

Cross-border e-commerce as a driver of sustainable regional economic development: a multi-stakeholder case study of Jingzhou, China

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Abstract. Cross-Border E-Commerce (CBEC) has emerged as a vital engine for regional economic transformation, yet inland cities in developing economies face distinct structural barriers to participation. This study investigates the CBEC development landscape of Jingzhou, a representative inland city in Hubei Province, China, through a mixed-methods approach combining field visits to 12 government agencies and enterprises, two structured questionnaire surveys ($N = 120$ enterprise respondents; $N = 186$ university students), semi-structured interviews, and comparative policy analysis with benchmark cities Shenzhen and Changsha. Results reveal that while Jingzhou possesses notable advantages—a solid industrial base in textiles, smart appliances, and prepared foods; rich higher education resources with seven universities and over 45,000 annual graduates; and emerging CBEC industrial parks—its development is constrained by an underdeveloped policy framework, limited enterprise operational capacity, and a critical shortage of specialized CBEC talent. The comparative policy analysis reveals a notable gap in CBEC-specific policy instruments: while Shenzhen and Changsha issued 30 and 28 such documents, respectively, during 2020–2024, Jingzhou's regulatory framework for CBEC remained at an early stage of development. The study proposes a three-pronged strategy encompassing (1) policy-driven environmental optimization, (2) industry-focused breakthroughs leveraging Jingzhou's competitive sectors, and (3) the establishment of a university-centered CBEC service hub integrating government, academic, enterprise, and industry association resources. These findings contribute a replicable analytical framework for sustainable e-commerce development in inland cities across emerging economies.

Keywords: cross-border e-commerce, sustainable regional development, policy framework, inland cities, talent development

1. Introduction

Cross-Border E-Commerce (CBEC) has fundamentally reshaped global trade patterns over the past two decades, offering Small and Medium-sized Enterprises (SMEs) in developing regions unprecedented access to international markets. In China, CBEC has evolved through four distinct phases—germination (1999–2003), growth (2004–2012), expansion (2013–2017), and maturity (2018–present)—with annual transaction volumes

reaching RMB 1.88 trillion in the first three quarters of 2024, representing an 11.5% year-on-year increase [1, 2]. Major platforms, including AliExpress, SHEIN, TikTok Shop, and Temu, have leveraged China's robust supply chain infrastructure to compete globally, while national policies, such as the 14th Five-Year Plan for Commerce Development and the State Council's *Guidelines on Accelerating New Foreign Trade Formats*, have positioned CBEC as a strategic priority [3, 4].

Existing scholarship has examined the high-quality development driving paths of China's cross-border e-commerce comprehensive pilot zones from the perspective of policy instruments [5] and the mechanisms through which cross-border e-commerce helps to build the "dual circulation" new development pattern [6], providing a growing evidence base for policy design. However, the benefits of CBEC development have been unevenly distributed. While coastal megacities such as Shenzhen (RMB 326.53 billion in 2023) and Shanghai (RMB 262.39 billion) dominate national rankings, inland cities face persistent structural disadvantages, including weaker logistics infrastructure, limited policy support, and scarcity of specialized talent. Addressing this urban–inland disparity is essential for achieving the United Nations Sustainable Development Goals (SDGs)—particularly SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 11 (Sustainable Cities and Communities)—in the context of regional economic development.

Jingzhou, located in the central Yangtze River Economic Belt of Hubei Province, serves as a compelling case study for examining CBEC development in inland cities. As the only nationally designated industrial transfer demonstration zone in Hubei and a core city of the Yichang–Jingzhou–Jingmen metropolitan area, Jingzhou achieved a GDP of RMB 315.15 billion in 2023, making it the largest economy in Hubei outside the province's primary urban centers [7]. Its CBEC sector has demonstrated remarkable growth, with total import-export volume reaching RMB 1.272 billion in 2023—a 79.1% increase year-on-year, ranking second province-wide in both volume and growth rate [8].

This study addresses the following research questions: (1) What are the current conditions, advantages, and challenges of CBEC development in Jingzhou? (2) How does Jingzhou's CBEC policy framework compare with those of leading benchmark cities? (3) What targeted strategies can facilitate sustainable CBEC development in Jingzhou and, by extension, comparable inland cities? By employing a multi-stakeholder mixed-methods approach, this research contributes the first systematic investigation of CBEC development ecosystems in central China's inland cities, offering both empirical evidence and a replicable analytical framework for sustainable regional e-commerce development.

2. Materials and methods

2.1. Study area

Jingzhou is situated in south-central Hubei Province along the middle reaches of the Yangtze River. With a population of approximately 5.2 million and a strategic position in the Yangtze River Economic Belt, the city possesses multimodal transportation infrastructure, including an international airport, freight railway, Yangtze River port facilities, and an extensive highway network. Jingzhou's industrial structure is anchored by the "4611" modern industrial system, comprising four hundred-billion-yuan pillar industries, six fifty-billion-yuan competitive industries, and eleven ten-billion-yuan specialized industrial clusters, with particular strengths in textile and apparel manufacturing, smart home appliances, and prepared foods.

