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# Digital farming platforms as a tool for strengthening cooperation between Kyrgyzstan and China: Potential and prospects

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► **Abstract.** The purpose of this study was to assess the role of digital agricultural platforms in strengthening economic cooperation between Kyrgyzstan and China, focusing on their potential to increase agricultural productivity, resources optimisation, and farmers' access to markets expansion. The methodology involved analysing primary and secondary sources, conducting structured interviews with experts, examining trade data between Kyrgyzstan and China from 2001 to 2023, and evaluating barriers and opportunities for digitalisation in the agricultural sector. The results indicated that digital agricultural platforms contributed to improved logistics, enhanced efficiency in managing agricultural processes, and facilitated international cooperation. Kyrgyzstan's exports to China increased from USD 50 million in 2001 to USD 900 million in 2023, while imports reached USD 3.6 billion, demonstrating the economic interdependence between the two countries. The adoption of digital solutions, including Internet of Things, artificial intelligence, and blockchain, minimised costs, enabled yield forecasting, and improved supply chains. The findings of the study indicated that the digitalisation of Kyrgyzstan's agricultural sector had the potential to significantly enhance its competitiveness and promote sustainable economic development. However, several challenges needed to be addressed, including financial constraints, underdeveloped digital infrastructure, and the

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necessity to align government policies with the digital economy. The successful implementation of digital solutions required a comprehensive approach that encompassed both technological modernisation and the development of farmers' competencies to effectively utilise innovative tools

▸ **Keywords:** agriculture; technology adoption; supply chain; blockchain; food security

## ▸ Introduction

Agriculture is central to the national economy of Kyrgyzstan, contributing an estimated one-third of the country's gross domestic product. China is Kyrgyzstan's largest trading partner in Central Asia and abroad. As in Kyrgyzstan, in China agriculture is one of the main types of economic activity and plays an important role in the welfare of the population. Both countries have significant competitive advantages in agricultural production. Both countries are interested in partnership to promote sound agricultural economic actions between them, combining production and supply advantages to achieve complementary benefits. The Digital Farming Platform concept is a systemic, technology-based approach to create a more inclusive and transparent value chain for local agricultural systems. The Digital Farming Platform focuses on building digital and physical infrastructure that connects value chains both economically and socially.

The use of Internet of Things (IoT) technologies and decision-making systems in agriculture needs to be improved in 2025. C. Cambra Baseca *et al.* (2019) investigated the potential of IoT to optimise field management, showing the effectiveness of sensor networks and machine learning algorithms for irrigation, fertilisation, and yield. However, their study does not take into account the adaptation of these systems to different climatic conditions and regions with weak infrastructure. Kyrgyzstan faces challenges in agricultural productivity due to its dependence on food imports and regional conflicts. Z.A. Musarova & C.U. Adamkulova (2023) explored the country's economic vulnerabilities, focusing on food security. The existing literature highlights the reliance on imports, making Kyrgyzstan vulnerable to external shocks.

The problem addressed in study by B. Xu (2021) is the lack of comprehensive analysis on the long-term impacts of educational initiatives within China's Belt and Road Initiative on the development of partner countries. He explores how education policies, including international collaborations and cultural exchanges, contribute to China's regional influence and cooperation. The study reveals that education diplomacy plays a key role in China's foreign policy, enhancing bilateral relations and fostering mutual understanding.

The small scale of agriculture and limited access to modern technologies often lead to a significant gap between large and small farms in the context of digital technologies (Bekmuratov *et al.*, 2025). L. Xie *et al.* (2021) studied the impact of digital technologies on small farmers in China, where technologies have helped to increase production efficiency, but their adoption is limited due to insufficient access to infrastructure and financial resources.

The use of digital reporting platforms in Environmental, Social and Governance Strategy implementation enhances transparency and investor confidence. O. Lagodiyenko (2024) analysed their benefits, including automated data collection, analysis, and integration with management systems, highlighting their role in optimising processes and reducing errors. The expansion of digital technologies in agriculture improves production efficiency, resource optimisation, and environmental impact. R. Savkov & N. Karvatska (2024) examined the use of IoT, big data, automation, and robotics, proving their role in productivity and yield growth.

Integration of the digital economy into agriculture contributes to modernisation and efficiency. J. Guo & J. Lyu (2024) investigated the relationship between the digital economy and the development of China's agricultural sector using panel data from 31 provinces and spatial autocorrelation models. The authors found that digitalisation improves productivity and coordination between producers, but the development of digital infrastructure outpaces the adaptation of the agricultural sector. At the same time, significant regional disparities remain and the spatial impact of the digital economy on agricultural production is not well understood.

Digital technologies increase the efficiency of agriculture by optimising production processes (Wrzecińska *et al.*, 2023). M. Anitei *et al.* (2021) explored the prospects for digital farming by analysing the use of IoT, big data, and robotic systems. A survey of farmers revealed key barriers: lack of personnel, financial constraints, and high cost of technology. At the same time, the long-term economic impact of digitalisation on small farms has not been sufficiently considered.

The purpose of this study was to assess the impact of digital platforms on the development of the agricultural sector of Kyrgyzstan and China, to determine their role in improving economic cooperation between the countries and to outline the prospects for their further implementation to strengthen international cooperation. The objectives of the study were to analyse the current state of use of digital technologies in agriculture in Kyrgyzstan and China, identifying key trends and challenges; to study the economic, technological and political aspects of cooperation between the countries in the field of digital.

## ▸ Materials and methods

This study was applied interdisciplinary research with elements of descriptive and analytical approaches. It covered the economic, technological, and environmental aspects of digital agricultural platforms in the context of agricultural development in Kyrgyzstan and China. The surveys were conducted between January and December 2024, gathering data from stakeholders in the agricultural sector in both Kyrgyzstan and China. The tools studied included the IoT for collecting data from sensors, Artificial Intelligence (AI) for analysis and decision-making, big data for improving resource management and forecasting, robotics (drones, robotic systems) for process

automation, blockchain for ensuring transparency of product supply, smart contracts for automating transactions, and cloud services for data storage (Kumar *et al.*, 2024; Mussa, 2024). The choice of these tools was based on their ability to increase production efficiency, reduce costs, ensure the sustainability of the agricultural sector, and support international cooperation.

