Do Business and Trade Facilitation Journal
Volume 5, Issue 1, 2025, Page 1-13
https://doi.org/10.6914/dbtf.050101

Do Business and Trade Facilitation Journal

The Connotation Deconstruction of Cross-Border E-Commerce Enterprises Empowered by New Quality Productive Forces: A Case Study of Guangdong Industrial Clusters

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Abstract

Against the backdrop of economic globalization, the "dual carbon" goal and "dual circulation" strategy, China's cross-border e-commerce enterprises face opportunities from digital technology development and challenges such as a complex international environment and hindered transformation and upgrading. Centered on the collaborative empowerment of technology, data and laborers, new quality productive forces offer new insights for their upgrading. This paper deconstructs its connotation for cross-border e-commerce, identifies core elements (technological innovation, data elements, new-type laborers), explores their coupling mechanism, and builds a technology-market-ecology framework. By analyzing three typical Guangdong industrial clusters, it verifies the framework's effectiveness, finding new quality productive forces significantly empower in three dimensions, drive industrial transformation from single-point breakthrough to systematic reconstruction, form a "manufacturing + service + data" model, and support high-quality development.

Keywords new productive forces; cross-border e-commerce; industrial cluster

1 Introduction

In the context of economic globalization, global economic exchanges have become increasingly close, and transaction processes have become more convenient and efficient. The implementation of multilateral trade agreements has driven progress in reducing corporate tariff costs, improving logistics efficiency, and enhancing trade compliance mechanisms. Under the "carbon peaking and carbon neutrality goals" and the "dual circulation" new development pattern, new technologies such as big data and mobile logistics networks have emerged as the driving force behind leapfrog development in the socio-economic sphere, playing a crucial role in the transformation and upgrading of foreign trade manufacturing[1]. An open and inclusive trade environment and the rapid development of digital technology have provided more opportunities for the transformation and upgrading of China's cross-border e-commerce enterprises and their sustained development. However, the complex international environment has also posed unprecedented

Article History Received: April 3, 2025; Accpted: June 5, 2025; Published: June 30, 2025. ***Do Business and Trade Facilitation Journal***, ISSN 2789-3944 (Print), ISSN 289-3952 (Online),published by Creative Publishing Co., Limited 2025.. Email: wtocom@gmail.com, https://dbtf.cc, https://cpcl.hk. **CPCL**® is a registered trademark of *Creative Publishing Co., Limited*. **Funding** The authors acknowledge financial support sponsored by the Guangdong Provincial College Students' Innovative Entrepreneurial Training Plan Project (Grant No. S202514278022) and the Guangdong Office of Philosophy and Social Science Planning Project (Grant No. GD23XGL019).

challenges for cross-border e-commerce enterprises, such as the slow global economic recovery leading to weak demand for foreign goods and regional conflicts causing increased overall costs, resulting in difficulties in transformation and upgrading. Taking cross-border e-commerce enterprises in Guangdong as an example, the business composition is dominated by OEM (original equipment manufacturing) business, with less investment in R&D (research and development) of high value-added products, and there is a tendency to rely on increasing product volume to compensate for insufficient momentum for sustained development, which seriously affects the sustainable development of the enterprises.

To help China's cross-border e-commerce enterprises break through existing constraints and gain a competitive edge in the wave of global trade development, new quality productive forces have emerged. These new quality productive forces are centered on the synergistic empowerment of technology, data, and labor, and are underpinned by breakthrough scientific and technological innovations and transformative industrial changes. They provide strong momentum for cross-border e-commerce enterprises to break through the limitations of traditional development models and achieve transformation and upgrading.

This paper first analyzes the connotation of new quality productive forces empowering cross-border e-commerce enterprises. Based on an exploration of the mechanisms of interaction among technology, market, and ecosystem, it constructs a three-dimensional empowerment framework of "technology-market-ecosystem". The paper focuses on the cross-border e-commerce industrial clusters of Zhongshan household appliances, Foshan home furnishings, and Guangzhou leather goods to conduct practical verification and validate the effectiveness of the three-dimensional empowerment framework. The logical structure of this paper is shown in the figure 1.

