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КЫРГЫЗСТАНДАГЫ АГРАРДЫК ЭКОНОМИКАНЫН ЖОГОРКУ САПАТТУУ ӨНҮГҮШҮН КАМСЫЗ КЫЛУУДА ИНФРАСТРУКТУРАНЫН ОРДУ

ИНФРАСТРУКТУРА КАК ФАКТОР ПОДДЕРЖКИ ВЫСОКОКАЧЕСТВЕННОГО РАЗВИТИЯ АГРАРНОЙ ЭКОНОМИКИ КИРГИЗИИ

INFRASTRUCTURE SUPPORTS AGRICULTURE ECONOMY HIGH-QUALITY DEVELOPMENT IN KYRGYZSTAN

Кыскача мүнөздөмө: Дүйнө жүзүндө айыл чарбасынын өнүгүшү инфраструктуранын жакшырышы менен тыгыз байланыштуу. Айыл чарбасына негизделген өлкө катары Кыргызстан үчүн бул маселе өзгөчө актуалдуу болуп саналат. Инфраструктураны чыңдоо айыл чарба өндүрүшүнүн натыйжалуулугун жогорулатууга гана эмес, айыл экономикасынын өнүгүшүнө да өбөлгө түзөт. Бул макалада Кыргызстанда инфраструктураны жакшыртуунун агрардык тармактын өнүгүшүнө тийгизген оң таасири изилденип, учурдагы көйгөйлөр талданат.

Аннотация: Во всем мире развитие сельского хозяйства тесно связано с улучшением инфраструктуры. Как страна, экономика которой в значительной степени опирается на аграрный сектор, Кыргызстан испытывает в этом отношении особую потребность. Укрепление инфраструктуры позволяет не только повысить эффективность сельскохозяйственного производства, но и способствует развитию сельской экономики. В данной статье исследуется положительное влияние улучшения инфраструктуры на развитие сельского хозяйства Кыргызстана и анализируются существующие проблемы.

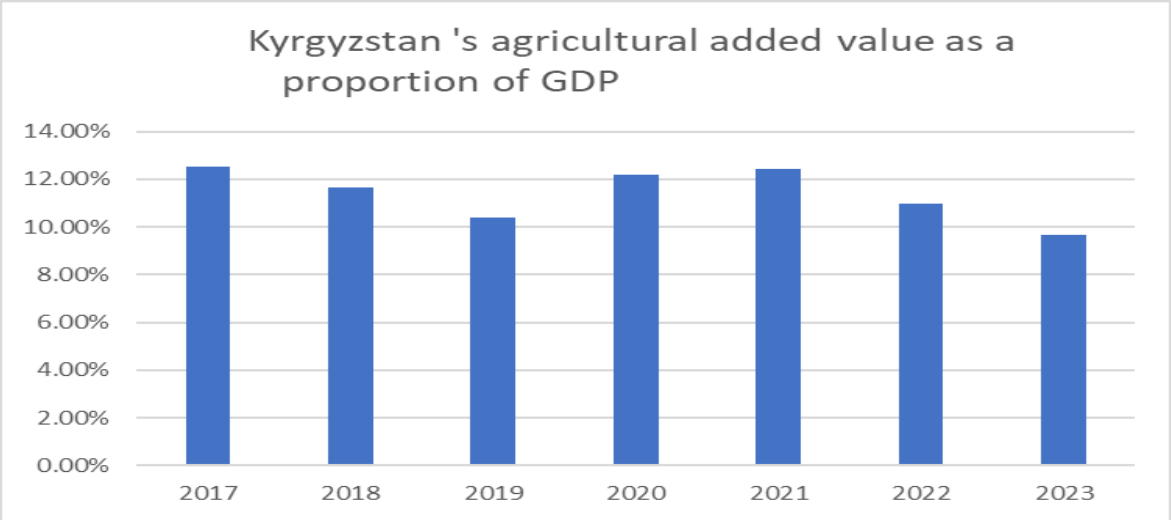
Abstract: Globally, the development of agriculture has always been closely associated with the improvement of infrastructure. As a country whose economy is largely based on the agricultural sector, Kyrgyzstan has a particularly urgent need in this regard. Strengthening infrastructure not only improves the efficiency of agricultural production but also contributes to the development of the rural economy. This article examines the positive impact of infrastructure improvement on the development of agriculture in Kyrgyzstan and analyzes the existing challenges.

