

**MTMSD 2022****I International Conference «Modern Trends in Governance and Sustainable Development of Socio-economic Systems: from Regional Development to Global Economic Growth»****CENTRALIZED CONSTRUCTION OF ELEVATORS AS A TOOL FOR SUSTAINABLE DEVELOPMENT RUSSIAN ECONOMY**

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**Abstract**

The purpose of this research is to investigate the potential of centralized construction of elevators as a strategy for promoting sustainable development in the Russian economy. The study aims to assess the economic, environmental, and social implications of adopting centralized construction practices for elevators across various regions of Russia. To achieve this goal, a mixed-methods approach is employed, comprising both quantitative and qualitative analyses. Quantitative data is collected from government reports, industry statistics, and economic indicators to evaluate the cost-effectiveness and efficiency of centralized elevator construction. Qualitative data is obtained through interviews with industry experts, policymakers, and stakeholders to gather insights into the environmental impact, regulatory framework, and socio-economic benefits associated with centralized construction practices. One notable finding of the study is the potential for significant cost savings and efficiency gains through centralized construction of elevators. By consolidating construction efforts and resources, economies of scale can be realized, resulting in reduced construction costs and faster project completion times. Furthermore, centralized construction allows for better standardization and quality control, leading to improved safety and reliability of elevator systems. In conclusion, the research demonstrates that centralized construction of elevators holds promise as a sustainable development strategy for the Russian economy. By leveraging economies of scale, standardization, and improved efficiency, centralized construction practices can contribute to economic growth, environmental conservation, and enhanced social well-being. However, further research and policy interventions are needed to fully capitalize on the potential benefits of centralized elevator construction and ensure its widespread implementation across the country.

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## 1. Introduction

Agriculture is traditionally one of the most significant sectors of the national economy of the Russian Federation. Socio-economic prerequisites for the development of agriculture are determined by the scale and general development of the territory, its population, labor resources, as well as regional differences in the economic situation: rising prices, investments, proximity to markets for products (Barzaeva & Ilyasov, 2022; Dzobelova et al., 2020; Ozerova & Sharopova, 2021). In the 20th century, the large-scale industrialization of the Russian state ousted the agricultural sector from the priority areas of the country's development, and today it accounts for only 4% of the total GDP (Dalisova et al., 2020). At the same time, in the context of the activation of fundamentally new epidemiological and sanctions threats, the strengthening of agriculture directly meets the tasks of ensuring the national security of the country (Magomedov et al., 2020; Shardan et al., 2020).

In 2020, by Decree of the President of the Russian Federation No. 20 dated January 21, 2020, a new Doctrine of Food Security of the Russian Federation (Official Internet Portal of Lighting Information, 2020) was approved, which is a strategic planning document that reflects official views on the goals, objectives and main directions of state policy in the field of providing the population with domestic agricultural products and other food. The implementation of the provisions of this doctrine can be achieved through comprehensive support and innovative reform of the country's agro-industrial complex.

## 2. Problem Statement

The development of private farms is a pivotal component of the Russian agro-industrial complex, playing a crucial role in ensuring food security and bolstering the overall agricultural sector. However, a significant impediment to the growth of private farms in Russia is the inadequate availability of modern elevator capacities. The Ministry of Agriculture of the Russian Federation has initiated a national program to promote agricultural production, yet the insufficiency of modern elevators remains a major challenge.

The lack of proper elevator facilities leads to substantial crop losses during storage and transportation, negatively impacting the income of farmers and posing a direct threat to the country's food security. This challenge not only affects the economic viability of individual farmers but also hampers the growth potential of the entire agricultural sector in Russia.

The current insufficient elevator capacity stands as a formidable barrier to the efficient functioning and expansion of private farms. It not only results in economic losses but also undermines the broader goals of the national agricultural program. Therefore, there exists an urgent need to explore viable solutions that address the inadequate elevator capacity, ensuring the resilience and growth of private farms while simultaneously fostering the overall development of the agricultural sector in Russia.