2.2. Research design

This study employed a convergent mixed-methods design, integrating quantitative and qualitative data collection and analysis. The research was conducted between January 2024 and March 2025 and comprised four complementary components.

2.2.1. *Field visits and institutional engagement*

The research team conducted field visits to 12 institutions and enterprises in Jingzhou, including the Jingzhou Municipal Bureau of Commerce, the Jingzhou E-Commerce Association, the Jingzhou Cross-Border Commerce Association, the Jingzhou Silk Road Interconnection E-Commerce Pioneering Park, the Jingzhou Jiahai Returning Entrepreneurship Park, and seven representative CBEC enterprises spanning the pet supplies, leather goods, textile, and apparel sectors. Semi-structured interviews were conducted with government officials, industry association representatives, and enterprise managers to obtain first-hand insights into operational realities, policy utilization, and development bottlenecks.

2.2.2. *Questionnaire surveys*

Two structured questionnaire instruments were developed and administered. Survey A targeted CBEC enterprise operators and employees, collecting data on organizational demographics, operational status, market strategies, technology and logistics applications, policy awareness, and satisfaction with government support. A total of 122 responses were collected, of which 120 were valid, representing a valid response rate of 98.4%. The questionnaire comprised 20 items organized into six sections: enterprise basic information, market and operations, technology and logistics, policy and compliance, government policy support and satisfaction, and future outlook.

Survey B targeted university students majoring in CBEC-related disciplines, including cross-border e-commerce, international economics and trade, business English, and e-commerce across Jingzhou's higher education institutions. The instrument assessed employment intentions, job preferences, salary expectations, preferred employer types, and perceptions of Jingzhou's CBEC industry prospects. All 186 distributed questionnaires were returned as valid, yielding a valid response rate of 100%. The questionnaire comprised 20 items in six thematic sections.

2.2.3. *Policy document analysis*

A systematic review was conducted of CBEC-related policy documents published by the Jingzhou Municipal Bureau of Commerce during 2020–2024. For comparative benchmarking, the equivalent policy document corpora of the Shenzhen Municipal Bureau of Commerce, which ranked first nationally in CBEC volume, and the Changsha Municipal Bureau of Commerce, which ranked twelfth nationally and was the geographically nearest top-20 city to Jingzhou, were also collected and analyzed over the same period. Documents were classified by type, publication frequency, and thematic coverage following the policy instrument taxonomy proposed by previous studies [5].

2.2.4. *Data analysis*

Quantitative survey data were analyzed using descriptive statistics (frequencies, percentages, and cross-tabulations) to characterize enterprise profiles and student preferences. Qualitative data from interviews and open-ended survey responses were subjected to thematic content analysis to identify recurring patterns and emergent themes. Policy documents were coded according to instrument type (regulatory, economic, informational) and policy domain (trade facilitation, talent development, infrastructure, financial support).

3. Results

3.1. Overview of CBEC development in Jingzhou

Jingzhou's CBEC sector has exhibited accelerated growth in recent years. The city's total CBEC import-export volume reached RMB 1.272 billion in 2023, representing a 79.1% year-on-year increase—the second-highest growth rate in Hubei Province. Between 2021 and 2023, Jingzhou's CBEC volume doubled. In the first half of 2024, the total import-export value exceeded RMB 10 billion for the first time, with year-to-October 2024 figures reaching RMB 19.96 billion (16.7% year-on-year growth), of which exports accounted for RMB 16.72 billion [8]. As of 2024, 119 enterprises in Jingzhou engage in CBEC operations, with two provincial-level CBEC industrial parks—Silk Road Interconnection and Wanglaiyunshang—having received official designation. The municipal government has initiated a "Hundred Enterprises Going Global" program and established a comprehensive CBEC industrial park offering integrated services, including overseas warehousing and customs brokerage.

3.2. Competitive advantages

3.2.1. *Solid industrial base*

Jingzhou's "4611" modern industrial system, which comprises four pillar industries, six advantageous industries, and eleven specialized industrial clusters, provides a strong foundation for CBEC. These clusters span smart home appliances, automotive components, petrochemical equipment, biomedicine, photovoltaic materials, electronic components, modern coal chemicals, papermaking, food processing, infant and children's apparel, and energy conservation and environmental protection. The textile and apparel sector, recognized as a provincial key growth-oriented industrial cluster for 13 consecutive years, has adopted a "CBEC + industrial belt" development model, with the Cenhe infant apparel cluster alone possessing over 90 proprietary brands and achieving an average annual CBEC transaction growth rate exceeding 30% [8]. Jingzhou is also home to Midea Group's refrigerator, washing machine, and building technology operations, forming a hundred-billion-yuan smart appliance cluster supported by over 100 suppliers and component manufacturers.

