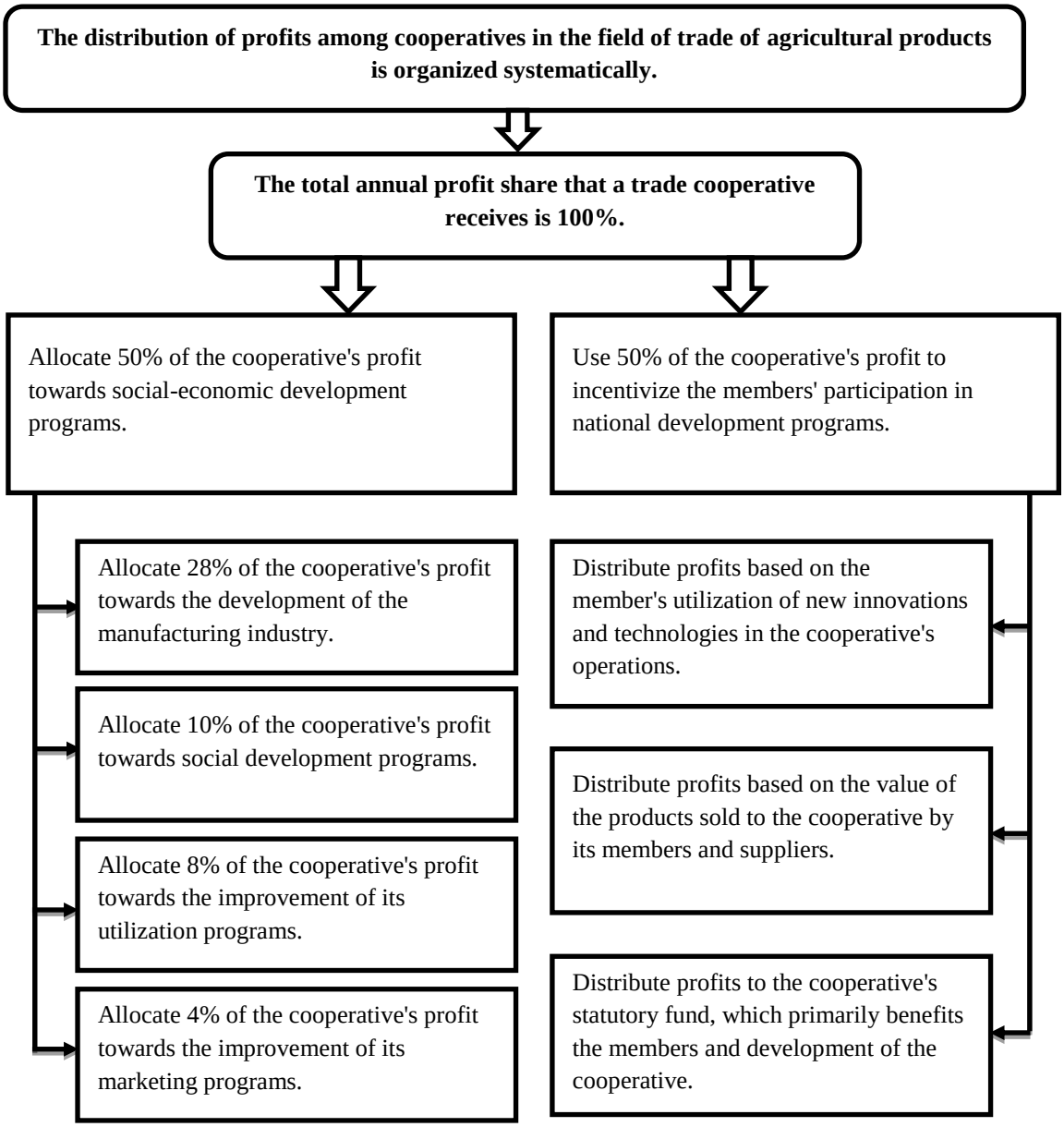

Figure 7.System of distribution of results of trade and production activity of the cooperative (recommendation)

The recommended method for distributing funds from the "Share Incentive Fund" among founders is as follows: a) Determine the amount of each founder's share in the cooperative's charter fund. b) Determine the quantity and quality of products sold by each individual founder to the cooperative. The quality of the product should be taken into account along with the quantity when determining the founder's share.

After conducting research, it is recommended that the state address the following issues in the development of the fruit and vegetable product sales field. These issues should not only be seen as problems requiring state solutions in the product sales field, but also as measures to support the sector (see Fig. 13).

State support for fruit and vegetable product sales should be implemented through the following three groups:

1. Legal promotion of fruit and vegetable product sales development, including the creation of legal frameworks by the state and the development of control mechanisms to ensure compliance.

2. State incentives, such as customs privileges for importing technology and equipment, and procurement of energy-saving techniques and technologies (e.g. water-saving techniques and related technologies, components for these techniques, and techniques for processing economical fruits and vegetables).

