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INSTITUTIONAL FOUNDATIONS FOR THE DEVELOPMENT OF THE LOGISTICS SYSTEM IN AGRICULTURE

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Abstract: The channels of production and sale of agricultural products in Uzbekistan are a complex system. Organization of the flow of goods through the logistics system in the markets of agricultural products and the organization of a system of recycling of products after consumption, saving resources and reducing waste are one of the urgent issues. The main task of this study is to develop scientific foundations for solving the problems and opportunities of implementing a green supply chain in the organization of product flows. Taking into account the characteristics of the traditional logistics of agricultural products in Uzbekistan and the prospects for a green supply chain, measures for the development of agricultural product logistics and aspects of the quality and safety control system for agricultural products were developed on a scientific basis.

Keywords: Logistic Services, Green Economy, Recycling, Agriculture, Farmers, Harvesting, Storage, Transportation, Warehouses, Electronic Platforms, Modern Agriculture, Processing Products, Packaging, Logistics System, Supply of Resources

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Introduction

Since gaining independence, our republic has undertaken extensive reforms to modernize agriculture, considering its specific characteristics. These reforms have facilitated the development of private ownership, introduced free-market principles, and transitioned the sector through significant stages of transformation. Initially, state farms were reorganized into partnerships, followed by the establishment of peasant farms and the complete privatization of production. Subsequently, the formation of modern agricultural clusters has driven industrialization within the sector.

Urbanization and industrial development have further accelerated the need for agricultural modernization. The agricultural sector in our republic can broadly be divided into three components: agricultural enterprises, farmers and peasant farms, and clusters that support these entities. Given the substantial rural population and the reliance of many livelihoods on agriculture, ensuring economic stability for peasant farms and agricultural enterprises is crucial.

Despite progress, the agricultural sector faces significant challenges. Key issues include the modernization of agricultural machinery, the establishment of robust marketing and logistics systems, and the development of efficient supply chains. The lack of well-organized logistics systems contributes to high costs and inefficiencies, impacting product flow and consumer prices. These

challenges underscore the urgent need for a systematic approach to integrating production, storage, and distribution processes [1].

Furthermore, global trends emphasize the importance of sustainability, urging the adoption of green energy and environmentally friendly practices. Developing a green supply chain that incorporates renewable energy, minimizes waste, and reduces environmental impact aligns with modern agricultural goals. Addressing these priorities requires both private sector innovation and state support mechanisms to ensure the harmonization of environmental and economic interests.

This study explores the critical aspects of agricultural modernization, with a focus on logistics system development and the implementation of green supply chain practices [2], [3], [4], aiming to enhance sustainability and economic efficiency in the agricultural sector.

Methods

The study employs a systematic approach to analyze the logistics systems in the agricultural sector, focusing on the following core areas:

1. **Data Collection and Analysis:**
 - a. Examination of agricultural product production and product flow movements.
 - b. Assessment of the capacity and efficiency of storage systems, including proper determination of storage volumes.
2. **Infrastructure Planning:**
 - a. Evaluation of storage warehouse locations based on the characteristics of agricultural products to minimize costs.
 - b. Optimization of warehouse utilization to accommodate product-specific requirements.
3. **Logistics System Development:**
 - a. Promotion of wholesale sales systems and formalization mechanisms for informal intermediaries.
 - b. Encouragement of interregional storage facilities equipped with renewable energy-powered refrigeration systems.
 - c. Liberalization of agricultural product markets and incorporation of e-commerce platforms.
4. **Green Logistics Initiatives:**
 - a. Integration of green energy sources (hydropower, wind, and bioenergy) into agricultural logistics, including transportation, storage, and processing.
 - b. Adoption of sustainable packaging practices and elimination of single-use plastics.
5. **Comparative Analysis:**
 - a. Comparative evaluation of agricultural logistics costs in Uzbekistan versus developed countries to identify inefficiencies.
 - b. Analysis of natural losses during harvesting, transportation, and storage processes, with a focus on strategies to reduce these losses.
6. **Supply Chain Integration:**
 - a. Development of a continuous communication chain between farmers and processing enterprises to streamline production, storage, and transportation processes.
 - b. Addressing challenges related to uniting small-scale farming enterprises and standardizing their outputs.

This methodology provides a framework for understanding the complexities of agricultural logistics in Uzbekistan, emphasizing efficiency improvements, cost reductions, and environmental sustainability.

Results and Discussion

The modernization and transformation of agriculture in Uzbekistan have undergone significant stages since independence. The reforms have enabled the establishment of private ownership in agriculture, transitioning from state farms to peasant farms, and eventually to modern clusters. This progression has emphasized the need to address challenges such as urbanization and industrialization, which demand further modernization in agriculture.

Currently, agriculture in Uzbekistan can be categorized into three main components: agricultural enterprises, farmers and peasant farms, and clusters providing services to these entities. Given that a majority of the population resides in rural areas and relies on agriculture for employment, ensuring the economic stability of these agricultural actors is critical. The following key issues have been identified as priorities for development in the sector:

1. **Modernization of Agricultural Machinery**

The sector requires the use of multifunctional machinery to enhance productivity.

2. **Development of Marketing and Logistics Systems**

Proper storage, transportation, and delivery systems are essential to reduce costs and increase efficiency. Specific improvements include:

- a. Studying agricultural production and product flow.
- b. Planning warehouse capacity and location based on product characteristics.
- c. Encouraging wholesale sales and formalizing informal intermediaries.
- d. Expanding interregional storage warehouses with refrigeration systems.
- e. Promoting e-commerce and market liberalization for agricultural products.