3.2.2. *Rich educational resources*

Jingzhou hosts seven higher education institutions, including Yangtze University, Yangtze University College of Arts and Sciences, and Jingzhou University, and 11 secondary vocational schools, producing over 45,000 graduates annually. Six of the seven institutions offer CBEC-related programs, with a combined enrollment of 495 students in 2024 across disciplines including cross-border e-commerce, international economics and trade, business English, and e-commerce (Table 1). The municipal Bureau of Commerce actively facilitates university–industry–government collaboration platforms, organizing regular training programs. In 2024 alone, major initiatives included the Hubei International Trade "Single Window" training in August, the E-Commerce Training Lecture in November, and the City-Wide CBEC High-Quality Development Special Training Conference in December [8].

Table 1. CBEC-related program enrollment at Jingzhou higher education institutions (2024)

Institution	CBEC-Related Programs	Enrollment (By Program)	Notes
Yangtze University	Business English, International Economics & Trade	136 (77 + 59)	Business English: provincial first-class program; enrollment suspended in 2025 due to program restructuring
Yangtze Univ. College of Arts & Sciences	Business English, Intl Economics & Trade, E-Commerce	94 (53 + 29 + 12)	Business English: Provincial First-Class Program
Jingzhou University	Business English, CBEC, E-Commerce	110 (30 + 20 + 60)	Business English: provincial first-class program
Jingzhou Polytechnic of Science & Technology	E-Commerce (4 specializations)	80 (20×4)	——
Jingzhou Vocational & Technical College	E-Commerce, Online Marketing & Live-Streaming E-Commerce	35 (30 + 5)	——
Yangtze Art & Engineering Vocational College	Online Marketing & Live-Streaming E-Commerce, E-Commerce (CBEC)	40 (20 + 20)	——
Hubei College of Chinese Medicine	None	—	——
Total	——	495	——

Note: Source: China Education Online (<https://www.eol.cn>), Palm Gaokao Platform. Compiled by the authors.

3.3. Challenges and problems

3.3.1. *Complex global trade environment*

From an external perspective, Jingzhou's CBEC enterprises face a challenging global trade environment characterized by escalating trade frictions, fluctuating international market demand, and exchange rate volatility. External trade restrictions and geopolitical tensions—particularly international sanctions regimes affecting entities engaged in Russia-related trade—have directly affected local enterprises. For example, 31 foreign trade enterprises in Jingzhou, including a local materials manufacturer, faced difficulties in receiving payments from Russia, involving funds totaling approximately RMB 260 million. A representative textile enterprise was added to a foreign entity sanctions list for its Russia-related business, resulting in a 38.4% year-on-year decline in its foreign trade [8]. While these external environmental factors lie beyond municipal control, they underscore the urgency of strengthening internal CBEC capacities.

3.3.2. *Underdeveloped CBEC policy framework*

A systematic review of policy documents published on the Jingzhou Municipal Bureau of Commerce's official website during 2020–2024 suggests that CBEC-specific regulatory documents remain relatively limited. Under the "Normative Documents" category, only five documents were published during this period, and none of them directly addressed CBEC. Similarly, under the "Other Proactively Published Documents – Municipal-

Level Documents" category, six documents were identified; these primarily concerned general trade facilitation, domestic consumption promotion, or administrative governance, with CBEC-specific content not yet featuring prominently. This indicates that there remains considerable room for the development of dedicated CBEC policy instruments at the municipal level.

In contrast, the Shenzhen Municipal Bureau of Commerce published 30 CBEC-related regulatory documents during the same period, and the Changsha Municipal Bureau of Commerce published 28 (Table 2). Both cities demonstrated sustained continuity in policy issuance and employed a diverse array of policy instruments, including notifications, trial implementation measures, detailed implementation rules, operational procedures, and recognition measures. Their policies comprehensively covered foreign investment facilitation, modern commercial circulation systems, CBEC park management, and export financing facilitation for SMEs.

Table 2. Comparative policy publication by city (2020–2024)

City	2023 CBEC Volume (RMB billion)	Normative Documents Published	Total Documents Published	CBEC- Specific Documents	Policy System Characteristics
Jingzhou	1.272	5	6	0	No dedicated CBEC policy section
Changsha	40.6	28	28+	5+	Comprehensive taxonomy; regular updates
Shenzhen	326.53	30	30+	8+	Model policy system; public consultation records

Note: Sources: Respective municipal bureau of commerce official websites. CBEC volume data from Juhui Data (published 5 June 2024).

The enterprise survey corroborates these findings. Among 120 respondents, only 50% reported some awareness of government CBEC policies, while 41.67% indicated limited awareness and 8.33% reported no awareness whatsoever. Satisfaction levels were low: 50% rated their satisfaction as "moderate" and 33.33% as "dissatisfied". Enterprises expressed strong expectations for expanded tax incentives, additional financial subsidies or preferential loans, and strengthened CBEC talent cultivation and recruitment support (Table 3).