### 3. Research Questions

1. Factors Contributing to the Lack of Modern Elevator Capacities:
  - i. What are the key factors and challenges contributing to the insufficient availability of modern elevator capacities in the Russian agriculture sector? This question aims to identify the underlying issues that have led to the current state of inadequate elevator infrastructure.
2. Impact of Absence of Modern Elevator Capacities on Crop Storage and Preservation:
  - ii. How does the absence of modern elevator capacities impact the storage and preservation of crops in the Russian agriculture sector? This question seeks to understand the consequences of the current situation on the quality, quantity, and overall preservation of agricultural produce.
3. Policies and Measures to Address Inadequate Elevator Capacities:
  - iii. What policies and measures can be proposed and implemented by the government and other stakeholders to address the issue of inadequate elevator capacities in the Russian agriculture sector? This question focuses on exploring potential solutions and interventions to enhance elevator infrastructure.
4. Role of Centralized Construction of Elevators for State and Regional Support:
  - iv. To what extent can centralized construction of elevators serve as a tool for comprehensive state and regional support of agricultural producers in Russia? This question aims to assess the feasibility and effectiveness of centralized construction as a strategy to support agricultural development at both the state and regional levels.

By addressing these research questions, the study endeavors to provide a thorough understanding of the challenges, impacts, and potential solutions related to the inadequate elevator capacities in the Russian agriculture sector, with a specific focus on the role of centralized construction in supporting agricultural producers.

### 4. Purpose of the Study

1. Assessment of Current Elevator Capacities:
  - i. Examine and analyze the current state of elevator capacities in the Russian agriculture sector. This involves a comprehensive review of existing infrastructure, technological capabilities, and distribution of elevators across different regions.
2. Identification of Factors Leading to Inadequacy:
  - ii. Identify and understand the factors and challenges that contribute to the inadequacy of modern elevators in the Russian agriculture sector. This includes investigating issues such as technological obsolescence, insufficient investment, and other systemic barriers.
3. Exploration of Impact on Crop Storage and Preservation:
  - iii. Investigate and evaluate how the absence of modern elevator capacities impacts the storage and preservation of crops in Russia. This involves assessing the economic losses, quality deterioration, and overall consequences for agricultural producers.
4. Evaluation of Existing Policies and Measures:

- iv. Evaluate the effectiveness of existing policies and measures implemented by the government and other stakeholders to address the inadequacy of elevator capacities in the agriculture sector. This includes analyzing regulatory frameworks, financial incentives, and support mechanisms.

#### 5. Substantiation of Centralized Construction as a Solution:

- v. Substantiate the necessity and viability of centralized construction of elevators as a strategic solution. This involves exploring the potential benefits, challenges, and implications of adopting centralized construction practices to address the elevator capacity issue.

By addressing these objectives, the study aims to provide a comprehensive understanding of the current state of elevator capacities, diagnose the root causes of inadequacy, assess the impact on crop storage, critically evaluate existing policies, and advocate for the adoption of centralized construction as a tool for state and regional support in the Russian agriculture sector.

## 5. Research Methods

### 1. Quantitative Data Analysis:

- i. Employed for statistically assessing the current state of elevator capacities, their distribution, and technological capabilities. Data were extracted from reports of the Ministry of Agriculture of the Russian Federation and statistical databases on agriculture.

### 2. Surveys and Interviews:

- ii. Conducted surveys among farmers, agricultural experts, government representatives, and elevator construction companies to collect both quantitative and qualitative data on issues, the impact of the lack of modern elevators on crop storage, and possible solutions. This method also included interviews with key stakeholders.

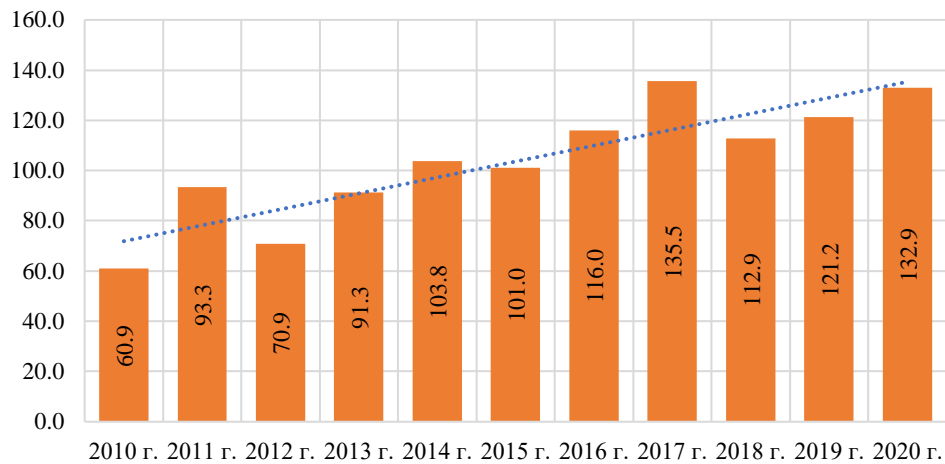
### 3. Policy and Legislative Analysis:

- iii. Involved qualitative analysis of agricultural policies, regulatory acts, and measures aimed at addressing the issue of inadequate elevator capacities. Official documents and reports from government bodies were utilized.

