# The Innovation and Application of Big Data Technology in Cross-Border E-Commerce Comprehensive Test Zone in China

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**Abstract:** The digital transformation of the world economy is accelerating, a new round of scientific and technological revolution and industrial transformation is deepening, and the iterative upgrading and converged application of technology driven by e-commerce continues to deepen. The cross-border e-commerce comprehensive test zone in China is the "Gathering place" of system innovation, management innovation, service innovation and technology innovation, in particular, in the extensive application of big data and other information technologies to promote the reform and development of the comprehensive test zone to form a number of worthy reference and promote the application of the advanced experience, it includes building new statistical model, risk early-warning system, intelligent logistics system, and global trade precision marketing, to promote the high-quality development of global digital trade.

**Keywords:** Cross-Border E-Commerce Comprehensive Test Zone, Big Data Technology, Statistical Index, Risk Early Warning, Intelligent Logistics, Precision Marketing.

## 1    INTRODUCTION

### 1.1    The development course of cross-border e-commerce comprehensive test zone in China

The cross-border e-commerce comprehensive test zone in China started in 2012, it has gone through the development stages of the pilot phase (2012-2014), the first batch (March 2015), the second batch (January 2016), the third batch (July 2018), the fourth batch (December 2019), the fifth batch (May 2020), the sixth batch (February 2022), and the seventh batch (November 2022). As of December 2022, it has built 165 cross-border e-commerce comprehensive test zones, covering 31 provinces, municipalities and autonomous regions nationwide, the quantity, development scale and regional distribution of the comprehensive test zone have all gone up to a new stage. With the number of approved cities as the standard, we can divide the cross-border e-commerce comprehensive test zone in China into three echelon. The first echelon is: more than 10 cities, the top four were Guangdong Province, Shandong Province, Jiangsu province and Zhejiang province. The second echelon, there were less than 10 cities and more than five cities, in terms of number from more to less, they include Jiangxi province, Fujian Province, Sichuan Province, Anhui province, Liaoning

province, Hunan Province, Hebei province, Henan province and Inner Mongolia Province. The third echelon, less than 5 cities, in terms of number from more to less, they include Hubei Province, Heilongjiang Province, Jilin Province, Xinjiang Province, Yunnan Province, Guangxi Zhuang Autonomous Region and so on, the detailed distribution is shown in Table 1.

**Table 1** The distribution table of"Three echelon" of cross-border e-commerce comprehensive test zone in China

| Area | Quantity | Echelon |
|---|---|---|
| Guangdong Province | 21 | the first echelon |
| Shandong Province | 16 | |
| Jiangsu province | 13 | |
| Zhejiang province | 12 | |
| Jiangxi province | 9 | the second echelon |
| Fujian Province | 8 | |
| Sichuan Province | 8 | |
| Anhui province | 6 | |
| Liaoning province | 6 | |
| Hunan Province | 6 | |
| Hebei province | 5 | |
| Henan province | 5 | |
| Inner Mongolia autonomous region | 5 | |
| Hubei Province | 4 | the third echelon |
| Heilongjiang Province | 4 | |
| Jilin Province | 4 | |
| Xinjiang autonomous region | 4 | |
| Yunnan Province | 4 | |
| Guangxi Zhuang autonomous region | 4 | |
| Guizhou Province | 3 | |
| Shanxi Province | 3 | |
| Shaanxi Province | 3 | |
| Hainan Province | 2 | |
| Gansu Province | 2 | |
| Qinghai Province | 2 | |
| Beijing | 1 | |
| Chongqing | 1 | |
| Shanghai | 1 | |
| Tianjin | 1 | |
| Ningxia Hui autonomous region | 1 | |
| Tibet | 1 | |
| Total | 165 | -- |

## 1.2 The present research situation of cross-border e-commerce comprehensive test zone in China

Using the keywords "Cross-border e-commerce comprehensive test zone" as the title, we can retrieve 248 research results from 2015 to 2022 on CNKI, this is shown in Figure 1.
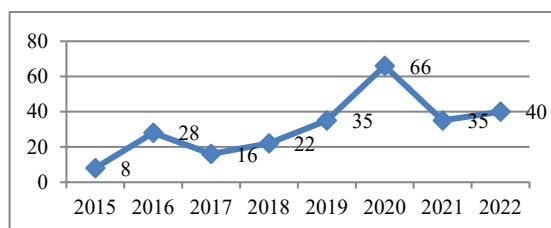