The data used in this study were derived from a combination of primary and secondary sources, carefully selected to provide a holistic understanding of digital farming platforms and their potential role in Kyrgyz-Chinese agricultural cooperation. Primary data were collected through direct engagement with stakeholders in the agricultural sector in Kyrgyzstan and China, with 30 participants in total. The sample included agricultural experts, policymakers, and farmers, selected based on their experience in managing agricultural projects, implementing or advising on digital technologies in agriculture (such as the IoT, AI, or precision agriculture), and their involvement in the development or implementation of agricultural policies or digital transformation strategies. In Kyrgyzstan, the research focused on the Naryn and Chui provinces, where smallholder farmers were involved in agricultural practices and faced varying levels of digital readiness. The experts were categorised as follows: 12 agricultural experts (5 from research institutes, 4 from non-governmental organisations, and 3 from government agencies), 10 farmers, and 8 policymakers. The gender distribution was 60% male and 40% female, ensuring a diverse range of perspectives on digital technology adoption in agriculture. The aim of the interviews was to assess the state of digital readiness among smallholder farmers in Kyrgyzstan and the barriers they faced in adopting new technologies. First-hand accounts helped identify challenges and opportunities from the perspective of those directly involved in agriculture. Sample questions included: How would you assess the digital readiness of farmers in your region? What barriers hinder the adoption of digital farming technologies? What role should the government play in promoting digital agriculture? Ethical standards such as the Belmont Report were followed, with participants informed about the study's purpose and ensuring confidentiality (U.S. Department of Health and Human Sciences, n.d.). Consent was obtained from all participants, who were assured that their responses would be anonymised and used solely for research purposes.

The selection of secondary data sources was based on their relevance to understanding the trade and agricultural relationship between Kyrgyzstan and China. Key government documents, such as the Protocol on Phytosanitary Requirements for the Export of Beans from the Kyrgyz Republic to the People's Republic of China between the Ministry of Water Resources, Agriculture and Processing Industry of the Kyrgyz Republic, provided insights into the agricultural export regulations applicable to Kyrgyzstan's trade (Kyrgyzstan and China…, 2025). Additionally, reports from international organisations like China, Kyrgyzstan agree Belt and Road Initiative key to bilateral ties, regional cooperation offered context on broader economic frameworks, such as the Belt and Road Initiative, that influenced agricultural trade (Bo, 2019). These sources combined regulatory, policy, and economic insights.

The interview data were processed using a qualitative method of analysis, in particular, content analysis. This method allowed for the systematisation of the respondents' answers, identification of key themes and trends, and determination of barriers and opportunities in the process of introducing digital platforms in the agricultural sector. Research methods for digital platforms and tools included an analysis of existing digital solutions, such as precision farming platforms, tools for monitoring and forecasting yields, and integration with databases for monitoring weather conditions and soil indicators. To study the impact of digital technologies on the agricultural sector, comparative analysis methods were also used to assess the effectiveness of different platforms in Kyrgyzstan and China, as well as economic analysis methods to determine the impact of digitalisation on productivity and cost reduction.

The analysis was based on historical trade data between Kyrgyzstan and China from 2001 to 2023, sourced from official government statistics (Observatory of Economic Complexity, n.d.). The period from 2001 to 2023 was selected because it encompassed key developments in trade relations, including the implementation of major bilateral agreements and the growing influence of initiatives such as the Belt and Road Initiative, which had shaped the economic dynamics between the two countries. These materials provided a comprehensive overview of trade dynamics, including export and import volumes, which were used to assess the impact of digital transformation on bilateral agricultural trade flows. The study also involved a SWOT analysis, identifying the key strengths, weaknesses, opportunities, and threats related to the digitalisation of the agricultural sector in Kyrgyzstan and China. Based on these findings, a set of strategic recommendations was developed to address the risks, such as technological barriers, financial constraints, and regulatory challenges, and to promote the sustainable adoption of digital farming technologies. By integrating multiple research methods, the study provided a comprehensive evaluation of digital agriculture's potential in Kyrgyzstan and China, offering insights into both the opportunities and challenges associated with agricultural digitalisation.

## ▸ Results

Digital agricultural platforms are crucial for modernising agriculture, ensuring efficiency and transparency while integrating advanced technologies like AI, IoT, big data, and blockchain. These platforms optimise agricultural processes, helping enterprises manage production cycles, increase yields, and reduce resource costs. In a globalised environment, digital technologies facilitate international cooperation, simplify trade, and create a shared information space for market participants.

IoT devices track essential parameters like temperature and soil moisture, providing real-time data that enables more efficient use of resources. Big data and analytics process large data volumes, enhancing resource efficiency, soil conditions, and yield forecasts. Automation, including drones and robotic systems, improves

productivity and reduces losses (Kumar *et al.*, 2024). AI systems help with precise decision-making, such as pest detection and water optimisation, while blockchain ensures transparency and reduces fraud, improving trust and automating transactions through smart contracts. Digital platforms support sustainable development, resource efficiency, and productivity, and facilitate international cooperation through data sharing and unified trade chains (Mussa, 2024).

The development of 5G and cloud technologies is key for expanding digital platforms in remote areas, allowing small farms to adopt innovative solutions. Continued advancements in AI and automation further improve agricultural activities and forecasting accuracy, enhancing productivity and supply chain transparency. However, the widespread adoption of digital agriculture faces obstacles like high technology costs, limited digital literacy, poor infrastructure, and cybersecurity threats (Mandal *et al.*, 2024). Regulatory restrictions and inconsistent international standards complicate the global implementation of digital technologies in agriculture. To overcome these barriers, government support, private investment, and increased technology accessibility are essential. Digital transformation can be accelerated by improving farmer education, creating safe cloud services, and enhancing internet access in rural areas (Nehrey, 2023). Trade relations between Kyrgyzstan and China, dating back to the Great Silk Road, have evolved significantly. Since Kyrgyzstan's independence, trade turnover has increased from USD 500 million in 2001 to over USD 4.5 billion in 2023, underscoring the importance of their economic partnership, particularly in agriculture (Observatory of Economic Complexity, n.d.). Despite growth, Kyrgyzstan's trade balance has shifted to a deficit, mainly due to high imports from China. This growing dependence highlights the need for Kyrgyzstan to develop domestic industries and boost exports. A key step is leveraging digital farming platforms and technology to enhance agricultural productivity, processing, and competitiveness in international markets.

Kyrgyzstan and China have signed agreements on agricultural trade cooperation, covering quarantine, food safety, and health protocols. Notably, the Protocol on Phytosanitary Requirements for the Export of Beans from the Kyrgyz Republic to the People's Republic of China between the Ministry of Water Resources, Agriculture and Processing Industry of the Kyrgyz Republic and the General Administration of Customs of the People's Republic of China ensures quality control and product safety, opening up opportunities for expanding Kyrgyz exports (Kyrgyzstan and China…, 2025). Investment projects, such as milk processing plants in Chon-Korgon and Naryn, aim to modernise agriculture by attracting investment and reducing raw material exports. Additionally, under the "One Belt, One Road" initiative (Bo, 2019), A Memorandum of understanding was signed between the Ministry of Economy and Commerce of the Kyrgyz Republic, the State Development Bank and the Silk Road Foundation (China) (2024) to develop agricultural trade infrastructure, enhancing the competitiveness of Kyrgyz agriculture by improving logistics and processing capacities. This agreement strengthens cooperation, facilitating access to the Chinese market and supporting agricultural sustainability.