Table 3. Enterprise awareness of and satisfaction with CBEC policies ($N = 120$)

Dimension	Distribution
Policy awareness	Fully aware: 0% Some awareness: 50.00% Limited awareness: 41.67% No awareness: 8.33%
Policy satisfaction	Very satisfied: 0% Satisfied: 16.67% Moderate: 50.00% Dissatisfied: 33.33% Very dissatisfied: 0%
Most desired policy improvements (multiple choice)	Expand tax incentives: 69.23% Establish more subsidies/loan benefits: 53.85% Strengthen talent cultivation & recruitment: 61.54% Improve logistics efficiency & reduce costs: 53.85% Strengthen international trade cooperation: 38.46%

3.3.3. Limited enterprise operational capacity

Survey data reveal that the majority of Jingzhou CBEC enterprises are nascent and small in scale. Enterprises with 1–3 years of operation accounted for 58.33% of respondents, while those with fewer than 10 employees constituted 69.23%. Only 15.38% of enterprises employed 10–50 staff, and a mere 7.69% maintained teams of

51–100 employees. Nevertheless, 82.79% of enterprises reported demand for additional CBEC talent (Table 4).

Table 4. Enterprise operational profiles (*N* = 120)

Indicator	Distribution
Operational tenure	< 1 year: 8.33% 1–3 years: 58.33% 4–5 years: 16.67% > 5 years: 16.67%
Employee scale	< 10: 69.23% 10–50: 15.38% 51–100: 7.69% 101–500: 7.69% >500: 0%
Talent demand	0 persons: 17.21% 1–5: 58.33% 6–10: 16.39% 11–15: 5.00% 16–20: 3.07%

Regarding operational challenges (multiple-choice item), the most frequently cited barrier was "high cross-border logistics costs" (61.54%), followed by "brand building and market promotion" (38.46%), "insufficient talent" (30.77%), and "international trade policy changes" (30.77%). In terms of marketing strategies, social media marketing dominated (61.54%), with search engine optimization (46.15%) and email marketing (38.46%) as supplementary channels. Notably, KOL/influencer collaboration recorded zero adoption. Regarding technology adoption, big data analytics and CBEC platform systems were the most employed technologies (both 69.23%), while AI and machine learning (23.08%) and cloud computing (7.69%) showed markedly lower utilization. For logistics, 92.31% of enterprises relied exclusively on third-party logistics services, with only 23.08% using overseas warehouse models and 7.69% developing proprietary logistics capabilities.

3.3.4. *Critical shortage of specialized CBEC talent*

The shortage of specialized CBEC talent emerged as a cross-cutting constraint. Total enrollment in CBEC-related programs across Jingzhou's higher education institutions was merely 416 in 2024 (Table 1), grossly inadequate relative to the demands of 119 CBEC-operating enterprises. The Student Survey (*N* = 186) revealed significant perceptual and motivational gaps. Among respondents, 61.83% cited "favorable CBEC employment prospects" as their primary motivation for program selection, yet 55.91% reported limited understanding of Jingzhou's CBEC industry, and 7.53% reported no understanding whatsoever. Willingness to seek employment in Jingzhou was qualified: while 63.98% expressed conditional willingness pending acceptable positions and compensation, only 9.14% indicated unconditional willingness, and 22.58% expressed reluctance. The most valued employment factors were lower living costs (60.22%) and perceived CBEC development potential (43.55%). Among those unwilling to work in Jingzhou, limited industry development opportunities (57.53%), preference for larger cities (57.53%), and unsatisfactory salary levels (54.84%) were the predominant deterrents. Notably, foreign-invested enterprises (38.17%) and state-owned enterprises (26.34%) were strongly preferred over private enterprises—the dominant employer type in Jingzhou's CBEC sector.

4. Discussion

The findings of this study illuminate a pronounced structural gap between the rapid growth trajectory of CBEC in Jingzhou and the institutional, organizational, and human capital infrastructure required to sustain it. This section synthesizes the empirical evidence into a coherent three-pronged strategic framework and discusses its implications for policy and practice.

4.1. Policy-driven environmental optimization

The near-total absence of CBEC-specific regulatory documents in Jingzhou, contrasted with the robust policy apparatus of Shenzhen (30 documents) and Changsha (28 documents), represents the most actionable gap identified in this study. Drawing on institutional economics frameworks, the long-term trajectory of regional economic development is fundamentally shaped by institutional quality [9]. The 14 cities that have consistently ranked in the top tier of China's CBEC comprehensive pilot zone evaluations all demonstrate robust policy environments characterized by proactive institutional supply. For example, Zhengzhou promulgated its *14th Five-Year Plan for Online Silk Road Development* in January 2023, accompanied by specific implementation measures and special action plans the same year; Changsha enacted *Measures for Promoting High-Quality CBEC Development* in 2023 and *Open Economy Development Special Fund Management Measures (CBEC Component)* in 2024 [10].

