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GRADUATION THESIS

on

Chinese e-commerce: features and prospects

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ASSIGNMENT
FOR THE GRADUATION THESIS OF

Master's degree student Zhang Yingying, group 24ЭЭВам1, full-time mode of study

1 The topic of the graduation thesis: "Chinese e-commerce: features and prospects" was approved by the university order dated «____» _____ 20____ no. _____

2 The deadline for the Master's degree student to complete the graduation thesis is 15.06.2026.

3 The input data for the graduation thesis is the regulatory and legal framework, scientific literature and reference books, and Internet data.

4 The list of issues to be studied includes theoretical foundations of e-commerce; macroeconomic and microeconomic impact of e-commerce on China's economy; challenges and future prospects of e-commerce development.

5 The list of visuals contains tables and figures.

6 The date of setting the assignment is 8.10.2024.

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The assignment was accepted by Master's degree student _____ / Zhang Yingying /
(signature) (full name)

Schedule for completing the graduation thesis

№ п/п	Content of the thesis	Deadline for completion	Due date, signature of the academic adviser
First year of study			
1	Substantiating of the research topic and methodology, subject and object of research	1.09.2024 – 31.10.2024	
2	Framing the scientific concept of research	1.11.2024 – 18.12.2024	
3	Collection of scientific literature for the thesis	19.12.2024 – 15.01.2025	
4	Substantiating the relevance, concept, and novelty of the research	16.01.2025 – 19.02.2025	
5	Framing of a detailed plan and layout of the research	20.02.2025 – 12.03.2025	
6	Studying new literature sources within the topic of the thesis	13.03.2025 – 26.03.2025	
7	Conducting theoretical research within the first chapter of the thesis	27.03.2025 – 30.04.2025	
8	Preparing the first chapter of the thesis	1.05.2025 – 30.06.2025	
Second year of study			
9	Conducting analytical research within the second chapter of the thesis	1.09.2025 – 22.10.2025	
10	Preparing the second chapter of the thesis	23.10.2025 – 24.12.2025	
11	Conducting analytical research within the third chapter of the thesis	25.12.2025 – 25.02.2026	
12	Preparing the third chapter of the thesis	26.02.2026 – 21.04.2026	
13	Preparing the introduction and conclusion	22.04.2026 – 12.05.2026	
14	Completing the graduation thesis	13.05.2026 – 27.05.2026	
15	Handing in the thesis for compliance control and antiplagiat	28.05.2026 – 11.06.2026	
16	Getting acquainted with the feedback and review	13.06.2026	
17	Presenting the written thesis	15.06.2026	

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Summary

The graduation thesis comprises 82 pages, 3 chapters, 15 figures, 8 tables, 60 sources. E-COMMERCE, MODERN GLOBAL ECONOMY, POSITIVE INFLUENCE FACTOR, NEGATIVE INFLUENCE FACTOR, MARKETPLACE, INTERNET-RETAIL, INTERNET-PLATFORM

The research object of this thesis is e-commerce industry in China and its overall economic operation system.

The goal of this research is to comprehensively analyze the multi-layered impacts generated by China's booming e-commerce on national economic development, sort out realistic challenges hindering high-quality industrial advancement, and propose targeted policy suggestions for the sustainable development of domestic e-commerce.

The novelty of this research lies in three aspects. Firstly, it divides e-commerce's economic impacts into current practical influence and future potential influence, adopting differentiated analytical frameworks for two dimensions. Secondly, it combines indicator construction and input-output analysis to avoid defects of traditional single regression models when measuring economic contribution of e-commerce. Thirdly, the paper integrates typical industrial cases including rural e-commerce and border cross-border e-commerce to conduct horizontal and vertical comparative analysis, combining theoretical deduction with realistic industrial data to improve the comprehensiveness of research conclusions.

Three core research approaches are adopted throughout this paper: literature research method, case study method and comparative analysis method:

1 Literature research method: relevant domestic and foreign monographs, journal papers, official statistical reports and industry white papers are collected from CNKI, Web of Science and other authoritative databases to comb existing research results, relevant basic theories including transaction cost theory and innovation diffusion theory, and clarify research deficiencies of current literature.

2 Case study method: typical cases covering comprehensive platform e-commerce, social live-stream e-commerce, rural e-commerce and border cross-border e-commerce are

selected, such as Alibaba, Pinduoduo and Ruili cross-border jewelry live streaming industry, to verify the practical economic influence path of e-commerce at micro level.

3 Comparative analysis method: vertical comparison is carried out on e-commerce's economic effects in different development stages of China; horizontal comparison is conducted on the industrial gaps between eastern coastal developed regions and central-western underdeveloped areas, as well as operational differences between e-commerce and traditional retail industry.

Theoretical significance: this research supplements the existing theoretical system on e-commerce and economic growth. It makes up for the research gaps regarding e-commerce's transformation effect on domestic circulation system, enriches empirical research on digital economy empowering rural economy and border trade development, and provides new analytical perspectives for subsequent related academic studies on China's e-commerce economy.