These methods and literature sources provide a robust foundation for conducting research and further analyzing the issue of insufficient elevator capacities in Russian agriculture.

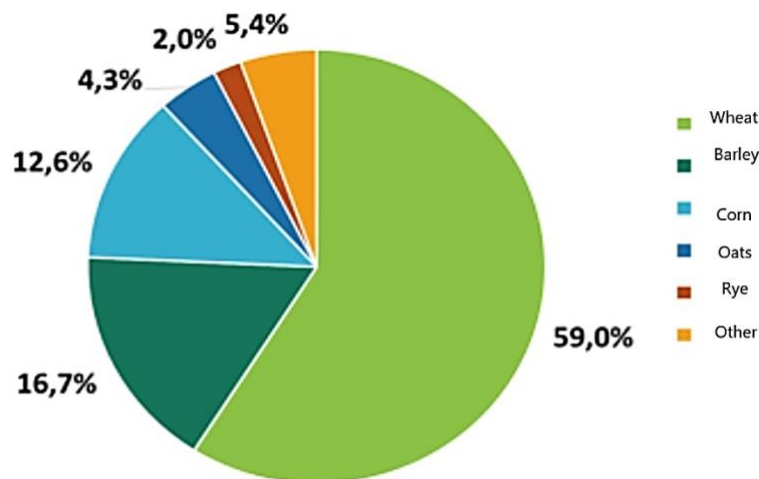
Agriculture is the only Russian industry that demonstrates sustainable development even in a crisis situation in the economy, while its most significant sector is grain production (Dzhabrailova et al., 2021; Maltais & Nykvist, 2020). In 2021, Russia harvested more than 121.4 million tons of grain crops, while the historical maximum was reached just five years earlier - in 2017 (134 million tons) (Rosstat, 2022, March 3). According to the Center for Grain Quality Assessment, a record high level of quality over the past 20 years of monitoring has also been achieved this year (FSBI Center for Grain Quality Assessment, 2021).

The dynamics of grain production according to statistics for recent years is shown in Figure 1.



**Figure 1.** Volumes of grain production in the Russian Federation, million tons (Rosstat, 2022, March 3)

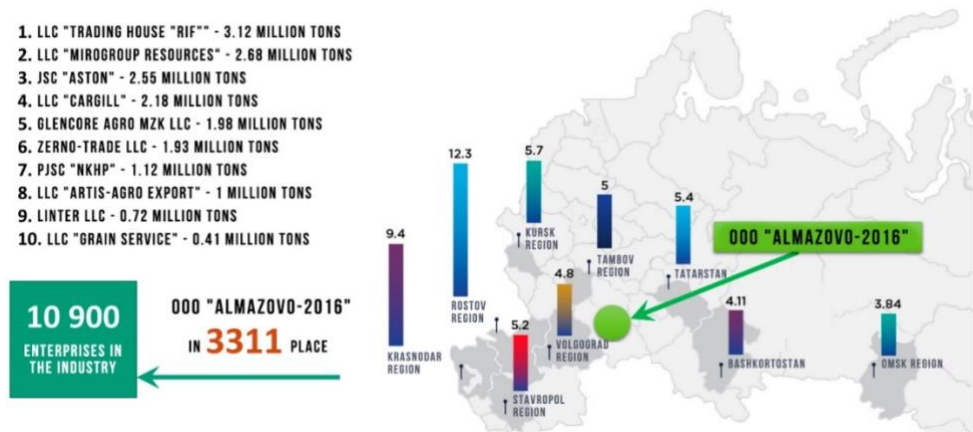
Thus, starting from 2014, the yield in Russia does not fall below 100 million tons. The most significant crops are winter and spring wheat (64.6% of the gross grain volume), as well as barley, corn, oats and rye (Figure 2).