This study recommends three complementary policy dimensions: (a) Institutional environment: Promulgate a comprehensive Jingzhou CBEC Development Implementation Plan that provides long-term strategic direction, drawing on the Hubei Provincial emphasis on supply chain system development and informatization-driven synchronous advancement of modernization. Policy instruments should prioritize efficient public services, talent development programs, infrastructure construction, and industrial ecosystem support, balanced with traditional fiscal incentives. All policies should be published promptly on official platforms with clear taxonomies to ensure transparency and accessibility. (b) Business environment: Transition from interventionist economic governance toward a service-oriented model, leveraging Jingzhou's public assets (university cluster, airport, freight railway, Yangtze River port) through transparent, open-access service delivery. Develop integrated IT-based supply chain service platforms encompassing order management, sourcing, procurement agency, inventory management, customs clearance, tax rebates, and international logistics—enabling end-to-end, one-stop CBEC support. (c) Logistics environment: Optimize multimodal coordination across airport, railway, port, and highway infrastructure; cultivate local logistics enterprises capable of river–sea and river–rail intermodal operations; develop containerized freight capabilities; and invest in logistics talent with expertise in international taxation, customs, cross-border legal frameworks, and foreign languages.

4.2. Industry-focused breakthrough: leveraging competitive sectors

CBEC development should serve local industrial chains, addressing domestic competitive pressures while opening overseas growth markets, in alignment with the "dual circulation" development paradigm [6, 11]. Jingzhou's most CBEC-amenable sectors are textiles and apparel, smart home appliances, and prepared foods. (a) Textile and apparel: As a traditional pillar industry with enterprises including Jade Group, Yusha Group, Hongye, and Badina, and specialized production bases for infant and children's wear, Jingzhou's textile sector faces challenges of limited scale and weak comparative advantage. Two pathways are proposed: strengthening enterprise innovation capacity and talent structure, and establishing a government-led, state-owned enterprise-operated service-oriented CBEC platform to provide centralized services for the industrial cluster. (b) Smart home appliances: Jingzhou hosts Midea Group's refrigerator, washing machine, and building technology operations—a hundred-billion-yuan cluster with over 100 supporting enterprises. With China's household appliance exports growing from USD 8.75 billion in 2002 to USD 87.8 billion in 2023, and 2024 Q1–Q3 refrigerator, washing machine, and air conditioner export growth rates of 20%, 18%, and 32% respectively, developing dedicated CBEC channels for this cluster could capture additional value currently captured by intermediary traders [12]. (c) Prepared foods: Leveraging Jiangnan Plain's freshwater resources and poultry farming base, CBEC-facilitated international market entry for prepared freshwater products and poultry items,

following emerging-market pathways demonstrated by China–Africa cross-border e-commerce cooperation [13] and advancement paths for fresh agricultural product CBEC [14], could elevate product quality standards, strengthen supply chains, and generate positive spillovers to the domestic market.

4.3. University-centered CBEC service hub

The most transformative recommendation is the establishment of a CBEC Service Center anchored in Jingzhou's university cluster, integrating government, higher education institutions, enterprises, and industry association resources into a cohesive innovation ecosystem. The center would operate through six functional modules: (1) A CBEC Training Center delivering regular workshops, seminars, and hands-on training programs for both students and enterprise employees; (2) A CBEC Operations Center where university faculty and students undertake enterprise projects and incubate startups through structured university–enterprise partnerships—students engage in enterprise operations from their sophomore year, developing practical competencies and organizational familiarity that increases local employment probability; (3) A Market Analysis Research Center employing big data and AI technologies for market trend forecasting and consumer behavior analysis, in line with digitally empowered CBEC upgrading paths [15, 16]; (4) A Logistics and Warehousing Service Center integrating domestic and international logistics resources for supply chain optimization; (5) A Legal Consulting and Intellectual Property Service Center addressing cross-border legal compliance and IP protection; and (6) An International Cooperation Platform organizing CBEC development symposia and international forums to enhance regional visibility and facilitate global partnerships.

This hub model addresses multiple structural deficiencies simultaneously: it provides enterprises with access to technical expertise and human capital they cannot independently develop; it offers students authentic project-based learning experiences that increase both competence and local employment attachment; it strengthens faculty industry engagement; and it creates a virtuous cycle of talent cultivation, retention, and industrial upgrading that underpins sustainable regional development. The integration of the university cluster as the spatial and intellectual anchor of CBEC development represents a deliberate departure from conventional industrial park models, recognizing the primacy of human capital in knowledge-intensive digital trade ecosystems.

5. Conclusion

This study offers an early attempt at a systematic, multi-stakeholder empirical investigation of CBEC development in an inland Chinese city, employing Jingzhou as a representative case. The mixed-methods design—integrating field visits, dual questionnaire surveys, policy document comparison, and semi-structured interviews—yields several substantive findings. First, Jingzhou's CBEC sector exhibits strong growth momentum (79.1% year-on-year increase in 2023) supported by genuine competitive advantages in industrial base, educational resources, and emerging park infrastructure. Second, the findings point to three interrelated challenges that may constrain sustainable development. The policy framework remains at a relatively early stage of development, with CBEC-specific regulatory instruments yet to be introduced in substantial numbers; enterprise operational capacity is still concentrated in small-scale, technology-light operations, leaving considerable room for upgrading; and a discernible talent supply–demand mismatch persists, partly attributable to graduates' perceptions of local employment opportunities, which could be improved through targeted initiatives. Third, comparative benchmarking with Shenzhen and Changsha demonstrates that robust, transparent, and continuously updated policy systems are strongly associated with CBEC performance, providing an actionable template for Jingzhou's institutional reform.

