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Research on the role of cross-border trade in the economic growth of border regions of Central Asia

Chinara Adamkulova*

Doctor of Economic Sciences
Kyrgyz National University
720033, 547 Frunze Str., Bishkek, Kyrgyzstan
https://orcid.org/0000-0002-5052-9602

Azamat Baialinov

Postgraduate Student
Kyrgyz National University
720033, 547 Frunze Str., Bishkek, Kyrgyzstan
https://orcid.org/0009-0007-9795-1935

Arsen Akhunbaev

Postgraduate Student
Kyrgyz National University
720033, 547 Frunze Str., Bishkek, Kyrgyzstan
https://orcid.org/0009-0002-4094-5773

Alla Imakeeva

Associate Professor
Kyrgyz National University
720033, 547 Frunze Str., Bishkek, Kyrgyzstan
https://orcid.org/0009-0002-7991-2645

Nuri Mambetkazieva

Postgraduate Student
Kyrgyz National University
720033, 547 Frunze Str., Bishkek, Kyrgyzstan
https://orcid.org/0009-0000-6722-3936

Abstract. The aim of this study was to determine how trade flows and integration processes influenced the socio-economic development of the border regions of Central Asia. The methodology was based on the analysis of official statistics and the application of a correlation approach to identify dependencies between investments and export flows. The results of the study demonstrated that trade between Kazakhstan and Kyrgyzstan remained structurally asymmetric: in 2019, Kyrgyzstan's exports amounted to 327 million USD, and by 2023-2024 they had increased to 559 million USD, yet imports from Kazakhstan were considerably higher, generating a persistent deficit. Kazakhstan's exports comprised grain and flour (in 2023 alone – 40.4 thousand tonnes of grain and 53.2 thousand tonnes of flour), gold, tobacco products and mineral waters, while more than 90% of Kyrgyz exports consisted of precious metal ores and petroleum products. In the Talas region, investments rose from USD 36.6 million in 2020 to USD 127.9 million in 2022, before declining to USD 107.1 million in 2024. Correlation analysis confirmed a strong relationship between investment activity and exports (coefficient 0.84). In the Zhetysu region of Kazakhstan, in 2024, gross regional product increased by 5.6%, investments reached USD 641.4 million, and foreign trade turnover approached USD 3 billion, accompanied by a low unemployment rate of 4.7%. The findings could be applied by state authorities, regional administrations and international organisations in designing strategies aimed at enhancing the efficiency of cross-border trade and investment policy

Keywords: transport corridors; investment; infrastructure; logistics; export; import

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*Corresponding author

Introduction

The transformation of border areas in Central Asia has unfolded against the backdrop of expanding international trade and the region's strengthening role within global supply chains. The intensification of transport corridor development and increasing investment inflows have created new opportunities for economic advancement; however, these processes are simultaneously associated with uneven regional progress and potential threats to socio-economic stability. S. Golunov & A. Bitabar (2025) demonstrated that most studies focused on European and North American experiences, while a systematic analysis of local specificities was lacking. The authors identified the potential for adapting international practices to enhance the integration capacities of the region. They emphasised that despite the existence of individual works on local issues – such as informal trade, demographic processes and water resources management – there was no overarching vision of the development of cross-border cooperation in the region.

B.K. Kuanshaliev (2025) summarised the results of studies on the interaction of border states, their economic security and infrastructure projects, highlighting patterns in the evolution of relations between neighbouring countries. The author found that comparative analysis of socio-economic processes makes it possible to identify new areas of cooperation and their potential. G. Bodaubayeva *et al*. (2025) analysed the institutional and infrastructural factors of cooperation, with particular attention to transport corridors, industrial and logistics zones, and non-tariff barriers that hinder the movement of goods. The authors concluded that sustainable development is possible only with the harmonisation of legislation, the establishment of joint regulatory bodies and the digitalisation of processes. G. Tekir (2025) examined Uzbekistan's strategic participation in Chinese infrastructure projects, showing that the modernisation of the transport system, the development of digital networks and the attraction of foreign investment have significantly altered the country's economic landscape. The author emphasised that Uzbekistan was able to deepen its integration into regional markets and strengthen transit potential, but at the same time financial risks, reliance on external creditors and challenges in the field of digital security increased.

B. Kadyrov & B. Kuantkan (2024) conducted a comprehensive regression analysis of export-import flows in the agricultural and livestock sectors for 2018-2022, finding that the volume of agricultural exports did not significantly affect their value, while imports demonstrated a strong correlation with dollar indicators. B.K. Yeleussizova *et al.* (2024) examined the role of the de minimis threshold in shaping low-value parcel flows, showing that its adjustment partly influenced the growth of e-commerce imports and a reduction in misdeclared goods. The authors concluded that the fiscal impact remained limited, while access to cheaper and better-quality goods was of greater importance for consumers.