Practical significance: the research conclusions can provide objective reference for government departments to formulate industrial supervision, fiscal support and talent cultivation policies of e-commerce. Meanwhile, the analysis on industrial challenges and development trends helps e-commerce enterprises, traditional retailers and rural market participants to adjust operational strategies, grasp digital development opportunities and reduce operational risks, further boosting the high-quality and standardized development of China's digital commerce economy.

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Introduction

E-commerce triggered a new commercial circulation revolution globally. Originating in the United States in the mid-1990s, this industry has achieved the most remarkable expansion in China since 2000. China's online retail transaction volume surpassed the United States in 2013, making the country the world's largest online retail market. Currently, academic research concerning e-commerce's economic impacts is split into two primary directions: comparative studies between e-commerce and traditional retail, and targeted exploration of China's unique e-commerce development characteristics.

Existing literature still bears prominent deficiencies. First, few empirical studies systematically analyze how e-commerce reconstructs China's domestic commodity circulation system. Second, mainstream quantitative measurement models for e-commerce's economic influence contain flaws such as missing variables and multicollinearity. Third, forward-looking research on e-commerce's future influential fields is insufficient. Against such a backdrop, exploring the multi-dimensional economic effects of China's e-commerce development bears important practical and theoretical value. It can resolve existing academic disputes over the pros and cons of e-commerce development, identify bottlenecks restricting industrial growth, and provide decision-making basis for targeted industrial policies to unleash new momentum for China's economic transformation.

The research object of this thesis is e-commerce industry in China and its overall economic operation system.

The subject of the research is the specific influence mechanism and practical effects of e-commerce development on China's macroeconomy, microeconomic entities and traditional retail industry, alongside developmental bottlenecks and future evolving tendencies of domestic e-commerce.

The core goal of this research is to comprehensively analyze the multi-layered impacts generated by China's booming e-commerce on national economic development, sort out realistic challenges hindering high-quality industrial advancement, and propose targeted policy suggestions for the sustainable development of domestic e-commerce.

The concrete research tasks of the paper are defined as follows:

1 To sort out the theoretical connotation, classification features and domestic & international research progress of e-commerce.

2 To elaborate the macroeconomic and microeconomic impacts of e-commerce on China's economy, including its driving effect on rural revitalization, cross-border trade, employment expansion and consumption upgrading.

3 To analyze the transformation impact of e-commerce on the traditional retail sector.

4 To summarize prominent challenges restricting China's e-commerce high-quality development.

5 To predict future development trends of domestic e-commerce and formulate feasible policy recommendations.

The novelty of this research lies in three aspects. Firstly, it divides e-commerce's economic impacts into current practical influence and future potential influence, adopting differentiated analytical frameworks for two dimensions. Secondly, it combines indicator construction and input-output analysis to avoid defects of traditional single regression models when measuring economic contribution of e-commerce. Thirdly, the paper integrates typical industrial cases including rural e-commerce and border cross-border e-commerce to conduct horizontal and vertical comparative analysis, combining theoretical deduction with realistic industrial data to improve the comprehensiveness of research conclusions.

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Chapter 1 Theoretical foundations of e-commerce

1.1 Definition and characteristics of e-commerce

"E-commerce" was originally translated from "Electronic Commerce (EC)" and "Electronic Business (EB)". EC and EB have similar but not identical meanings. EC emphasizes electronic transactions, that is, transactions and cooperation between enterprises and external parties. EB has a richer connotation, referring to various business management activities conducted using the Internet, including online transactions, supply chain management, customer relations, and internal resource management. E-commerce can be understood in two ways: narrowly and broadly. Narrowly defined, e-commerce refers only to business activities conducted using the Internet.

Broadly defined, e-commerce expands to include a wide range of business activities using various information technology tools, from electronic currency exchange, electronic transactions, and electronic payments to supply chain management, online marketing, and inventory management, covering all aspects of production and consumption, supply and demand, of both physical and non-physical goods, commodities and factors of production. Regardless of whether it is narrowly or broadly defined, e-commerce is a constantly evolving concept in both theory and practice [27], with different institutions, enterprises, and governments having different understandings of it.

Because e-commerce developed alongside the Internet and inherently possesses a globalized nature, international organizations have been ahead of national governments in defining and regulating e-commerce. As early as 1984, the United Nations Commission on International Trade and Development (UNCITRAL) submitted a report entitled "Legal Issues Regarding Automatic Data Processing," recommending a review of legal requirements concerning computer records and systems, thus initiating e-commerce legislation. In December 1996, the 85th plenary session of the UNCITRAL adopted the UNCITRAL Model Law on Electronic Commerce [41], the world's first comprehensive normative document regulating e-commerce-related issues. By establishing general principles of e-commerce, such as rules for electronic data exchange, it laid the foundation

for the global development of e-commerce. In November 1997, the International Chamber of Commerce held the World Business Agenda for Electronic Commerce in Paris. Experts and government representatives from various fields, including commerce, information technology, and law, discussed and ultimately defined e-commerce as the electronic transformation of the entire trade activity.