From 2001 to 2023, trade turnover between Kyrgyzstan and China has demonstrated a consistent upward trend, highlighting the strengthening economic ties between the two countries. Kyrgyz exports to China have shown a steady increase, growing from USD 50 million in 2001 to USD 900 million in 2023 (Observatory of Economic Complexity, n.d.). These exports primarily consist of raw agricultural products, livestock, and food commodities, reflecting Kyrgyzstan's strong agricultural base. However, a gradual transition toward value-added processing has been observed, which presents an opportunity to further enhance the competitiveness of Kyrgyz exports in the Chinese market. Strengthening production facilities and investing in processing technologies can allow Kyrgyz exporters to move up the value chain and capture a greater share of the market. Imports from China have also risen substantially, reaching USD 3.6 billion in 2023. A significant portion of these imports includes machinery, electronics, textiles, and construction materials, illustrating Kyrgyzstan's reliance on Chinese goods across various industries. This increasing dependence on Chinese imports raises concerns about long-term economic sustainability and underscores the need for Kyrgyzstan to bolster its domestic manufacturing and industrial capabilities to achieve a more balanced trade structure.

Despite the growth in exports, trade between the two countries remains asymmetrical, with Kyrgyzstan's imports consistently exceeding its exports, leading to a persistent trade deficit. Addressing this imbalance requires targeted efforts to diversify the country's export portfolio, promote industrialisation, and strengthen the logistics infrastructure to facilitate trade expansion. Investments in processing industries, modernisation of supply chains, and trade facilitation policies could contribute to reducing the trade deficit while enhancing the competitiveness of Kyrgyz products in the Chinese market. Given the increasing importance of agriculture in Kyrgyzstan-China trade relations, integrating digital solutions can significantly enhance efficiency and sustainability. Digital farming platforms, IoT-based farm management systems, and blockchain-enabled supply chains can improve productivity and create direct market access for Kyrgyz farmers. Moreover, strengthening investment in smart agricultural infrastructure will allow Kyrgyz producers to compete more effectively in the Chinese market.

To fully capitalise on these opportunities, Kyrgyzstan must prioritise policy harmonisation, financial incentives for digital agriculture, and cross-border collaboration in agritech. Continued cooperation between the two countries will not only enhance economic ties but also contribute to regional food security and agricultural innovation. Figure 1 illustrates the evolution of trade relations between Kyrgyzstan and China from 2001 to 2023, showing a steady increase in trade turnover, particularly with an increase in Kyrgyzstan's exports and imports. This visual representation highlights the growth and trade dynamics between the two countries, underlining the significance of agricultural trade.

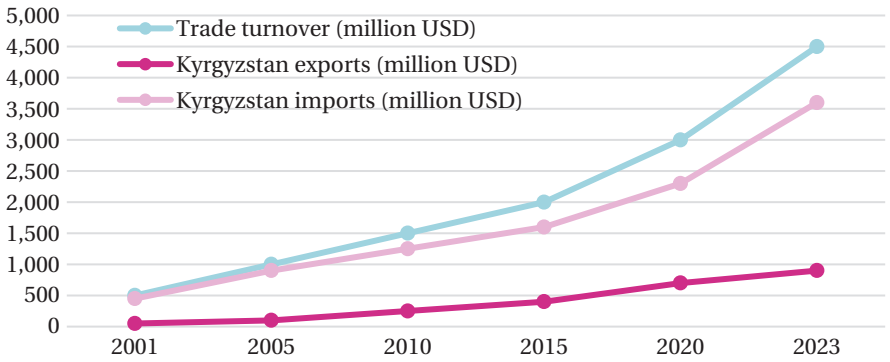


**Figure 1.** Trade dynamic between Kyrgyzstan and China 2001-2023
**Source:** created by the authors based on Observatory of Economic Complexity (n.d.)

Kyrgyzstan and China have developed a strong economic partnership, with agriculture playing a pivotal role in their bilateral trade relations. However, to ensure long-term sustainability and balanced trade growth, Kyrgyzstan must focus on increasing domestic production capacity, enhancing agricultural processing industries, and reducing import dependency. Leveraging digital farming platforms and modern agricultural technologies will be essential in achieving these objectives.

By fostering continued cooperation in research, investment, and policy alignment, both nations can maximise the benefits of their agricultural trade relationship. Strengthening trade agreements, expanding digital agricultural initiatives, and improving market access will be key drivers of economic growth and regional stability in the coming years. The trade dynamics shown in the Figure 1 emphasise that Kyrgyzstan needs to use strategic tools such as digital agricultural platforms to increase export potential. By improving agricultural productivity, developing value-added processing, and increasing access to international markets, Kyrgyzstan can create a more balanced trade relationship with China. The introduction of digital tools can also help improve the transparency and efficiency of the agricultural value chain, making Kyrgyzstan's exports more competitive.

Digitalisation contributes to the development of the agricultural sector by automating management processes, improving access to market data, optimising resource use, and increasing production efficiency (Khamzaeva *et al.*, 2020). Platforms for precision farming, soil, weather and yield data analysis help farmers make informed decisions, which in turn increases productivity and reduces costs. They also provide more convenient conditions for financing through digital platforms and microcredit, providing access to digital financial services for small farmers.

Trade cooperation between Kyrgyzstan and China, in particular in the agricultural sector, is actively developing through the use of digital technologies. Many of the agreements signed, such as the Protocol on Phytosanitary Requirements for the Export of Beans from the Kyrgyz Republic to the People's Republic of China between the Ministry of Water Resources, Agriculture and Processing Industry of the Kyrgyz Republic and the General Administration of Customs of the People's Republic of China, include standards for digital monitoring of product quality and transparency in supply chains (Osmonalieva, 2025). The relationship between digitalisation and trade cooperation is manifested in the fact that digital platforms help to develop new business opportunities, reduce the cost of transportation, storage and processing of products, which increases exports, in particular to China (Bekmuratov *et al.*, 2024).

To better understand the level of digital readiness in Kyrgyzstan's agricultural sector, in-depth interviews were conducted with a total of 30 participants, including farmers, agricultural experts, and policymakers from the Naryn and Chui oblasts. The goal was to identify the barriers to the adoption of new digital technologies in agriculture and to gain insight into the challenges faced by smallholder farmers in these regions. The data gathered highlighted that a significant portion of farmers, about 70%, expressed a keen interest in using digital platforms to improve their agricultural practices. They recognised the potential benefits of digital solutions in increasing productivity, enhancing efficiency, and reducing operational costs. However, the majority of the respondents (80%) pointed out several obstacles that hindered their ability to adopt these technologies.

The key challenges identified included a lack of necessary infrastructure, particularly in rural areas where internet access remains limited. Over 60% of farmers mentioned that unreliable or insufficient internet coverage in remote regions made it difficult to utilise digital farming tools effectively. Another critical barrier was the high cost of technology and equipment, with 75% of farmers stating that the initial investment required for digital solutions such as precision farming tools, sensors, and automation systems was beyond their financial capacity. Furthermore, low levels of digital literacy were cited as a major obstacle by 70% of the respondents, indicating that many farmers struggle to understand and operate digital tools effectively.