I. Bastanifar *et al.* (2024) applied the Morris Economic Stability Index and the Granger causality test to data for 2000-2021, considering inflation, unemployment, private and public debt, as well as the trade-to-GDP ratio. The study concluded that the average level of stability in Kyrgyzstan was 63%, while in Tajikistan it was 65%; since 2013 Tajikistan has demonstrated higher figures due to demographic factors and changes in the structure of trade. The results indicated that trade relations with China increase economic stability in Kyrgyzstan, while no significant effect was observed for Tajikistan. A. Ibyzhanova *et al.* (2024) investigated the dynamics of agri-food trade between the two countries for 2012-2022, showing that China, as the world's second largest importer of agricultural products, occupies one of the leading positions among Kazakhstan's trading partners, yet Kazakhstan's share in the Chinese market remains marginal at only 0.1%. The authors found that the main export commodities are grains, seeds and vegetable oils, while the potential for diversification and expansion is much greater. They highlighted the importance of developing transport infrastructure, harmonising standards and pursuing technological modernisation to enhance competitiveness.

Existing studies underscore the lack of quantitative analysis, statistical evidence and systematic assessments, which complicates the evaluation of the long-term effects of cross-border interaction on economic security, social stability, competitiveness and environmental sustainability. In addition, labour mobility plays a crucial role in shaping regional economic activity. As noted by A. Makyev & N. Zairova (2023), the movement of labour in Kyrgyzstan substantially affects the level of economic activity and income formation in border regions, highlighting the importance of demographic processes in trade and integration dynamics. The purpose of this study was to examine the impact of trade flows and integration processes on the socio-economic development of the border regions of Central Asia. To achieve this aim, the study set the following tasks: to investigate the dynamics and structure of cross-border trade flows in the region, with particular focus on the role of transport corridors and logistics infrastructure; and to analyse the interrelationship between investment activity, economic growth and trade turnover in border territories.

Materials and Methods

This study was empirical in nature and covered the period 2018-2024, focusing on the dynamics of cross-border trade between the border states of Central Asia, primarily Kazakhstan and Kyrgyzstan. The starting point of 2018 was selected as a baseline year preceding the global shocks of the COVID-19 pandemic and the subsequent structural adjustments in regional trade. This allowed the research to capture the pre-crisis state of bilateral trade flows and to compare it with the ensuing dynamics. The period 2020-2024 was examined in order to trace transformations in cross-border trade under the influence of the pandemic, post-crisis recovery and integration projects, such as the modernisation of transport corridors and logistics hubs.

The analysis investigated the general tendencies of trade flows between Kazakhstan and Kyrgyzstan, identifying their structure and long-term dynamics. It considered the role of key transport corridors and border checkpoints that form the backbone of trade. The Trans-Caspian International Transport Route (TITR) (n.d.), also known as the Middle Corridor, was studied as a multimodal route linking China and Europe through Central Asia, with rail and maritime components ensuring reduced delivery times (Kyrgyzstan plans to use TITR, 2024). In parallel, the Bedel Corridor project through the Bedel Pass (Kwan, 2025a; 2025b) into China's Xinjiang region was analysed as part of the One Belt, One Road initiative (One Belt, One Road..., n.d.), with emphasis on its modern customs infrastructure, logistics hubs and potential to improve Kyrgyzstan's transit role. The research also assessed Kazakhstan's logistics policy, in particular the expansion of southern railway lines and the construction of an industrial trade and logistics complex on the Kazakhstan-Kyrgyzstan border. The introduction of "green corridors" for agricultural products, simplified customs procedures and sanitary measures was investigated to evaluate institutional mechanisms for trade facilitation.

The study further traced long-term regional trade trends and the growing role of China as an external partner. The consequences of the COVID-19 pandemic for cross-border flows were examined, with emphasis on prolonged border crossing times, the introduction of quarantine inspections and rising transport expenses (Kim *et al.*, 2025). In addition, the effects of Kyrgyzstan's accession to the Eurasian Economic Union (EAEU) were examined, as this integration process reduced tariff barriers and expanded access to regional markets (Barnes, 2025).

Quantitative methods were applied to track the dynamics of bilateral trade volumes. Official trade statistics were collected for Kazakhstan's exports to Kyrgyzstan and Kyrgyzstan's exports to Kazakhstan for 2020-2024 (QazTrade, 2020a; 2020b; Observatory of economic complexity: Kazakhstan/Kyrgyzstan, 2023; Kyrgyzstan, Kazakhstan aim to significantly..., 2024). These data were used to monitor changes in the structure of exports and imports and to highlight the asymmetry in bilateral trade. Complete statistical data were available for the Talas region of Kyrgyzstan and the Zhambyl region of Kazakhstan, which enabled a quantitative assessment of investment dynamics and export flows. For the other regions – Zhetysu and Almaty in Kazakhstan, and Naryn and Issyk-Kul in Kyrgyzstan – statistical information was limited. This restricted the possibility of making comprehensive comparisons at the regional level and necessitated reliance on data for mutual export volumes at the national level as a basis for generalisation. A separate analytical focus was placed on the correlation between investment activity and export flows. Data on the dynamics of investments in Kyrgyzstan's Talas region and the country's exports to Kazakhstan in 2020-2024 were employed (Foreign direct investment..., n.d.). The relationship was tested using the Pearson correlation coefficient, calculated as:

$$r = \frac{\sum(xi-x)(yi-y)}{\sqrt{\sum(xi-x)^2(yi-y)^2}}, \quad (1)$$

where xi – represented investment volumes and yi – export values; x – denoted the arithmetic mean of investments over the period, and y – the arithmetic mean of export indicators. This method was applied to determine whether growth in investments in border regions was associated with an increase in cross-border trade flows.

