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DEVELOPMENT OF AGRICULTURAL CLUSTERS IN THE SUBURBS OF LARGE AND LARGEST CITIES IN UZBEKISTAN

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Annotation: this article analyzes the theoretical and practical aspects of the development of agricultural clusters around large and largest cities in Uzbekistan. The importance of the cluster system in ensuring food security and the sustainable development of the territorial economy in the conditions of urbanization processes is justified. The issues of organizing intensive farming in suburban areas, efficient use of logistics and infrastructure capabilities are covered. The role of agroclusters in increasing production efficiency and expanding export potential is also highlighted. The study emphasizes the need to introduce modern management mechanisms and innovative technologies.

Keywords: agroclaster, urbanization, suburban, agricultural, intensive farming, food security, logistics, infrastructure, economic development, territorial development, innovation, efficiency, export potential, agribusiness, land resources, sustainable development, production system, integration.

Agriculture is one of the leading sectors of the economy of Uzbekistan, accounting for about 25–27 percent of the country's gross domestic product. In recent years, reforms in the agricultural sector, in particular the introduction of the cluster system, have served to increase production efficiency and form a single chain from product cultivation to processing and realization. The development of agricultural clusters,

especially in the suburbs of large and largest cities, is closely related to specific geographical, economic, and social factors.

First of all, the geographical location factor plays a decisive role in the formation of clusters. The major cities of Uzbekistan – Tashkent, Samarkand, Namangan, Andijan, Fergana and Bukhara – are densely populated areas with intensive agriculture around them. For example, the city of Tashkent and its surrounding area (Tashkent region) produce more than 20 percent of the country's vegetables and melons, and 35–40 percent of greenhouse products. The Chirchik-Ahangaran Valley in this region, the vastness of irrigated land, and the developed irrigation system are creating the basis for the rapid formation of clusters.

Another important aspect of suburban areas is the convenience of transport and logistics. The development of automobile and rail networks around major cities allows for fast delivery of products. For example, international transport corridors passing through the Tashkent region (Tashkent–Andijan, Tashkent–Samarkand highways) are important for delivering agricultural products to domestic and foreign markets. According to statistics, more than 60% of fresh vegetables and fruits grown in the Republic are brought to the market precisely from suburban areas. This is the reason why clusters are located precisely near large cities.

The process of urbanization is also one of the important factors in the formation of clusters. The urbanization rate in Uzbekistan is approaching 50 percent, which leads to an increase in the number of urban residents and a sharp increase in demand for food. For example, the population of Tashkent is over 3 million, and the daily food demand is very high. Therefore, intensive agriculture is developing rapidly in suburban areas - greenhouse farms, livestock complexes, and poultry clusters. As a result, the product delivery distance is shortened, transportation costs are reduced, and product quality is maintained.

Also, natural-climatic conditions are one of the main factors in the development of clusters. Most major cities in Uzbekistan are located in irrigated valleys and oases. For example, the Fergana Valley (Andijan, Namangan, Fergana) is characterized by fertile soils, a warm climate, and the availability of water resources. Fruit and vegetable, grape, and horticultural clusters are widely developed in this region, accounting for a significant part of the country's export potential.

According to 2023 data, about 55% of the fruits and vegetables exported from Uzbekistan came from the Fergana Valley.

In addition, market demand and economic interest factors stimulate the formation of a cluster system. The large population around major cities, the presence of restaurants, supermarkets, processing plants, and export companies ensure a constant demand for agricultural products. This encourages farmers and entrepreneurs to operate in a cluster system. Through the cluster system, farmers not only grow products, but also integrate them into the processing, storage and sales chain. State policy and institutional support also play an important role. A number of decrees and resolutions have been adopted in the Republic of Uzbekistan to modernize agriculture and develop a cluster system. In particular, production efficiency is being increased by establishing cotton-textile clusters, fruit and vegetable clusters, and livestock clusters. As of 2024, more than 100 cotton-textile clusters operate in the republic, through which about 90% of cotton production is carried out. A significant part of these clusters is located precisely around large cities.

Another important factor is the availability of labor resources. Suburban areas have a relatively large workforce, which allows for efficient organization of agricultural work. Especially in seasonal work - harvesting, processing, logistics - city residents also actively participate. This increases the socio-economic efficiency of the cluster system.