These findings were also corroborated by the opinions of agricultural experts, who stressed that the successful implementation of digital solutions in agriculture requires significant state-level support. Experts emphasised that the government should take a proactive role in providing incentives for technology adoption, such as subsidies for equipment and financial assistance for smallholder farmers. Additionally, they highlighted the importance of creating training programmes tailored to farmers' needs,

aiming to boost their digital literacy and technical skills. Without such support, many farmers remain reluctant to embrace new technologies.

The findings from the interviews revealed that 70% of the farmers surveyed expressed interest in using digital platforms, with 65% recognising the potential benefits of digital tools in increasing efficiency, improving market access, and reducing operational costs. However, 85% of farmers cited significant barriers to adoption, including a lack of necessary infrastructure (with many rural areas facing limited internet access), high technology costs, and low levels of digital literacy. Agricultural experts also emphasised that, while farmers showed enthusiasm for digital technologies, there was a critical need for government support. They noted that financial incentives, such as subsidies for technology and equipment, along with targeted training programmes to increase digital literacy, would be essential for facilitating the widespread adoption of digital farming solutions.

In November 2024, China unveiled a five-year action plan aimed at accelerating the digital transformation of its agricultural sector. This plan includes establishing a national agricultural big data platform by 2028, which will enhance efficiency across farms, livestock, and fisheries (Morchid *et al.*, 2024). Despite the numerous advantages, the implementation of digital farming platforms in Kyrgyzstan faces several obstacles. One of the primary challenges is the lack of sufficient digital infrastructure, particularly in rural areas, where limited internet access restricts the full utilisation of digital tools. Farmers who rely on traditional agricultural methods often exhibit resistance to adopting new technologies, further complicating the transition to digitalised farming (Uzenbaev *et al.*, 2019). Additionally, financial constraints, such as the high upfront costs associated with acquiring digital equipment, make it difficult for smallholder farmers to invest in these platforms without government support or external funding.

Policy-related challenges also hinder the widespread adoption of digital solutions in Kyrgyzstan. The absence of a supportive regulatory framework and high tariffs on digital components increase the costs associated with technology integration. Moreover, cultural differences in decision-making and resource utilisation between Kyrgyz and Chinese agricultural stakeholders can create further complexities. Overcoming these challenges requires coordinated policy efforts, financial incentives, and structured training programmes to facilitate a smoother transition toward digital agriculture.

The expansion of digital platforms in Kyrgyzstan and China offers opportunities to improve productivity, market access, and supply chain management. Digital solutions like online trading platforms, precision farming, and digital payment systems provide valuable data on soil, climate, and crop health, leading to better resource use and increased yields. However, challenges like limited digital infrastructure in rural Kyrgyzstan, complex land ownership regulations, and resistance from traditional farming methods hinder adoption. Financial constraints, high equipment costs, and tariffs further complicate the transition to digital farming.

Cultural and organisational factors also impede implementation, as decision-making within farming communities is influenced by traditional hierarchies. The lack of specialised training in digital agriculture prevents farmers from fully utilising these platforms. Addressing these challenges requires investments in rural broadband, financial support, and educational initiatives to increase digital literacy. Collaboration between Kyrgyz and Chinese institutions can accelerate the adoption of digital farming and create a more efficient agricultural sector.

Digital farming platforms hold immense potential to transform agriculture and strengthen bilateral cooperation between Kyrgyzstan and China. By integrating advanced technologies such as IoT, AI, blockchain, and big data, these platforms can modernise agricultural practices, optimise resource use, and improve productivity. This research highlights the significant economic and social benefits of adopting digital farming platforms in Kyrgyzstan, including enhanced market access, sustainable farming practices, and increased export capacity. For China, these platforms provide a reliable supply of high-quality agricultural products and expand the Belt and Road Initiative's influence in Central Asia (Bo, 2019). In order to further develop recommendations for the implementation of digital agricultural platforms between Kyrgyzstan and China, it is necessary to assess the strengths, weaknesses, opportunities, and threats that exist for each party. These aspects that determine the potential for cooperation and development are presented in Table 1. The recommendations were developed based on the results of surveys conducted among farmers, agricultural experts and policy makers in Kyrgyzstan and China.

**Table 1.** SWOT analysis of the introduction of digital agricultural platforms between Kyrgyzstan and China

| Category | Kyrgyzstan | China | Joint benefits |
|---|---|---|---|
| Strengths | Digital farming platforms can enhance productivity and market access | Strong technological expertise and infrastructure in agriculture | Collaborative agricultural innovation and joint research centres |
| Weaknesses | Limited digital infrastructure and financial constraints for smallholder farmers | Dependence on external markets and regulatory complexities in Kyrgyzstan | Cultural and organisational barriers to digital adoption |
| Opportunities | Increased export capacity and market access through digital platforms | Expansion of Belt and Road Initiative and increased agritech investments | Creation of regional data processing centres for efficient analysis |
| Threats | Resistance to technological change and policy misalignments | Cybersecurity risks and regulatory barriers to cross-border data exchange | Geopolitical risks and trade disruptions that could affect cooperation |

**Source:** created by the authors

Despite these opportunities, the adoption of digital farming platforms in Kyrgyzstan faces several challenges. Limited digital infrastructure, financial constraints, and resistance to technological change among farmers are key barriers that must be addressed. Additionally, policy misalignments and high tariffs on digital components further hinder the widespread adoption of these technologies. However, with collaborative efforts, strategic investments, and policy reforms, these challenges can be overcome, paving the way for a mutually beneficial partnership.

For the successful implementation of digital farming platforms between Kyrgyzstan and China, a unified policy must be developed to facilitate the digital transformation of agriculture. A key component of this policy is the introduction of tax incentives for companies investing in the digitisation of the agricultural sector. Additionally, bilateral agreements regulating the exchange of agricultural data between the two countries are necessary to create a transparent and secure environment for cooperation. Reducing tariffs on digital equipment, sensors, and software will encourage faster adoption of advanced technologies, particularly among small and medium-sized enterprises, for whom initial investment costs remain a major barrier.

The development of digital and physical infrastructure is critically important for the effective use of digital farming platforms. Kyrgyzstan must prioritise the expansion of broadband networks in rural areas and implement 5G connectivity to support IoT devices and smart farming systems. A crucial aspect is the establishment of regional data processing centres, which will enable efficient analysis of information collected from digital platforms and provide rapid access to analytics for farmers and government institutions. The implementation of smart farming solutions based on IoT allows for resource optimisation and increased productivity. Sensors for monitoring soil conditions, nutrient levels, moisture, and temperature enable precise control over crop cultivation conditions. Automated management systems regulate irrigation, fertiliser application, and pest control, minimising resource use and improving the environmental sustainability of farming operations. AI-driven analytics can assist farmers in predicting yields, determining optimal planting schedules, and adopting sustainable farming practices tailored to local conditions (Morchid *et al.*, 2024).