3. Provision of financial support, including the creation of development funds, credit and guarantee funds, and subsidies for certain areas of activity in the fruit and vegetable sector.

4.3. Cooperation in the fruit and vegetable industry in the context of economic modernization

The country is implementing various measures to attract funds from international financial institutions to improve the fruit and vegetable sector. These measures include increasing the area of production, storage and processing capacity, and developing a network for these products. The President of Uzbekistan has issued decisions to develop agricultural cooperation for fruit and vegetable production, which include marketing analysis, organization of production, transportation, and ensuring guaranteed markets for these products. The country is also organizing clusters in all regions to increase export and added value, and it aims to export 2.4 million tons of fruit and vegetables in 2020. The competitiveness of fruit-vegetable and grape products needs to be increased, and directions for this can be determined based on Figure 14.

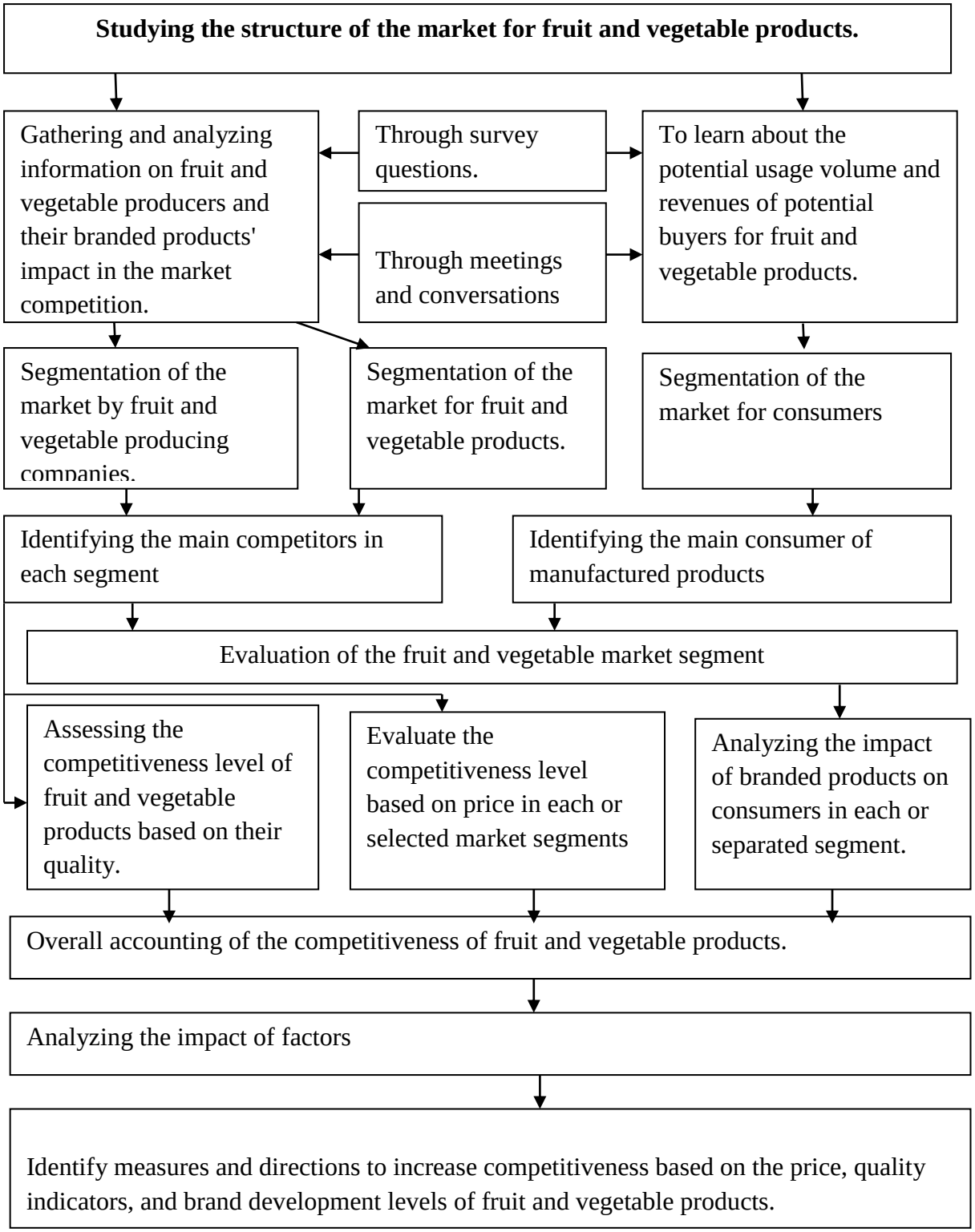

Figure 8.Evaluation classification of the competitiveness of the market of fruit and vegetable products