The Organization for Economic Cooperation and Development (OECD) defines e-commerce as the sale or purchase of goods or services through computer networks, based on specially designed methods, for the purpose of receiving or placing orders. Goods or services must be ordered through these specialized methods, but related payments and final delivery do not necessarily have to be conducted online. E-commerce transactions can take place between businesses, households, individuals, governments, and other public or private organizations. E-commerce transactions include orders placed via the internet, extranets, or electronic data interchange, but exclude orders placed by telephone, fax, or manually typed email. The United Nations Conference on Trade and Development (UNCTAD) published the "E-commerce and Development Report 2001" in November 2001, and has since published an annual "E-commerce and Development Report," adopting the OECD's definition of e-commerce [48].

The Global Information Infrastructure Council (GIIC) E-commerce Working Committee believes that e-commerce is an economic activity using electronic communication as a means to advertise, purchase, and settle accounts for products and services with economic value; this transaction method is not affected by geographical location, amount of capital, or ownership of retail channels, and all types of market participants can freely participate in a wide range of economic activities [52].

The World Trade Organization (WTO) defines e-commerce as: production, marketing, sales, and distribution activities conducted through telecommunications networks. This includes both internet-based transactions and all business activities that utilize electronic information technology to solve problems, reduce costs, increase value, and create business opportunities. It involves a range of trade activities conducted online, from raw material sourcing, procurement, product display, ordering to production, storage, transportation, and electronic payment. The United Nations Working Group on International

Trade Simplification defines e-commerce as: conducting business activities electronically, including sharing structured or unstructured business information among suppliers, customers, and other participants through any electronic tool, and managing and completing various transactions related to business, management, and consumption activities. These definitions emphasize the commercial nature of e-commerce while distinguishing it from other commercial activities in terms of transaction methods and technological aspects. In terms of transaction methods, the parties no longer exchange or directly negotiate face-to-face, but conduct business transactions electronically. In terms of technological aspects, e-commerce integrates various technologies based on information networks.

In addition to international organizations and institutions, major economies such as the European Union and the United States have also proposed the concept of e-commerce. For example, the European Parliament defines e-commerce as: business activities conducted electronically, with two key aspects: first, the electronic processing and transmission of data; and second, the inclusion of products and services, traditional activities, and new activities [29]. The US government, in its "Global E-Commerce Framework," states that e-commerce refers to all business activities conducted through the Internet, including advertising, transactions, payments, and services; global e-commerce involves all countries worldwide.

In the business world, e-commerce, as a new business model, is driving significant changes in business operations and management. Some corporate giants are also pioneers in promoting e-commerce development, and based on their own understanding of e-commerce and business needs, they have provided definitions of the concept. For instance, the concept of E-Business was first proposed by IBM [58], which includes three parts: corporate intranet, corporate extranet, and e-commerce. It is an application that combines buyers, sellers, manufacturers, and their partners on the Internet, corporate intranet, and corporate extranet. HP proposed the concepts of e-commerce [55], e-business, e-consumer, and e-world, defining e-commerce as "a way of completing commercial trade activities through electronic means," emphasizing the exchange of goods and services through electronic transactions, and defining e-commerce as a new network link between merchants and customers.

Alibaba Research Institute (2015) further proposed the concept of an e-commerce economy [5]. According to this view, today's national economy has transcended the scope of the information industry. It encompasses both traditional industries that have successfully transformed and upgraded using information technology, ideology, and organizational principles, and the internet economy. The internet economy is a part of the information economy; it is an economy based on the internet, also known as the network economy, digital economy, or new economy, and includes internet applications and services. The e-commerce economy is included within the internet economy, which is a collection of economic activities with e-commerce attributes. Alibaba Research Institute has redefined the national economic system by defining the information economy, internet economy, and e-commerce economy, defining the conceptual boundaries of e-commerce in three layers from top to bottom, and explaining the relationship between e-commerce and the internet economy and information economy.

The academic community has also conducted in-depth research on e-commerce [25] argue that from a business process perspective, e-commerce is the application of technologies oriented towards business and workflow automation. Pon (2001) et al [40] define e-commerce as the process of business activities conducted by enterprises in an open network, replacing manual processes with information. Turban et al. (2018) [47] define e-commerce as the purchase, sale, delivery, or trading of goods, services, and data through the internet or other networks; it includes not only online transactions but also all online business activities, such as customer service, business cooperation, and intra-enterprise transactions. This definition is close to "the informatization of business activities." Liu Yujun (2012) summarized my country's mobile e-commerce (MEC, M-Electronic) [28]... This paper reviews the current state of development of mobile e-commerce, arguing that mobile e-commerce mainly transmits data through the mobile internet, connects to enterprise business platforms through mobile terminal devices, and ultimately completes business operations using wireless communication technology. Mobile e-commerce has significant advantages over traditional e-commerce in terms of potential customer scale, economic efficiency, price formation, and time and space constraints.