Негизги сөздөр: инфраструктура; Кыргызстан; агрардык экономика.

Ключевые слова: инфраструктура; Кыргызстан; аграрная экономика.
Keywords: infrastructure; Kyrgyzstan; agricultural Economy.

1. The Relationship Between Infrastructure Status and Agriculture. Kyrgyzstan is located in Central Asia, and agriculture is the foundational industry of its economy. Agricultural resources are abundant, but infrastructure development is relatively lagging. As shown in Figure 1 from the World Bank data, the agricultural value added in Kyrgyzstan accounts for a significant proportion of the gross domestic product, although it is on a downward trend.

Figure 1. Share of agriculture in GDP of Kyrgyzstan



Source: World Bank data.

The structure of the transportation and road sector in the Kyrgyz Republic depends on the country's geographical location and its geophysical characteristics. Due to the lack of access to the sea and navigable rivers, primarily mountainous terrain, and distance from major railway hubs, a transportation system dominated by road transport has formed. To date, Kyrgyzstan's transportation infrastructure includes roads and railways. The road network accounts for up to 96% of freight transport and up to 98% of passenger transport in the Kyrgyz Republic. The total length of the road network in the Kyrgyz Republic is approximately 34,000 kilometers, of which 19,051.76 kilometers are public roads maintained by the Ministry of Transport and Communications of the Kyrgyz Republic. However, as shown in Table 1, a large proportion of the remaining roads in urban and rural areas are unpaved.

Table 1. Road network characteristics in Kyrgyzstan

Road situation	lengt h
The length of streets and roads of cities, urban-type settlements and villages, agricultural, industrial and other enterprises	15,190 km
The length of public roads with a hard surface	7580 km
The length of unhardened road	7610 Km

Data from World bank Updated: March 15, 2024

The existing transportation, irrigation, and storage facilities are generally inadequate, causing farmers to face numerous difficulties in production, transportation, and sales. Especially in mountainous

areas, the transportation and circulation of agricultural products are restricted, directly affecting farmers' income and living standards.

In 2023, the planting and animal husbandry industries in Kyrgyzstan developed steadily, with the agricultural, forestry, and animal husbandry output value reaching 378.7 billion soms (approximately 4.31 billion USD), a slight increase of 0.6% year-on-year. Due to summer drought conditions, major crops such as wheat experienced significant reductions in yield, leading to a 13% decrease in total grain production for the year. The livestock sector performed slightly better, with a small increase in the number of cattle and sheep. Meat, milk, and potatoes basically achieved self-sufficiency, but products such as eggs, edible oil, and fruits and vegetables still require substantial imports.

Kyrgyzstan's planting industry is primarily focused on land-intensive products, with food crops and cash crops becoming the mainstay of the agricultural economy. The arable land area is approximately 1.27 million hectares, accounting for only 11.8% of the total agricultural and pastoral land. The main crops grown include grains such as barley, corn, and wheat. Although agricultural infrastructure such as irrigation canals has improved, storage and logistics facilities remain relatively underdeveloped, with 95% of agricultural products sold in raw form, resulting in low added value.

The conditions for animal husbandry are favorable, but the infrastructure for animal husbandry is lagging behind. 90% of Kyrgyzstan's territory is mountainous, with 54% of the land suitable for agricultural and pastoral development, totaling 10.8 million hectares. Among this, the area of pastures and natural grasslands reaches 9.34 million hectares, accounting for 86.5% of agricultural and pastoral land. The more than 9 million hectares of pastures and natural mowing fields, along with ample sunlight, provide unique conditions for the development of animal husbandry, making it a major livestock country in Central Asia. The livestock breeding industry is developing rapidly, primarily focusing on beef, mutton, and products such as hides, wool, eggs, and milk, with a strong export advantage for live animal products. However, the overall level of development in Kyrgyzstan's animal husbandry is not high, with lagging infrastructure, feeding still using the mixed feed and water method, and a lack of feed processing equipment and manure resource treatment facilities.