The aim is to encourage cooperative relationships between members of agricultural cluster-cooperative associations and participants of fruit-vegetable cluster-cooperatives by

providing financial support for the creation of new orchards, vineyards, and greenhouses, and loans for product storage and processing facilities. The state fund for the support of business activities will consider providing non-revolving funds and compensation for the interest rate on loans up to 20 billion soums, as well as guarantees in the amount of 50% of the loan amount. Banks financing projects for the organization of intensive orchards are recommended to determine a preferential period for the main loan until the orchards are in production. Subsidies will also be allocated to cover a portion of the costs of selling intensive seedlings and locally grown seedlings. Scientific research has shown that there are opportunities for fruit and vegetable production and cooperation in Uzbekistan, and practical proposals for the sector's development have been made. Particular, practical proposals for the development of fruit and vegetable production in Uzbekistan include organizing orchards and productive vegetable species, determining economic efficiency of replacing old orchards with new intensive ones, efficient land use and renewal of non-productive orchards, establishing specialized farms, intensifying production by expanding cultivated areas and introducing new innovations, and organizing fruit and vegetable cluster cooperation. In order to expand production and export high-quality products to foreign markets, the government is supporting the creation of agricultural clusters through initiatives such as the 2018 decree "On additional measures for the further development of fruit and vegetable production in the Republic of Uzbekistan". To succeed in the global market, it is important to analyze internal strengths and opportunities and external risks and opportunities in the fruit and vegetable industry.

The Uzbekistan government is implementing measures to develop new markets and export directions for various agricultural products, such as fruits and vegetables, grapes, sugarcane, legumes, as well as dried vegetables and fruits. The focus is on organizing and developing agro-industrial clusters in the private sector, reorganizing economic activities, and promoting integration processes in terms of quality, based on the experiences of other countries.

To expand production, storage, processing, and export of agricultural products, the Ministry of Agriculture is working with the agency "Uzstandart" to provide complex services and ensure that products meet international standards. The ministry conducts inspections on implementation in farms and agro-clusters to ensure compliance with standards like "Global GAP," "Organic," "Halal," "HACCP," and "ISO 22000."

The government is also promoting the implementation of modern agro-technologies, such as drip irrigation, to increase productivity, and minimize the use of mineral fertilizers.

These measures are being implemented in various regions of the country, including Andijan, Namangan, Navoi, Samarkand, Kashkadarya, and Surkhandarya.

In Uzbekistan, it is important to coordinate all aspects of the vegetable industry towards a common goal. This includes developing mutually beneficial economic relationships between production and processing companies, and adopting a new modern approach to organizing agribusiness through clustering with processing industries. Integration in the form of agro-industry clusters allows for the establishment of mutually beneficial organizational and economic relationships between fruit and vegetable networks, both domestically and internationally.

To support the intensive development of fruit and vegetable production, cultivation areas are being expanded and support for storage and processing of products is being provided. Furthermore, financial resources, including funding from international financial institutions, are being actively pursued to aid in these efforts.

In the Republic of Uzbekistan, there is a need to coordinate activities across all sectors of the vegetable industry, including developing a system of mutually beneficial economic relationships between production and processing enterprises, and adopting a modern approach to organizing agribusiness based on clusters. However, progress in this regard has been hindered due to a variety of challenges, such as a lack of cooperation between producers and manufacturers, low compliance levels among small agricultural producers, and insufficient supply of high-quality seeds and seedlings. Additionally, logistics and transport infrastructure is underdeveloped, and there is a lack of in-depth research on various agrotechnology issues. To address these challenges, measures such as expanding production, storage, processing, and export of fruit and vegetable products have been implemented, and ways to develop fruit and vegetable cooperatives have been proposed. These include allowing cooperatives to independently determine the volume and variety of production, setting up logistics centers, attracting credit lines from international financial organizations, and expanding credit lines for financing projects related to nurseries, clusters, and greenhouses. It is also necessary to include issues related to the preparation, storage, and delivery of products in the model of commercial relations from the field to the store. Finally, grant funds and technical assistance can be used to send managers and agronomists to training and internship programs in specialized foreign companies.

In order to develop fruit and vegetable cooperatives, it is important to consider the following issues in the commercial relations model "from the field to the store" which relates

to the preparation, storage, and delivery of fruit and vegetable products to the consumer (as shown in Figure 15).