Farmer training programmes are essential to ensure the successful adoption of digital farming platforms. Mobile applications with user-friendly interfaces should be developed to provide farmers with access to market prices, weather forecasts, and crop management tools. Collaboration with Chinese agritech firms can facilitate hands-on training sessions, while localised digital content in Kyrgyz and Russian can bridge language barriers. Increasing farmers' awareness of digital tools will accelerate the transition to data-driven agricultural management. Blockchain technology can revolutionise agricultural supply chains by ensuring traceability and transparency. Each step in the supply chain – from planting and harvesting to packaging and shipping – can be recorded on a blockchain, allowing buyers to verify the origin and quality of products (Kudrenko & Hall, 2024). Smart contracts can automate transactions, ensuring secure payments to farmers and reducing reliance on intermediaries. Blockchain systems can also enhance compliance with international trade standards, boosting the marketability of Kyrgyzstan's agricultural exports.

Collaboration between governments, tech companies, and farmer cooperatives is essential for the development and sustainability of digital farming platforms. Public-private partnerships can support the co-development of affordable IoT kits and farm management software tailored to Kyrgyzstan's needs. Additionally, establishing incubators for agritech start-ups can drive innovation and create localised solutions for agricultural challenges. Joint investment in digital agriculture will accelerate the adoption of new technologies and expand access to funding opportunities. Launching pilot projects in key agricultural regions such as Naryn and Chuy can demonstrate the tangible benefits of digital farming platforms. These projects should integrate IoT-based sensing technologies and automated irrigation systems to provide tangible benefits for farmers. The results of these studies can be used to showcase best practices and promote the scaling of digital agriculture across the country. Demonstrating real-world success through pilot programmes will increase farmer confidence in new technologies and encourage wider adoption.

Digital farming practices should be aligned with sustainability goals to promote resource-efficient farming models. AI tools can optimise water usage and energy consumption, while satellite imaging can assess land use and the extent of degradation. Encouraging precision farming through digital mapping systems can enhance the export potential of eco-friendly products. Sustainable agriculture initiatives must prioritise the long-term environmental impact of digital farming solutions to ensure that technology-driven advancements do not compromise natural ecosystems. Tailored financial instruments should be created to make digital solutions accessible to smallholder farmers. Micro-loans and subsidies should be provided for purchasing IoT devices and smart farming equipment. Shared ownership models, where cooperatives lease expensive machinery like drones and sensors, can also reduce costs for individual farmers. Financial support structures should aim to lower entry barriers and facilitate long-term digital adoption in rural agricultural communities (Nagaraja *et al.*, 2024).

Developing digital marketplaces that connect Kyrgyz farmers directly to Chinese buyers can streamline trade and reduce reliance on intermediaries. These platforms should integrate digital payment solutions, including mobile wallets and blockchain-enabled transactions, to simplify cross-border trade and improve farmer profitability. Transparent online trading platforms will help farmers secure better prices for their produce and expand access to international markets. Climate-smart agriculture solutions should be developed to help farmers adapt to changing weather conditions. Predictive analytics based on climate and weather data can enable farmers to take proactive measures against droughts, floods, and pest outbreaks. Early warning systems supported by satellite-based monitoring can further enhance resilience. These systems should be integrated into digital farming platforms to provide farmers with real-time recommendations on crop management and disaster preparedness.

By addressing these challenges and implementing the recommended technical solutions, Kyrgyzstan and China can unlock the full potential of digital farming platforms, driving agricultural productivity, economic growth, and environmental sustainability. The implementation of digital farming platforms is expected to significantly enhance the agricultural sectors of both Kyrgyzstan and China while fostering economic cooperation and technological advancements. For Kyrgyzstan, the integration of AI-driven analytics and precision irrigation systems will enable farmers to optimise resource usage, improve crop yields, and reduce environmental impact. Moreover, these platforms will contribute to economic empowerment by providing farmers with access to digital tools and market insights, allowing them to make informed decisions and increase their profitability. China, on the other hand, will benefit from expanding digital marketplaces that facilitate secure cross-border transactions through blockchain technology. This will not only strengthen China's influence in Central Asia but also open new avenues for investment in regional agritech start-ups. By leveraging its technological expertise, China can enhance its role in the global agricultural supply chain while supporting Kyrgyzstan in adopting innovative farming solutions.

The mutual advantages of digital farming extend beyond economic growth and trade expansion. Joint research centres focused on agricultural innovation and sustainable practices will drive scientific collaboration between the two countries. Additionally, the creation of harmonised regulatory frameworks will facilitate seamless agricultural data sharing and trade policies, ensuring transparency and efficiency in cross-border agricultural trade. These advancements will ultimately contribute to regional stability, increased food security, and long-term environmental sustainability. The detailed impacts of digital farming adoption are summarised in Table 2.

**Table 2.** Expected impact of digital farming platforms

| Category | Impact | Additional benefits |
|---|---|---|
| For Kyrgyzstan | Implementation of AI-driven analytics for real-time crop health monitoring and pest detection | Integration of precision irrigation systems to optimise water use and reduce resource waste |
| For China | Expansion of digital marketplaces facilitating cross-border transactions with blockchain security | Investment in local agritech start-ups to enhance regional digital farming capabilities |
| Joint Benefits | Development of joint research centres for agricultural innovation and sustainable farming practices | Creation of harmonised regulatory frameworks to standardise agricultural data sharing and trade policies |

**Source:** created by the authors

China and Kyrgyzstan can take the lead in agricultural innovation by adopting digital farming solutions and developing strategic alliances. If this project is successful, it will set an example for other nations looking to use technology to improve their agricultural industries. Overcoming any obstacles will require a well-coordinated strategy that incorporates infrastructural development, farmer education, and policy harmonisation. In the end, the broad use of digital farming platforms will strengthen China's and Kyrgyzstan's positions as leaders in resilient and intelligent agriculture while also increasing agricultural productivity and promoting sustainable economic growth.

## ▸ Discussion

Digitalisation of agriculture is a key factor in increasing productivity, optimising resources and developing agri-food systems. The use of digital platforms, the IoT, AI, and big data is transforming traditional agricultural production processes, contributing to efficient management, cost reduction, and improved logistics. However, the level of adoption of digital solutions in different countries and regions varies considerably, driven by both economic and socio-cultural factors. D.J. Choruma *et al.* (2024) studied agricultural digitalisation in Africa, focusing on smallholder access to technology and finance, and how IoT, AI, and Big Data can improve productivity and market integration. Both studies acknowledge the positive effects of digital technologies but highlight barriers like limited access to tech and finance. While D.J. Choruma *et al.* focus on smallholders, this study emphasises digitalisation's role in Kyrgyzstan's international trade and cooperation with China. Similarly, B. Ezeomah & R. Duncombe (2019) and this study both explore digital platforms in agriculture. B. Ezeomah & R. Duncombe focus on how digital platforms transform supply chains, while this study looks at state-to-state cooperation, international trade, and government agreements in driving digital agricultural transformation. B. Ezeomah & R. Duncombe explore various platform types, while this study focuses on public policy and economic impacts.

