

Research on the Innovations Concerning China's Cross-Border E-Commerce Operational Modes and its Long-Term Sustainable Development Mechanism

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Abstract: This study investigates the mechanisms driving innovation and long-term sustainable development within China's cross-border e-commerce operational modes. It first outlines the research background and significance, emphasizing the critical role of cross-border e-commerce in national economic growth and clarifying the study's objectives and methodological approach. The paper then provides a comprehensive analysis of existing operational modes, examining their characteristics, current innovation practices, and associated challenges, while identifying key areas requiring further innovation. Building on this foundation, the study explores mechanisms that support sustainable development, guided by principles of market demand orientation, technological innovation, and cooperative synergy. Core components such as policy support, talent cultivation, and market expansion are analyzed, and an evaluative framework is developed to assess their effectiveness. Case study evidence further illustrates the practical application and outcomes of these mechanisms. Overall, the findings contribute both theoretical insights and actionable recommendations for enhancing innovation capacity and promoting the sustainable evolution of China's cross-border e-commerce sector.

Keywords: China; Cross-border e-commerce; Innovation; Operation mode; Sustainable development mechanism

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1. Introduction

1.1. Research background and significance

Cross-border e-commerce has emerged as a prominent trend in global trade, exhibiting rapid growth within China in recent years, serving as a crucial catalyst for the expansion of China's foreign trade. The swift progression of internet technologies, coupled with the integration of global markets, has provided enterprises worldwide with enhanced opportunities and development prospects based on cross-border e-commerce. Being the largest goods

trading nation and the second-largest services trading nation globally, China holds distinctive advantages in the cross-border e-commerce sector^[1].

Currently, China's cross-border e-commerce sector encounters both emerging challenges and opportunities. On one side, the growing diversity of international market demands alongside heightened consumer expectations regarding product quality and service experience impose more stringent requirements on the operational modes and innovation capacities of cross-border e-commerce enterprises. Conversely, evolving policies, escalating international trade tensions, and the reconfiguration of global supply chains exert considerable influence on the long-term sustainable development of cross-border e-commerce. Consequently, investigating innovative operational modes and mechanisms for the long-term sustainable development of China's cross-border e-commerce is of substantial theoretical and practical significance.

This research seeks to conduct a comprehensive investigation of the prevailing operational modes concerning China's cross-border e-commerce sector, extensively assessing their current state of innovation and identifying principal challenges. Based on these insights, this study aims to develop a scientifically grounded mechanism for long-term sustainable development. By establishing an evaluation system specifically designed for operational modes of China's cross-border e-commerce industry, the research intends to provide a strategic reference for enterprises in formulating long-term development plans, while simultaneously providing theoretical support to governmental policy decisions. Additionally, case studies empirically validate the proposed sustainable development framework, supporting the robust and positive advancement of China's cross-border e-commerce sector.

1.2. Methodology and investigation

This research aims to undertake a comprehensive investigation of innovative practices within the operational modes of China's cross-border e-commerce sector and their impact on sustainable development over the long term. The analysis of prevailing operational modes and case studies enables the identification of critical innovations as well as existing challenges. Furthermore, the study aims to develop an evaluative framework for assessing mechanisms that promote long-term sustainability concerning China's cross-border e-commerce operations, with its validity substantiated through empirical case analyses.

The investigation includes the following aspects:

- (1) The fundamental concepts of cross-border e-commerce operational modes are outlined to establish the theoretical foundation;
- (2) A detailed analysis of the innovations in China's current cross-border e-commerce operational modes is used to identify successful cases and major challenges;
- (3) Key issues (such as market positioning, supply chain management, and customer relationship maintenance) in the innovation of China's cross-border e-commerce operational modes are further investigated to propose recommendations for subsequent improvements;
- (4) This study constructs a highly adaptable mechanism evaluation system centered on the long-term sustainable development of China's cross-border e-commerce, validates it through practical cases, and provides a reference for the industry.