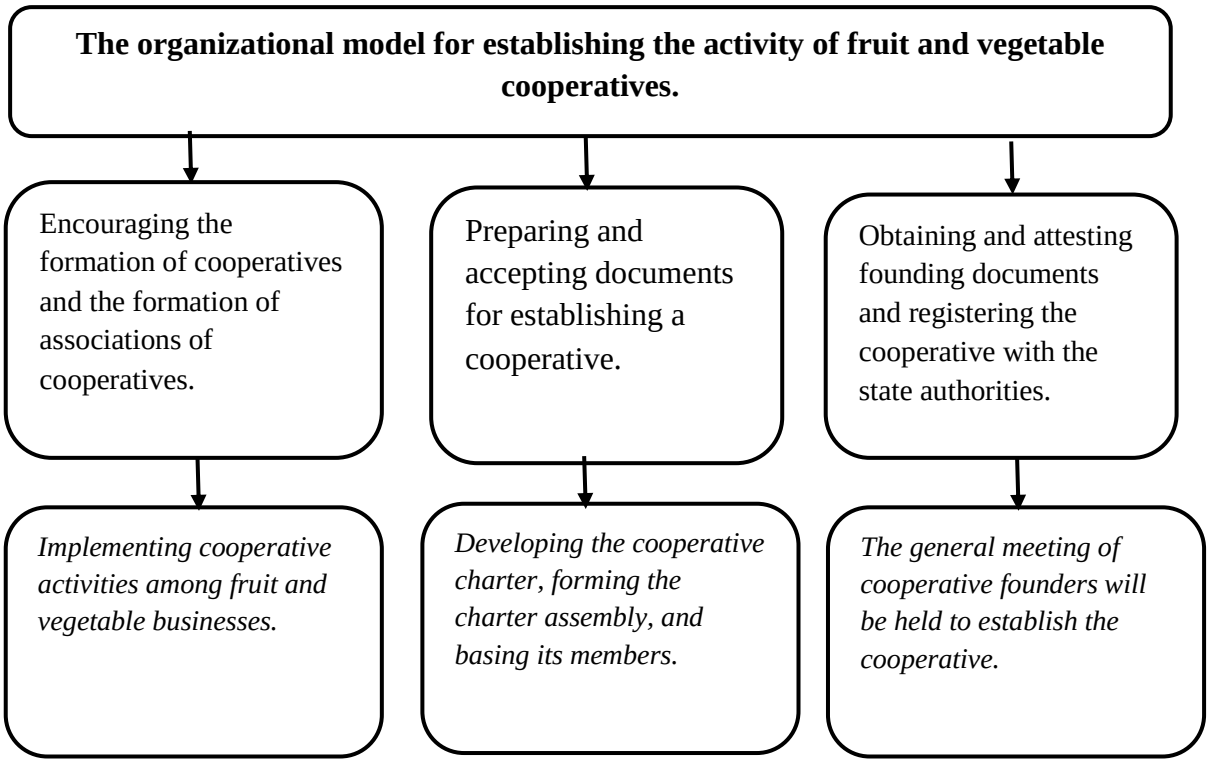

Figure 9.Organizational model of the activity of fruit and vegetable cooperatives

In order to effectively manage the fruit and vegetable production operation and ensure the delivery of high-quality products to consumers, it is important to establish a "field-to-store" chain that includes activities related to preparation, storage, transportation, and delivery of products. Additionally, economic relations related to managing the cooperative and establishing material and technical support should be established. The trade cooperative should also implement a price policy and manage its trade and economic activities based on changes in market conditions. A visual representation of these activities can be seen in Figure 16.

