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ИННОВАЦИЯЛЫК КЫРГЫЗСТАН-КЫТАЙ ЧЕК АРАЛЫК БАШКАРУУСУ: САНАРИПТИК СИНЕРГИЯ ЖАНА ПРАКТИКАЛЫК ИННОВАЦИЯЛЫК ЖОЛДОР
ИННОВАЦИОННОЕ КЫРГЫЗСТАНСКО-КИТАЙСКОЕ ТРАНСГРАНИЧНОЕ УПРАВЛЕНИЕ: ЦИФРОВАЯ СИНЕРГИЯ И ПРАКТИЧЕСКИЕ ИННОВАЦИОННЫЕ ПУТИ
CHINA-KYRGYZSTAN CROSS-BORDER MANAGEMENT: DIGITAL-DRIVEN SYNERGY AND PRACTICAL INNOVATION PATHS

Кыскача мүнөздөмө: Глобалдык санариптик экономиканын интеграциясы жана «Бир алкак — бир жол» демилгесинин өнүгүшү шартында Кыргызстан менен Кытайдын чек аралык кызматташтыгы салттуу бир багыттуу соода алмашууларынан көп тармактуу биргелешкен өнүгүүгө өттү. Чек аралык башкаруу эки өлкөнүн ресурстарын натыйжалуу бөлүштүрүүнүн жана кызматташтык долбоорлорун туруктуу өнүктүрүүнүн негизги таянычы катары институционалдык шайкешсиздик, маалыматтык асимметрия жана тобокелдиктердин алдын алуу системасынын жеткилең эместиги сыяктуу көйгөйлөргө туш болууда. Бул изилдөөнүн максаты — санариптик технологиялардын негизинде Кыргызстан-Кытай чек аралык башкаруусунун инновациялык биргелешкен жолдорун аныктоо.

Изилдөөнүн натыйжасында институционалдык кызматташтыкты, санариптик инфраструктураны, көп субъекттүү биргелешкен механизмдерди жана тобокелдиктердин алдын алуу системасын оптималдаштыруу стратегиялары иштелип чыкты. Бул стратегиялар эки өлкөнүн чек аралык башкаруусунун натыйжалуулугун жогорулатууга жана биргелешкен өнүгүүнүн натыйжаларын жакшыртууга өбөлгө түзөт.

Аннотация: В условиях интеграции глобальной цифровой экономики и развития инициативы «Один пояс, один путь» трансграничное сотрудничество между Кыргызстаном и Китаем перешло от традиционных однонаправленных торговых обменов к многоотраслевому совместному развитию. Трансграничное управление как ключевой механизм эффективного распределения ресурсов двух стран и устойчивого развития совместных проектов сталкивается с такими проблемами, как институциональная несовместимость, информационная асимметрия и несовершенство системы профилактики рисков. Целью данного исследования является определение инновационных путей совместного кыргызстанско-китайского трансграничного управления на основе цифровых технологий. В результате исследования разработаны стратегии оптимизации институционального сотрудничества, цифровой инфраструктуры, механизмов многостороннего взаимодействия и системы профилактики рисков. Эти стратегии будут способствовать повышению эффективности и результативности трансграничного управления между двумя странами, а также улучшению результатов совместного развития.

Abstract: Against the backdrop of the integration of the global digital economy and the development of the Belt and Road Initiative, cross-border cooperation between Kyrgyzstan and China has evolved from traditional one-way trade exchanges to multi-field collaborative development. As a core pillar for the efficient allocation of resources between the two countries and the sustainable development of cooperative projects, cross-border management is confronted with issues such as institutional incompatibility, information asymmetry, and imperfect risk prevention systems. The purpose of this study is to identify innovative collaborative paths for China-Kyrgyzstan cross-border management using digital technologies. The research results have developed strategies for optimizing institutional cooperation, digital infrastructure, multi-subject collaborative mechanisms, and risk prevention systems. These strategies will help improve the efficiency and effectiveness of cross-border management between the two countries and enhance the outcomes of collaborative development.

Негизги сөздөр: Кыргызстан-Кытай кызматташтыгы; чек аралык башкаруу; санариптик колдоо; институционалдык координация; тобокелдиктердин алдын алуу.

Ключевые слова: кыргызстанско-китайское сотрудничество; трансграничное управление; цифровая поддержка; институциональная координация; профилактика рисков.

Keywords: China-Kyrgyzstan cooperation; cross-border management; digital empowerment; institutional coordination; risk prevention.