The research methodology includes the following aspects:

- (1) A comprehensive survey of both domestic and international scholarly works pertaining to operational modes, innovative advancements, and sustainability within the realm of cross-border e-commerce was

conducted, thereby establishing a theoretical foundation for the research;

- (2) Exemplary Chinese cross-border e-commerce enterprises were identified as focal points of investigation. Based on the detailed analysis of their operational frameworks, innovation strategies, and sustainable development trajectories, effective practices as well as prevailing challenges were elucidated;
- (3) This study employed a comparative approach to examine the development and characteristics of cross-border e-commerce both within China and internationally. By identifying the distinctive and common characteristics of China's cross-border e-commerce, the research enhanced the understanding of innovative operational modes and sustainable development mechanisms specific to China's cross-border e-commerce sector.

Through the application of these research methods and content, the study seeks to offer a theoretical framework and practical recommendations to support innovation in operational modes and promote the long-term sustainable development of China's cross-border e-commerce sector.

2. Analysis of cross-border e-commerce operation modes and innovations

2.1. Overview of cross-border e-commerce operation modes

Cross-border e-commerce operational modes denote the operational pattern employed by multinational enterprises to facilitate the exchange of goods, provision of services, and dissemination of information via e-commerce platforms. With the progression of internet technologies and the intensification of globalization, cross-border e-commerce has emerged as a crucial part of international trade. It surpasses conventional national boundaries, thereby providing businesses with expanded market opportunities and access to a broader consumer demographic.

Within the domain of cross-border e-commerce, three principal operation modes are identified: business-to-business (B2B), business-to-consumer (B2C), and consumer-to-consumer (C2C). The B2B mode emphasizes large-scale transactions between enterprises, with platforms such as Alibaba functioning as marketplaces for manufacturers and wholesalers ^[2]. The B2C mode targets end consumers directly, as exemplified by platforms like Amazon and JD. Meanwhile, the C2C mode facilitates the exchange of goods and services between individuals or small enterprises through platforms such as Taobao and eBay ^[3]. Furthermore, cross-border e-commerce encompasses a variety of platform types, including emerging patterns like social commerce and live-streaming shopping platforms. These modes utilize social media and live-streaming technologies to enhance consumer engagement and foster interactive shopping experiences ^[4].

Crucial operational aspects in cross-border e-commerce include logistics and distribution, payment and settlement, and cross-border taxation. An effective logistics infrastructure ensures the timely and secure delivery of goods to consumers, while accessible payment systems and robust tax compliance mechanisms underpin the seamless execution of transactions ^[5].

In summary, the operational modes of cross-border e-commerce have undergone rapid advancement within the context of globalization, attributable to their extensive cross-regional reach, cost-effectiveness, and high operational efficiency. Nevertheless, the imperative to continuously innovate in global competition, improve user experience, and secure sustainable long-term development has been a significant challenge for enterprises engaged in cross-border e-commerce. This study comprehensively evaluates existing operational modes, aiming to investigate the current status of cross-border e-commerce in China, and further identify prevailing challenges and their prospective developments.

2.2. Current innovations concerning China's cross-border e-commerce operating modes

In recent years, propelled by rapid advancements in internet technology and the intensification of globalization, China's cross-border e-commerce sector has experienced unprecedented growth opportunities. Within this context, the operational modes of China's cross-border e-commerce have undergone continuous innovation to adapt to evolving market dynamics and satisfy consumer demands. The key dimensions of contemporary innovations in China's cross-border e-commerce operational modes are summarized as follows ^[6]:

- (1) Technology-driven personalized services: This type of service employs big data analytics and artificial intelligence to examine consumer behavior, thereby providing customized product recommendations and services aimed at enhancing the user experience;
- (2) Multi-channel integrated marketing: Integrating online and offline strategies by leveraging diverse marketing channels, including social media platforms and live-streaming sales, the cross-border e-commerce enterprises achieve comprehensive brand promotion and sales optimization;
- (3) International supply chain management: The overall supply chain efficiency has been improved by enhancing cross-border logistics systems to reduce delivery times, lower shipping costs;
- (4) Policy support and compliance development: The industry proactively aligns business practices with national policies while governmental departments reinforce compliance mechanisms to ensure legality and sustainable operations;
- (5) Cultural export and brand internationalization: The industry utilizes cross-border e-commerce platforms to promote Chinese cultural products internationally and introduce high-quality foreign goods, thereby facilitating cultural exchange and advancing brand globalization.