1.1 The inadequacy of transportation infrastructure. The lack of transportation infrastructure is a significant factor restricting agricultural development in Kyrgyzstan. Currently, most of the roads, air, and rail transport infrastructure in Kyrgyzstan are old and in disrepair. Road transport is the main mode of transportation in Kyrgyzstan. The total length of roads in Kyrgyzstan is approximately 34,200 kilometers, of which 15,200 kilometers are roads for towns, villages, and various enterprises, with no highways within the country. The damage and inadequacy of rural roads lead to time-consuming and labor-intensive transportation for farmers when delivering agricultural products, increasing logistics costs and affecting market competitiveness. In recent years, the government and international organizations have begun to focus on improvements in this area, investing in the construction of rural roads, but the overall situation still needs enhancement. The expenditure strategy for the transportation and road sector in the Kyrgyz Republic's 2025-2029 mid-term financial budget proposal is explained in Table 2.

Table 2. Expenditure Strategy for the Transport and Roads Sector of the Kyrgyz Republic for 2025–2029

Explanatory Note to the Medium-Term Budget Expenditure Strategy for the Transport and Roads Sector for 2025-2029	
Program	**Major repair Measure**
Program 431. Management and administration	

Program 432. Maintenance of public roads in working order.	Measure 43202 Major repairs (Construction of bridges, roads, medium repairs, roadway markings, installation of road signs and traffic lights)
Program 433. Rehabilitation of international transport corridors	Measure 43301 Rehabilitation of international transport corridors of the western direction (Osh-Batken-Isfana):
	Measure 43302 Rehabilitation of international transport corridors of the western direction (Bishkek-Osh):
	Measure 43303 Avalanche Protection of the Bishkek-Osh Road (JICA) Project (Grant) WB
	Measure 43305 Rehabilitation of International Transport Corridors (North-South)

Explanatory Note to the Medium-Term Budget Expenditure Strategy for the Transport and Roads Sector for 2025-2029	
Program	**Major repair Measure**
Program 433. Rehabilitation of international transport corridors	Measure 43306. Rehabilitation of international transport corridors of the western direction (Taraz-Talas-Suusamyr)
	Measure 43307. Rehabilitation of international transport corridors of the eastern direction (Balykchy-Karakol-Balykchy):
	Measure 43308. Rehabilitation of international transport corridors of the eastern direction. (Third Phase Central Asia Road Links Improvement Project (Tup-Kegen District, km 39-76 and Tourism Development)
Program 434. Development of road transport in the Kyrgyz Republic	Measure 43401. Road transport regulation and control

Source: Explanatory Note to the Medium-Term Budget Expenditure Strategy for the Transport and Roads Sector for 2025–2029 (issued on May 6, 2024).

1.2 Shortage of Irrigation Systems. Kyrgyzstan has a typical arid continental climate, which is essential for irrigated agriculture. Most of the main irrigation canals in Kyrgyzstan were built during the Soviet era, and many sections are old and severely damaged. Because water sources cannot reach the villages along the lines, not only do residents face difficulties in accessing water, but it also leads to a

large amount of farmland becoming barren. The lack of systematic irrigation facilities severely impacts agricultural production during dry seasons.

1.3 The infrastructure for electricity, storage, and cold chain logistics needs improvement. Since its independence, Kyrgyzstan's electricity infrastructure has developed somewhat, but the equipment is severely outdated. Currently, the power generation capacity cannot meet domestic demand, resulting in an annual shortfall of approximately 35 billion kilowatt-hours. In 2023, Kyrgyzstan generated 13.8 billion kilowatt-hours of electricity, a year-on-year decrease of 8.3%, with significant power shortages and blackouts during the winter.

After the harvest of agricultural products, storage and transportation also critically determine their market value. Kyrgyzstan's warehousing and logistics facilities are still relatively underdeveloped, and due to the lack of effective storage facilities, many agricultural products are prone to spoilage and deterioration after harvest, preventing fresh products from reaching consumers in a timely manner, which limits market expansion and farmers' income growth.