**Figure 2.** The structure of grain production in the Russian Federation, million tons

In 2021, the leader in the gross grain harvest was the Rostov region, where the gross grain harvest reached 12.5 million tons, followed by the Krasnodar Territory and the Voronezh Region. The TOP-10 regions in terms of grain production traditionally included Stavropol Territory, Kursk Region, Tatarstan, Volgograd and Saratov Regions.

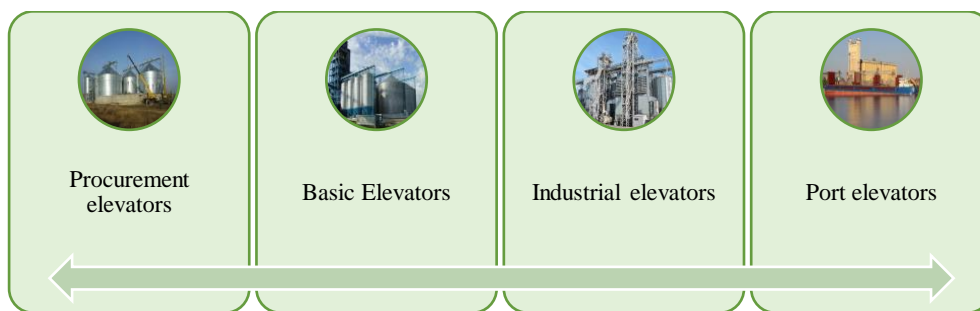
TOP-10 regions and grain producers in the Russian Federation are presented in Figure 3.



**Figure 3.** TOP-10 regions and grain producers in the Russian Federation

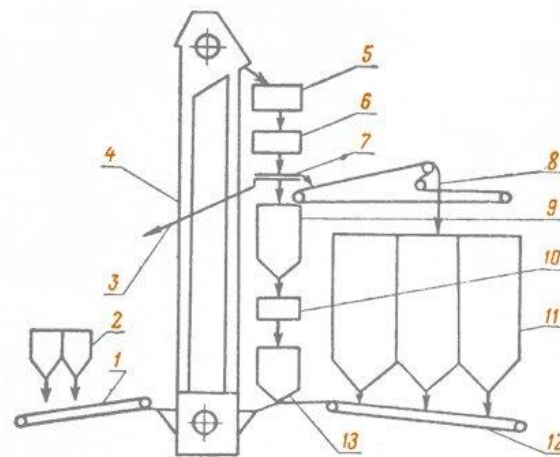
The share of agricultural enterprises amounted to 70% of the harvested grain, 30% of the grain was collected by farms and individual entrepreneurs. According to the forecast of the Ministry of Agriculture of Russia in 2035, the yield will be 153 million tons, and in the optimistic scenario - 170 million tons of grain.

Over the past century, one of the most efficient ways to store agricultural products has been the grain elevator, a fully mechanized large-capacity granary that ensures long-term maintenance of grain quality before it is sold at a time of high value (Zinina et al., 2021). There are various types of elevators, different in volume and purpose (Figure 4).



**Figure 4.** Typology of elevators

Thus, procurement elevators have a volume of 15 to 100 thousand tons, they are equipped with equipment for receiving, cleaning and average storage of grain with its subsequent shipment to elevators or granaries of greater capacity (Voloshin, 2019). Basic elevators are designed for long-term storage and have a capacity of 150,000 tons, they have created conditions for maintaining grain in the right condition and periodically shipping grain for processing. Production elevators have a small volume and are used for temporary storage of grain with subsequent shipment to food production. Transshipment or port elevators are designed to store grain before it is reloaded onto ships, wagons or trucks. All listed categories of elevators independently operate according to the following scheme (Figure 5).



1 - receiving belt hopper; 2 - receiving hopper; 3 - vacation system; 4 - noria; 5 - suspended bunker; 6 - scale; 7 - disctribution pipes; 8 - transporter; 9 - separation bunker; 10 - separator; 11 - storage; 12 - undersilo transporter; 13 - under separator bunker.

**Figure 5.** Scheme of the operation of the elevator

## 6. Findings

The research reveals the pressing issue of insufficient elevator capacity for storing grain in the Russian Federation. Different countries adopt varying approaches to address grain storage challenges. In nations with advanced grain crop production, a trend is observed toward abandoning the reconstruction of old linear elevators in favor of creating granaries directly managed by agricultural producers. This strategy reduces transport costs, enhances owners' responsibility for grain safety, and facilitates marketing flexibility during fluctuating market conditions.