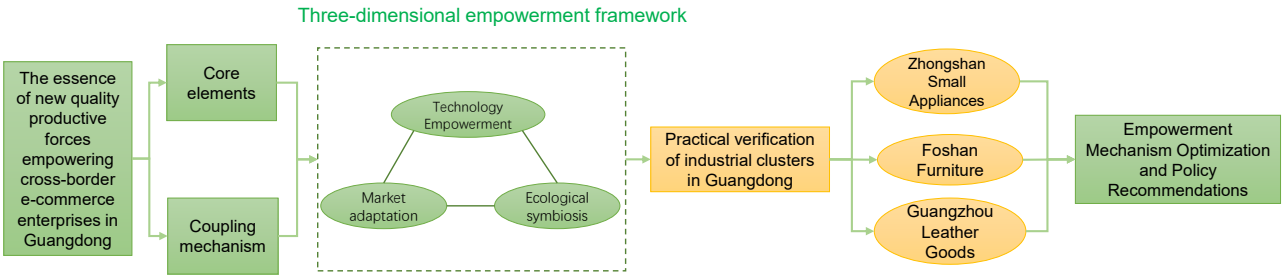

Figure 1: The theoretical logic of this study

2 The Essence of New Quality Productive Forces Empowering Cross-Border E-Commerce

2.1 The Core Elements of New Quality Productive Forces

2.1.1 Technological innovation: smart production tools, blockchain technology applications

New quality productive forces encompass three core elements: technological innovation, data elements, and new types of workers. Among these, technological innovation serves as the driving force behind the development of new-quality productive forces, with key components including breakthroughs in core technologies, the widespread application of digital technologies, and the industrialization of research outcomes[2]. Big data, logistics of Things, blockchain, and other digital technologies have played a crucial role in efficiently optimizing resource allocation, real-time transmission of commodity production information, and enhancing transparency in production processes. These technologies have to some extent disrupted traditional production mechanisms, breaking through the limitations of conventional production methods, and providing strong support for the development of new quality productive forces.

2.1.2 Data elements: mechanisms for the collection, analysis, and cross-border circulation of digital production factors

Data elements are a key driver of the development of new-quality productive forces, and also a prerequisite for cross-border e-commerce enterprises to grasp market demand trends, make scientific decisions, and drive the production process of goods. Under the impetus of digital intelligence technology, data elements are gradually achieving marketization. The marketization of data elements provides a strong driving force for the optimization of enterprises' human capital structure, thereby significantly enhancing their core competitiveness[3].

2.1.3 New type of workers: Composite talents with digital skills and cross-border collaboration abilities

New type of workers are the leading force in the development of new productive forces. Compared with traditional workers, new type of workers have a higher level of mastery of digital and intelligent technologies, a broader global perspective, and stronger cross-border integration abilities. They also have stronger risk resistance capabilities in responding to the complex and changing global trade environment.

2.2 The Coupling Mechanism Between New Quality Productive Forces and Cross-Border E-Commerce

2.2.1 Smart production tools improve supply chain efficiency and flexible manufacturing capabilities

Smart production tools are the result of the continuous development and evolution of next-generation digital technologies, and they play a targeted role in enhancing enterprises' flexible manufacturing capabilities and supply chain efficiency. Overseas warehouses empowered by smart warehousing systems participate in the process of smart production tools understanding the dynamic market conditions of consumer countries and executing terminal instructions, making them a key pillar of the new productive forces in foreign trade. RFID (radio frequency identification) batch identification and AMR (autonomous mobile robot) technology have accelerated the speed of goods entering and exiting warehouses. AI predictive technology provides fact-based data support for warehouse shipments, resulting in a significant improvement in supply chain efficiency. Technologies such as inventory warning AI convert market demand into highly visible real-time data, enabling supply chain data to be promptly transmitted to the production end, thereby significantly enhancing a company's flexible manufacturing capabilities.

2.2.2 Data-driven optimization of global market insights and precision marketing

The availability and diversity of data play a crucial role in improving a company's total factor productivity[4]. In a market-driven production environment, companies seeking to enhance their competitive edge on a global scale must gain deep insights into global markets and achieve precision marketing for their products. AIGC (artificial intelligence generated content) can thoroughly analyze collected data, helping businesses quickly grasp the dynamics of market supply and demand balance and capture consumer preferences, thereby providing robust technical support for developing precise cross-border marketing strategies[5]. As such, data serves as the core support for businesses to comprehensively understand the market and achieve precise marketing.

2.2.3 Industrial Cluster Collaboration: Resource Integration and Ecosystem Co-construction Based on Digital Platforms

As a spatial organizational model, industrial clusters concentrate a large number of related enterprises, professional institutions, and service providers. Through specialized division of labor systems, the spillover effects of tacit knowledge, and resource-sharing mechanisms, they shape corporate competitive advantages

and promote collaborative development among enterprises[6]. Cross-border e-commerce enterprises can effectively break down data silos by sharing processed high-value data streams through industrial internet platforms, enabling complementary advantages and cost reduction and efficiency improvements among enterprises. The collective participation of multiple parties in leveraging aggregated resources to build a cross-border e-commerce enterprise ecosystem plays a significant role in deepening industrial division of labor and enhancing enterprise operational efficiency.