2. Improving infrastructure to support high-quality agricultural development

The improvement of infrastructure will bring positive changes to agriculture in Kyrgyzstan, mainly reflected in the following aspects:

2.1 Improving Agricultural Production Efficiency. With the improvement of irrigation facilities, it will help to enhance the production efficiency of agriculture. The upgrade of irrigation equipment can ensure that crops receive sufficient moisture during dry seasons, significantly increasing the yield per unit area of crops, as shown in Table 3 regarding the measures to improve irrigation efficiency in Kyrgyzstan. In addition, In recent years, the Xinjiang Production and Construction Corps has actively participated in the construction of the "Silk Road Economic Belt" and has implemented a water-saving agricultural technology park project in Kyrgyzstan, where drip irrigation facilities have been introduced for corn planting in the northern regions of Kyrgyzstan, resulting in increased corn yields.

Table 3. Measures to Improve Irrigation Efficiency within China–Kyrgyzstan Agricultural Cooperation (2018–2024)

year	Improve irrigation efficiency
2018	The Kyrgyz government initiated a 32-million-U.S.-dollar project allocated from a Chinese grant to reconstruct the country's irrigation system Ltd in Ak-Olon in Issyk-Kul region, in 2021 after three years of work, it can increase the irrigation area of 2310 hectares for Jilin, increase the water supply guarantee rate of 11 thousand hectares of irrigated land, and benefit the population of 20 thousand people.
2022	More than 20 agricultural experts and officials from the Ministry of Agriculture of Kyrgyzstan participated in the Kyrgyzstan Agricultural Technology Seminar sponsored by the Ministry of Commerce of China and hosted by Yangling Demonstration Zone in Shaanxi Province to learn about China 's experience and practices in water-saving irrigation, facility agriculture, soil and water conservation.
2024	China handed over the first section of a renovated irrigation system, a China aid project, to Kyrgyzstan on Wednesday outside the city of Balykchy in the Issyk-Kul Oblast.

Source: compiled by the author based on data from *Xinhua News Agency* (updated on March 15, 2024).

2.2 Expanding Markets and Increasing Income. The improvement of transportation infrastructure will directly reduce transportation costs and increase the market accessibility of agricultural products, allowing farmers to expand their sales channels. For example, in February 2023, the Kyrgyz government released the "2023-2030 Road Development Plan," proposing to implement the repair of four roads with international corridor significance, including the Bishkek-Naryn-Torugart road, under the framework of the "Central Asia Economic Cooperation Program." Additionally, projects such as the construction of eight projects including the Osh-Uzgen bypass road through public-private partnerships (PPP) and the implementation of the China-Kyrgyzstan-Uzbekistan railway project may position Kyrgyzstan as an important transportation hub in the future. This will help Kyrgyzstan overcome geographical isolation and ensure access to the world market. Improved storage facilities and cold chain logistics will ensure the freshness of agricultural products during transportation, enhance market competitiveness, and thereby increase farmers' income levels.

2.3 Promoting Agricultural Mechanization. The enhancement of infrastructure provides the foundational conditions for agricultural mechanization. With good roads and transportation facilities, farmers can more conveniently use agricultural machinery, reducing labor costs and improving labor efficiency. At the same time, the popularization of agricultural machinery can also promote the scale and intensive development of agricultural production. For instance, the overseas economic and trade cooperation zone developed by China in Kyrgyzstan includes the Asia Star Agricultural Industry Cooperation Zone, which introduces agricultural machinery facilities to enhance the mechanization level in vegetable planting, cattle and sheep breeding, poultry slaughtering and processing, and feed processing.

2.4 Enhancing Rural Risk Resistance. In the context of frequent natural disasters, well-developed infrastructure will enhance the risk resistance capacity of rural areas. For example, a stable and reliable power supply can effectively mitigate the adverse effects caused by cold weather, while a well-established transportation network can ensure that farmers quickly receive rescue and support after a disaster occurs. On November 5, 2024, according to the National Electric Network of Kyrgyzstan (NENK), Kyrgyzstan has completed the construction of energy infrastructure under the CASA-1000 international project framework, which aims to establish the largest cross-regional transmission line connecting Central Asia and South Asia. This not only promotes energy integration between Central Asia and South Asia but also brings new economic opportunities to Kyrgyzstan.