Research indicates that Uzbekistan's agricultural logistics network is underdeveloped. Challenges such as poor organization of product flows and limited logistics services contribute to high costs, accounting for 35–40% of total production costs—significantly higher than in developed countries (10–12%).

Green Supply Chain Management in Agriculture

Chinese research has highlighted the importance of green supply chains, emphasizing aspects such as green production, transport, and recycling. These practices focus on:

- a. Reducing environmental emissions using renewable energy.
- b. Promoting sustainable transportation options like hydropower and wind energy.
- c. Using eco-friendly packaging materials to minimize environmental impact.

Although green energy initiatives require substantial investment, state support can incentivize private sector involvement, fostering environmentally friendly production and addressing climate change. We can describe a green supply chain in the agricultural sector as follows: Figure 1.

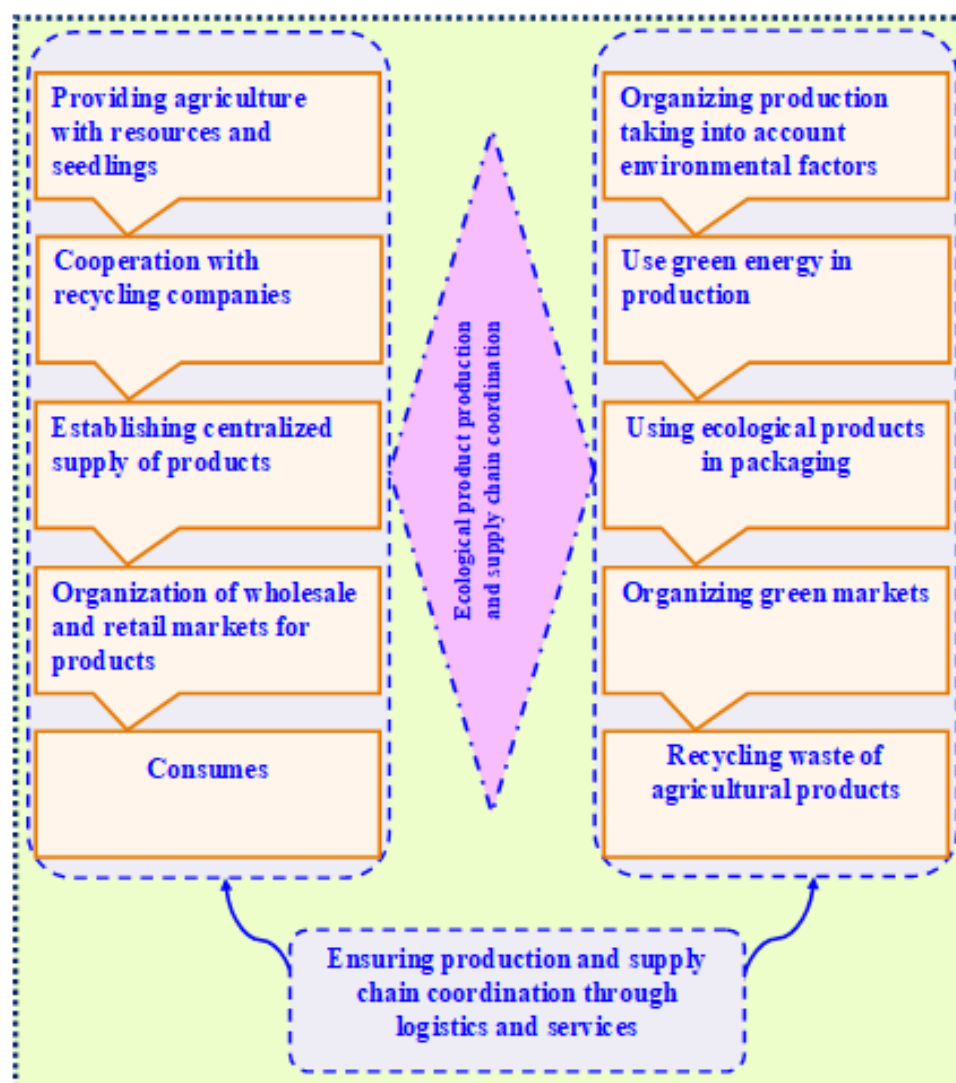


Figure 1. The organizational system of green supply chain of agricultural products.

Reducing Losses and Costs in Agriculture

High losses during harvesting, transportation, and storage—averaging 18–25%—pose significant economic challenges. Reducing these losses by even 1–3% could save billions. For comparison, losses in the USA and Europe are 2–3%, underscoring the need for improved logistics in Uzbekistan.

A well-organized logistics system should integrate the production, storage, and distribution stages into a unified framework. It should also focus on minimizing the number of intermediaries and promoting standardized practices across various farming entities. By addressing these issues, Uzbekistan can reduce environmental impacts, lower costs, and ensure sustainable agricultural development.

The creation of a continuous supply chain between farmers and processing enterprises is essential for reducing waste and improving efficiency. This approach can enhance resource supply and integrate logistics services into the production process, aligning with the principles of a green economy.

Conclusion

In conclusion, the high number of agricultural producers, the correct assessment of the

market situation in the organization of production, and the establishment of a system for storing products using energy-efficient technologies, on the one hand, reduce the impact on the environment, and on the other hand, ensure the intensive use of resources. As mentioned above, by reducing losses in the processes of harvesting, storing, and transporting agricultural products by 4-5 percent, it is possible to save an additional several hundred thousand US dollars per year, as well as to achieve savings in excess resources spent on production.

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