In conclusion, the formation of agricultural clusters in the suburbs of large and largest cities in Uzbekistan is a multifactorial process, which is directly related to geographical location, transport-logistics system, urbanization level, natural-climatic conditions, market demand, Public Policy and labor resources. The combination of these factors is transforming suburban areas into the most intensive and productive zones of agricultural production, playing a key role in ensuring the country's food security. The system of agricultural clusters in Uzbekistan is developing on the principle of territorial specialization. The formation and development of clusters, especially in the suburbs of large and largest cities, is taking place in a differentiated manner, in accordance with natural and geographical conditions, economic infrastructure, and market demand. The Tashkent agglomeration, the Samarkand region, and the Fergana Valley regions play a leading role in this process, and each of them is distinguished by its own specialization.

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First of all, the city of Tashkent and its surroundings (Tashkent region) stand out as the largest consumer market and logistics center in the republic. Agricultural clusters in this region are mainly specialized in intensive and highly profitable areas. In particular, greenhouse farming, vegetable growing, poultry farming, and dairy farming are leading. According to statistics, about 35–40 percent of greenhouse products grown in Uzbekistan are produced in the Tashkent region. Modern agroclusters have been established in Zangiota, Kibray, and Yukori Chirchik districts, where tomatoes, cucumbers, greens, and export-oriented products are grown.

In addition, livestock clusters located around Tashkent are also highly developed. The production of dairy and meat products, their processing and realization through supermarket chains is organized on the basis of a single chain. The majority of dairy products produced in this region are aimed at meeting the needs of the capital's population. Due to the developed transport and logistics infrastructure, products are delivered to consumers in a short time, which increases product quality and competitiveness.

In the city of Samarkand and its surrounding areas, agricultural clusters are more specialized in traditional horticulture, viticulture, and vegetable growing. The temperate climate of the Samarkand region, fertile soil, and availability of water resources allow for large-scale cultivation of fruit and vegetable products. According to statistics, Samarkand region is one of the leading regions in grape production in the republic, accounting for about 15–18 percent of the total harvest.

Another important feature of Samarkand suburban clusters is its inextricable connection with the processing industry. Directions such as canning, drying, juice production of fruit and vegetable products have developed, which serves to increase the volume of exports. For example, dried fruits (dried apricots, raisins) produced in the Samarkand region are exported to European and Asian markets. This suggests that the cluster system serves to create a higher value added rather than being limited to production alone.

In the cities of the Fergana Valley (Andijan, Namangan, Fergana), agricultural clusters have developed in a more complex and diversified form. This area is a densely populated region, and intensive farming is widely practiced due to

limited land resources. Fruit and vegetable farming, horticulture, sericulture, and livestock farming clusters operate in harmony in the Fergana Valley.

According to statistics, about 50–55 percent of the fruits grown in Uzbekistan are grown in the Fergana Valley. In Andijan and Namangan regions, greenhouse farms have developed rapidly, allowing year-round production. At the same time, silk clusters are also developing, Mulberry plantations are being expanded and silk products are being exported. This demonstrates the uniqueness of territorial specialization. An important place in the development of suburban clusters is occupied by the introduction of intensive technologies. The use of drip irrigation, hydroponics, greenhouse technologies and modern agrotechnics significantly increases productivity. For example, the yield of greenhouse-grown tomatoes is 2–3 times higher than that of open-field tomatoes, which ensures the economic efficiency of the clusters.

In addition, the development of agro-service and infrastructure systems is also a regional feature. Refrigerated warehouses, logistics centers, packaging and processing plants are widely developed in suburban areas. This allows for long-term storage and export of products. For example, modern logistics centers established in the Tashkent and Samarkand regions are exporting fruit and vegetable products to Russia, Kazakhstan, and other countries.

Also, the principles of territorial differentiation and zoning are important in the development of clusters. Each area specializes based on its own natural-economic conditions. This allows for efficient use of resources, reduced production costs, and the production of competitive products.

In conclusion, the specialization and territorial development of agricultural clusters in the suburbs of large and largest cities in Uzbekistan is a multifactorial and complex process, determined by the natural-geographical conditions of the regions, market demand, level of infrastructure and the level of introduction of innovative technologies. The Tashkent agglomeration is dominated by intensive and high-tech sectors, Samarkand by traditional horticulture and processing, and the Fergana Valley by a diversified agrarian system. This territorial specialization serves the sustainable development of the country's agricultural sector.