The study also examined the factors of growth and risks for the sustainable development of border territories. For this purpose, official strategic documents were reviewed, including the State Program for Regional Development of the Republic of Kazakhstan for 2020-2025 (Kazakhstan: Strategic development plan..., 2018) and the National Development Strategy of Kyrgyzstan "Unity. Trust. Creation" (2018-2022) (Kyrgyzstan: Development Program..., 2018). The analysis of these programs made it possible to assess the institutional foundations of trade facilitation, infrastructural development, and regional competitiveness.

Results and Discussion

Dynamics and structure of cross-border trade flows in Central Asia

Trade relations between Kazakhstan and Kyrgyzstan have been determined by the presence of a system of major transport corridors and border checkpoints that ensure the movement of goods and contribute to regional interconnectivity. A central element of this network is the Middle Corridor, a multimodal route that links China with Europe through Central Asia. Combining rail connections with ferry crossings over the Caspian and Black Seas, the corridor shortens delivery times to approximately 20-25 days and indirectly supports bilateral trade by expanding available transit opportunities. At the same time, Kyrgyzstan has invested in the construction of the Bedel Corridor through the Bedel Pass towards China's Xinjiang province (Kwan, 2025b). This initiative has strengthened Kyrgyzstan's transit function, offering a faster and more reliable alternative to the Irkeshtam and Torugart routes, which often remain closed during winter. The Bedel project, integrated into the Belt and Road Initiative (One Belt, One Road..., n.d.), is financed through substantial Chinese investment and envisages the creation of advanced customs infrastructure, cargo control areas and services for transport operators. By reducing travel time by more than 12 hours and the overall distance by around 500 kilometres, the project is expected to deliver significant logistical and economic advantages (Kyrgyzstan plans to use TITR, 2024).

Kazakhstan's logistics policy complements these efforts by focusing on the expansion of southern railway lines to increase efficiency in cross-border flows. At the bilateral level, the Kazakhstan-Kyrgyzstan border hosts checkpoints such as Karasu and Ak-Tilek, where a large Industrial Trade and Logistics Complex is under construction. This hub is designed to be one of Central Asia's largest cargo distribution centres, enabling the consolidation, processing and transit of goods. In addition, "green-light" corridors have

been introduced for perishable agricultural goods, such as early-season fruit and vegetables, ensuring smooth delivery from Kyrgyzstan to Kazakhstan. Simplified customs procedures, health protocols and disinfection systems are applied to maintain the resilience of trade flows. Kazakhstan's geographical location provides a transit advantage, connecting not only Kyrgyzstan but also trade routes extending to Uzbekistan, Afghanistan and further south. This strengthens regional integration and supports Kazakhstan's ambition to expand bilateral trade with Kyrgyzstan to 3 billion USD annually by 2030. A significant share of this growth is expected to come from agriculture, particularly grain and flour exports from Kazakhstan, alongside Kyrgyzstan's role as a re-exporter of Chinese goods (Kwan, 2025a).

Similar dynamics can be observed in Kazakhstan-Uzbekistan trade, which is underpinned by the modernisation of transport corridors and border checkpoints. The TITR (n.d.), or the Middle Corridor, links Central Asia with Europe through Kazakhstan, the Caspian Sea, the South Caucasus and Turkey. Uzbekistan actively engages in this network whilst also diversifying its routes to the Indian Ocean via Afghanistan, Iran and Pakistan, thereby reducing dependency on northern transit lines. In 2024, bilateral trade between Kazakhstan and Uzbekistan surpassed 4 billion USD, with grain representing a major export from Kazakhstan. Investments in logistics hubs and checkpoints have supported these flows, strengthening regional trade integration.

The broader picture of long-term regional trade shows that, after the global crisis of 2008-2009, Central Asian exports began to recover around 2010, with Kazakhstan's exports growing at a compound annual rate of about 23%. However, structural barriers such as geographical remoteness, lack of direct access to seaports and underdeveloped infrastructure limited the region's full trade potential. Nevertheless, cooperation and integration initiatives gradually developed, focusing on trade facilitation, corridor expansion and the reduction of tariff and non-tariff barriers (Kazakhstan, Uzbekistan to open four..., 2025). Figure 1 demonstrates the TITR.

Figure 1. Trans-Caspian International Transport Route

Source: J.C.K. Daly (2025)

By 2024, trade dynamics in Central Asia were heavily shaped by China as the dominant partner. Trade turnover between China and Central Asia reached approximately 95 billion USD, more than triple the volume of 2014, with Kazakhstan accounting for 43.8 billion USD and Kyrgyzstan for 22.7 billion USD. China mainly exports manufactured goods, machinery and technology, whilst importing energy resources, metals and an increasing volume of agricultural products (Kazakhstan ranks first among China's Central..., 2025). Land-based transport rose from 19.9% of trade in 2020 to 51.8% in 2024 due to improved infrastructure. Despite this growth, challenges remain: Kazakhstan runs a trade deficit with China of around 12 billion USD, and Kyrgyzstan also faces a deficit despite a sharp increase in exports, as imports of consumer goods remain dominant. These trends underline both the opportunities and vulnerabilities of regional economies, showing that although China is a crucial driver of trade expansion, structural imbalances and infrastructure gaps persist (China, Central Asia witness deepened..., 2025).