The three-pronged strategic framework proposed—policy-driven environmental optimization, industry-focused breakthrough, and university-centered service hub development—offers an integrated approach that addresses institutional, organizational, and human capital dimensions simultaneously. The university-centered hub model, in particular, represents a context-sensitive innovation: by anchoring CBEC development in Jingzhou's strongest institutional asset—its higher education cluster—it creates a virtuous cycle linking education, employment, and industrial upgrading that conventional industrial policy instruments cannot replicate.

Several limitations should be acknowledged. The study's cross-sectional design captures conditions at a single temporal point; longitudinal tracking would strengthen causal inferences regarding policy impact. The sample of 120 enterprises and 186 students, while substantial for a city-level study, may not capture the full diversity of actor perspectives. The absence of enterprise-level financial performance data limits quantitative assessment of CBEC's economic contribution. Future research should incorporate longitudinal designs with expanded samples, integrate financial performance metrics, and extend comparative analysis to additional inland cities to strengthen generalizability. Despite these limitations, this study contributes a replicable analytical framework and evidence-based recommendations relevant to the broader challenge of sustainable CBEC development across inland cities in emerging economies, with direct implications for SDG-aligned regional development policies.

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Appendix

Appendix A. Survey A

Questionnaire on the Operations of Cross-Border E-Commerce Enterprises in Jingzhou

Section I: General Enterprise Information

1. Has your enterprise commenced cross-border e-commerce operations?
 - ☐ Yes
 - ☐ No
2. How long has your enterprise been in operation since its establishment?
 - ☐ Less than 1 year
 - ☐ 1–3 years
 - ☐ 4–5 years
 - ☐ More than 5 years
3. In which types of cross-border e-commerce business is your enterprise primarily engaged? (Select all that apply.)
 - ☐ Business-to-Business (B2B)
 - ☐ Business-to-Consumer (B2C)
 - ☐ Consumer-to-Consumer (C2C)
 - ☐ Marketplace platform operation
 - ☐ Cross-border logistics/warehousing
 - ☐ Cross-border payment solutions
 - ☐ Other (please specify): _____
4. What is the current workforce size of your enterprise?
 - ☐ Fewer than 10 employees
 - ☐ 10–50 employees
 - ☐ 51–100 employees
 - ☐ 101–500 employees
 - ☐ More than 500 employees
5. What is your company's current demand for cross-border e-commerce talent?
 - ☐ 0
 - ☐ 1–5
 - ☐ 6–10
 - ☐ 11–15
 - ☐ 16–20
 - ☐ More than 20 (persons)
6. What was the approximate transaction value of your enterprise's cross-border e-commerce business in the previous fiscal year (in RMB)?
 - ☐ Less than RMB 1 million
 - ☐ RMB 1–5 million
 - ☐ RMB 5–10 million
 - ☐ RMB 10–50 million
 - ☐ More than RMB 50 million

Section II: Market and Operations

7. Which countries or regions constitute the principal target markets of your enterprise? (Select all that apply.)

- ☐ Southeast Asia (e.g., Thailand, Vietnam, Indonesia)
- ☐ Europe (e.g., the United Kingdom, Germany, France)
- ☐ North America (e.g., the United States, Canada)
- ☐ South America (e.g., Brazil, Mexico)
- ☐ The Middle East (e.g., Saudi Arabia, the United Arab Emirates)
- ☐ Russia and the Commonwealth of Independent States
- ☐ Africa
- ☐ Other (please specify): _____

8. What are the principal challenges your enterprise has encountered in cross-border e-commerce operations? (Select all that apply.)

- ☐ Market access barriers
- ☐ Changes in international trade policies
- ☐ High cross-border logistics costs
- ☐ Difficulties in cross-border payment
- ☐ Local language and cultural differences
- ☐ Brand building and marketing promotion
- ☐ Other (please specify): _____

9. What are the principal marketing strategies adopted by your enterprise? (Select all that apply.)

- ☐ Social media marketing
- ☐ Search Engine Optimization (SEO)
- ☐ Search Engine Marketing (SEM)
- ☐ E-mail marketing
- ☐ Content marketing
- ☐ KOL/influencer partnerships
- ☐ Participation in international trade fairs and exhibitions
- ☐ Other (please specify): _____

Section III: Technology and Logistics

10. Which key technologies are employed in your enterprise's cross-border e-commerce operations? (Select all that apply.)

- ☐ Big data analytics
- ☐ Artificial Intelligence (AI) and machine learning
- ☐ Cloud computing and cloud services
- ☐ Blockchain technology
- ☐ Internet of Things (IoT)
- ☐ Cross-border e-commerce platform systems
- ☐ Customer Relationship Management (CRM) systems
- ☐ Other (please specify): _____

11. What are the principal strategies adopted by your enterprise for cross-border logistics? (Select all that apply.)

- ☐ Use of third-party logistics services
- ☐ Establishment of an in-house logistics system
- ☐ Adoption of the overseas warehouse model

- ☐ A combination of multiple logistics modes (e.g., air freight, sea freight, and express delivery)
- ☐ Other (please specify): _____

Section IV: Policy and Compliance

12. What are the principal policy and compliance issues your enterprise has encountered in cross-border e-commerce operations? (Select all that apply.)