To visually depict the current state of operational mode innovation within China's cross-border e-commerce industry, **Table 1** presents the primary innovation directions along with the respective number of enterprises involved in each category.

Table 1. Current state of operational mode innovation within China's cross-border e-commerce industry

Innovation	Number of Enterprises
Technology-driven personalized services	120
Multi-channel integrated marketing	95
International supply chain management	80
Policy support and compliance development	70
Cultural export and brand internationalization	65

Technology-driven personalized services constitute a primary focus in the innovation of operational modes within China's cross-border e-commerce sector, with more than 120 enterprises actively engaged in exploring and implementing initiatives in this domain. Furthermore, multi-channel integrated marketing, international supply chain management, and Cultural Export and Brand Internationalization have attracted considerable attention, with 95, 80, and 65 enterprises formulating strategies in these areas, respectively ^[7].

In conclusion, innovation in China's cross-border e-commerce operational modes extends beyond technological advancements and business model innovation to include supply chain management, policy adaptability, and cultural engagement. These efforts collectively establish a robust foundation for the sustainable long-term development of China's cross-border e-commerce industry ^[8].

2.3. Principal challenges in innovation of China's cross-border e-commerce operational modes

In the analysis of the operational modes innovation within China's cross-border e-commerce sector, several principal challenges have been identified. These challenges not only hinder the robust development of cross-border e-commerce but also limit its long-term viability. The principal issues are outlined as follows:

- (1) Incomplete payment and logistics infrastructure: Cross-border transactions necessitate the coordination of diverse currencies, payment systems, and logistics networks across multiple countries and regions. The inherent complexity of these requirements presents considerable obstacles for cross-border e-commerce. Notably, the payment process is affected by divergent financial regulatory policies among nations, leading to elevated costs and reduced efficiency in cross-border payment transactions;
- (2) Significant differences in laws and regulations: Significant differences in e-commerce legislation and regulatory standards across various countries and regions complicate compliance efforts for cross-border e-commerce enterprises. Variations in regulations related to intellectual property rights and consumer protection, in particular, heighten operational risks for businesses engaged in international trade;
- (3) Difficulties in brand development and marketing: Developing a globally competitive brand within an internationalized market environment demands substantial capital investment and extended periods of market cultivation. Concurrently, heterogeneous consumer preferences shaped by diverse cultural contexts complicate the design and execution of effective marketing strategies;
- (4) Data security and privacy concerns: The progression of big data analytics and cloud computing technologies has elevated data security and privacy protection to critical challenges within cross-border e-commerce. Striking an appropriate balance between safeguarding user information and leveraging data assets for marketing analysis and product optimization remains a pressing issue requiring resolution.

To facilitate a clearer understanding of the principal challenges faced in innovating China's cross-border e-commerce operational modes and their associated impacts, **Table 2** presents a concise tabular analysis.

Table 2. Principal challenges faced in innovating China's cross-border e-commerce operational modes

Category	Issue	Impact level (1–10)
Payment & logistics	High cross-border payment costs and low efficiency	8
Legal & regulatory	Significant legal differences across countries, high compliance costs	7
Brand development	Establishing an international brand requires substantial capital and time	6
Data security	Increased risk of data breaches	9

The above analysis reveals that China's cross-border e-commerce sector encounters a range of complex challenges in the course of innovating its operational modes. To effectively address these challenges, enterprises must implement strategic approaches and measures that foster the positive and sustainable growth of cross-border e-commerce ^[9].