In summary, the development of transport corridors such as the Middle Corridor and the Bedel project, the modernisation of checkpoints and logistics hubs, and the intensifying trade with China reflect the dual trajectory of Central Asia's cross-border trade: continuous growth alongside persistent asymmetries. Kazakhstan maintains a strategic advantage as a transit hub and exporter of diversified goods, whilst Kyrgyzstan strengthens its role through

re-exports and targeted infrastructure projects. Together, these processes highlight the region's gradual integration into Eurasian trade networks and its increasing dependence on external partners, especially China.

Between 2020 and 2022, cross-border trade in Central Asia encountered serious disruptions as a result of the COVID-19 pandemic, which led to longer delays, higher expenses and declining trade volumes. The average time required to cross borders rose by 23.7%, increasing from 12.2 hours in 2019 to 15.1 hours in 2020, largely due to quarantine procedures and mandatory testing. In states with more stringent restrictions, the clearance period for imported goods expanded by up to 40%, whilst export operations were indirectly hindered by broader regional "spill-over effects". This was accompanied by an increase in transport costs: road transport costs rose by 1.8%, rail transport by 1.9%. In a landlocked environment, this further increased the cost of trade for the region (Kim *et al.*, 2025).

A separate factor influencing trade dynamics was Kyrgyzstan's accession to the EAEU in 2015. Kazakhstan is one of Kyrgyzstan's key trading partners within the integration association: in 2016, it accounted for about 14.8% of Kyrgyzstan's total trade turnover, and in 2025, about 7.3% of Kazakhstan's trade with the EAEU countries. Participation in the union has provided a reduction in customs barriers, simplification of procedures and duty-free access to markets, which has contributed to the growth of trade in non-raw-material sectors. Kyrgyzstan has benefited from tariff preferences for Russian gas, which reduced energy costs compared to countries that are not EAEU members (Foreign trade turnover of the Republic..., 2025).

An additional factor was the use of the so-called "sanctions arbitrage" after 2022, when Kyrgyzstan began to play the role of a transit hub for the re-export of machinery and cars, which brought additional budget revenues of up to 3.3% of GDP. On average, in 2015-2023, Kyrgyzstan's GDP growth was 3.9% per year, which is partly explained by participation in the integration bloc. At the same time, the expected benefits were offset by external crises: the fall in oil prices and the impact of sanctions, which led to a reduction in intra-union trade by 26% in 2015. Kyrgyz exports lost competitiveness due to the devaluation of neighbouring currencies, and the country's political weight in decision-making remained limited. Labour migration also creates additional challenges: on the one hand, simplified access to the EAEU labour markets, and on the other, pressure on the social sphere and problems with informal employment (Barnes, 2025).

The dynamics of bilateral trade between Kazakhstan and Kyrgyzstan during 2018-2024 demonstrate both cyclical fluctuations and gradual growth. In 2018, the trade structure returned to the usual regional pattern: Kazakhstan maintained a stable surplus whilst Kyrgyzstan operated under a deficit. Kyrgyz exports to Kazakhstan reached around 327 million USD, dominated by precious metal ores, petroleum products and ferrous metals, whilst Kazakhstan exported 699 million USD worth of goods, led by gold, mineral waters and tobacco products. Despite positive growth rates over the subsequent five years – 11.3% annually for Kyrgyz exports and 9.23% for Kazakh exports – the beginning of 2018 was marked by a contraction in trade, with turnover for January-May decreasing by 10.5% compared to 2017. The year 2019 preserved these trends, as Kazakhstan continued to run a surplus and Kyrgyzstan a deficit. Trade volumes in mid-2019 were about 318 million USD, reflecting an 11% decline from the previous year. Kyrgyz exports consisted primarily of ores, dairy products and grains, but imports from Kazakhstan remained substantially higher (Observatory of economic complexity: Kazakhstan/Kyrgyzstan, 2023).

The COVID-19 pandemic in 2020 disrupted trade flows significantly. From January to August, turnover dropped to 489.2 million USD, 17.9% lower than in 2019. Kazakhstan's exports fell by 14% to 338.7 million USD, whilst Kyrgyzstan's exports decreased by 25.4% to 150.5 million USD. Although Kazakhstan preserved a positive balance of approximately 188.3 million USD, the surplus narrowed considerably (QazTrade, 2020b). Recovery began in 2021, when trade gradually stabilised, albeit with notable contributions from informal exchanges – estimated at 20-30% of total flows, particularly in petroleum products and grain. The year also witnessed an exceptional episode in June, when Kyrgyzstan temporarily registered a surplus of 230.5 million USD, the highest on record (Kyrgyzstan Trade Balance, n.d.). By 2022, mutual trade volumes expanded again, with Kazakhstan's exports reaching 600-700 million USD and Kyrgyzstan's 382 million USD. Kazakhstan's surplus was sustained by energy, food, engineering goods and metals, whilst Kyrgyzstan remained in deficit (Kyrgyz Republic trade balance, exports..., 2022). The upward trajectory strengthened in 2023 as bilateral trade turnover amounted to 1.317 billion USD, an 11.6% increase from the previous year. Kazakhstan exported 1.09 billion USD in goods, primarily gold (214 million), mineral waters (86.8 million) and tobacco products (54.2 million). Kyrgyz exports to Kazakhstan rose to 559 million USD, driven mainly by precious metal ores (159 million), petroleum products (46.3 million) and ferrous metals (42.1 million). As a result, Kazakhstan secured a surplus of about 530 million USD (Daryo, 2024).