For instance, in the United States, a significant proportion (up to 60%) of grain is stored in farm granaries, showcasing a high level of cooperation among American grain producers. Over a third of farmers participate in cooperatives owning 4,000 elevators, constituting 38% of the country's total grain storage capacity. These cooperatives play a crucial role in realizing a substantial portion of the gross harvest and export deliveries of grain. Notably, a state program in the U.S. compensates farms for 50% of the costs of building grain tanks. Canada similarly organizes the activities of grain producers along cooperative lines (Shakhgiraev, 2019).

According to estimates from the Russian Grain Union, Russia currently has over 400 grain storage facilities with a total capacity of approximately 135-145 million tons. About 50% of these facilities are specialized granaries, including elevators, processing enterprise warehouses, and grain receiving points. Grain storage also occurs in warehouses within agricultural enterprises and private farms. Despite statistics indicating peak occupancy in Russian granaries, agricultural producers highlight the insufficiency of existing elevators. Statistical studies suggest a deficit of granary capacity reaching 8.2 million tons, necessitating a comparison of grain production indicators with elevator capacities in terms of gross volume.

The largest grain storage capacities are naturally located in the traditional agrarian regions of the country: the Central, Southern and Volga federal districts. Thus, Russia's largest grain elevator complex is located in the Voronezh region, which can store 300 tons of grain, elevators with a capacity of more than 150 tons are located in Budennovsk and Omsk. At the same time, a significant part of the existing granaries was built in the middle of the last century and today has equipment wear of about 60-70%. In addition, granaries are located unevenly and do not cover the volume of grain production in certain regions. At the same time, in the conditions of a regional monopoly, the owners of elevators charge unreasonably high prices for storage, which forces agricultural producers to independently organize the placement of products, including in obsolete barn-type granaries. This method of storing grain leads to its losses in the amount of up to 10%.

The construction of elevators is a low-profit activity: the average cost of building facilities is about \$200 per ton of storage, while the profit from this activity does not exceed \$15 per ton per year. Obviously, only large agro-industrial holdings can afford to build their own elevator. Thus, in the Altai Territory, 15-20 new elevators with a capacity of up to 15 thousand tons are put into operation annually. Over the past four years, 44 granaries have been built in the Volgograd region, although already in 2017 the volumes of existing granaries fully covered all the needs for grain storage, even taking into account high yields. Two elevators with a capacity of 20 and 50 thousand tons have recently been built in the Novosibirsk region, but about ten more granaries need to be built to supply the region.

In the Nizhny Novgorod Region, an elevator complex with a capacity of 130,000 tons of grain was put into operation in 2021. The elevator will serve the enterprises of the agricultural holding "RBPI Group" and other farmers of the Nizhny Novgorod region. In the Chelyabinsk region in 2017, the Ariant agricultural holding commissioned the first stage of an elevator with a capacity of 200 thousand tons. After the launch of the second stage, the capacity of the elevator will increase to 290 thousand tons, and it will become the largest granary in Russia.

## **7. Conclusion**

The export of grain has alleviated the burden on elevators, with a notable surge in agricultural product exports to the foreign market in 2020, particularly against the backdrop of the global pandemic and crises in the agricultural sectors of the United States and other countries. The Ministry of Agriculture estimates Russia's export potential for grain at around 40 million tons annually. Foreign capital is actively involved in investment projects in grain-producing regions, exemplified by the construction of a grain terminal in the Azov district of the Rostov region by the Dutch company Louis Dreyfus Commodities Vostok, capable of handling up to 1.2 million tons of grain per year.

However, the financial constraints of farms producing a substantial portion (up to 30%) of the total grain crop hinder their ability to construct new elevators and modernize existing granaries. This disparity leads to a significant decline in competitiveness and market position, allowing agricultural holdings and large elevator owners to procure grain at lower prices for subsequent processing.

Addressing the challenge of providing farms with high-quality granaries stands out as a pivotal task for the agricultural sector. The existing program, "Long-term strategy for the development of the grain complex of the Russian Federation for 2016–2025" (Electronic sinking fund and regulatory and



technical information, 2022) and its extension until 2035, has resulted in the operation of granaries with a total capacity of about 16 million tons by 2021. The future vision for the Russian agro-industrial complex involves strengthening farmer cooperation and intensifying state support for small agricultural producers. This includes the construction of modern elevators across all agricultural regions of the country, paving the way for sustainable development in the sector.

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