1. Introduction. As core strategic partners in building the China-Central Asia Community with a Shared Future, Kyrgyzstan and China have fostered profound traditional friendship based on geographical proximity, cultural affinity, mutual benefit and win-win cooperation. In recent years, with the steady advancement of the Belt and Road Initiative and the joint promotion of bilateral economic and social development strategies, cross-border cooperation between the two countries has maintained a sound growth momentum. China has become Kyrgyzstan's largest trading partner, and bilateral trade volume has hit record highs repeatedly, covering a wide range of categories from daily necessities and high-tech equipment to agricultural products and mineral resources.

Cross-border investment projects have expanded from traditional energy and agriculture to emerging fields such as cross-border e-commerce, digital infrastructure, and renewable energy development, forming a multi-level and all-round cooperation pattern. With the expansion of cooperation scale and the deepening of cooperation fields, cross-border management involving policy coordination, market supervision, information

exchange, and logistics clearance has become increasingly complex. Efficient and refined cross-border management is an important guarantee for reducing transaction costs, improving cooperation efficiency, and maintaining the long-term stability of bilateral relations. However, in practice, it still faces prominent bottlenecks such as institutional adaptation obstacles, information barriers, and imperfect risk prevention systems, which restrict the in-depth development of bilateral cooperation [10; 12; 16; 17].

2.Materials and Methods.

2.1 Theoretical Basis Cross-Border Governance Theory. Originating from the transnational cooperation practice in Europe and North America in the 1990s, cross-border governance theory holds that cross-border affairs management is not the exclusive responsibility of the government, but requires the joint participation of enterprises, industry associations, international organizations and other subjects. Its core is to establish effective coordination mechanisms and cooperation platforms to balance the interests of all parties and improve the efficiency and sustainability of cross-border cooperation. For China-Kyrgyzstan cross-border management, this theory provides a theoretical basis for constructing a multi-subject collaborative management system, emphasizing the need to give play to the leading role of the government, the main role of enterprises, and the supporting role of international organizations [2; 13].

Proposed by institutional economists, institutional adaptation theory points out that the effectiveness of cross-border cooperation depends largely on the compatibility of the institutional environments of the cooperating parties. Differences in legal systems, policy regulations, and market rules between countries will increase transaction costs and hinder the smooth progress of cooperation. Therefore, in cross-border management, it is necessary to promote institutional connection and adaptation through policy communication and standard alignment, and create a favorable institutional environment for cooperation. This theory provides an important perspective for solving institutional differences in China-Kyrgyzstan cross-border management.

Digital economy theory focuses on the impact of digital technologies such as big data, artificial intelligence, and blockchain on economic activities. It emphasizes that digital technology has become a core production factor that can optimize resource allocation, reshape industrial structures, and innovate development models. In the field of cross-border management, digital economy theory provides a technical path for solving traditional problems, such as breaking information barriers and realizing intelligent management through digital technology.

2.2 Literature Review. Existing research on cross-border management mainly focuses on trade, investment, and logistics management [7; 8; 17]. In terms of China-Central Asia cooperation, scholars have explored cooperation models and policy suggestions, but there are still deficiencies. Most studies lack in-depth discussion on the digital-driven optimization path of China-Kyrgyzstan cross-border management [16; 20], and the integration of digital technology with institutional coordination and risk control in the specific context of bilateral cooperation has not been fully explored. This study fills this gap, which has important theoretical and practical value for deepening China-Kyrgyzstan digital cooperation.

3.Results

3.1 Current Development Status

3.1.1 Continuous Deepening of Policy Coordination. The governments of the two countries attach great importance to cross-border cooperation and have signed a series of cooperation agreements covering trade, customs, and digital economy. In terms of customs cooperation, measures such as "single window" clearance and mutual recognition of inspection and quarantine results have been promoted, improving clearance efficiency. Kyrgyzstan has issued the "National Information Infrastructure Development Plan" and established a "cross-border data flow special fund" to provide policy support for digital cooperation.

3.1.2 Accelerated Digital Transformation Trend. Both countries are accelerating digital transformation. China has taken the lead in building digital customs and cross-border e-commerce platforms [4; 7; 11; 12]. Kyrgyzstan is promoting the construction of electronic border defense systems and has launched a pilot project of the central bank digital currency "Digital Som" to improve the level of digital financial services. The construction of the China-Kyrgyzstan-Uzbekistan Railway has also driven the digital

transformation of cross-border logistics, laying a foundation for improving the efficiency of cross-border management.

3.2 Existing Key Problems

3.2.1 Institutional Adaptation Gaps. There are obvious differences in legal systems, tax policies, and market access standards between the two countries. For example, differences in product quality certification systems require enterprises to conduct repeated testing, increasing time and economic costs. Kyrgyzstan's regulations on cross-border e-commerce require foreign platforms to register local legal entities and use local currency for settlement, which brings compliance challenges to Chinese enterprises.