In 2024, positive dynamics continued, with trade turnover for the first eleven months reaching approximately 1.6 billion USD. Kazakhstan's exports amounted to 772.5 million USD, whilst Kyrgyzstan's reached 382 million USD, leaving Kazakhstan with a positive balance and Kyrgyzstan facing a deficit of – 662 million USD in December 2024 (Seilkhanov, 2025). Figure 2 presents the dynamics of Kazakhstan-Kyrgyzstan trade for the years 2018, 2020, 2022-2024. The year 2018 is included as a reference point before the pandemic, 2020 reflects the sharp decline in trade flows caused by COVID-19 restrictions, whilst 2022-2024 illustrate the subsequent recovery and gradual expansion of bilateral trade.

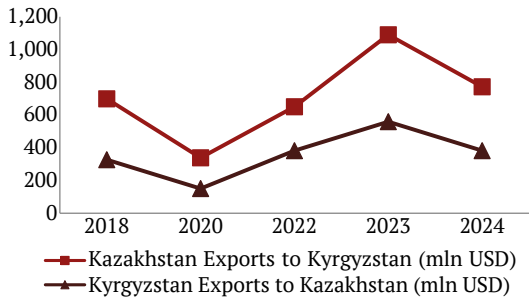

Figure 2. Dynamics of bilateral trade: Key years reflecting pre-COVID, pandemic, and post-COVID trends

Source: compiled by authors based on QazTrade (2020a; 2020b), Observatory of economic complexity: Kazakhstan/ Kyrgyzstan (2023), Daryo (2024), A. Seilkhanov (2025), Kyrgyzstan Trade Balance (n.d.)

The graph demonstrates the dynamics of mutual trade between Kazakhstan and Kyrgyzstan during 2018-2024, highlighting both cyclical declines and subsequent recovery. Kazakhstan consistently maintained higher export volumes, ensuring a trade surplus throughout the entire period. The lowest point was observed in 2020, when the COVID-19 pandemic led to a sharp contraction in bilateral flows, after which both countries experienced steady growth, peaking in 2023. In 2024, exports slightly decreased compared to the previous year but remained significantly higher than in the pre-pandemic period. Overall, the data confirm a stable upward trend in trade turnover with structural asymmetry, as Kazakhstan dominates bilateral trade due to its more diversified export base, whilst Kyrgyzstan's exports remain comparatively limited. Thus, during 2018-2024, bilateral trade between Kazakhstan and Kyrgyzstan showed a stable trend: Kazakhstan maintained a trade surplus due to a more diversified economy and exports of energy, metals and food, whilst Kyrgyzstan remained dependent on imports and recorded a deficit, with the exception of isolated episodes. Despite the imbalance, the dynamics of indicate an increase in trade volumes and the desire of both states to strengthen economic integration.

A number of studies have found a common view that cross-border trade is one of the key drivers of economic development. In particular, both this study and the work of Y. Chen (2024) confirmed that the growth of external flows contributed to the integration of countries into global value chains, but at the same time created additional risks. Both approaches emphasised the importance of regulatory reforms and infrastructure development, yet the difference lay in the scope of consideration: whilst this study focused on transport corridors and the impact of crisis events in Central Asia, Y. Chen examined digitalisation and the role of e-commerce in the growth of Chinese exports. Similar parallels were also found in the work of T. Zhu (2023). Both studies emphasised that cross-border e-commerce is a powerful catalyst for trade and requires updated regulatory mechanisms. However, in this case, the focus was on the logistics routes and structural challenges of Central Asia, whilst T. Zhu analysed the deeper changes in China's service sector, where the integration of e-commerce was accompanied by the need for harmonisation of rules and standards. The meaningful combination of logistics and digital tools became a point of intersection between this study and the work of H.Z. Ping *et al.* (2024). Both approaches emphasised the positive impact of Cross-Border E-Commerce (CBEC) on the economy and its role in opening up new markets. Nevertheless, whilst the focus of this study was on transport and customs processes in Central Asia, H.Z. Ping *et al*. concentrated on the economic effects for China, especially in less developed regions, where technological investment could be a crucial factor for growth.