3. Research on the long-term sustainable development mechanism of China's cross-border e-commerce operational modes

3.1. Principles for establishing the long-term sustainable development mechanism of China's cross-border e-commerce operational modes

In the investigation and implementation of operational modes for China's cross-border e-commerce sector,

fostering sustainable long-term development requires a comprehensive analysis and strict adherence to a set of fundamental construction principles. These principles include critical dimensions such as strategic positioning, technological innovation, market adaptability, cultural integration, and risk management.

The clarification of strategic positioning is essential. Establishing well-defined development objectives and market positioning is particularly significant for enterprises engaged in cross-border e-commerce. This process involves not only the target international market selection but also the identification of distinctive positioning and competitive advantages within the highly competitive global market. Enterprises need to adopt a long-term strategic outlook, effectively utilizing their resources and capabilities to develop plans that are congruent with evolving market trends^[10].

Technological innovation and its application play a pivotal role. Ongoing technology advancements provide cross-border e-commerce enterprises with expanded operational opportunities and more efficient management methodologies. Therefore, enhancing research and development efforts and the practical application of technology has become a critical strategy for improving competitive strength. Moreover, applications such as big data analytics, artificial intelligence, and cloud computing can substantially promote service quality and operational efficiency, while also providing consumers with more personalized shopping experiences^[11].

Market adaptability and flexibility are essential. In response to the rapidly evolving market, cross-border e-commerce enterprises must demonstrate heightened sensitivity and the capacity to promptly adjust to market development. This necessitates maintaining flexibility in product selection, marketing strategies, and other operational aspects to accommodate diverse market demands and bolster competitive advantage^[12].

The extent of cultural integration also plays a critical role. In the progress of globalization, cultural differences exert a significant influence on the success of cross-border e-commerce. Enterprises are required to develop a profound understanding of the cultural characteristics and consumer behaviors of their target markets. By implementing effective cultural integration strategies, enterprises can mitigate cultural communication barriers, enhance brand recognition, and foster greater customer loyalty^[13]. The efficacy of risk control mechanisms is crucial. Cross-border e-commerce operations are exposed to a variety of risks, including legal and policy uncertainties, international trade challenges, and cybersecurity threats. The establishment of a comprehensive risk management system capable of accurately identifying, assessing, and addressing these risks is vital for ensuring stable business operations. Furthermore, reinforcing international cooperation and exchanges, alongside improving compliance with international regulations, constitutes essential measures for risk mitigation and the promotion of sustainable development^[14].

By adhering to these fundamental principles, Chinese cross-border e-commerce enterprises can not only effectively navigate current challenges but also establish a robust foundation for long-term sustainable growth.

3.2. Principal elements of long-term sustainable development mechanisms for China's cross-border e-commerce operations

In investigating the mechanisms that underpin the long-term sustainable development of China's cross-border e-commerce operations, it is imperative to identify and critically analyze their fundamental components. These components encompass not only internal factors such as corporate management, technology innovation, and marketing strategies, but also external influences, including the policy environment and international relations. The principal elements contributing to the long-term sustainability of China's cross-border e-commerce operational framework are listed as follows:

- (1) The governmental policies, alongside the continuous refinement of legal and regulatory frameworks, function as the foundational basis for sustainable development in cross-border e-commerce. This encompasses measures such as tax incentives, trade facilitation initiatives, and the protection of intellectual property rights;
- (2) Technological advancement represents a central driving force in the development of cross-border e-commerce. The deployment of technologies, including big data analytics, artificial intelligence, and blockchain, can significantly improve operational efficiency and optimize the consumer experience;
- (3) The precise target market identification and a robust brand image cultivation are critical for consumer attraction and retention. Effective market positioning combined with strategic brand promotion enhances the enterprise's competitive ability;
- (4) An efficient logistics and distribution system is essential to ensure service quality and customer satisfaction within cross-border e-commerce. It involves efficient customs clearance and multi-channel delivery networks;
- (5) Enhancing communication and cooperative efforts with international partners facilitates the expansion of global market reach and strengthens a brand's international presence.

To elucidate the significance of these elements more comprehensively, **Table 3** provides a summary of these factors alongside their respective impacts on the sustainable development of cross-border e-commerce business models.