3 Building a Three-Dimensional Empowerment Framework

3.1 Technology Empowerment

3.1.1 Cloud computing, IoT, and AI technologies

Cloud computing platforms collect and integrate information from upstream and downstream supply chains, standardize it, and convert it into digital assets, providing a foundation for IoT and AI technology decision-making. IoT (internet of things) technology equips goods, transportation vehicles, and storage facilities with smart devices such as sensors and RFID tags to detect the status of goods in real time and accurately track their transportation routes[7]. IoT devices automatically transmit the collected transportation data to the cloud computing platform, which processes and models the data to convert it into executable instructions for IoT execution. AI technology retrieves multidimensional data from the cloud computing platform, analyzes the intrinsic needs of target consumers in different countries and regions, and focuses on users' personalized needs to enhance product and service quality and efficiency. The comprehensive application of digital and intelligent technologies enables China's cross-border e-commerce enterprises to fully tap into their potential, cultivate comprehensive competitive advantages, and secure a foothold in the highly competitive global market.

3.1.2 Blockchain Technology

Blockchain technology plays a crucial role in enhancing supply chain transparency, ensuring data security, and safeguarding transaction trust[7]. The core characteristic of blockchain technology is decentralization, where data that was previously stored centrally is distributed across various nodes. This characteristic reduces the risk of product information being tampered with or monopolized, thereby ensuring the integrity of the data. Such data serves as the primary basis for tracing the production and transaction processes of goods. The stronger the data' s immutability, the higher the supply chain transparency, thereby reducing transaction trust costs. For cross-border e-commerce enterprises, this creates a safer trade environment. Blockchain technology provides a reliable execution environment for smart contract systems. Transactions conducted under a smart contract system automatically execute once specific conditions are met. This setup simplifies transaction processes, reduces the risk of errors caused by human intervention, and effectively enhances transaction credibility and efficiency.

3.2 Market adaptation

3.2.1 Multi-source data analysis supports market positioning and demand forecasting

A company's market positioning determines whether it can demonstrate its differentiated advantages and seize opportunities in a homogeneous market, as well as whether it has the momentum for sustainable development. The target audience defines the basic scope of market positioning, while market positioning further refines the target audience. The two influence each other and are mutually dependent. In the era of data intelligence, both market positioning strategies and demand forecasting mechanisms are undergoing disruptive changes. By thoroughly analyzing data such as online and offline sales performance and user

feedback, companies can deeply uncover the core needs of their target consumer groups, guiding them in establishing differentiated and precise market positioning. Additionally, the intrinsic connection between enterprise ERP (enterprise resource planning) sales, inventory, industry statistics, and market demand enables companies to accurately analyze and predict market demand. As such, multi-source data analysis provides a solid foundation for market positioning and demand forecasting.

3.2.2 Intelligent implementation of dynamic pricing and personalized marketing strategies

Pricing for businesses is a dynamic process influenced by a variety of factors. The real-time PEST intelligent sensing and response platform can promptly detect changes in data such as policies, exchange rates, and sales figures. Such data are decisive factors in achieving dynamic pricing for products, enabling businesses to adopt more flexible and adaptive strategies to respond to changes in the international market. Additionally, by leveraging big data analysis and other tools, companies can deeply analyze the value behind data such as product sales figures and consumer purchase records. This enables precise identification of target consumer groups and capture of consumer behavior patterns, providing decision-making insights for personalized marketing strategies—such as personalized product recommendations and targeted ad placements—to enhance the reach of marketing content and create differentiated marketing approaches[8]. This promotes the realization of intelligent marketing strategies.

3.3 Ecological Symbiosis

3.3.1 Building Cross-Border Ecosystems

The entities and elements that constitute the cross-border e-commerce ecosystem can be categorized into three hierarchical layers: the core layer, the extended layer, and the related layer. These layers encompass cross-border e-commerce platforms, cross-border e-commerce enterprises, logistics companies, and government entities, among others[9]. Cross-border e-commerce enterprises drive the development and evolution of other entities and serve as important hubs within the ecosystem. Enterprises establish partnership relationships through signed cooperation agreements, collaborating and supporting one another to achieve resource sharing in areas such as technology and channels. This efficiently advances enterprise product innovation, research and development, as well as the upgrading and transformation of industrial chains. Even if enterprises have different market positioning and growth paths, they can leverage digital and intelligent technologies to integrate resources within the ecosystem, establish a complementary and differentiated competitive landscape, achieve differentiated development, and jointly promote the sustainable development of Guangdong's cross-border e-commerce industry.