Zheng Shurong and Lü Qinghua (2013) reviewed domestic and international scholars' research on the concept of e-commerce, summarizing it into four types: scope, content, process, and technology. They argued that the essence of e-commerce is "traditional commerce armed with the internet," meaning its business activities remain unchanged, but its form has changed with the intervention of the internet; e-commerce signifies a shift in consumption patterns and an increase in consumption volume. Zong Qianjin (2013) [60] reviewed foreign social e-commerce (SC)... Studies in the field of commerce suggest that social e-commerce, within a social media context, promotes and sells a company's products or services by integrating social graphs (interactions based on interpersonal relationships) and interest graphs (interactions based on information flow). This research indicates that its emergence is driven by both the development of social media and e-commerce.

Yang Xiu (2014) [53] emphasizes the characteristics of e-commerce, such as being online, face-to-face, and providing comprehensive services. He points out that e-commerce, based on the internet environment, primarily uses browsers or server applications to help trading parties complete business activities remotely, achieving global online consumer shopping, inter-enterprise online transactions, and integrated transactions and services such as internet finance.

The impact of e-commerce on the economy and society is gradually deepening, and the government is increasingly emphasizing this emerging business model. (2007) In 2018, the National Development and Reform Commission and the State Council Information Office jointly released my country's "Eleventh Five-Year Plan for E-commerce Development," which for the first time defined e-commerce as "a new type of networked economic activity," namely, production, circulation, and consumption activities based on electronic information networks such as the Internet, broadcast television networks [39], and telecommunications networks, rather than simply new transaction or circulation methods based on the Internet.

The e-commerce model embodies the fundamental characteristics of networked information technology, namely, a high degree of information resource sharing and a high degree of social collaboration, which is conducive to improving the efficiency and effectiveness of economic activities. In 2018, the "E-commerce Law of the People's

Republic of China" was passed by the Standing Committee of the National People's Congress [43], which for the first time legally stipulated many aspects of e-commerce, including the operating entities, business activities, contracts, express delivery and logistics, and electronic payment, and defined e-commerce as "selling goods or services through information networks such as the Internet." "E-commerce is a business activity that provides services to businesses." This definition clarifies that the formal characteristic of e-commerce is business activity relying on information and communication networks such as the Internet, and its essential characteristic is the remote nature of the business activity, that is, non-face-to-face interaction.

This figure 1 splits global e-commerce development from 1990 to 2025 into four stages and plots its overall expanding trend alongside key industrial landmark events.

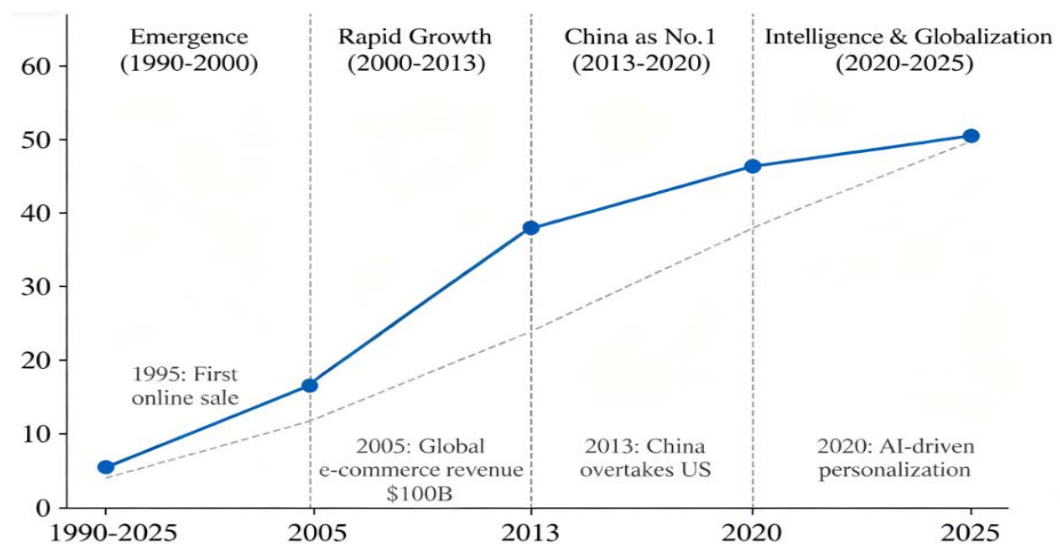


Figure 1–Development stages of global e-commerce (1990–2025) [39]

In summary, e-commerce is a commercial activity conducted using information technology and the Internet. It is the process by which the flow of commerce, logistics, information, and capital relies on a network platform to achieve commercial objectives. Its essence is the channel and process of goods and services transactions, and its focus is on new forms and models of business activities conducted by enterprises relying on the Internet and mobile Internet [58]. Based on the above definition of e-commerce, e-commerce development can be defined as a comprehensive and dynamic evolution of e-commerce in

terms of scale, penetration rate, level, element density, and business formats. In terms of scale, e-commerce development is reflected in the expansion of e-commerce transaction volume and the increase in transaction value achieved through e-commerce. The increase in the proportion of total market transaction volume. In terms of penetration rate, this mainly refers to the level of awareness and use of e-commerce among market players, and the degree of integration with market activities. Commonly used metrics include the proportion of enterprises introducing e-commerce into their daily operations, the proportion of consumers shopping online, etc [26].