3.2.2 Insufficient Information Sharing. Language barriers between Chinese, Kyrgyz, and Russian, as well as inconsistent data standards, lead to serious information asymmetry. The lack of a unified cross-border information sharing platform makes it difficult for enterprises to obtain timely and accurate information on market demand and policy changes. Although both countries have built preliminary digital platforms, there is a lack of interconnection, which restricts the flow and sharing of information resources.

3.3 Comparative Analysis of Core Indicators. To intuitively reflect the development status and gaps of cross-border management.

Table 1. Compares core indicators from three dimensions, providing a basis for subsequent strategy formulation

Indicator Category	Specific Indicators	China	Kyrgyzstan	Gap Analysis
Digital Infrastructure	Digital customs coverage rate	85%	42%	Lagging intelligent construction
	Cross-border payment digitalization level	High (CIPS mature)	Medium (digital som pilot)	Incomplete infrastructure
Institutional Coordination	Policy alignment degree	High	Medium	Low execution efficiency
	Legal service coverage	Comprehensive	Basic	Insufficient professional resources
Risk Control	Risk early warning response time	1-2 working days	3-5 working days	Backward technical means
	Risk disposal mechanism completeness	High	Medium	Single disposal method

Sources: Field survey data (2025); Kyrgyzstan Digital Economy Development White Paper (2024); CAREC Program Research Report (2025)

3.4. Digital-Driven Optimization Strategies

3.4.1 Promote Institutional Connection and Policy Alignment. Establish a regular high-level communication mechanism to focus on coordinating cross-border management policies. For key areas such as cross-border e-commerce and digital payment, formulate unified product standards and market access rules. Improve bilateral tax agreements and investment protection agreements to avoid double taxation and protect the legitimate rights and interests of investors. Align with international standards such as the WTO Trade Facilitation Agreement to enhance policy compatibility.

Jointly build a China-Kyrgyzstan cross-border legal service platform integrating consulting, dispute resolution, and training. Strengthen the exchange of legal talents and carry out multi-language legal training. Establish a characteristic cross-border commercial dispute arbitration center to formulate dispute resolution rules suitable for bilateral cooperation and provide efficient dispute resolution channels.

Relying on big data and artificial intelligence technology, jointly build a unified cross-border information sharing platform, integrating market demand, policy regulations, and enterprise credit information [1; 6; 19]. Adopt multi-language intelligent translation technology to break language barriers and establish unified data standards to realize information interconnection. Learn from the experience of Kashgar's "three-in-one" supervision model to realize "one-time data collection and full-network sharing".

Accelerate the digital transformation of customs clearance, logistics, and payment processes. Expand the coverage of "single window" clearance and promote the application of electronic bills of lading and digital signatures. Promote the in-depth connection between Kyrgyzstan's "digital som" system and China's CIPS to build a safe and efficient cross-border payment channel. Build a digital cross-border logistics system, use IoT technology to realize real-time tracking of goods, and improve logistics efficiency.

3.4.2Establish Multi-Subject Collaborative System. Build a collaborative management system involving governments, enterprises, industry associations, and educational institutions. Give play to the leading role of the government in policy formulation, the main role of enterprises in technological innovation, and the bridging role of industry associations. Learn from the "government-school-enterprise-chamber of commerce" linkage mechanism in Jiaxing to promote the integration of industry and education and cultivate cross-border e-commerce talents.

3.4.3 Improve Risk Prevention and Control System

3.4.4 Build Cross-Border Risk Early Warning Platform. Using artificial intelligence and big data technology, build a cross-border risk early warning platform, integrate multi-source data to establish a risk assessment index system. Deploy intelligent perception technologies such as infrared monitoring and drones to realize dynamic risk assessment and timely issue early warning information. Adopt quantum security encryption technology to ensure the security of cross-border data transmission [3; 17; 19].

Formulate standardized emergency plans for different types of risks and establish a joint risk disposal mechanism. Establish a cross-border emergency command platform to shorten the disposal time of crisis events. Use zero-knowledge proof technology to complete identity verification and compliance review under the premise of protecting data privacy, meeting international compliance requirements.

Table 2. Constructs a digital technology application matrix to clarify the application paths and expected effects of different technologies in cross-border management.