T. Qin *et al.* (2022) and this study both examine digital agriculture, focusing on IoT, big data, and AI to improve efficiency, resource management, and logistics. They highlight challenges like limited access to digital tools for small farmers and the need for supportive government policies. T. Qin *et al.* focus on macro-level digitalisation in China and the EU, while this study emphasises the practical use of digital platforms in specific regions and the role of public administration and international cooperation. Similarly, W. Gong *et al.* (2024) and this study explore digital agro-technological services and farmers' adoption of digital tools. Both stress the importance of digital literacy and transformation in agriculture. However, this study has a broader international focus, while W. Gong *et al.* focus on Sichuan Province, China. While they examine technology accessibility and economic motivation, this study looks at broader international digital integration in agriculture.

R. Zhong *et al.* (2022) explore digital technologies' impact on agriculture. R. Zhong *et al.* focused on the relationship between the digital economy, technological progress, and carbon reduction, while this study looks at how digital agriculture impacts ecosystem services and social well-being. Both agree on digitalisation's contribution to sustainable development, but R. Zhong *et al.* focus more on environmental performance, while this study addresses the alignment of digital agriculture with ecosystem needs and social well-being. The study by I. Taranov & Y. Kawabata (2024) and this research share a focus on improving agricultural efficiency in Kyrgyzstan, but differ in their approaches. Study by I. Taranov & Y. Kawabata emphasises organic farming and Participatory Guarantee Systems, focusing on local certification for smallholders. Both studies address challenges such as infrastructure limitations and the need for government support. However, work by I. Taranov & Y. Kawabata emphasises social aspects and local traditions, while this study focuses on the technological and policy dimensions of digital agriculture, including international cooperation and public administration.

Similarly, this study and G. Duginets & K. Nizheiko (2023) explore the role of digital technologies in agricultural development. Both highlight the importance of digital platforms, AI, and automation in improving productivity. However, while G. Duginets & K. Nizheiko focus on the European context and the environmental and regulatory aspects of digitalisation in Ukraine, this study takes a broader international perspective, examining digital transformation in global agricultural supply chains and cross-border cooperation. This study and the research by H. Chkarat *et al.* (2023) also share a focus on the role of digital platforms in agriculture, particularly for sustainable development and efficiency. Both studies recognise the importance of digitalisation for optimising resources and improving communication between farmers and government agencies. However, H. Chkarat *et al.* focused on the social, economic, and environmental prerequisites for deploying digital platforms, while this study investigates the practical implementation of digital solutions and their impact on supply chains, technology access for farmers, and agricultural productivity.

Digital platforms play a key role in the development of the agricultural sector, contributing to the optimisation of production, improved supply chain management and the use of big data, as confirmed by M. Kenney *et al.* (2020). This study also emphasises that digitalisation helps to reduce costs and increase farm efficiency. At the same time, M. Kenney *et al.* considered digital platforms as a global economic phenomenon, while this study focuses on local mechanisms for their implementation. Thus, both studies recognise the importance of digitalisation for the agricultural sector, but approach the analysis from different perspectives.

B. Wang & H. Dong (2023) examined farmers' behaviour towards digital agricultural services within a rural revitalisation strategy, highlighting the importance of technology adoption intentions, infrastructure availability, and factors like expected efficiency, social impact, and data quality. This study also explores digital agriculture but with a broader focus on economic efficiency and technology adaptation in agricultural production. Both studies recognise the role of infrastructure and farmers' intentions as key factors in digital adoption, but B. Wang & H. Dong concentrate on the behavioural aspects, whereas this study focuses on the strategic implementation of digital solutions in agriculture.

J.D. Borrero & J. Mariscal (2022) and this study both examine the role of digital platforms in improving production efficiency. J.D. Borrero & J. Mariscal focus on supporting farmers' decision-making through data management and platform transparency, while this study explores the integration of big data, machine learning, and cloud technologies in agriculture. The key distinction is that J.D. Borrero & J. Mariscal studied a specific digital platform for the fruit and vegetable sector, while this study addresses the broader digitalisation of agriculture. Both studies agree on the importance of effective platform management, but their implementation approaches differ.

A study by S. Brooks (2021) analysed the impact of digital platforms on the agricultural sector, emphasising their impact on farmer behaviour and the potential risks of dependence on financial structures. This study focuses on the practical implementation of digital technologies, their effectiveness in increasing productivity and sustainability of the agricultural sector. S. Brooks emphasised the risks of digitalisation, in particular deskilling and market actors' control over platforms, while this study considered digitalisation as a tool for optimisation. Both recognised the importance of digital technologies, but with different approaches – socio-economic in S. Brooks and technological-production in this study.

Study by K. Bronson (2019) explored the social and ethical challenges of digital agriculture, focusing on how digital platforms and big data are reshaping the agricultural sector, with large corporations gaining dominance and small farmers facing barriers. The study emphasised the growing technological inequality resulting from uneven digital benefits. This study also examines the digitalisation of agriculture but focuses more on its economic and technological aspects, specifically how digital platforms affect production efficiency and market performance. Unlike K. Bronson's work, this study addresses technological opportunities rather than social and ethical concerns.

M. Ayre *et al.* (2019) examined the role of advisors in the digital transformation of agriculture, while this study looks at broader trends in digitalisation. Both studies highlight the significance of digital tools in farm decision-making, but M. Ayre *et al.* emphasised the role of advisors collaborating with digital platforms, whereas this study focused on the impact of digitalisation on agricultural enterprise management. The main difference lies in M. Ayre *et al.*' s focus on the co-design of digital tools, while this study investigates structural changes in digital management.

The analysis shows that digital platforms play a key role in the transformation of agriculture, contributing to increased productivity, management efficiency, and integration of farms into global markets. At the same time, various studies point to barriers related to uneven access to technology, insufficient digital literacy, and economic constraints of small farmers. The use of digital solutions can improve the environmental sustainability of the agricultural sector, but requires coherent government strategies, international cooperation, and financial support.

## ▸ Conclusions

From 2001 to 2023, trade turnover between Kyrgyzstan and China has shown steady growth, indicating the strengthening of economic ties between the countries. Kyrgyz exports to China increased from USD 50 million in 2001 to USD 900 million in 2023, while imports from China increased to USD 3.6 billion, a significant share of which is machinery, electronics, textiles and construction materials. This indicates Kyrgyzstan's growing dependence on Chinese goods and the need to expand its own production capacity to reduce the trade deficit.

According to the results of the interviews, 70% of the farmers who participated said that they would be interested in adopting digital platforms, and 65% of them acknowledged the potential advantages of digital tools in terms of boosting productivity, expanding market access, and cutting expenses. Nonetheless, 85% of farmers identified major obstacles to adoption, such as low levels of digital literacy, expensive technology prices, and a lack of the required infrastructure. Experts in agriculture also underlined that although farmers were enthusiastic about digital technologies, government assistance was desperately needed.