**Figure 1:** Annual distribution map of research achievements

In 2015, Hangzhou cross-border e-commerce comprehensive test zone as the first cross-border e-commerce comprehensive test zone in China was formally established, the same year there are related topics of research results. During the 8 years from 2015 to 2022, research results showed an overall upward trend, with the highest peak in 2020 and a slight decline in 2021 to 2022. The research topics mainly focus on: government policy, development strategy, Hangzhou (Guangdong, Henan, Shandong, etc.) city construction experience, tax policy, industry competitiveness evaluation.

Analysis of research outcomes 2015-2016: with the development of the first batch of cross-border e-commerce comprehensive test zone and the establishment of the second batch of 12 urban comprehensive test zone, the research results of these two years are mainly carried out around the mode, experience and advantages and disadvantages of the construction of the existing comprehensive test areas, representative achievements include standardization promoting the development of the Hangzhou cross-border e-commerce comprehensive test zone (Zhang Xin et al. , 2015), actively linking the "Belt and Road" strategy, and accelerating the construction of the China (Dalian) cross-border e-commerce comprehensive test zone (Yang Xiaomeng et al. , 2016).

Analysis of research outcomes 2017-2019: the results of this stage will continue to revolve around the four groups of cross-border e-commerce comprehensive test zone that have been established, and continue to summarize their experience in development and construction, in addition, the depth and breadth of research has been new changes. SWOT analysis, new trade model, big data, evaluation of industrial competitiveness, some new research methods, models and technologies are gradually combined with the development of cross-border e-commerce comprehensive test zone. Representative research results include: development strategy research of Zhengzhou cross-border e-commerce comprehensive test zone based on SWOT analysis (Zhang Juntao, 2018), cross-border e-commerce and the coordinated development of the Economic system-an empirical study based on 35 cross-border e-commerce comprehensive test zone (Zhang Xiaodong, 2019).

Analysis of research outcomes 2020-2022: the systematic results in development policy analysis of cross-border e-commerce comprehensive test zone, high-quality research results have also been achieved in the qualitative and quantitative analysis of sample data from the

cross-border e-commerce comprehensive test zone, this paper sums up the problems of the mode, performance, supply chain development potential and other important fields of cross-border e-commerce comprehensive test zone in china, and forms a conclusion of great reference and reference value. The representative research results include: the research on evolution dynamics and innovation realization mechanism of cross-border e-commerce comprehensive pilot area [10](Xiao Liang et al. , 2020), mechanisms and effects of quality change in manufacturing enabled by digital trade-quasi-natural experiments from the cross-border e-commerce comprehensive test zone (Yuan Qigang et al. , 2022).

## 1.3    The significance of this study

The digital transformation of the world economy is accelerating, a new round of scientific and technological revolution and industrial transformation is deepening, and the iterative upgrading and converged application of technology driven by e-commerce continues to deepen. The cross-border e-commerce comprehensive test zone in China is a "Gathering place" for institutional innovation, Management Innovation, service innovation and technological innovation, through a series of innovations to promote the cross-border e-commerce industry liberalization, facilitation, standardization of development, thus promoting the higher-quality economic development in China. The cross-border e-commerce comprehensive test zone in China, in the extensive application of big data and other information technology, to promote the reform and development of the comprehensive test zone to form some valuable experience.

## 2    MAKE FULL USE OF BIG DATA TO ESTABLISH NEW MODELS AND SYSTEMS FOR CROSS-BORDER E-COMMERCE STATISTICS

The cross-border e-commerce comprehensive test zone in China actively utilizes information technologies such as big data, artificial intelligence, blockchain, cloud computing, etc. They use new technologies to promote service innovation, Control risks and regulate the smooth operation and development of the economy in the comprehensive test zone. Hangzhou, Shenzhen, Zhengzhou, Ningbo, Yiwu, Qingdao and other cross-border e-commerce comprehensive test zones have made full use of big data and other technologies to establish new models and systems for cross-border e-commerce statistics.