Digital Technology	Application Scenarios	Expected Effects	Implementation Path
Big Data	Market demand analysis, risk assessment	60% higher demand prediction accuracy; 50% shorter risk assessment cycle	Integrate bilateral multi-source data to build a unified data pool
Artificial Intelligence	Intelligent customs clearance, multi-language translation	40% shorter customs clearance time; 80% reduced language barriers	Deploy NLP and image recognition technology in customs inspection

Blockchain	Transaction traceability, digital payment	100% traceable transaction data; 35% lower payment costs	Build a cross-border blockchain alliance chain and formulate unified standards
IoT	Logistics tracking, border monitoring	Full-process logistics visualization; 20% lower cargo loss rate	Equip logistics vehicles with sensors and build an intelligent monitoring platform

Sources: Field survey data of cross-border enterprises (2025); Technical white paper on digital transformation of cross-border management (2024); CAREC E-Commerce Clearance Strategy Report (2025)

3.4.5 Case Analysis: China-Kyrgyzstan Cross-Border E-Commerce Comprehensive Service Platform. The China-Kyrgyzstan Cross-Border E-Commerce Comprehensive Service Platform, jointly built by bilateral enterprises with government support, was put into operation in 2023. It integrates product display, transaction matching, logistics clearance, and legal consulting functions, attracting more than 500 enterprises to settle in. The platform has established an overseas exhibition center and warehousing facilities in Kyrgyzstan, promoting the digital export of characteristic industries such as Jiaxing sweaters.

The platform has set up a professional policy coordination team to maintain close communication with the customs and taxation departments of both countries, dynamically adjusting transaction rules according to policy changes. Aiming at the differences in customs clearance policies, a personalized digital clearance solution has been developed to realize "one-click customs clearance".

The platform has built an advanced digital information system, realizing full-process digitalization of transactions. Using big data technology to analyze user behavior and market trends, it provides accurate demand forecasting for enterprises. It has established a "dual trust system" with logistics companies to ensure the smooth progress of cross-border transactions.

The platform has established a multi-subject collaborative management committee to coordinate and solve problems such as logistics bottlenecks. Cooperate with universities to establish a "Silk Road College" to carry out the closed-loop training model of "study-industry-employment" and cultivate cross-border e-commerce talents.

4. Discussion. This study focuses on the digital-driven optimization of China-Kyrgyzstan cross-border management, and its research conclusions and strategic proposals have important theoretical supplements and practical reference significance. From the theoretical perspective, this study constructs a theoretical analysis framework integrating cross-border governance theory, institutional adaptation theory and digital economy theory, which enriches the research context of cross-border management in the context of the digital economy. Unlike the previous single-theory analysis of China-Central Asia cross-border cooperation, this study realizes the organic integration of institutional coordination and digital technology application, and clarifies the internal logical relationship between digital empowerment and the solution of cross-border management bottlenecks, which provides a new theoretical perspective for the research on cross-border management between developing countries.

In terms of practical implications, the digital-driven optimization strategies proposed in this study, such as building a unified information sharing platform and innovating multi-subject collaborative mechanisms, directly respond to the prominent problems of institutional adaptation gaps and insufficient information sharing in current China-Kyrgyzstan cross-border management. The case of the China-Kyrgyzstan Cross-Border E-Commerce Comprehensive Service Platform verifies that the integration of digital technology and cross-border management can effectively improve clearance efficiency, reduce transaction costs, and promote policy alignment. This practice model can be replicated and promoted in other cross-border cooperation fields between the two countries, such as cross-border energy investment and agricultural product trade, providing practical support for deepening China-Kyrgyzstan practical cooperation.

It should be noted that this study also has certain limitations. In terms of research scope, it mainly focuses on the macro-level optimization strategies of cross-border management, and the in-depth analysis of micro-level enterprise digital transformation practices is relatively insufficient. In addition, due to the difficulty in obtaining some micro-data of bilateral cross-border enterprises, the quantitative evaluation of the effect of digital-driven strategies needs to be further improved. Future research can expand the research perspective, focus on the digital transformation path of small and medium-sized cross-border enterprises, and use a combination of qualitative and quantitative methods to conduct a more comprehensive and in-depth evaluation of the implementation effect of digital-driven strategies.

From the perspective of regional cooperation development, the digital-driven cross-border management optimization model explored in this study also has reference value for promoting the digital transformation of cross-border management in the whole Central Asian region. Under the background of building the China-Central Asia Community with a Shared Future, strengthening digital cooperation among regional countries is an important direction for future regional cooperation. China and Kyrgyzstan can take the optimization of cross-border management as a breakthrough, drive the construction of a regional digital cooperation platform, and promote the formation of a regional digital economic cooperation ecosystem, which will help enhance the overall competitiveness of the Central Asian region in the global digital economy.

5. Conclusion. This study systematically analyzes the current situation and problems of China-Kyrgyzstan cross-border management, and proposes a digital-driven optimization strategy system. The research finds that the current cross-border management has made positive progress in policy coordination and digital transformation, but there are still prominent problems such as institutional adaptation gaps. The case analysis verifies that digital empowerment and multi-subject collaboration can effectively improve the efficiency of cross-border management and reduce costs.

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