3.3.2 Digital Transformation of Industrial Clusters

Under the concept of new quality productive forces—exploring the process of digital transformation and upgrading of industrial clusters led by cross-border e-commerce enterprises in Guangdong—the industrial park of smart equipment and home furnishing located in Foshan City provides an important reference. The park focuses on two core industries—smart equipment and smart home—while introducing other related production-oriented services in designated zones. Among these, the Smart Home and Smart Equipment Innovation Zone led by Yunmi Technology Group targets the home industry, aggregating three major resources—projects, enterprises, and talents—within the ecosystem to continuously enhance the industrial chain upgrading of the smart home sector[10]. AI technology converts consumer-end demands into production-end instructions, enabling the design of product blueprints that meet market needs in the shortest possible time. The cloud-based order platform makes real-time sharing of order information possible. Based on this, the intelligent production scheduling system distributes orders to enterprises

according to their production advantages, achieving flexible production.

4 Case analysis

In order to better illustrate the three-dimensional enabling framework constructed above, this study focuses on the highly representative and diverse cross-border e-commerce industrial clusters in Guangdong Province. As the core engine of China's foreign trade and manufacturing, Guangdong's industrial cluster development presents distinct digital transformation characteristics and cross-border e-commerce practice vitality. Industrial clusters such as small household appliances in the city of Zhongshan, home furnishings in Foshan, and leather goods in Guangzhou are at the forefront of the country in the integration and application of new productive forces factors, providing a typical sample for observing the mechanism of new productive forces to enable cross-border e-commerce.

The selected cases here cover three-dimensional framework, highlighting industrial differences, and focusing on practical frontiers to select cases:

4.1 Case Situation

4.1.1 Zhongshan small home appliance industry cluster

Zhongshan City, a pivotal manufacturing hub in the Greater Bay Area, is renowned for its highly specialized small household appliance cluster, a national leader in production and export. The cluster gathers more than 20,000 enterprises, and Zhongshan household appliance exports accounted for nearly one-fifth of the province, an increase of 26 % year-on-year, becoming one of the most important export bases for "Guangdong Appliance".[1] At the same time, the cluster attaches great importance to technological innovation, and widely applies advanced technologies such as AI quality inspection and intelligent production. Most enterprises in the cluster have introduced digital production tools, which are highly adapted to the dimension of "technology empowerment", and can provide practical case support for verifying the role of intelligent production tools in improving the efficiency and compliance of cross-border e-commerce supply chain.

4.1.2 Foshan home industry cluster

Renowned as a national center for advanced manufacturing, Foshan City boasts the world's largest home furnishing industrial cluster. This sector serves as a cornerstone of the regional economy, exemplified by its immense scale and output. According to a China News Network report, Foshan's traditional home furnishing manufacturing cluster boasts an annual output value of over 100 billion yuan. As of early 2024, it comprised more than 30,000 local enterprises, including over 7,000 manufacturers and more than 20,000 distribution and trade enterprises.[2] The cluster relies on big data mining, flexible production and other models to achieve a precise docking of European and American market demand. This practice is consistent with the core connotation of the "market adaptation" dimension. By analyzing the development of the cluster, we can explore how new quality productivity optimizes cross-border e-commerce market positioning and marketing logic through data elements.

[1]Liao, H. (2024, August 14). Shuyoudao | Why does this data in Zhongshan lead the Pearl River Delta (EB/OL). http://m.toutiao.com/group/7402656309696348735/

[2](2024, April 10). Guangdong's first-quarter economic 'red door': industrial investment strong consumer market picks up (EB/OL). https://www.gd.chinanews.com.cn/2024/2024-04-10/434164.shtml

4.1.3 Guangzhou leather industry cluster

Shiling Town in Guangzhou's Huadu District is synonymous with leather goods, hosting a deeply integrated and collaborative manufacturing ecosystem. This cluster is renowned for its highly efficient and synergistic industrial networks. Centered around the Huadu Shiling Leather City, this cluster has attracted over 5,000 enterprises, forming an industrially collaborative ecosystem characterized by centralized raw material procurement, shared design resources, and integrated logistics. With the leather goods market and a leading hardware market at its core, Shiling has aggregated tens of thousands of various businesses and merchants in the surrounding area. These market entities have established a tightly-knit model of shared collaboration. Leveraging the flexibility and efficiency derived from centralized regional resource sharing, the cluster has evolved into a renowned agglomeration area for leather goods and luggage, demonstrating a prevalent trend of collaborative expansion into overseas markets. This model of industrial collaboration corresponds to the ecological symbiosis dimension. Research into this cluster can help verify the specific enabling pathways through which an industrial cluster's ecosystem empowers SMEs (small and medium-sized enterprises) in cross-border e-commerce, driven by new productive forces.