## 2.1    Set up and publish cross-border e-commerce index

Using new technologies such as big data and cloud computing to analyze and process huge amounts of data on various platforms, such as commodity trading, logistics, customs clearance, financial payments, intellectual property rights, etc. , it will gradually establish a comprehensive index system that reflects the operation of cross-border e-commerce at multiple levels and dimensions, and regularly release the "Cross-border e-commerce index" to the whole society, to guide and monitor the economic development and smooth operation of the comprehensive cross-border e-commerce comprehensive test zone.

## 2.2 Establishing a new model for cross-border e-commerce statistics

To establish a cross-border e-commerce big data service center to realize the exchange and aggregation of cross-border e-commerce data, and to explore the establishment of a new model for statistics and management based on declaration lists, platform data, etc. Establish a "Cross-border e-commerce data monitoring system" to provide decision-making advisory services for government regulation and business operations.

## 2.3 Establish statistical standards for cross-border e-commerce

To explore the establishment of standard formats such as information of transaction entities, electronic contracts and electronic orders, as well as simplified statistical classification standards for cross-border e-commerce imports and exports, and to explore the establishment of a multi-party cross-border e-commerce statistics system, to improve cross-border e-commerce statistical methods, and provide experience for national cross-border e-commerce statistical system and mechanism construction.

# 3 APPLICATION OF BIG DATA TECHNOLOGY, THE ESTABLISHMENT OF RISH EARLY WARNING SYSTEM

## 3.1 Establish risk early warning system based on big data

Ningbo cross-border e-commerce comprehensive test zone supports third-party credit service providers to provide credit evaluation services to governments and enterprises through big data technologies; and establishes an early warning system for classified and graded risks based on big data analysis, to realize real-time monitoring, identification and evaluation of market risks, transaction risks, financial risks, technical risks and public security risks in cross-border e-commerce.

## 3.2 Use big data and other technical means to innovate enterprise credit rating methods

Nanjing cross-border e-commerce comprehensive test zone of proposes to build a big data trade finance platform, to use big data and other technical means to innovate enterprise credit rating methods, to provide non-face-to-face approval of trade finance products and services, to provide convenience for enterprises to carry out various types of financing business.

## 3.3 Use big data to achieve "point-to-point" matching and control enterprise financing needs and risks

Qingdao cross-border e-commerce comprehensive test zone fully mining cross-border e-commerce generated by internet trade big data, through data information dynamic and independent "Point-to-point" matching and hedging, to realize the dynamic control and effective control of enterprise financing demand and risk management. The wide application of new technologies such as big data and artificial intelligence has greatly improved the advanced service, scientific management and sensitivity of risk early warning.

# 4 APPLICATION OF BIG DATA AND OTHER TECHNOLOGIES, THE ESTABLISHMENT OF INTELLIGENT LOGISTICS SYSTEM

## 4.1 Rely on big data to promote the transformation of foreign trade from logistics oriented to information oriented

Qingdao cross-border e-commerce comprehensive test zone relies on technical services such as big data, internet of things and cloud computing to promote the transformation of foreign trade from logistics-oriented to information flow-oriented, and to provide cross-border e-commerce information services, to guide the integration of settlement, transportation and other related services, and promote the facilitation of cross-border e-commerce trade in goods.

## 4.2 Use the internet of things and big data technology to build an interconnected intelligent logistics information system

Hangzhou, Zhengzhou and Qingdao cross-border e-commerce comprehensive test zone make full use of new technologies such as the internet of things and big data to build interconnected intelligent logistics information systems, to standardize and standardize the operation process of cross-border e-commerce logistics by connecting and operating a smooth logistics warehousing network system, a high-quality and efficient logistics operation service system, etc. , to integrate transport resources efficiently and seamlessly link up transport organizations to form a rational, full-featured, efficient and high-quality cross-border logistics distribution and operation service system.