A similar contrast was observed in the work of W. Wang *et al*. (2025). Both works recognised that cross-border trade and e-commerce required digitalisation and institutional support, yet the focus was significantly different. This study highlighted integration processes through the development of Central Asian transport corridors, whilst W. Wang *et al.* focused on the functioning of e-commerce pilot zones in China, showing their impact on reducing financial barriers for companies. A somewhat different dimension of analysis was presented by H. Paul *et al.* (2025). Whilst this study examined specific trade flows between Kazakhstan and Kyrgyzstan, the work of H. Paul *et al*. was global in nature. It systematised research on border economies, outlined conceptual approaches and highlighted gaps in the scientific literature, which made it possible to relate the local empirical dimension of Central Asia to the broader academic discourse.

A comparison with the work of L. Yang *et al.* (2024) demonstrated another plane of differences. The common understanding was that CBEC required digitalisation and institutional support. However, whilst this study focused on cross-border trade between Kazakhstan and Kyrgyzstan, L. Yang *et al*. employed the Global Entrepreneurship Monitor (GEM) model to quantitatively measure the competitiveness of different regions in China, revealing disparities between eastern and western provinces. No less revealing was the comparison with L. Wang (2020). In both cases, e-commerce was regarded as a factor of economic growth that reduced costs and facilitated integration into global markets. However, L. Wang concentrated on China's macroeconomic challenges – increasing competition, a crisis of confidence and the need to integrate online and offline formats – whilst this study focused on the regional logistics processes of Central Asia. The results of S. Li *et al.* (2025) showed that the high-quality development of CBEC depended on a combination of internal and external factors. Their analysis through fuzzy-set Qualitative Comparative Analysis enabled them to identify configurations that ensured the resilience of Chinese companies. In this sense, their work differed from the present study, which focused on interstate trade flows in Central Asia, but both approaches demonstrated a shared belief in the key role of digitalisation, logistics and institutional support for the effective development of cross-border trade.

Overall, the analysis showed that cross-border trade in Central Asia developed dynamically, relying on the expansion of transport corridors and the modernisation of customs infrastructure. Kazakhstan strengthened its position as a key transit hub, whilst Kyrgyzstan actively formed the role of an intermediary through new routes and projects within the framework of the "One Belt, One Road" initiative. Alongside positive trends, the region's vulnerability was also observed – dependence on China, structural imbalances and the impact of external crises. Taken together, these processes reflected the dual nature of development: the growth of trade volumes was combined with asymmetries and challenges to the sustainability of economic integration.

The impact of cross-border trade on the economic development of border regions

Cross-border trade between Kazakhstan and Kyrgyzstan in 2020-2024 was characterised by a stable positive balance for Kazakhstan and a chronic deficit for Kyrgyzstan. At the same time, the key direction remained cooperation between the Talas region of Kyrgyzstan and the Zhambyl region of Kazakhstan, where joint programmes for optimising cargo flows and developing agricultural partnerships were being implemented in 2024. Despite the lack of detailed regional data for other regions (Zhetysu, Almaty, Naryn, Issyk-Kul), national trade trends allow one to trace a certain correlation between the growth of mutual trade volumes and the dynamics of key economic indicators of border territories.

Thus, Kyrgyzstan is characterised by a high dependence on imports from Kazakhstan, which determines its persistent trade deficit. At the regional level, the most illustrative example is the Talas region, where investment volumes increased from USD 36.6 million in 2020 to a peak of USD 127.9 million in 2022, after which there was a gradual decrease to USD 107.1 million in 2024. The dynamics of these indicators indicate a close relationship with general trade trends: the period of active investment growth coincides with the phase of growth of Kyrgyzstan's exports to Kazakhstan (from USD 170.5 million in 2020 to USD 559 million in 2023-2024) (Kyrgyzstan, Kazakhstan aim to significantly..., 2024). Table 1 demonstrates the dynamics of investments in the Talas region and Kyrgyzstan's exports to Kazakhstan, 2020-2024.

Table 1. Dynamics of investments in Talas region and Kyrgyzstan's exports to Kazakhstan, 2020-2024

Year	Investments (mln USD)	Exports to Kazakhstan (mln USD)
2020	36,581.40	170.5
2021	81,845.50	382
2022	127,900.80	411
2023	117,547.80	559
2024	107,162.10	559

Source: compiled by authors based on Foreign direct investment by territory (n.d.), QazTrade (2020a; 2020b), Daryo (2024), Kyrgyzstan, Kazakhstan aim to significantly boost trade turnover (2024)

Correlation analysis of the data obtained showed a close positive relationship between the dynamics of investments in the Talas region and the volume of exports from Kyrgyzstan to Kazakhstan. The calculated correlation coefficient for the period 2020-2024 is 0.84, which indicates a strong dependence of the growth of foreign trade flows on the scale of investment activity in the border region (formula 1). For Kazakhstan, a similar dynamic is illustrated by the Zhetysu region, formed in 2022. In the first half of 2024, its gross regional product grew by 5.6% compared to 2023, the volume of investments reached USD 641.4 million, and foreign trade turnover amounted to almost USD 3 billion. The average wage exceeded USD 330 per month, and the unemployment rate remained relatively low – about 4.7% (Abuova, 2024). Such indicators demonstrate the growing economic activity of the region and confirm the direct connection between the expansion of the investment base, an increase in the gross regional product and the intensification of cross-border trade flows, in particular with Kyrgyzstan.