Table 3. Factors and their impacts on the sustainable development of cross-border e-commerce business models

Factor	Impact
Policy support and regulatory improvement	10
Technology innovation and application	9
Market positioning and brand development	8
Logistics and distribution infrastructure	7
International collaboration and communication	6

The values denote the importance scores assigned to various factors influencing the long-term sustainable development of China's cross-border e-commerce operational mode, with a maximum possible score of 10 points. According to this scoring framework in establishing a sustainable development mechanism for China's cross-border e-commerce operations, priority should be accorded to factors such as policy support and regulatory improvement, and technology innovation and application.

In summary, the attainment of long-term sustainable development within China's cross-border e-commerce operational mode necessitates efforts and coordinated actions. Through the continuous optimization and adjustment of these critical elements, the healthy growth of the cross-border e-commerce sector can be effectively facilitated, thereby achieving the overarching objectives of sustainable development.

3.3. Evaluation system for the long-term sustainable development mechanism of China's cross-border e-commerce operation mode

When establishing a long-term sustainable development mechanism for China's cross-border e-commerce operation mode, the evaluation system functions as an essential tool for assessing and directing its advancement.

This system is designed to provide a comprehensive appraisal of the operation mode's efficiency, innovation capacity, market adaptability, and sustainability, thereby offering a scientifically grounded basis for decision-making. **Table 4** indicates the evaluation system, which includes the following dimensions: operational efficiency, innovation capacity, market adaptability, and sustainability.

Table 4. Evaluation for the long-term sustainable development mechanism of China's cross-border e-commerce operation mode

Evaluation dimension	Evaluation dimension	Weight
Operational efficiency	Logistics costs	0.25
Innovation capacity	New product development cycle	0.15
	Technology update speed	0.10
Market adaptability	Market response time	0.20
Sustainability	Environmental impact score	0.30

The evaluation framework is founded on a comprehensive understanding of the long-term sustainable development of cross-border e-commerce operational modes. Within each evaluative dimension, specific indicators are delineated and assigned corresponding weights to signify their relative significance in the overall assessment. By employing quantitative analyses of these indicators, the holistic performance of cross-border e-commerce operational modes can be assessed objectively, thereby facilitating their ongoing optimization and refinement.

In practical implementation, the evaluation system necessitates not only systematic data collection and analysis but also the timely revision of evaluation criteria and weightings in response to the dynamic nature of cross-border e-commerce operations. This approach ensures the precision and timeliness of the evaluation outcomes. Moreover, the utilization of evaluation results is pivotal, serving as a basis for internal managerial decision-making while simultaneously showcasing the enterprise's competitiveness and development potential to external stakeholders such as partners and investors, thus bolstering external confidence.

The development and continuous enhancement of an evaluation system tailored to the long-term sustainable development mechanisms of China's cross-border e-commerce operational modes is of paramount importance for fostering the industry's healthy progression. The rigorous and methodical evaluation enables this system to effectively stimulate innovation and the optimization of operational modes, thereby achieving sustainable development objectives over the long term.

3.4 Case study of long-term sustainable development mechanisms in China's cross-border e-commerce operations

In investigating the long-term sustainable development mechanisms within China's cross-border e-commerce sector, case studies provide a more direct and comprehensive insight into the interplay between theoretical frameworks and practical applications. This section focuses on two prominent Chinese cross-border e-commerce enterprises, Alibaba and JD Worldwide, as primary subjects of analysis. Through a comparative examination of their strategies concerning operational model innovation and sustainable development practices, this study elucidates the critical factors contributing to their success (**Table 5**).