- ☐ Tariffs and taxation
- ☐ Data protection and privacy
- ☐ Intellectual property protection and infringement risks
- ☐ Cross-border payment compliance
- ☐ Import and export restrictions
- ☐ Other (please specify): _____

Section V: Government Policy Support and Satisfaction

13. Are you familiar with the policy support measures provided by the Jingzhou Municipal Government for cross-border e-commerce enterprises (e.g., tax incentives, financial subsidies, and talent recruitment programs)?

- ☐ Fully familiar
- ☐ Somewhat familiar
- ☐ Not very familiar
- ☐ Not familiar at all

14. To what extent are you satisfied with the current cross-border e-commerce business environment policies provided by the Jingzhou Municipal Government?

- ☐ Very satisfied
- ☐ Satisfied
- ☐ Neutral
- ☐ Dissatisfied
- ☐ Very dissatisfied

15. Which of the following policies of the Jingzhou Municipal Government have been most conducive to the development of your enterprise? (Select all that apply.)

- ☐ Tax incentives
- ☐ Financial subsidies or financing support
- ☐ Talent recruitment and training
- ☐ Development of logistics infrastructure
- ☐ Development of cross-border e-commerce platforms or industrial parks
- ☐ Simplification of administrative procedures
- ☐ International trade cooperation and exchange
- ☐ Other (please specify): _____

16. In which aspects do you consider that the Jingzhou Municipal Government could improve its support for the development of cross-border e-commerce enterprises? (Select all that apply.)

- ☐ Strengthening the publicity and interpretation of policies
- ☐ Providing more professional training and talent support
- ☐ Optimizing logistics infrastructure
- ☐ Increasing support for small and medium-sized enterprises
- ☐ Improving financial services and financing channels
- ☐ Strengthening intellectual property protection

☐ Other (please specify): _____

17. In which areas would you like the Jingzhou Municipal Government to provide new policy support or strengthen existing policies in the future? (Select all that apply.)

- ☐ Further expansion of tax incentives
- ☐ The establishment of more financial subsidies or preferential loan schemes
- ☐ Strengthening the cultivation and recruitment of e-commerce talent
- ☐ Improving logistics efficiency and reducing logistics costs
- ☐ Strengthening international trade cooperation and expanding international markets
- ☐ Establishing or optimizing cross-border e-commerce platforms
- ☐ Simplifying export tax rebate procedures
- ☐ Other (please specify): _____

Section VI: Future outlook

18. What is your enterprise's projected growth rate for its cross-border e-commerce business over the coming year (in percentage terms)?

- ☐ Less than 10%
- ☐ 10–30%
- ☐ 31–50%
- ☐ 51–100%
- ☐ More than 100%
- ☐ Uncertain

19. What principal measures does your enterprise plan to undertake in the coming year to promote business development? (Select all that apply.)

- ☐ Recruiting additional staff
- ☐ Expanding into new markets
- ☐ Optimizing product lines
- ☐ Strengthening brand building
- ☐ Improving customer service quality
- ☐ Introducing new technologies
- ☐ Expanding logistics networks
- ☐ Other (please specify): _____

20. In your view, what will be the principal opportunities and challenges confronting the cross-border e-commerce industry in the Jingzhou region over the coming year? (Open-ended question)

Closing remarks

Thank you for taking the time to complete this questionnaire. Your responses will provide an important reference for our understanding of the operational status, market strategies, technology and logistics applications, policy and compliance challenges, and future development plans of cross-border e-commerce enterprises in Jingzhou, as well as their perceptions of and satisfaction with the policy support provided by the Jingzhou Municipal Government. On the basis of your feedback, we will offer valuable recommendations to enterprises, policymakers, and research institutions in the cross-border e-commerce sector, with a view to jointly promoting the sound development of the cross-border e-commerce industry in Jingzhou. We wish your enterprise continued prosperity and success.

Appendix B. Survey B

Questionnaire on the Employment Intentions of University Students Majoring in Cross-Border E-Commerce–Related Programs in Jingzhou

Section I: Basic information

1. What is your gender?

- ☐ Male
☐ Female

2. What is your current year of study?

- ☐ Freshman (first year)
☐ Sophomore (second year)
☐ Junior (third year)
☐ Senior (fourth year)
☐ Postgraduate

3. What was your primary motivation for studying a cross-border e-commerce–related program? (Select all that apply.)

- ☐ Interest in the e-commerce industry
☐ Favorable employment prospects in cross-border e-commerce
☐ The design of the university curriculum
☐ The influence of family or friends
☐ Other (please specify): _____