E-commerce can be classified into various types based on different participants and transaction models, while also sharing some common characteristics. Figure 2 shows the classification and characteristics of e-commerce.

GLOBALIZATION	CONVENIENCE	PERSONALIZATION	REAL-TIME
Global reach, cross-border transactions	24/7 access, easy navigation	Tailored recommendations, user profiles	Instant updates, live tracking
REAL-TIME	INTERACTIVITY	DATA-DRIVEN	LOW COST
Instant updates, live tracking	Two-way communication, feedback loops	Analytics-driven strategies, customer insights	Reduced overhead, competitive pricing

Figure 2– Core characteristics of e-commerce [4]

The characteristics of e-commerce are as follows:

1 Globalization: E-commerce breaks through geographical limitations, allowing businesses and consumers to trade globally, enabling them to expand into global markets and develop their businesses.

2 Convenience: Online transactions and payments in e-commerce greatly simplify the shopping process, allowing consumers to easily complete purchases anytime, anywhere.

3 Personalization: E-commerce platforms can provide personalized recommendations and customized services based on consumer needs and behaviors, enhancing user experience.

4 Real-time: E-commerce platforms provide real-time updates on product information and inventory, allowing consumers to stay informed about product availability.

5 Interactivity: E-commerce platforms offer rich interactive features, allowing consumers to provide online reviews, messages, and inquiries, enhancing interaction between businesses and consumers.

6 Data-driven: E-commerce platforms analyze consumer behavior and preferences through big data, providing decision support and market forecasting for businesses.

7 Low cost: Compared to traditional brick-and-mortar stores, e-commerce has lower operating costs, reducing business operating expenses.

In terms of hierarchy, it reflects the position and functional improvement of e-commerce development in a larger region, such as evolving from a city-wide e-commerce center to a province-wide e-commerce center. Directly related to hierarchy are the scale and flow density of factors. Generally speaking, the higher the level of e-commerce development in a region, the higher its position and hierarchy in the entire e-commerce network system, and the larger, more comprehensive, and higher-quality the static products, funds, and data that are gathered; at the same time, the flow of logistics, capital, information, and people through the region will also be stronger [56].

Furthermore, e-commerce... development also drives the development of corresponding information and logistics infrastructure, and promotes institutional and cultural changes in the region; these are also manifestations of e-commerce development[9]. From a business model perspective, e-commerce development is reflected in the continuous innovation and maturation of specific sub-sectors and business models. From telegraph transactions to early portal websites, and then to the various business models of the retail e-commerce era, the continuous expansion from core to peripheral business models, and the emergence and development of new business models and formats are also important aspects of e-commerce development [55].

The development history of e-commerce is shown in it. The definition and development history of e-commerce demonstrate that its continuous evolution and innovation have brought new development opportunities and challenges to economic and trade activities. With continuous technological progress and changes in consumer behavior, e-commerce will continue to play an important role in future development, driving the innovation of business models and the prosperity of economic development [28].

1.2 Research status of e-commerce in China

Most international studies on the mechanism of e-commerce's impact on the economy focus on the micro-level, primarily studying its impact on enterprises and supply chains. They argue that e-commerce reduces enterprise costs, and due to its ease of use, it is widely adopted by micro-enterprises, improving efficiency and thus impacting the economy.

Ziaul et al. (2015) discussed the significant impact of e-commerce on enterprise costs and productivity from the supply-side perspective. They argued that e-commerce saves costs related to production (procurement and manufacturing) and sales (marketing and transportation)[59]. E-commerce innovates business models and is widely adopted by enterprises, which helps improve overall economic efficiency and has a significant economic impact. He et al. (2011), from the perspective of international trade, analyzed the impact of e-commerce on international trade enterprises [20]. They argued that e-commerce is part of the iceberg of costs; the reduction in transaction costs it causes reduces the iceberg of costs, leading to fewer imports, increased domestic production, and ultimately higher profits.

David J. Grinshaw and Elizabeth M. Daniel (2013), after studying the application of e-commerce in UK businesses, found that small businesses focused more on strengthening customer loyalty and supplier relationships through e-commerce, and that increased customer loyalty could save businesses marketing costs. Mahdi Choshin and Ali Ghaffari (2017) argued that e-commerce is the most advantageous marketing method for businesses, playing a crucial role in identifying, acquiring, and maintaining customers. E-commerce

improves communication efficiency among producers, distributors, and consumers, strengthens customer relationships, and is valuable for enhancing user stickiness [12].

From a production structure perspective, Sherah and Basil (2018) argued that e-commerce puts SMEs on an equal footing with large enterprises in terms of access to customer information and resources [42]. E-commerce helps bridge the information gap, improves the efficiency and competitive position of SMEs, and promotes their development. From a consumption structure perspective, Joshi (2012) argues that e-commerce can reduce the locational disadvantages of rural areas and enhance their competitiveness in market transactions. The paper points out that in India, 57% of sellers conducting transactions through e-commerce come from small towns, with the remainder coming from large cities [24].