By examining multiple industrial clusters across various enabling dimensions, this study can systematically test the adaptability of the "technology-market-ecology" three-dimensional empowerment framework in the practice of cross-border e-commerce in Guangdong, and explore the differentiation mechanism and common laws of new quality productivity-enabled cross-border e-commerce.

4.2 Analysis of practical results

With the in-depth development of globalization and digitization, cross-border e-commerce has become an important force to promote economic growth. The introduction of new productive forces, especially in the application of technology empowerment, market adaptation and ecological symbiosis, has a significant impact on the transformation and upgrading of cross-border e-commerce enterprises. This part will evaluate the practical effect of new quality productivity enabling cross-border e-commerce enterprises through specific case analysis, including three aspects: technology empowerment, market adaptation and ecological symbiosis.

4.2.1 Case 1: Analysis of Zhongshan's Appliance Cluster Empowerment

Zhongshan small home appliance industry cluster has achieved remarkable results in technology empowerment, which has been reflected in many aspects.

First of all, the cluster has achieved rapid development of the industry through technological innovation and policy support. For example, Zhongshan Qiku Electronic Technology Co., Ltd.' s R & D investment in the field of home beauty instruments has enabled the company to achieve operating income growth from millions to tens of millions in just a few years, with a growth rate of up to 25 times.[3] This achievement not only reflects the company's emphasis on technological innovation, but also shows the role of technology empowerment in promoting the growth of enterprises.

In addition, the customized One Enterprise, One Policy service offered by the Dongfeng Taxation Branch of the Zhongshan Taxation Bureau has bolstered enterprise innovation by providing tailored policy guidance and elaboration in relevant fields. For example, in 2023, Qiku Co., Ltd.enjoyed the preferential income tax reduction for small and low-profit enterprises, which not only reduced the financial burden of enterprises, but also provided financial support for the continuous innovation of enterprises.

[3]State Administration of Taxation. (2024, March 22). Guangdong Provincial Taxation Bureau. Guangdong : tax benefits ' spring breeze ' to help market players move forward lightly (EB/OL). https://guangdong.chinatax.gov.cn/gdsw/zssw_swxw/2024-03/22/content_23501691522f47b7bdf0d56d53f44631.shtml

Through technological empowerment, Zhongshan small household appliance industrial cluster not only enhances the innovation ability and market competitiveness of enterprises, but also lays a foundation for the sustainable development of industrial clusters. Through technological innovation, policy support and digital transformation, Zhongshan small household appliance industry cluster shows the important role of technological empowerment in promoting industrial upgrading.

4.2.2 Case 2: Analysis of Foshan furniture industry cluster market adaptation

As one of the largest pan-home industry clusters in China, Foshan furniture industry cluster has achieved remarkable results in market adaptation. Relying on precise positioning and rapid iteration, Foshan furniture is deeply adapted to international demand, especially in the middle and high-end export markets of Europe and the United States. According to the Foshan Furniture Industry Belt Supply Chain Logistics Insight White Paper reported by CCTV Network Technology, there are more than 7,000 production enterprises in the cluster, more than 20,000 distribution and trade enterprises, and 11670 offline stores in 103 cities across the country.[4] It can be seen that Foshan furniture industry cluster not only has strong competitiveness in the domestic market, but also shows the strong strength of 'home is made in Foshan' in the international market.

The overseas expansion of Foshan furniture industry cluster is more effective. According to the statistics of customs data cited by the Economic Reference Network, Guangdong's furniture exports will reach 124.3 billion yuan in 2023, with significant growth in emerging markets such as the Middle East, Africa and Southeast Asia.[5] With precise positioning, iterative ability and supply chain management, Foshan furniture cluster not only stabilizes the traditional market, but also breaks through the emerging fields, providing a reference sample for the development of industrial clusters. It not only improves the international competitiveness of Foshan furniture industry cluster, but also provides valuable experience and reference for other industrial clusters.