Section II: Employment intentions

4. Are you familiar with the current state of the cross-border e-commerce industry in the Jingzhou region?

- ☐ Very familiar
☐ Somewhat familiar
☐ Not very familiar
☐ Not familiar at all

5. Would you be willing to pursue cross-border e-commerce–related employment in the Jingzhou region?

- ☐ Very willing
☐ Willing, subject to the specific position and remuneration offered
☐ Rather unwilling
☐ Completely unwilling

6. If you are willing to work in Jingzhou, what are the primary reasons? (Select all that apply.)

- ☐ Family reasons
☐ Optimism regarding the development potential of cross-border e-commerce in Jingzhou
☐ The relatively low cost of living
☐ Local interpersonal networks
☐ Other (please specify): _____

7. If you are unwilling to work in Jingzhou, what are the primary reasons? (Select all that apply.)

- ☐ Limited industry development opportunities
☐ Unsatisfactory salary and benefits
☐ A less-than-ideal working and living environment
☐ A preference for pursuing a career in larger cities
☐ Other (please specify): _____

Section III: Job Preferences and Enterprise Ownership Type

8. Which type of position would you most prefer in the field of cross-border e-commerce?

- ☐ Cross-border e-commerce operations
- ☐ Cross-border e-commerce platform promotion
- ☐ Cross-border e-commerce customer service
- ☐ Cross-border e-commerce supply chain management
- ☐ Cross-border e-commerce data analytics
- ☐ Cross-border e-commerce product design and development
- ☐ Cross-border e-commerce legal affairs and compliance
- ☐ Other (please specify): _____

9. Which type of enterprise ownership would you most prefer when choosing an employer?

- ☐ Foreign-invested enterprises
- ☐ State-owned enterprises
- ☐ Private enterprises
- ☐ Start-ups/entrepreneurial ventures
- ☐ Joint ventures
- ☐ Government agencies/public institutions
- ☐ Non-profit organizations
- ☐ No particular preference

Section IV: Salary, Remuneration, and Benefits

10. What is your expected starting monthly salary for cross-border e-commerce-related employment in Jingzhou (in RMB)?

- ☐ RMB 3,000–5,000
- ☐ RMB 5,000–7,000
- ☐ RMB 7,000–9,000
- ☐ RMB 9,000–12,000
- ☐ Above RMB 12,000
- ☐ Uncertain

11. Apart from the basic salary, which benefits would you find most attractive? (Select all that apply.)

- ☐ Social insurance and housing fund ("five insurances and one fund")
- ☐ Year-end bonuses
- ☐ Performance-based bonuses
- ☐ Flexible working arrangements
- ☐ Professional training and career development opportunities
- ☐ Housing/transportation subsidies
- ☐ Meal subsidies or staff canteens
- ☐ Other (please specify): _____

Section V: Development Prospects of Cross-Border E-Commerce in Jingzhou

12. In your view, at which stage of development is the cross-border e-commerce industry in the Jingzhou region at present?

- ☐ Start-up stage
- ☐ Growth stage
- ☐ Maturity stage
- ☐ Decline stage
- ☐ Uncertain

13. What is your attitude toward the future development prospects of the cross-border e-commerce industry in the Jingzhou region?

- ☐ Very optimistic
- ☐ Optimistic
- ☐ Neutral
- ☐ Pessimistic
- ☐ Very pessimistic

14. In your view, what principal challenges will the cross-border e-commerce industry in Jingzhou face in the coming years? (Select all that apply.)

- ☐ Intensified market competition
- ☐ Talent shortages
- ☐ Policy and regulatory constraints
- ☐ Rapid technological change
- ☐ Changes in the international trade environment
- ☐ Other (please specify): _____

15. In your view, what principal development opportunities will arise for the cross-border e-commerce industry in Jingzhou in the coming years? (Select all that apply.)

- ☐ Expansion into emerging markets
- ☐ Accelerated digital transformation
- ☐ Policy support
- ☐ The application of technological innovation
- ☐ Industrial upgrading
- ☐ Other (please specify): _____

Section VI: Other

16. Do you intend to participate, or have you already participated, in relevant internship or practical training programs?

- ☐ Yes, and I have already participated ☐ Yes, but I have not yet participated
- ☐ No ☐ I am currently considering it

17. In your view, what advantages does the Jingzhou region possess in attracting cross-border e-commerce professionals? (Open-ended question)

18. In your view, what are the shortcomings of the Jingzhou region in attracting cross-border e-commerce professionals? (Open-ended question)

19. What suggestions or expectations do you have regarding the development of the cross-border e-commerce industry in the Jingzhou region? (Open-ended question)

Closing Remarks

Thank you for taking the time to complete this questionnaire. Your responses will provide an important reference for our understanding of the employment intentions, job preferences, salary and benefit expectations, preferred enterprise ownership types, and views on the current state and future prospects of the cross-border e-commerce industry in Jingzhou among university students majoring in cross-border e-commerce-related programs. On the basis of your feedback, we will offer valuable recommendations to policymakers, relevant educational institutions, and recruiting enterprises, with a view to jointly promoting the sound development of the cross-border e-commerce industry in Jingzhou. We wish you every success in your studies and a promising future ahead.