In recent years, with the popularization of the internet and digital technologies, rural e-commerce has developed rapidly globally, becoming an important force driving rural economic transformation. Foreign scholars have conducted extensive research on this, mainly focusing on development models, influencing factors, policy support, and technological innovation.

In developed countries, rural e-commerce has formed relatively mature models. For example, the United States has optimized its agricultural product supply chain through large e-commerce platforms (such as Amazon) and direct-from-farm models (Goodman & Wats, 1997). The European Union focuses on Community Supported Agriculture (CSA), emphasizing localized production and consumption (Marsdenetal, 2000). In developing countries, rural e-commerce relies more on mobile payments and social platforms. For example, India has solved the payment and delivery problems in rural areas through digital payments and low-cost logistics (Kumar & Singh, 2017). Research shows that rural e-commerce has a significant impact on rural economies and societies. On the one hand, it can increase farmers' income, create employment opportunities, and improve the quality of life in rural areas (Bhatnagar & Singh, 2010). On the other hand, problems such as the digital divide, high logistics costs, and talent shortages constrain its development.

Policy support is key to the development of rural e-commerce. The World Bank (2016) points out that governments should strengthen infrastructure construction, provide

digital skills training, and formulate relevant regulations to standardize market behavior. Meanwhile, emerging technologies such as blockchain and artificial intelligence have broad application prospects in rural e-commerce [51]. For example, blockchain technology can improve the transparency of agricultural product traceability (Kshetri, 2018), while artificial intelligence can optimize logistics and precision marketing (Kshetri, 2020).

Overall, international research on rural e-commerce mainly focuses on its model innovation, policy support, and technological innovation. Whether in developed countries or emerging economies, successful cases of rural e-commerce usually indicate that sound infrastructure, policy support, and the cultivation of professional talent are key factors driving its development. These studies provide valuable experience and lessons for the development of rural e-commerce in my country, enabling us to better understand how to utilize internet technology to promote the transformation and upgrading of the rural economy.

Many domestic scholars believe that the impact of e-commerce on the economy is mainly reflected in the reduction of transaction costs, savings in distribution expenses, and improved distribution efficiency through the application of information technology. However, in specific studies, different scholars present certain differences in their views. Some scholars believe that e-commerce directly reduces related costs in the transaction process. Zhao Hongjun and Li Junyang (2011) discussed the market structure types under the e-commerce model, arguing that e-commerce reduces transaction costs in the industrial chain [20]. Driven by market resource allocation, more enterprises utilize external markets to organize production, thereby avoiding high internal organizational costs.

Meng Xiaoming (2016) analyzed the changes in supply chain management under the e-commerce model, arguing that e-commerce integrates the upstream and downstream of the industrial chain through the network, consolidates the supply chain, realizes the networking of transaction systems and organizations, eliminates intermediate links, and makes information transmission more timely and accurate, thereby reducing distribution costs such as transportation, sales, and inventory [59]. Lu Chengcheng (2012) discussed the impact of e-commerce on the economy from both supply and demand perspectives. From the supply perspective, e-commerce reduces the cost of resource allocation in the market,

including production costs and distribution costs. From the demand perspective, e-commerce reduces the search costs for demanders in the process of purchasing satisfactory goods. Some scholars argue that e-commerce expands the market scope. Wang Yongqin and Lu Ming (2017) elaborate on the impact of market expansion on economic growth. They believe that while the expansion of the market scope brings increasing marginal returns to transaction costs, the complementarity of factors or products in different markets can overcome the diminishing marginal returns to capital during capital accumulation or the diminishing marginal utility during production growth, making market expansion a beneficial choice [12].

Ni Mengjia (2014), from the perspective of Marx's theory of commodity management capital, argues that firstly, due to the endogenous mechanism of the e-commerce market—namely, the innovation and transformation of industrial organizations or industrial chains such as commerce, logistics, and warehousing—both productive and pure circulation costs are reduced simultaneously. Secondly, e-commerce greatly expands the market scope, accelerates the turnover of commercial capital [59], increases the average profit rate, and achieves rapid economic growth.

Some scholars believe that e-commerce changes the circulation structure and improves circulation efficiency. Yi Ming (2015) analyzes how e-commerce leads to changes in the circulation channel environment. The application of information technology in circulation channels allows producers to obtain consumer demand information at low cost, enabling customized production and a return of consumer sovereignty. The reduction in information acquisition costs has led trading participants to no longer seek to maximize profits from a single transaction, but to focus more on long-term cooperation. Under the influence of e-commerce, the distribution channel structure tends to be flattened, shortening the distance from production to consumption and improving distribution efficiency [26].