In Uzbekistan, the system of agricultural clusters is considered an important factor in modernizing the agricultural sector, increasing production efficiency, and

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expanding export potential. Clusters formed in the suburbs of large and largest cities are playing a crucial role in ensuring the country's food security. However, despite the rapid development of this system, there are a number of systemic problems that need to be addressed to determine the prospects for future sustainable development.

First of all, the problem of effective use of resources is considered urgent. In the conditions of Uzbekistan, water resources are limited, and about 85-90% of the water used in agriculture is spent on irrigation. The development of intensive farming in suburban areas is further increasing the demand for water. For example, as a result of the expansion of greenhouse farms in the Tashkent and Fergana Valley regions, pressure on Water Resources increased. In some areas, 30–35 percent of water is lost due to outdated irrigation systems. This negatively affects the economic efficiency of cluster activities.

There are also problems with the use of land resources. In suburban areas, there is a reduction in agricultural land as a result of the acceleration of the urbanization process. According to statistics, over the past 10 years, the area of irrigated land in areas adjacent to some large cities has decreased by 5–7 percent. This limits the possibilities for the territorial expansion of clusters and requires the introduction of intensive technologies. The second important problem is the issue of ensuring environmental sustainability. Overexploitation of chemical fertilizers and pesticides in agriculture leads to soil degradation, land salinity, and environmental imbalance. In particular, the level of soil salinity is high in the Fergana Valley and Zarafshan Valley regions, reaching 30–40 percent in some areas. In addition, the insufficient development of waste recycling systems in livestock clusters is causing environmental problems.

Another pressing problem is the imbalance in the introduction of innovative technologies. Although modern technologies have been introduced in agriculture in recent years, their distribution by region is not the same. For example, in the Tashkent region, the share of land covered by drip irrigation systems is 25–30 percent, while in some other regions this figure does not exceed 10–15 percent. This creates differences in production efficiency between clusters.

There are also financial and institutional problems. For farms and entrepreneurs operating in the cluster system, access to credit resources is limited, and high interest

rates are slowing investment processes. In some cases, insufficient transparency in contractual relations between clusters and farmers also creates problems.

In addition, the issue of Personnel Training and qualifications is also important. For the application of modern agrotechnologies, highly qualified specialists are needed, the lack of which reduces the effectiveness of clusters. According to statistics, a large proportion of those employed in agriculture have experience working in traditional methods and have a low level of adoption of innovative technologies.

At the same time, despite the existing problems, there are great prospects for the development of agricultural clusters. First of all, it is necessary to widely introduce modern technologies in order to effectively use water and land resources. Through drip irrigation, laser Earth leveling, water-saving agrotechnologies, water consumption can be reduced by up to 30-40 percent. This serves to improve cluster efficiency.

Secondly, the introduction of digital technologies is one of the important areas of perspective. Innovations such as" smart agriculture " (Smart agriculture) systems, artificial intelligence-based productivity forecasting, drone-assisted monitoring take cluster activities to a new level. For example, some pilot projects have shown that the use of drones has increased the efficiency of fertilization and protection by 20–25 percent. The third important line is the expansion of export potential. Uzbekistan's fruit and vegetable products are in high demand in the international market and there is an opportunity to increase the volume of exports through the cluster system. In 2023, the country's fruit and vegetable exports exceeded 2 billion US dollars, and it is planned to increase this figure to 3-4 billion dollars in the future. It is expected that suburban clusters will play a leading role in this.

Fourth, ensuring environmental sustainability and implementing the principles of a "green economy" are of paramount importance. Environmental problems can be reduced by developing organic agriculture, reducing the use of chemical fertilizers, and establishing a waste recycling system. This also meets the requirements of export markets.

An important prospect is also the improvement of state support mechanisms. Through subsidies, preferential loans, tax relief, and Infrastructure Development, Cluster activities can be further encouraged.

In conclusion, the process of developing agricultural clusters in Uzbekistan is characterized by a combination of challenges and opportunities. Clusters can further develop their activities through efficient use of resources, maintaining ecological balance, introducing innovations, and improving the institutional system. This will not only ensure sustainable growth of the agricultural sector, but will also serve to strengthen the country's food security and export potential.

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