Table 5. Comparative examination of Alibaba and JD Worldwide

Enterprises	Innovation	Sustainable development mechanisms	Annual growth rate (%)
Alibaba	Big data-driven personalized recommendations	Diversified payment systems	25
JD Worldwide	Logistics network optimization	Green packaging and environmental protection	18

Alibaba utilizes big data analytics to perform a comprehensive evaluation of user behavior, thereby enabling personalized product recommendations that substantially improve user experience and increase purchase conversion rates. Concurrently, Alibaba has developed a diversified payment system tailored to consumers from various countries and regions, facilitating seamless cross-border transactions. Moreover, Alibaba emphasizes sustainable development by demonstrating corporate social responsibility through initiatives such as energy conservation, emission reduction, and green logistics practices.

JD Worldwide focuses on optimizing its logistics network. By establishing a global delivery infrastructure, the company ensures expedited product distribution and enhances customer satisfaction. In terms of sustainability, JD Worldwide advocates for green packaging and the utilization of environmentally friendly materials to reduce pollution. These efforts not only bolster the company's competitiveness but also provide a solid foundation for its long-term sustainable growth ^[15].

4. Conclusion

These case studies illustrate that Chinese cross-border e-commerce enterprises have implemented diverse strategies in innovating operational modes and establishing sustainable development frameworks. The effective implementation of these strategies has driven substantial growth. In the future, as technological advancements and market conditions continue to evolve, these enterprises must persistently refine and optimize their operational approaches to address emerging challenges and secure the long-term sustainable development.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Kang X, 2020, Research on Sustainable Development Issues in China's Cross-Border E-Commerce. *Journal of Hexi University*, 2020(3): 112–118.
- [2] Ma B, 2019, Exploration of Development Models and Future Trends in China's Cross-Border E-Commerce, thesis, Jilin University.
- [3] Shao T, 2019, Analysis of Cross-Border E-Commerce Operational Modes for Traditional Foreign Trade Enterprises in China. *Journal of Hubei Open Vocational College*, 2019(16): 104–105.
- [4] Ding Q, Xiang Y, Gu C, et al., 2021, Research on Innovation in Cross-Border E-Commerce Platform Operational Modes. *China Economic and Trade Guide*, 2021(6): 99–100.
- [5] Ju H, Liu C, 2021, Research on Innovation and Development of Cross-Border E-Commerce Logistics Models. *Rural*

- Economy and Technology, 2021(6): 67–68.
- [6] Tan L, Zhang C, Guo Q, 2020, Research on Cross-Border E-Commerce Operation Mechanisms in the New Era. Reform and Opening Up, 2020(10): 4–6.
 - [7] Liu Y, Liu L, 2022, Innovation Pathways for Cross-Border E-Commerce Development Models. Modern Market, 2022(23): 52–54.
 - [8] Zhang X, Li W, 2020, Research on Innovative Models of Cross-Border E-Commerce Under the Belt and Road Initiative. Modern Business, 2020(7): 56–57.
 - [9] Zhai J, 2020, Exploring Sustainable Innovation Mechanisms to Promote Cross-Border E-Commerce Development: A Review of “Exploring the Path of Sustainable Innovation for Enterprises”. Journal of Shanxi University of Finance and Economics, 2020(9): 130.
 - [10] Hu W, 2019, Research on Cross-Border E-Commerce Operational Modes for Small and Medium-Sized Enterprises. China Small and Medium Enterprises, 2019(8): 186–187.
 - [11] Wu Y, Guo Q, 2020, Research on Development Strategies for Cross-Border E-Commerce Operation Mechanisms in the New Era. Rural Economy and Technology, 2020(20): 67–69.
 - [12] Chen X, 2019, Research on the Mechanism of Continuous Innovation Motivation in Innovative Cross-Border E-Commerce Enterprises. North China Business & Trade, 2019(4): 132–133.
 - [13] Ma C, 2021, Research on Sustainable Development Pathways for Cross-Border E-Commerce. Modern Market, 2021(12): 32–34.
 - [14] Zhang X, Jin X, 2020, Analysis of Operational Modes for China’s Cross-Border E-Commerce Platforms. Marketing World, 2020(30): 58–59.
 - [15] Shi X, 2022, Exploration of Models and Operational Mechanisms for Traditional Enterprises’ Transition to Cross-Border E-Commerce. China Market, 2022(24): 186–188.

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