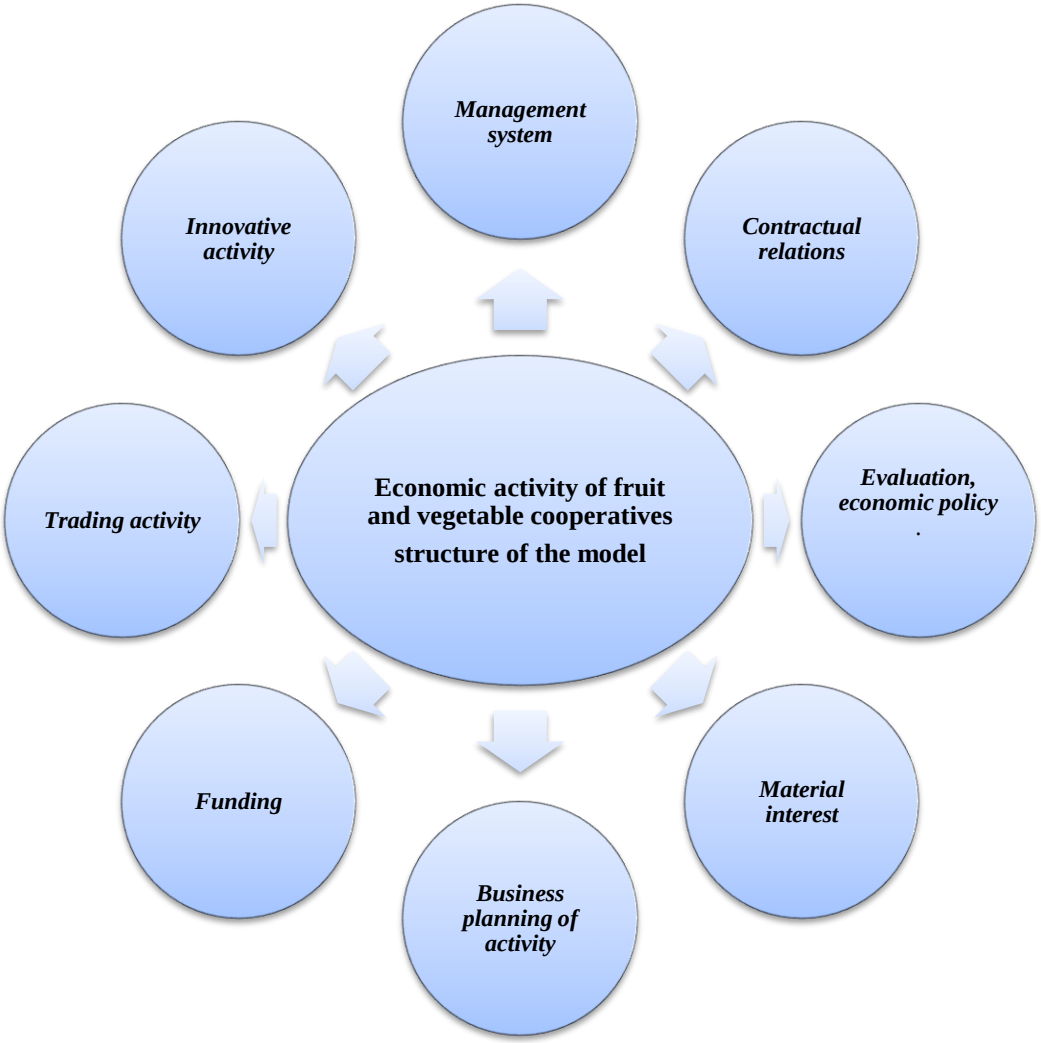

Figure 10.An economic model of the activity of fruit and vegetable cooperatives

4.4. Enhancing the operational and financial principles of cluster-cooperation in fruit and vegetable production.

One possibility that is not being utilized is the growth, processing, and storage of fruit and vegetable products without formation. Storing a variety of vegetables under natural conditions can prevent artificial price increases in the markets during the winter-spring season and have a positive impact on the social protection of the population, eliminating the need for importing similar products in the winter season.

Enhancing the competitiveness of fruit and vegetable production and expanding the range of products can be accomplished by creating a diverse array of nutritional supplements using locally available natural resources. By recycling unused fruits, numerous new and wholesome additives can be obtained, eliminating the need for artificial ingredients like

extracts. This approach holds the potential to boost the operations of numerous industrial enterprises in the regions, providing them with alternative sources of raw materials instead of relying on imports.

To improve the fruit and vegetable sector, it is necessary to implement modern, innovative, and resource-saving digital technologies, while addressing problems and inefficiencies in cultivation, storage, and processing. Mathematical modeling was used to develop forecast indicators until 2027 for the development of fruit and vegetable products in the Kashkadarya region. The study also considers the influence of various factors on the production of fruit products in the region.

Table 14.Prognostic indicators of economic growth in fruit growing cooperatives in Kashkadarya region

Years	The main indicator (Relative to field 1 production efficiency)	Growth (%)
2022	1,729	101.3
Forecast indicators		
2023	1,807	104.5
2024	1,873	103.7
2025	1,938	103.5
2026	1,992	102.8
2027	2,097	105.3
2022 year-to-date growth (%)	21 , 3	-

Based on the research conducted on the fruit and vegetable industry and the forecast indicators, I recommend the following measures for sustainable development:

1. Development and implementation of measures to modernize and renew the fruit and vegetable industry to ensure the competitiveness of the products and provide a strong impetus for sustainable development.

2. Ensuring the safety of food products and improving the government's support and management mechanisms in the agricultural sector to address the increased dependence of the world's consumer market on imports.

3. Adoption of advanced methods of irrigation based on innovative technologies, with special attention to the expansion of drip irrigation, due to the increasing shortage of water resources.

4. Conducting an in-depth analysis of economic, technological, legal, and other spheres to identify possibilities and achievements of farmers and agricultural enterprises in factors that influence the sustainable development of fruit and vegetable production. This will help eliminate identified shortcomings and implement innovative opportunities.

5. Adoption of programs aimed at replacing imported fruit and vegetable products with efficient use of internal resources to meet the needs of the population.

6. Developing the cooperation of the producers of fruit and vegetable products in the areas of production, storage, processing, and export to achieve a system of competitive cooperation and cluster production that responds to the quality and quantity of products.

It is important to note that the economic growth of the fruit and vegetable sector should not be pursued through further expansion of existing resources, but rather through the adoption of sustainable practices and competitive cooperation.