4.2.3 Case 3: Analysis of the ecological symbiosis of Guangzhou leather industry cluster

As a well-known leather production and trade base in the world, the Guangzhou leather industry cluster has achieved remarkable results in ecological symbiosis. Through multi-party linkages such as industrial chain collaboration, innovative resource sharing, and market joint expansion, the industrial ecology of "symbiosis and co-prosperity" has been formed.

In terms of industrial coordination, with Guangzhou Huadu Shiling Town as the core, more than 8,800 luggage and bag leather enterprises and more than 16,800 supporting service merchants are gathered, and the whole chain enterprises from raw material supply to sales logistics are closely coordinated to form an ecological network of one enterprise with needs and multi-enterprise response.[6]

At the level of innovation and development, the cluster has established a symbiotic model driven by regional brand leadership and collaborative enterprise innovation. The regional brand of "Shiling Leather" has been registered in 19 countries, with a brand value of 20 billion yuan, driving the coordinated development of 5,000 corporate brands. Among them, "Bisman" and "Sefilo" have been included in the key trademark protection list of Guangdong Province through the coordination of industry associations,

[4](2024, April 2). The added value of the core industry of Guangdong's digital economy has exceeded 3 trillion yuan, and the growth rate has exceeded 10 % (EB/OL). https://tech.cnr.cn/techph/20240402/t20240402_526649547.shtml

[5]Economic reference. (2024, April 3). Guangdong's "intelligent manufacturing" accelerated the rise of industrial technology investment growth of 28.7 % in the first quarter (EB/OL). http://www.jjckb.cn/2024-04/03/c_1310770170.htm

[6]Guangdong Provincial Taxation Bureau of the State Administration of Taxation. (2024, March 25). Guangzhou : 'tax benefit + service' two-wheel drive stimulates the vitality of market players (EB/OL). https://guangdong.chinatax.gov.cn/gdsw/gzsw_swxw/2024-03/25/content_7b5b1b31ad8641da93b699a072aa589d.shtml

forming a virtuous circle of regional brand lift enterprises and enterprises nurturing regional brands.[7]

In terms of market expansion, the cluster achieves win-win outcomes through collective global expansion and platform sharing. Shiling Town has an annual output of 700 million leather cases and bags, and more than 70 % of them are exported to more than 150 countries and regions, occupying most of the market share of popular simulation leather cases and bags in Europe and the United States.[8] This success stems from deep coordination among manufacturers, foreign trade service providers, and cross-border logistics firms within the cluster. Specifically, small and medium-sized manufacturers leverage the overseas channels of larger enterprises to access international markets, while larger enterprises integrate the production capacity of smaller manufacturers to fulfill bulk orders. Guangzhou leather industry cluster takes collaborative symbiosis as the core, activates enterprise vitality and agglomerates cluster competitiveness through industrial chain linkage, brand promotion and market expansion, and becomes a typical example of ecological symbiosis-enabled industrial upgrading.

Through the analysis of the above three cases, it can be seen that the new quality productivity empowers cross-border e-commerce enterprises to achieve remarkable results in the dimensions of technology empowerment, market adaptation and ecological symbiosis. It not only enhances the international competitiveness of enterprises, but also promotes the collaborative innovation of industrial clusters. It provides strong support for the transformation and upgrading of cross-border e-commerce and the empowerment of high-quality development, and also accumulates experience for follow-up research and practice.

4.3 Theoretical breakthrough and paradigm innovation

4.3.1 The transformation path from "single point breakthrough" to "system reconstruction"

Driven by new productive forces, Guangdong cross-border e-commerce industry cluster has realized the deep transformation from "single point breakthrough" to "system reconstruction", and reshaped the logic of industrial development.

In the past, industrial clusters focused more on optimizing individual segments. For example, Zhongshan small household appliances focused on improving production efficiency, Foshan home furnishings focused on designing improved products, and Guangzhou leather goods relied on traditional channels and single processes. In this mode, each link will be relatively separated, innovation is difficult to coordinate, and industrial upgrading has bottlenecks.

After the injection of new quality productivity, the industrial cluster turns to full-link coordination, Zhongshan small household appliances realize the linkage of "demand-R & D-manufacturing", and Foshan home furnishing builds a closed loop of "data mining demand-design matching-flexible production-channel integration" to open up the market and production; Guangzhou leather goods form a symbiotic ecology of raw material collection, design sharing and logistics distribution. This transformation breaks the limitations of a single link, realizes the multi-dimensional coordination of technology, market and ecology, and upgrades the industrial cluster from "local optimization" to "global value reshaping".