# 5 APPLICATION OF BIG DATA TECHNOLOGY, INNOVATION OF INSPECTION AND QUARANTINE PRCESS

Guangzhou cross-border e-commerce comprehensive test zone applies big data technology to inspection and quarantine processes, relying on "Smart inspection ports" for risk assessment, classification management, Integrity Management and overseas information comparison, to realize "Electronic distribution and control", explore the application of global product quality and standard information database for inspection and quarantine big data automatic judgment, automatic check and release. It will explore ways to control the quality of imported goods in cross-border e-commerce and encourage domestic enterprises to export famous-brand goods through market procurement. To formulate the administrative measures for the procedures of inspection and quarantine declaration and release in the cross-border e-commerce comprehensive test zone in Guangzhou, the supervisory model of "Pre-filing, pre-supervision, post-follow-up, quality control" shall be implemented for exit, and "Pre-filing and filing for entry, centralized inspection and quarantine in entry areas, verification and verification in batches in exit areas, and tracing of quality and safety" shall be implemented for entry. Full big data technology, product quality traceability management, to ensure the quality of import and export products, good product quality this pass.

# 6 APPLICATION OF BIG DATA TECHNOLOGY TO ACHIECE GLOBAL TRADE PRECISION MARKETING

## 6.1 The model of "Big Data + e-commerce + foreign trade"

Zhengzhou cross-border e-commerce comprehensive test zone explores the development model of "Big Data + e-commerce + foreign trade" to gradually build Henan foreign trade big data center and provide customized services for enterprises, to help companies in the global market accurate marketing and rapid increase in overseas market share.

## 6.2 The mode of transformation from mass manufacturing to mass customization

Qingdao cross-border e-commerce comprehensive test zone uses big data technology to help foreign trade enterprises convert customers' individual needs into valuable orders in accordance with market changes, we will build a flat cross-border trading system featuring on-demand design, on-demand manufacturing and on-demand distribution, and realize the transformation of large-scale manufacturing to mass customization and the optimization of product imports and exports.

## 6.3 The mode of global trade precision marketing big data platform

Nanjing cross-border e-commerce comprehensive test zone in the construction of an international network marketing system, scientific planning, outstanding results. Its main measures include speeding up the distribution of overseas marketing network, implementing the action plan of "Breaking Zero", promoting accurate marketing in international market, promoting the upgrading of trade fairs, and implementing the strategy of winning by quality, for the development of the comprehensive test area of the international market to make a positive contribution. In particular, it will speed up the introduction and cultivation of third-party overseas marketing services to help enterprises develop overseas independent stations; To guide and encourage enterprises to carry out international e-commerce-related products and enterprise certification, to establish international product standards, to enhance the voice of international competition, and so on, it shows the foresightedness and precision of the government in the aspect of careful planning and scientific help.

# 7 CONCLUSIONS

The Fourteenth Five Year E-commerce Development Plan (October 2021) jointly issued by the Ministry of Commerce, the Central Cyberspace Office and the National Development and Reform Commission clearly pointed out that "continue to promote the construction of cross-border e-commerce comprehensive test areas and explore the innovation of the whole process of cross-border e-commerce transactions." In October 2021, Premier Li Keqiang said in his speech at the opening ceremony of the 130th China Import and Export Commodities Fair and the Pearl River International Trade Forum: "Rely on industrial and market advantages, deepen foreign economic and trade cooperation, accelerate the innovative development of foreign trade, strengthen international cooperation in digital trade, and create a number of digital pilot areas for global trade."

From the above analysis, we can see that the development of digital technologies such as big data, artificial intelligence and cloud computing, as well as the extensive application of innovation in cross-border e-commerce comprehensive test zones, it not only promotes the optimization and upgrading of cross-border e-commerce supply chain services in China, but also accurately captures the needs of international market customers, realizes accurate marketing and effective marketing, and more effectively realizes digital supervision, to ensure the healthy development of cross-border e-commerce. In the wave of global digital development, cross-border e-commerce will gradually change into global digital trade with the accumulation of continuous quantitative changes, and its digital characteristics become more and more prominent, the issue of big data innovation and application in this industry is also becoming more important. It is hoped that the 165 cross-border e-commerce comprehensive test zones in China will have more innovation and exploration on the basis of the previous development experience, and form the "China Experience", which will contribute to the development of global digital trade.

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