Wang Chaoxian (2016) analyzed the impact of e-commerce on China from the perspectives of industry and macroeconomic growth, and believed that at the industry level, e-commerce has reshaped the basic structure of the distribution system, which is more efficient and has lower transaction costs compared to traditional channels. From the perspective of macroeconomic growth, the role of e-commerce in promoting the economy

has increased year by year. Some scholars believe that e-commerce promotes industrial agglomeration, deepens and broadens the division of labor, gains competitive advantages, and thus promotes economic development. Shen Ping (2016) believes that e-commerce and industrial agglomeration are mutually reinforcing. On the one hand, e-commerce alleviates the problem of information asymmetry for enterprises with the characteristics of real-time information sharing, reduces the transaction risks of upstream and downstream enterprises, and accelerates the realization of industrial agglomeration. At the same time, in the process of industrial agglomeration, each link of the industrial chain cooperates with specialized division of labor, equips the industrial supporting system, reduces enterprise costs, and enhances competitiveness.

The development models of rural e-commerce in China are diverse, mainly including the following: Platform-driven model: Based on large e-commerce platforms such as Taobao, JD.com, and Pinduoduo, this model promotes the upward flow of agricultural products and the downward flow of industrial goods by building rural e-commerce service stations and logistics systems. For example, Alibaba's "Rural Taobao" project helps farmers sell agricultural products and purchase industrial goods by establishing village-level service stations (Li Xiaopeng, 2018). JD.com, on the other hand, solves the "last mile" delivery problem in rural areas by building its own logistics system (Wang Lei, 2020) [49]. Government-led model: Local governments promote the development of rural e-commerce through policy support and financial investment. For example, the "Ganjie Model" in Suichang County, Zhejiang Province, established an e-commerce service system covering the entire county through government guidance, achieving efficient upward flow of agricultural products (Wang Shanshan, 2019). Suining County, Jiangsu Province, relying on its furniture industry, has transformed from traditional manufacturing to e-commerce sales through e-commerce platforms, becoming a nationally renowned "Taobao Village" [6].

Cooperative model: Farmers' cooperatives integrate resources and utilize e-commerce platforms to sell agricultural products. For example, Shandong Province's "cooperative + e-commerce" model, through cooperative procurement and sales, has enabled agricultural products to gain a foothold in a highly competitive market (Zhang Hua, 2020). This model not only reduces farmers' operating costs but also enhances the brand effect of agricultural

products. Social e-commerce models rely on social platforms such as WeChat, QQ, and Kuaishou to sell agricultural products through community marketing and live-streaming sales. For example, Pinduoduo's "Agricultural Products Going Upward" plan helps farmers directly connect with consumers through social e-commerce (Chen Zhigang, 2021).

The live-streaming e-commerce models of Douyin and Kuaishou have also achieved significant results in agricultural product sales (Wang Shanshan, 2019). Domestic scholars have conducted in-depth research on the influencing factors of rural e-commerce development, mainly including the following aspects: infrastructure—network coverage, logistics systems, and payment systems in rural areas are the foundation of e-commerce development. Research shows that high logistics costs and low delivery efficiency are the main bottlenecks restricting the development of rural e-commerce (Li Ming, 2019). Especially in remote areas, insufficient logistics infrastructure severely restricts the upward flow of agricultural products. Digital skills—farmers' digital literacy and e-commerce operation capabilities directly affect the promotion effect of e-commerce. Studies have found that the lack of professional e-commerce talent is a major obstacle to the development of rural e-commerce (Wang Lei, 2020) [49].

Many farmers are unfamiliar with the operating rules and technical tools of e-commerce platforms, making it difficult for them to effectively utilize e-commerce channels. Policy support, government policy support and financial investment play a key role in the development of rural e-commerce. For example, the national "Comprehensive Demonstration County for E-commerce in Rural Areas" project has significantly promoted the development of rural e-commerce (Liu Yang, 2021). Local governments also support rural e-commerce through financial subsidies, technical training, and other means. Standardization of agricultural products, two major standards affecting the market competitiveness of agricultural products: quality standards and brand standards. Studies have shown that the lack of standardization and branding is an important obstacle to the upward movement of agricultural products (Zhang Hua, 2022) [30]. Many agricultural products are difficult to enter the high-end market due to the lack of unified quality standards.

The state has introduced a series of policies to support the development of rural e-commerce, mainly including the "Comprehensive Demonstration County for E-commerce in Rural Areas" project. Since 2014, the Ministry of Commerce has launched the "Comprehensive Demonstration County for E-commerce in Rural Areas" project, which promotes the construction of rural e-commerce infrastructure and the improvement of service systems through financial support and policy guidance (Ministry of Commerce, 2020) [32] and the "Internet + Agriculture" action plan. By 2021, more than 1,000 demonstration counties had been established nationwide. The State Council proposed the "Internet + Agriculture" strategy to promote the deep integration of information technology and agriculture and facilitate the development of e-commerce for agricultural products (State Council, 2015) [31]. This plan, through technological empowerment, has improved the intelligence and marketization of agricultural production. This strategy provides policy guarantees for the long-term development of rural e-commerce.

Overall, domestic research on rural e-commerce is gradually deepening, covering various levels from theoretical frameworks to empirical analysis. However, current research still has some shortcomings, such as a lack of effective research on specific regions or special groups, and a lack of systematic and actionable solutions. Future research could conduct more detailed field surveys at the regional level to explore the development characteristics and needs of rural e-commerce in different regions and cultural backgrounds, enriching existing theoretical research and providing more targeted suggestions for practice.