To promote sustainable development of Uzbekistan's fruit and vegetable industry, several proposals have been suggested. These include strengthening exemplary enterprises in rural areas that specialize in innovative, resource-saving methods of storage and processing, and providing them with tax and customs benefits. Additionally, production, storage, and processing of agricultural products should be increased in every rural area through the development of small industrial branches and economic incentives for the production of competitive finished products for domestic and foreign markets. Export-credit organizations can provide credit, insurance, and support for entrepreneurs to address risks associated with exporting to foreign markets. Multi-chain agro-logistics complexes should be established, such as the "Agropark" and "Agrosanoat" complexes, which utilize digital innovative technologies to manage all aspects of the production process. A "Fruit and vegetable clinic" service should also be established, and legal-normative-technical documents should be developed to regulate the quality and safety of fruit and vegetable products. Implementation of these measures will lead to long-term sustainable development of the industry, increased efficiency, and expansion of export opportunities, while ensuring food safety and improving living conditions.

5. Conclusion

The scientific conclusions and practical recommendations developed during the research are as follows :

1. As a result of the conducted research , the theoretical-scientific foundations of the cluster-cooperation process are based on different views during the period of formation and development and the tasks it performs today in the direction of the development of the country's economy . It is a special form of labor in which many people participate in the same or different, interdependent, labor processes together. Cooperation is a production relationship formed on the basis of the principles of joint production of finished goods or services to meet needs. These can be any type of enterprises and other economic structures.

2. As a result of research, cooperation is an economic phenomenon that manifests itself in the sense of cooperation in economic relations between partners to achieve a common goal with less spending of resources on the basis of mutual benefit for all participants and satisfaction of everyone's interests. The main goal of cooperation is to help agricultural producers in developing their economy. it was concluded that it is to give and increase efficiency.

3. In my opinion, fruit and vegetable products - the legal basis for the development of cooperation is the procedure for creating cooperatives, their legal and organizational forms, the procedure for the provision of production, relations, product marketing, tax systems, relations between the state and cooperatives, mutual relations of cooperatives. , should be understood as a set of laws, regulations and legal documents that determine the strengthening of legal guarantees against alienation of property.

4. Our analysis shows that" cluster" in the production of agricultural products, including the cultivation, processing and storage of fruit and vegetable products based on the principles of organization and formation of cooperatives of fruit and vegetable products ,"cooperative", an improved author's definition of concepts was developed. In particular, a flawless set of services has been developed, which is distinguished by comparative classification and aims to fully satisfy the needs of the principles of their organization and formation, and brings them material and moral benefits at low costs.

5. The efficiency indicators of fruit and vegetable products are divided into types of technological, economic, social and ecological efficiency.

6. In the course of the conducted research , a methodology for evaluating the effectiveness of fruit and vegetable products was proposed, which took into account the

directions of integrated production, determination of the economic efficiency of individual stages, the production of final products, the production of fruit and vegetable products, raw materials, storage of finished products, processing and sales. .

7. Based on the research conducted, the cultivation area for vegetables in the republic witnessed significant growth between 2005 and 2020 across all farm categories. In 2005, the vegetable cultivation area was 137.7 thousand hectares, which increased to 220.5 thousand hectares in 2020, representing a growth of 155.1 percent during these years. The average productivity also showed notable improvements, with an increase from 215.8 centners to 301.6 centners, marking a common growth rate of 140.6 percent. As a result, the grown gross yield amount in 2005 2971.6 a thousand tons instead of 2020 in 6650.3 a thousand tons and the gross increase was more than 2.2 times.

8. Studies show that the productivity indicators of vegetable cultivation in our republic and Kashkadarya region are increasing year by year. However, it should be noted that the productivity of vegetable cultivation in Kashkadarya region is low compared to the national indicator, from 20.4 cents/ha to 88.9 cents/ha. Because Kashkadarya region has such an indicator due to soil-climate conditions, water issues in the cultivation of vegetable products.

9. The conducted analyzes show that the cultivated area, which is the main indicator of fruit cultivation in the Republic of Uzbekistan and Kashkadarya region, is increasing year by year. In the Republic of Uzbekistan in 2020, the area of fruit cultivation was 299,000 hectares in 2020, compared to 2005, it was 91,400 hectares, and this indicator increased by 7,300 hectares in the Kashkadarya region.

10. In the Kashkadarya region, the horticulture and viticulture industry is mostly located in the semi-desert and desert areas, in dry farming massifs, which complicates the water problem and water use. To see if there is a problem of water scarcity in such lands possible. Most of the existing gardens in Kashkadarya region are dying due to lack of water. Because most of the pumps are used to supply water to gardens in horticultural areas. Therefore, along with the water shortage, the high costs associated with the use of pumps (fuel, lubricants, electricity) also have a negative impact on water supply.

11. As a result of the analysis, the reasons for the low productivity of orchards and vineyards are the poor condition of existing orchards and vineyards, the abundance of non-yielding varieties in orchards and vineyards, and the need for restoration. At the same time, due to the decrease in the productivity of orchards and vineyards, the amount of net profit

received by the farmer as a result of fruit cultivation decreased per hectare and on the farm as a whole.