The necessity of coordinating Kyrgyz and Chinese trade policy in the area of digital technology continues to be a major obstacle. Even while the amount of Chinese technology and digital solutions being imported is increasing, it is still necessary to standardise customs processes, control data sharing, and guarantee cybersecurity. State support in the form of funding digitalisation initiatives, offering financial aid for the acquisition of contemporary equipment, and putting in place training programmes to raise farmers' digital literacy are all essential for the prosperous growth of digital agriculture in Kyrgyzstan. In order to effectively deploy digital technology for crop forecasting, climate monitoring, and farm management, it is also critical to enhance infrastructure, particularly increasing access to high-speed Internet in rural regions.

This study is limited by the lack of long-term empirical data on the impact of digital technologies on the productivity of the Kyrgyz agricultural sector and its international trade. Further research could focus on assessing the effectiveness of the implementation of digital platforms in Kyrgyz agriculture, taking into account regional characteristics, the level of digital literacy of farmers, and the impact of government support.

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## ▸ References

[1] A Memorandum of understanding was signed between the Ministry of Economy and Commerce of the Kyrgyz Republic, the State Development Bank and the Silk Road Foundation (China). (2024). Retrieved from https://sdb.kg/en/2024/04/30/a-memorandum-of-understanding-was-signed-between-the-ministry-of-economy-and-commerce-of-the-kyrgyz-republic-the-state-development-bank-and-the-silk-road-foundation-china/.

[2] Anitei, M., Veres, C., & Pisla, A. (2021). Research on challenges and prospects of digital agriculture. *Proceedings*, 63(1), article number 67. doi: 10.3390/proceedings2020063067.

[3] Ayre, M., *et al.* (2019). Supporting and practising digital innovation with advisers in smart farming. *NJAS: Wageningen Journal of Life Sciences*, 90-91(1). doi: 10.1016/j.njas.2019.05.001.

[4] Bekmuratov, A., Mamashov, K., Tookeeva, D., Tashiev, N., & Mametova, G. (2025). Economic assessment of the impact of clusters on farm development in Kyrgyzstan. *Scientific Horizons*, 28(2), 157-169. doi: 10.48077/scihor2.2025.157.

[5] Bekmuratov, A., Myrzaibraimova, I., Mamashov, K., Raimberdiev, B., & Tookeeva, D. (2024). Impact of leasing transactions on business development in Kyrgyzstan. *Scientific Bulletin of Mukachevo State University. Series Economics*, 11(3), 21-33. doi: 10.52566/msu-econ3.2024.21.

[6] Bo, X. (2019). *China, Kyrgyzstan agree BRI key to bilateral ties, regional cooperation*. Retrieved from http://www.xinhuanet.com/english/2019-06/13/c_138140839.htm.

[7] Borrero, J.D., & Mariscal, J. (2022). A case study of a digital data platform for the agricultural sector: A valuable decision support system for small farmers. *Agriculture*, 12(6), article number 767. doi: 10.3390/agriculture12060767.

[8] Bronson, K. (2019). Looking through a responsible innovation lens at uneven engagements with digital farming. *NJAS: Wageningen Journal of Life Sciences*, 90-91(1). doi: 10.1016/j.njas.2019.03.001.

[9] Brooks, S. (2021). Configuring the digital farmer: A nudge world in the making? *Economy and Society*, 50(3), 374-396. doi: 10.1080/03085147.2021.1876984.

[10] Cambra Baseca, C., Sendra, S., Lloret, J., & Tomas, J. (2019). A smart decision system for digital farming. *Agronomy*, 9(5), article number 216. doi: 10.3390/agronomy9050216.

[11] Chkarat, H., Abid, T., & Sauvée, L. (2023). Conditions for a convergence between digital platforms and sustainability in agriculture. *Sustainability*, 15(19), article number 14195. doi: 10.3390/su151914195.

[12] Choruma, D.J., Dirwai, T.L., Mutenje, M.J., Mustafa, M., Chimonyo, V.G.P., Jacobs-Mata, I., & Mabhaudhi, T. (2024). Digitalisation in agriculture: A scoping review of technologies in practice, challenges, and opportunities for smallholder farmers in sub-Saharan Africa. *Journal of Agriculture and Food Research*, 18, article number 101286. doi: 10.1016/j.jafr.2024.101286.

[13] Duginets, G., & Nizheiko, K. (2023). Digitalization of the EU agricultural sector: Experience for Ukraine. *Economy and Society*, 56. doi: 10.32782/2524-0072/2023-56-148.