In summary, the results of the correlation analysis confirm that in the border regions of Kyrgyzstan, particularly Talas Oblast, the growth in investment is directly related to the increase in exports to Kazakhstan, reflecting the mutual stimulation of trade and regional development. In the border regions of Kazakhstan, such as Zhetysu Oblast, a similar trend is observed: the growth in investment and gross regional product is accompanied by the revival of foreign trade operations. This indicates that the effects of cross-border trade extend beyond macroeconomic indicators, creating tangible changes at the level of regional economies and laying the foundations for further deepening of integration processes in Central Asia.

Between 2020 and 2024, the development of border territories of Kazakhstan and Kyrgyzstan was shaped by a combination of favourable growth drivers and persistent structural risks. Among the decisive factors stimulating regional progress were national programmes directed at strengthening border economies. In Kazakhstan, the State Programme for Regional Development of the Republic of Kazakhstan for 2020-2025 (Kazakhstan: Strategic development plan..., 2018) allocated resources for infrastructure modernisation, the improvement of transport corridors, and the attraction of investment flows into strategically important areas such as Zhambyl and Zhetysu. These measures created the prerequisites for expanding cross-border trade with Kyrgyzstan by enhancing logistical capacity and production potential.

In Kyrgyzstan, a comparable role was performed by the National Development Strategy of Kyrgyzstan "Unity. Trust. Creation" (2018-2022) (Kyrgyzstan: Development Program..., 2018), which prioritised regional economic competitiveness and resilience. The strategy facilitated improvements in the business environment for small and medium-sized enterprises located in the border zones and stimulated growth in agriculture and entrepreneurship. These processes were directly connected with the intensification of exports to Kazakhstan, as border regions strengthened their capacity to integrate into bilateral trade flows. Other growth factors include increased investment flows, the expansion of agricultural production, and the development of infrastructure and tourism in the border regions. However, there are also significant risks: Kyrgyzstan's high dependence on energy imports from Kazakhstan, extensive informal trade, and the vulnerability of the regions to external shocks, including price fluctuations and logistical constraints. Thus, the analysis confirms that the implementation of state development programmes in both countries contributes to strengthening the economic potential of the border areas, whilst maintaining the need to reduce structural risks and increase the resilience of these regions to external challenges.

A comparison of this study with a number of works by foreign authors showed that what they had in common was the recognition of cross-border trade as a key factor in economic development. Both the work of A. Karagkouni & D. Dimitriou (2025) and this study emphasised the need for modern infrastructure, digitalisation and regulatory reforms. However, whilst for Central Asia transport corridors, customs reforms and China's external influence were crucial, in the European context the focus was on the micro level – barriers to small businesses, innovation and environmental practices. A similar difference was also observed in a comparison with the work of C. Gao *et al.* (2025). Both approaches emphasised the importance of infrastructure investments and state support for the economic and social development of border regions. However, whilst in Central Asia the resilience of trade in times of crisis was crucial, a Chinese study based on machine learning methods found a direct effect of rail trade on urbanisation in ethnic regions. A different perspective was provided by a comparison with the work of J. Xiong & X. Wang (2023). All studies emphasised the importance of institutional support and reforms, but whilst in Central Asia the focus was on logistics and cross-border flows, in China integration was viewed through the transformation of enterprises and their adaptation to global competition.

Digitalisation as a factor of development became a point of intersection between this study and the work of J. Liu & G. Chen (2025). Both approaches considered it a driver of economic growth, although the directions of analysis differed: in Central Asia it was transport corridors and customs reforms, whilst in China it was the impact of the digital economy on the agricultural sector and export growth. A similar logic was demonstrated by the work of D.G. Borojo & H. Weimin (2025). Like this study, it focused on reducing trade costs through digitalisation and logistics development. However, the difference was in scale: for Central Asia, regional corridors and interaction with China were analysed, whilst in the case of China and Africa, the key factor was the combination of digital platforms with differing levels of institutional quality across African states.

Regional contrasts became even more pronounced when compared with the work of Z.M. Gnoleba (2022). Both approaches confirmed that cross-border trade stimulated integration into global value chains, but whilst in Central Asia the main drivers were infrastructure and Chinese influence, for West Africa the decisive elements were currency regimes, population incomes and demographic factors. A different set of challenges was highlighted by the work of C. Mendoza & J. Domínguez-Mujica (2025). In both cases, the importance of cross-border cooperation was emphasised, but in Central Asia it was determined by infrastructure projects and geopolitical factors, whereas in the border regions of Spain the main problem was depopulation and the need to attract migrants who could support the local economies. Similarly, the work of P. Chamusca (2024) highlighted the positive impact of cross-border cooperation on development, but emphasised the European experience. Whilst in Central Asia the priority was transport projects and the growing dependence on China, in Portugal and Spain EU programmes played a key role in promoting employment, innovation and cohesion in border areas.