4.3.2 New business model of "manufacturing + service + data" integration driven by new quality productivity

The new productive forces promotes the integration of manufacturing, services, and data, fostering innovative business models that are shifting Guangdong's cross-border e-commerce industrial clusters from mere product manufacturing to efficient value creation. In terms of manufacturing, from mass production

[7]CCTV.com. (2025, March 1). Guangdong : Optimizing the business environment to stimulate the vitality of market players (EB/OL). https://local.cctv.com/2025/03/01/ARTIpxpWb5OxVvpUd710VO3h250301.shtml

[8]Guangzhou Municipal People's Government. (2024, August 14). Happy ! China's top 100 Huadu District Shiling Town on the list ! (EB/OL). https://www.gz.gov.cn/qx/hdqrmzf/rdzt/yhyshjzcjczt/ysdt/zxdt/content/post_9806003.html

to on-demand customization. In the past, factories conduct massive production according to fixed standards, often out of touch with market demand. Manufacturing is now more flexible. Zhongshan small household appliances adjust parameters and switch styles according to overseas orders. Foshan home furnishing designs products according to market demand, responds quickly and achieves accurate docking. In terms of service, the evolution is from passive cooperation to active empowerment. The tax department's "one enterprise, one policy" saves costs and expands funds for enterprises. The cross-border e-commerce platform helps Foshan Home Furnishing solve the problem of going to sea. Guangzhou leather enterprises share procurement and logistics resources to help small and medium-sized enterprises operate. Regarding data, the transformation is from idle information to decision-making basis. Foshan Home Furnishing adjusts the design direction through overseas platform data, Zhongshan small household appliance production and sales data optimization process, Guangzhou leather goods rely on industrial chain data to allocate production capacity, so that decision-making is more scientific and accurate.

The integration of the three forms a collaborative model of "on-demand production + active service + data guidance", which can quickly respond to the market, reduce costs, enhance competitiveness, and provide sustainable development advantages for industrial clusters.

5 Optimization of Empowerment Mechanisms and Policy Recommendations

5.1 Technological Innovation Mechanism

Increasing investment in the R&D of core digital technologies and focusing on breakthroughs in key technologies for cross-border e-commerce is imperative. For core technologies of new quality productive forces (e.g., intelligent production tools including AI and IoT), enterprises should be encouraged to jointly establish special R&D funds with research institutions, prioritize solving scenario-specific technical problems such as cross-border logistics tracking and intelligent supply chain optimization, and enhance the efficiency of transforming technological achievements into industrial applications.

Establishing industry-university-research collaborative innovation centers to integrate resources from universities, research institutes, and enterprises is essential. Drawing on the practical experience of combining technological innovation with policy support in Zhongshan's small home appliance industrial cluster,[9] we will promote the docking of digital technology research in colleges and universities with the actual needs of cross-border e-commerce enterprises, form a closed loop of "R&D-test-industrialization" and accelerate the application of technological innovation in cross-border e-commerce scenarios.

5.2 Data Elements Circulation Mechanism

Improving the cross-border data security and compliance management system is crucial. Based on the role of blockchain technology in ensuring data security and transaction trust, a cross-border data classification management system is established to clarify the security standards of data collection, storage and transmission, reduce the compliance risk in cross-border data circulation, and provide security for enterprises to use global market data.

Promoting the marketization of data factors and constructing data trading platforms are essential steps. Drawing on the role of data factor marketization in enhancing the core competitiveness of enterprises, it supports the establishment of regional cross-border e-commerce data trading centers, promotes the orderly circulation of high-value data such as market demand data and supply chain data, and allows enterprises to obtain accurate market insights through data transactions. Optimize production and marketing strategies.

[9]Source : Guangdong Provincial Taxation Bureau, State Administration of Taxation, https://guangdong.chinatax.gov.cn/gdsw/zssw_swxw/2024-03/22/content_23501691522f47b7bdf0d56d53f44631.shtml

5.3 New Labor Training Mechanism

School-enterprise cooperation sets up cross-border e-commerce micro-majors to strengthen digital skills and international vision. In view of the digital intelligence technology mastery ability and global vision that new workers need to possess, we should promote the joint construction of curriculum system between universities and cross-border e-commerce enterprises, introduce practical contents such as AI tool application and cross-border data analysis, and cultivate compound talents with both theoretical and practical abilities.

The industry association organizes short-term training to improve the practical ability of practitioners. Referring to the demand of data-driven market adaptation in Foshan home furnishing industrial cluster,[10] the cross-border e-commerce industry association takes the lead to carry out special training such as blockchain practice and AIGC marketing application, so as to rapidly improve the ability of existing practitioners to cope with digital technology changes and adapt to the job demand driven by new productive forces.