In particular, it can be seen that the weight of orchards and vineyards in the total orchards and vineyards in the Kashkadarya region during 2005-2020 is increasing. However, at the same time, the number of old orchards and vineyards in need of restoration is causing a reduction in productivity and a decrease in the profitability of fruit growing. Such orchards and vineyards amounted to 17.3 thousand hectares in 2005, by 2015 they were 19.6 thousand hectares, by 2016 they were 21.1 thousand hectares, and by 2020 they were 24.6 thousand hectares.

12. During the research, when the average share of cooperative founders operating in Kashkadarya region was analyzed according to economic forms, in 2016, the share of cooperative founding of farms was on average 32 percent.

13. The main goal of creating fruit and vegetable cluster cooperatives in our country:

- ensuring rapid and effective development of fruit and vegetable growing ;
- expansion of production of high-quality and competitive finished fruit and vegetable products;
- to expand the production of high-quality and competitive finished fruit and vegetable products.

14. In 2020, there are opportunities to increase the export of fruits and vegetables to 2.5 billion dollars in our country, and to 5 billion dollars in 2021-2023. In order to fully achieve the above and increase the competitiveness of the fruit and vegetable sector of our country, we must implement the following:

- correct selection of crops and varieties ;
- increase productivity and income by at least two to three times;
- prevention of wastages;
- storage of products;
- logistics issues ;
- is the proper organization of export

15. Today, in the development of the fruit and vegetable cooperative system in Uzbekistan, attention should be paid to the following, in particular:

- implementation on the basis of agreements in the organization of a fruit and vegetable cluster for the cultivation, processing and export of fruit and vegetable products;

- selection from among processing and exporting organizations, based on their experience and capabilities, in which, first of all, to start the underutilized capacities for storage and processing of products;
- connecting fruit and vegetable producers to fruit and vegetable cooperatives, through voluntary product supply contracts between processing and exporting organizations and the district administration;
- fruit and vegetable cooperatives - regulation of relations between organizations that grow, process and export products through product supply contracts.

16. As a result of the research, shortcomings in the process of growing, storing, processing and exporting fruit and vegetable products were also identified, and scientifically based proposals were made for their solutions. It is worth noting that in the more consistent development of the fruit-vegetable cooperative system, it is necessary to pay attention to the following:

- organization of fruit-vegetable cluster-cooperation for cultivation, storage, processing and export of fruit-vegetable products on the basis of contracts;
- to select among the storage processing and exporting organizations based on their experience and capabilities, in which, first of all, to start the underutilized capacities for storage and processing of products;
- connecting fruit and vegetable growers to fruit and vegetable cooperatives, implementing voluntary product supply contracts between processing and exporting organizations and district administration;
- regulation of relations between fruit and vegetable cooperatives producing, storing, processing and exporting organizations through product supply contracts.

17. In the conducted scientific research, the Republic of Uzbekistan in fruit and vegetable cultivation and organization of cooperation was found to have great potential. For this reason, practical suggestions for the development of fruit and vegetable growing in our country have been developed :

- in fruit and vegetable cultivation, the intensive method of orchards and sufficient organization of high-yielding vegetable species;
- determining the economic efficiency of orchards and vineyards by replacing them with new intensive orchards as they become unusable;
- efficient use of land in fields and renewal of non-yielding orchards and vineyards;

- establishment of fruit and vegetable cluster-cooperation for production, procurement, storage and processing and export and coordination with the agricultural cooperation system;
- development of farms specialized in fruit and vegetable production;
- establishment of selection works in farms specialized in fruit and vegetable growing;
- intensification of production due to the expansion of their cultivated areas for the development of fruit and vegetable growing;
- The main way to increase the volume of fruit and vegetable production in irrigated areas is to increase the productivity of fruit trees and vegetables due to the intensification of each hectare of cultivated area;
- organization of reproduction processes in fruit and vegetable growing, introduction of new innovations in advanced technologies and variety selection, etc.

18. Within the framework of the fruit and vegetable cooperative, a model of economic relations "From the field to the store" related to the preparation, storage and delivery of fruit and vegetable products to the consumer was developed.

19. As a result of the conducted research, forecast indicators for the years 2022-2027 were developed regarding the measures recommended for the sustainable development of cooperation of fruit and vegetable products.

6. Summary

Cooperation among agricultural and horticultural product producers is crucial, yet there has been insufficient research on its theoretical and practical aspects, despite various organizational measures being utilized to enhance quality and efficiency.

A fruit and vegetable cooperative is a system of cooperatives and their partners organized by agricultural producers to meet their economic and other needs. It is an organizational and legal form of economic management that unifies contributions from fruit and vegetable product producers to fulfill the material and other needs of cooperative members.

The legal framework for the development of cooperation in fruit and vegetable products encompasses laws, legal and organizational forms of cooperatives, product marketing, tax systems, relations between the state and cooperatives, mutual relations between cooperatives, and strengthened legal guarantees against property alienation.