[14] Ezeomah, B., & Duncombe, R. (2019). The role of digital platforms in disrupting agricultural value chains in developing countries. In P. Nielsen & H.C. Kimaro (Eds.), *Information and communication technologies for development. Strengthening southern-driven cooperation as a catalyst for ICT4D* (pp. 231-247). Cham: Springer. doi: 10.1007/978-3-030-18400-1_19.
[15] Gong, W., Ma, R., & Haixia, Z. (2024). Digital agricultural technology services and farmers' willingness to choose digital production technology in Sichuan province, China. *Frontiers in Sustainable Food Systems*, 8, article number 1401316. doi: 10.3389/fsufs.2024.1401316.
[16] Guo, J., & Lyu, J. (2024). The digital economy and agricultural modernization in China: Measurement, mechanisms, and implications. *Sustainability*, 16(12), article number 4949. doi: 10.3390/su16124949.
[17] Kenney, M., Serhan, H., & Trystram, G. (2020). Digitalization and platforms in agriculture: Organizations, power asymmetry, and collective action solutions. *ETLA Working Papers*, 78.
[18] Khamzaeva, A.M., Myrzaibraimova, I.R., & Mamashov, K.A. (2020). Problems and prospects of economic digitalization in Kyrgyzstan. In E. Popkova & B. Sergi (Eds.), *Digital economy: Complexity and variety vs. rationality* (pp. 876-881). Cham: Springer. doi: 10.1007/978-3-030-29586-8_99.
[19] Kudrenko, I., & Hall, L. (2024). Adoption of reusable transit packaging in US industries: A framework for enhanced sustainability. *Review of Managerial Science*. doi: 10.1007/s11846-024-00826-1.
[20] Kumar, V., Sharma, K.V., Kedam, N., Patel, A., Kate, T.R., & Rathnayake, U. (2024). A comprehensive review on smart and sustainable agriculture using IoT technologies. *Smart Agricultural Technology*, 8, article number 100487. doi: 10.1016/j.atech.2024.100487.
[21] Kyrgyzstan and China deepen strategic partnership: Outcomes of Sadyr Japarov's state visit to Beijing. (2025). Retrieved from https://www.newscentralasia.net/2025/02/07/kyrgyzstan-and-china-deepen-strategic-partnership-outcomes-of-sadyr-japarovs-state-visit-to-beijing/.
[22] Lagodiyenko, O. (2024). Using digital platforms for reporting in the implementation and evaluation of ESG strategies. *Economic Scope*, 192, 63-67. doi: 10.30838/EP.192.63-67.
[23] Mandal, S., Yadav, A., Panme, F.A., Devi, K.M., & Kumar, S. (2024). Adaption of smart applications in agriculture to enhance production. *Smart Agricultural Technology*, 7, article number 100431. doi: 10.1016/j.atech.2024.100431.
[24] Morchid, A., El Alami, R., Raezah, A.A., & Sabbar, Y. (2024). Applications of Internet of Things (IoT) and sensors technology to increase food security and agricultural sustainability: Benefits and challenges. *Ain Shams Engineering Journal*, 15(3), article number 102509. doi: 10.1016/j.asej.2023.102509.
[25] Musarova, Z.A., & Adamkulova, C.U. (2023). Geopolitics in the region: Risks and prospects for ensuring food security in the Kyrgyz Republic. *Proceedings on Engineering Sciences*, 5(2), 423-430. doi: 10.24874/PES.SI.02.018.
[26] Mussa, F.A. (2024). *Artificial intelligence in agriculture: Revolutionizing crop monitoring and pest control*. Retrieved from https://www.researchgate.net/publication/382912446_Artificial_Intelligence_in_Agriculture_Revolutionizing_Crop_Monitoring_and_Pest_Control.
[27] Nagaraja, G., Shoba, H., Sreedevi, M.S., & Krishnamma, P.N. (2024). The impact of robotics and drones on agricultural efficiency and productivity. *International Journal of Research in Agronomy*, 7(9), 1001-1009. doi: 10.33545/2618060X.2024.v7.i9Sn.1650.
[28] Nehrey, M. (2023). Digital transformation of the agricultural sector: Prospects, challenges and solutions. *Scientific Papers NaUKMA. Economics*, 8(1), 94-100. doi: 10.18523/2519-4739.2023.8.1.94-100.
[29] Observatory of Economic Complexity. (n.d.). *China/Kyrgyzstan*. Retrieved from https://oec.world/en/profile/bilateral-country/chn/partner/kgz?dynamicBilateralTradeSelector=year2001.
[30] Osmonalieva, B. (2025). *State visit of Sadyr Japarov to China: Number of documents signed*. Retrieved from https://24.kg/english/319013__State_visit_of_Sadyr_Japarov_to_China_Number_of_documents_signed/.
[31] Qin, T., Wang, L., Zhou, Y., Guo, L., Jiang, G., & Zhang, L. (2022). Digital technology-and-services-driven sustainable transformation of agriculture: Cases of China and the EU. *Agriculture*, 12(2), article number 297. doi: 10.3390/agriculture12020297.
[32] Savkov, R., & Karvatska, N. (2024). Assessment of the state and directions of digital technologies use in the activities of agricultural enterprises. In *Proceedings of the 6th international scientific and practical conference "Scientific debates and prospective orientations for scientific development"* (pp. 74-79). Paris: Logos. doi: 10.36074/logos-01.03.2024.018.
[33] Taranov, I., & Kawabata, Y. (2024). Organic agriculture in Kyrgyzstan: Experiences with implementing participatory guarantee systems. *Frontiers in Sustainable Food Systems*, 8, article number 1453850. doi: 10.3389/fsufs.2024.1453850.
[34] U.S. Department of Health and Human Sciences. (n.d.). *The Belmont Report*. Retrieved from https://www.hhs.gov/ohrp/regulations-and-policy/belmont-report/index.html.
[35] Uzenbaev, R.A., Mardalieva, L.A., Abdiev, M.Z., Umarov, S.T., & Ergeshov, K.A. (2019). Prospects for development of Kyrgyzstan's food market in the conditions of integration in the EAEU. In E. Popkova (Ed.), *Ubiquitous computing and the Internet of Things: Prerequisites for the development of ICT* (pp. 859-869). Cham: Springer. doi: 10.1007/978-3-030-13397-9_88.
[36] Wang, B., & Dong, H. (2023). Research on the farmers' agricultural digital service use behavior under the rural revitalization strategy – based on the extended technology acceptance model. *Frontiers in Environmental Science*, 11, article number 1180072. doi: 10.3389/fenvs.2023.1180072.

[37] Wrzecińska, M., Czerniawska-Piątkowska, E., Kowalewska, I., Kowalczyk, A., Mylostyvyi, R., & Stefaniak, W. (2023). Agriculture in the face of new digitization technologies. *Ukrainian Black Sea Region Agrarian Science*, 27(3), 9-17. doi: 10.56407/bs.agrarian/3.2023.09.
[38] Xie, L., Luo, B., & Zhong, W. (2021). How are smallholder farmers involved in digital agriculture in developing countries: A case study from China. *Land*, 10(3), article number 245. doi: 10.3390/land10030245.
[39] Xu, B. (2021). Understanding education on China's belt and road initiative: A cultural political economy approach. *Beijing International Review of Education*, 3(1), 56-71. doi: 10.1163/25902539-03010005.
[40] Zhong, R., He, Q., & Qi, Y. (2022). Digital economy, agricultural technological progress, and agricultural carbon intensity: Evidence from China. *International Journal of Environmental Research and Public Health*, 19(11), article number 6488. doi: 10.3390/ijerph19116488.

# Платформи цифрового фермерства як інструмент посилення співпраці між Киргизстаном та Китаєм: потенціал та перспективи

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► **Анотація.** Метою цього дослідження було оцінити роль цифрових сільськогосподарських платформ у зміцненні економічного співробітництва між Киргизстаном і Китаєм, зосередившись на їхньому потенціалі для підвищення продуктивності сільського господарства, оптимізації ресурсів і розширення доступу фермерів до ринків. Методологія дослідження включала аналіз первинних і вторинних джерел, проведення структурованих інтерв'ю з експертами, вивчення даних про торгівлю між Киргизстаном і Китаєм з 2001 по 2023 рік, а також оцінку бар'єрів і можливостей для цифровізації в аграрному секторі. Результати показали, що цифрові сільськогосподарські платформи сприяють покращенню логістики, підвищенню ефективності управління сільськогосподарськими процесами та сприяють міжнародному співробітництву. Експорт Киргизстану до Китаю збільшився з 50 млн у 2001 році до 900 млн доларів США у 2023 році, а імпорт досяг 3,6 млрд доларів США, що демонструє економічну взаємозалежність між двома країнами. Впровадження цифрових рішень, зокрема Інтернету речей, штучного інтелекту та блокчейну, мінімізувало витрати, уможливило прогнозування врожайності та вдосконалило ланцюги поставок. Результати дослідження показали, що цифровізація сільськогосподарського сектору Киргизстану має потенціал для значного підвищення його конкурентоспроможності та сприяння сталому економічному розвитку. Однак необхідно було вирішити низку проблем, зокрема фінансові обмеження, нерозвиненість цифрової інфраструктури та необхідність узгодження державної політики з цифровою економікою. Успішне впровадження цифрових рішень вимагає комплексного підходу, який охоплює як технологічну модернізацію, так і розвиток компетенцій фермерів для ефективного використання інноваційних інструментів

► **Ключові слова:** сільське господарство; впровадження технологій; ланцюжок поставок; блокчейн; продовольча безпека