3. Development Policies and International Cooperation. Due to limited fiscal revenue, the improvement of infrastructure in Kyrgyzstan mainly relies on foreign or international organizations' aid, loans, and various investments. The Kyrgyz government and relevant organizations have made efforts to promote infrastructure construction, including formulating relevant policies to attract foreign investment and technical support. The government of the Kyrgyz Republic believes that the "Belt and Road" initiative, with two land economic corridors of Chinese projects passing through Central Asian countries, provides opportunities for Central Asian countries to obtain infrastructure construction investment from China, which will facilitate the export of agricultural products and labor.

At the same time, the government also encourages cooperation with international organizations. By leveraging international loans and aid, Kyrgyzstan can obtain greater financial support. International organizations, such as the Food and Agriculture Organization (FAO) and the World Bank, have launched multiple infrastructure construction project investments in Kyrgyzstan, aiming to improve agricultural production capacity and rural economic levels.

4. Challenges Faced. Despite the positive impacts of improved infrastructure on the agricultural development of Kyrgyzstan, there are still multiple challenges in the actual implementation process.

4.1 Funding Shortages. Kyrgyzstan's huge demand for investment in infrastructure development, while Kyrgyzstan's relatively tight fiscal situation makes the lack of funds a major obstacle. Although external financing can partially solve this problem, how to rationally allocate resources and ensure the efficient use of funds is still an urgent problem to be solved. This is shown in Table 4.

Table 4. Financial Analysis of Budget Programs of the Ministry of Transport and Communications of the Kyrgyz Republic for 2023–2029

Financial Analysis

Name	Year 2023	Year 2024	Year 2025	Year 2026	Year 2027	Year 2028	Year 2029
	(fact)	(approved)	(plan)	(forecast)	(forecast)	(forecast)	(forecast)
TOTAL Ministry of Transport and Communications of the Kyrgyz Republic							
Budget funds	4 030 334,9	4 450 935,1	5 205 027,2	5 507 098,5	6 073 141,1	6 708 239,4	7 281 714,6
Funds accumulated in special accounts	40 008,9	0,0	0,0	0,0	0,0	0,0	0,0
Public investment (external financing)	7 888 542,8	8 721 013,8	8 651 421,2	11 986 333,9	13 440 734,8	7 936 179,4	4 335 657,5
Extrabudgetary sources	0,0	0,0	0,0	0,0	0,0	0,0	0,0
In total, under the programs of the Ministry of Transport and Communications of the Kyrgyz Republic, of which:	11 958 886,6	13 171 948,9	13 856 448,4	17 493 432,4	19 513 875,9	14 644 418,8	11 617 372,1
– from the republican budget	11 958 886,6	13 171 948,9	13 856 448,4	17 493 432,4	19 513 875,9	14 644 418,8	11 617 372,1
– from extra-budgetary sources	0,0	0,0	0,0	0,0	0,0	0,0	0,0

The financial plan for all budget programs for 2025 will be 13,856,448.4 thousand soms, including 5,205,027.2 thousand soms for the current budget and 8,651,421.2 thousand soms for public investments.

Head of the Economics Department,

analysis and strategic planning by A. J. Duishebaev

Source: compiled by the author based on data from Explanatory Note to the Medium-Term Budget Expenditure Strategy for the Transport and Roads Sector for 2025–2029 (issued on 06.05.2024).

4.2 Complex Terrain and Environmental Impact. Kyrgyzstan's terrain is complex, with 90% of the land being mountainous, making infrastructure construction challenging, especially in remote areas where transportation and engineering face significant obstacles. Additionally, the potential impact of climate change on agriculture and infrastructure must be taken seriously.

4.3 Education and Training for Farmers. Improving infrastructure is not just about physical construction; it also requires enhancing farmers' ability to utilize new facilities. Education and training are crucial pathways to increasing agricultural productivity, and therefore, efforts in this area need to be intensified.

Conclusion. The improvement of infrastructure is an important factor in promoting the agricultural development of Kyrgyzstan. Through investment in construction, technology introduction, and policy support, the future of agriculture will be more efficient and sustainable. We look forward to a brighter

tomorrow for Kyrgyzstan's agriculture in the near future, contributing even more to the country's economic prosperity and social development.

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