Small-scale independent agricultural enterprises producing vegetable products can benefit from cooperating with other producers to increase industry scale, develop concentration and specialization, and deliver products to consumers at lower costs.

Advantages of cooperation among independent vegetable product producers include the ability to combine resources, develop concentration and specialization, optimize various processes in fruit and vegetable production, and determine the optimal production volume based on factors such as raw material transportation levels.

Theoretical aspects of agricultural and horticultural product cooperation have not been adequately researched, and an improved definition of the concepts of "cluster," "cooperation," and "cooperative" has been developed. Principles of organization and formation of fruit and vegetable product operations have been designed to meet the highest level of needs, and a set of services has been created to provide material at a low cost.

Efficiency indicators for fruit and vegetable production have been closely studied to create the best conditions for reviving the labor force and increasing people's well-being. Different types of efficiency have been identified, including technological, economic, socio-economic, and ecological. However, there is no existing definition of efficiency indicators in the economics literature. To address this gap, a calculation method has been developed that takes into account the entire chain from the field to the store.

The changing market demand, technical and technological advancements, and the increasing costs associated with large industrial enterprises have led to changes in the role of

the food health trade and production system. Maximum utilization of the enterprise's capacity is necessary to optimize costs, which requires sophisticated equipment and advanced production systems.

Based on the given information, the research conducted shows an increase in vegetable and fruit production in the republic, although productivity in some areas needs improvement. The evaluation of fruit and vegetable products consists of five stages, including cultivation, storage, processing, sale, and cooperation. The number of farms operating in the Kashkadarya region has been increasing, but some cooperatives face challenges with the increase in resource prices and lack of significant price increases for products in farmers' markets. The goal is to expand the production of high-quality and sustainable fruit and vegetable products and increase exports to 2.5 billion dollars and 5 billion dollars. Implementation of agreements, connecting producers with cooperatives, and organizing relations between cooperatives are essential for the development of the fruit and vegetable cooperative system.

Based on the research conducted, several findings and recommendations were made regarding the organizational and economic indicators of fruit and vegetable production co-operation and their development. The following are some of the key conclusions:

1. A cooperative chain for fruit and vegetable products should be formed, starting from the production of seeds and seedlings to the preparation, storage, processing, transportation, and marketing of the final products. However, there are several challenges that producers, storage, and processing enterprises face, including the lack of high-quality seedlings and seeds, material resources, proper delivery systems for resources, lack of special techniques, warranty contracts with buyers, non-payment of advance funds, insufficient knowledge and skills in the field, and a shortage of highly qualified personnel.

2. To address the shortcomings in the process of production, storage, processing, and export of fruit and vegetable products, proposals were made, including the implementation of fruit and vegetable cluster cooperation, choosing storage, processing, and exporting organizations based on their experience and capabilities, establishing fruit and vegetable cooperatives with product supply contracts, and arranging relations between these cooperatives and the processing and exporting organizations through product delivery contracts.

3. The state can support the sector by exempting taxes for a certain period of time, introducing customs privileges in the import of technology and technological

equipment, and partially or fully subsidizing costs in the purchase of energy-saving equipment and technologies in certain areas, among other measures.

4. Uzbekistan has great potential in the organization of cooperation in the cultivation of vegetables and fruits, and several practical proposals were made to develop fruit and vegetable production, such as organizing orchards and productive vegetable species, determining the economic efficiency of replacing old orchards with new intensive orchards, renewing non-productive orchards, intensifying production through the expansion of cultivated areas, and introducing new innovations in advanced technologies and selection.

5. A model of commercial relations "from the field to the store" related to the preparation, storage, and delivery of fruit and vegetable products to the consumer was developed within the fruit and vegetable cooperative.

The fruit and vegetable cooperative is presented as a system that unifies contributions from producers to fulfill the material and other needs of cooperative members.

The legal framework for the development of cooperation in fruit and vegetable products is discussed, as well as the advantages of cooperation among independent vegetable product producers. Theoretical aspects of agricultural and horticultural product cooperation are found to be under-researched, and a set of efficiency indicators is proposed to improve production.

A study on the system of indicators representing cooperation and efficiency of fruit and vegetable products is presented, including classification, identification, and analysis methods. The evaluation of fruit and vegetable products is explained in five stages, and challenges for cooperatives are discussed.

The goal of expanding production of high-quality and sustainable fruit and vegetable products and increasing exports is outlined. Proposals are made to address shortcomings in the production, storage, processing, and export of fruit and vegetable products, including the establishment of fruit and vegetable cooperatives and arrangements between these cooperatives and processing and exporting organizations.

Practical proposals are made to develop fruit and vegetable production, and a model of commercial relations "from the field to the store" is developed within the fruit and vegetable cooperative.

Overall, the research provides valuable insights into the potential benefits of cooperation among agricultural and horticultural product producers, and proposes measures for sustainable development of the fruit and vegetable production sector.

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