5.4 Policy Support System

According to the differentiated characteristics of different industrial clusters, formulate precise policy tools to promote the deep integration of new quality productive forces and industrial characteristics :

5.4.1 Advice on Zhongshan small home appliance industry cluster

A "Special Subsidy for Intelligent Production Transformation" will be established, which focuses on supporting enterprises in introducing AI quality inspection and IoT production equipment. This initiative draws on the case of Zhongshan Qiku Electronic Technology Co., Ltd., which achieved revenue growth through R&D investment.[11] It joins hands with industry associations to build a "Small Home Appliance Technology Sharing Platform", integrates the intelligent production patent resources of universities and scientific research institutions, and provides low-cost technology licensing to enterprises within the cluster, thereby addressing the predicament that small and medium-sized enterprises lack sufficient core technology R&D capabilities.

5.4.2 Advice on Foshan home industry cluster

A "Cross-border Home Furnishings Data Hub" will be established, led by the government to integrate customs export data and consumer data from overseas e-commerce platforms, while incorporating the response characteristics of industrial clusters to market demand as outlined in the White Paper on Supply Chain Logistics Insights of Foshan Furniture Industry Belt.[12] A home style-regional demand matching model is developed in conjunction with third-party institutions to provide accurate market positioning reports for enterprises.

5.4.3 Advice on Guangzhou leather industry cluster

A "Leather Goods Cluster Collaboration Fund" should be launched, with reference to the collaborative model of "centralized procurement of raw materials, shared design resources, and unified logistics distribution" implemented by Huadu Shiling Leather Goods City.[13] Set up collective sea service package,

[10]Source : CCTV, https://tech.cnr.cn/techph/20240402/t20240402_526649547.shtml
[11]Source : Guangdong Provincial Taxation Bureau, State Administration of Taxation, https://guangdong.chinatax.gov.cn/gdsw/zssw_swxw/2024-03/22/content_23501691522f47b7bdf0d56d53f44631.shtml
[12]Source : CCTV, https://tech.cnr.cn/techph/20240402/t20240402_526649547.shtml
[13]Source : CCTV, https://local.cctv.com/2025/03/01/ARTIpxpWb5OxVvpUd710VO3h250301.shtml

integrate cross-border logistics, overseas warehouse, intellectual property agency and other services, and provide overseas trademark registration fee subsidies for enterprises exporting through cluster unified channels.

At the same time, it retains the original universal policy framework: local governments and financial institutions set up special funds to support digital infrastructure construction, optimize cross-border trade facilitation policies and tax incentives, form a policy combination of "precise implementation + universal guarantee", and enhance targeted support for different industrial clusters.

6 Conclusion

The wave of new quality productive forces has brought profound changes to cross-border e-commerce enterprises in breaking through the shackles of traditional development. Its empowerment logic, centered on technology, data and new-type laborers, has become a key driving force for promoting the transformation and upgrading of the industry. Deconstructing the connotation of new productive forces enabling cross-border e-commerce, this paper constructs a three-dimensional framework of "technology-market-ecology". Combined with the cases of industrial clusters such as small household appliances in Zhongshan city, in Foshan home furnishings and in Guangzhou leather goods, this paper verifies the remarkable effects ofnew productive forces in improving supply chain efficiency, optimizing market adaptation and promoting ecological symbiosis, and reveals the transformation path from "single point breakthrough" to "system reconstruction" and from "product orientation" to "value co-creation".

At present, the development of cross-border e-commerce still faces challenges such as insufficient core technology breakthroughs, data circulation barriers, and shortage of compound talents. However, the "manufacturing + service + data" integration model driven by new quality productivity has pointed out the direction for industrial upgrading. In the future, it is necessary to continue to deepen the technological innovation mechanism, improve the data factor market, strengthen the talent training system and policy support, and promote the deeper integration of new productive forces and cross-border e-commerce industry. Only in this way can we help China's cross-border e-commerce build core advantages in global competition and inject lasting momentum into the development of new productive forces and the realization of high-quality economic development.

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To Cite This Article Weiya ZHUO, Yuen RONG, Zhiqi XU, & Zihan LIN(2025). The Connotation Deconstruction of Cross-Border E-Commerce Enterprises Empowered by New Quality Productive Forces: A Case Study of Guangdong Industrial Clusters. *Do Business and Trade Facilitation Journal*, *5*(1), 1-13. https://doi.org/10.6914/dbtf.050101

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