In 2020-2024, the development of cross-border trade between Kazakhstan and Kyrgyzstan displayed stable dynamics, but remained structurally asymmetric: Kazakhstan maintained a stable surplus, whilst Kyrgyzstan was characterised by a chronic deficit. At the same time, the examples of Talas and Zhetysu regions demonstrated that the growth of investments was directly correlated with the revival of exports and the expansion of economic activity in border areas, which is confirmed by the high level of correlation between indicators. State development programmes, which focused on infrastructure modernisation, support for small and medium-sized enterprises, and stimulation of agricultural production, were among the factors influencing this process.

Conclusions

The findings of this study confirmed that the development of border trade between Kazakhstan and Kyrgyzstan in 2018-2024 was stable but structurally asymmetric. Kazakhstan maintained a consistent positive balance, whilst Kyrgyzstan demonstrated a chronic deficit. In 2019, its exports to Kazakhstan amounted to only USD 327 million, whilst in 2023-2024 they increased to USD 559 million, but remained significantly lower than imports. The structure of exports remained relatively stable: on the Kazakh side, grain and flour prevailed (in 2023 – 40.4 thousand tonnes of grain and 53.2 thousand tonnes of flour), as well as gold, tobacco products and mineral waters, whilst more than 90% of imports from Kyrgyzstan comprised precious metal ores and petroleum products.

In Kyrgyzstan's Talas region, investment inflows rose from USD 36.6 million in 2020 to a maximum of USD 127.9 million in 2022, followed by a decline to USD 107.1 million in 2024. The correlation analysis revealed a strong positive linkage between investment dynamics and export performance (correlation coefficient of 0.84), underscoring the reciprocal reinforcement of trade expansion and regional economic growth. Comparable tendencies were identified in Kazakhstan's Zhetysu region, where in 2024 the gross regional product increased by 5.6%, the volume of investments amounted to USD 641.4 million, and foreign trade turnover approached USD 3 billion, whilst unemployment remained at a relatively low level of 4.7%.

Thus, the results confirmed that the development of transport corridors, the modernisation of customs infrastructure and government programmes contributed to the intensification of cross-border trade. A limitation of this study was that it relied mainly on official statistics for 2018-2024 and had limited regional data for border areas. Future research could expand the analysis to other border regions of Central Asia and take into account the impact of digitalisation and new e-commerce formats on trade development.

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Дослідження ролі транскордонної торгівлі в економічному зростанні прикордонних регіонів Центральної Азії

Чинара Адамкулова
Доктор економічних наук
Киргизький національний університет
720033, вул. Фрунзе, 547, м. Бішкек, Киргизстан
https://orcid.org/0000-0002-5052-9602
Азамат Баялінов
Аспірант
Киргизький національний університет
720033, вул. Фрунзе, 547, м. Бішкек, Киргизстан
https://orcid.org/0009-0007-9795-1935
Арсен Ахунбаєв
Аспірант
Киргизький національний університет
720033, вул. Фрунзе, 547, м. Бішкек, Киргизстан
https://orcid.org/0009-0002-4094-5773
Алла Імакеєва
Доцент
Киргизький національний університет
720033, вул. Фрунзе, 547, м. Бішкек, Киргизстан
https://orcid.org/0009-0002-7991-2645
Нурі Мамбетказієва
Аспірант
Киргизький національний університет
720033, вул. Фрунзе, 547, м. Бішкек, Киргизстан
https://orcid.org/0009-0000-6722-3936

Анотація. Метою цього дослідження було визначити, як торговельні потоки та інтеграційні процеси вплинули на соціально-економічний розвиток прикордонних регіонів Центральної Азії. Методологія ґрунтувалася на аналізі офіційної статистики та застосуванні кореляційного підходу для виявлення залежностей між інвестиціями та експортними потоками. Результати дослідження продемонстрували, що торгівля між Казахстаном і Киргизстаном залишалася структурно асиметричною: у 2019 році експорт Киргизстану становив 327 мільйонів доларів США, а до 2023-2024 років він зріс до 559 мільйонів доларів США, але імпорт із Казахстану був значно вищим, що спричиняло постійний дефіцит. Експорт Казахстану включав зерно та борошно (лише у 2023 році – 40,4 тис. тонн зерна та 53,2 тис. тонн борошна), золото, тютюнові вироби та мінеральні води, тоді як понад 90 % киргизького експорту складалося з руд дорогоцінних металів і нафтопродуктів. У Талаській області інвестиції зросли з 36,6 млн доларів США у 2020 році до 127,9 млн доларів США у 2022 році, перш ніж знизитися до 107,1 млн доларів США у 2024 році. Кореляційний аналіз підтвердив сильний зв'язок між інвестиційною активністю та експортом (коефіцієнт 0,84). У Жетисуській області Казахстану у 2024 році валовий регіональний продукт збільшився на 5,6 %, інвестиції досягли 641,4 млн доларів США, а зовнішньоторговельний обіг наблизився до 3 мільярдів доларів США, що супроводжувалося низьким рівнем безробіття у 4,7 %. Результати можуть бути використані державними органами, регіональними адміністраціями та міжнародними організаціями при розробці стратегій, спрямованих на підвищення ефективності транскордонної торгівлі та інвестиційної політики

Ключові слова: транспортні коридори; інвестиції; інфраструктура; логістика; експорт; імпорт