1.3 Research methods of e-commerce

This study delves into the multidimensional impact of e-commerce on the Chinese economy. Combining the theoretical and empirical needs of the research topic, it comprehensively employs three core research methods: literature review, case analysis, and comparative analysis. Following the logical approach of theoretical groundwork—empirical verification—case evidence—comparative summary, the research process is scientifically rigorous, and the conclusions are objective and reliable [47].

The literature review method is the fundamental method of this study and is used throughout the entire research process. First, this study systematically collected domestic and international academic papers, monographs, research reports, and policy documents related to e-commerce development, economic growth, industrial structure upgrading, employment changes, and consumption upgrading through domestic academic databases such as CNKI, Wanfang, and VIP, as well as foreign databases such as Web of Science and Springer. This process clarified the theoretical foundations related to e-commerce and economic development, including transaction cost theory, industrial integration theory, and endogenous growth theory, identifying the core viewpoints, research frameworks, and points of contention in existing research. Second, the collected literature was categorized, organized, and analyzed to summarize the research achievements of domestic and international scholars in the field of e-commerce's economic impact [52].

This clarified the research trajectory, identified weaknesses and gaps in existing research, and determined the research entry point and innovation direction for this study, laying a solid theoretical foundation for subsequent empirical analysis and case studies. Simultaneously, statistical data and industry reports released by official institutions such as the National Bureau of Statistics [38], the Ministry of Commerce, and the China E-commerce Research Center were collected to trace the development history, current characteristics, and related policy evolution of e-commerce in China, providing authoritative data and policy basis for the research [14].

With the advancement of technology, the application of emerging technologies such as big data, artificial intelligence, and blockchain in rural e-commerce has gradually become widespread [34]. Big data technology optimizes the agricultural product supply chain and marketing strategies by analyzing consumer demand. For example, JD.com uses big data technology to provide farmers with accurate market information (Li Xiaopeng, 2018). Blockchain technology is used for agricultural product traceability, improving consumer trust in agricultural products. For example, Alibaba uses blockchain technology to achieve full traceability of agricultural products (Chen Zhigang, 2021) [32].

Live-streaming e-commerce helps farmers directly connect with consumers through live-streaming sales. For example, the live-streaming e-commerce models of Douyin and

Kuaishou have achieved remarkable results in agricultural product sales (Wang Shanshan, 2019). Domestic scholars have conducted in-depth research on typical cases of rural e-commerce and summarized some successful experiences. The Suichang model in Zhejiang Province, through government guidance and enterprise participation, established an e-commerce service system covering the entire county, achieving efficient upstream sales of agricultural products (Wang Lei, 2019) [49].

The Suining model in Jiangsu Province, relying on the furniture industry, achieved a transformation from traditional manufacturing to e-commerce sales through e-commerce platforms, becoming a nationally renowned "Taobao Village" (Wang Fang, 2019). The Wugong model in Shaanxi Province, through a "government + enterprise + cooperative" model, promoted the e-commerce sales of specialty agricultural products such as kiwifruit (Liu Yang, 2021).

To make the research more targeted and persuasive, this study employs a case study method, selecting typical e-commerce models and representative e-commerce enterprises to deeply analyze the micro-level implementation paths of e-commerce's impact on the economy. On one hand, cases are selected according to e-commerce business models, including representative models such as comprehensive e-commerce platforms (Alibaba, JD.com), social e-commerce (Pinduoduo), live-streaming e-commerce (Douyin e-commerce, Kuaishou e-commerce), and rural e-commerce, analyzing the specific roles of different e-commerce models in promoting the transformation of the real economy, assisting rural revitalization, and driving the development of SMEs.

On the other hand, cases focus on key areas, selecting typical examples of e-commerce driving the digital transformation of manufacturing, innovative development of the service industry, and the upward flow of agricultural products. The study analyzes the participating entities, operating models, and implementation results of e-commerce, summarizing the actual impact of e-commerce on regional economies, industrial development, and market entities by reducing transaction costs, expanding sales channels, optimizing resource allocation, and fostering new business models. This micro-level analysis corroborates the conclusions of the macro-level empirical analysis, making the

research more relevant to the real-world development of e-commerce in China and enhancing its practical guiding significance [27].

This study employs comparative analysis, conducting a comparative analysis from both horizontal and vertical dimensions. Vertically, it examines the differences in the economic impact of e-commerce at different stages of development in China (initial stage, growth stage, mature stage, and innovative development stage) [57], analyzing the evolution of its impact on economic growth, industry, consumption, and employment as e-commerce technology upgrades and models innovate.

Hu Jun and Shao Hanhua (2010) argue that e-commerce is beneficial to the development of industrial clusters. As a supporting platform, e-commerce integrates resources for production, sales, and services within industrial clusters, improving customer response speed, reducing inventory turnover, and enhancing industrial competitiveness. Simultaneously, e-commerce's market expansion capabilities provide industrial clusters with a broader market space. Zhang Jing (2011), from a value chain perspective, analyzes in detail the agglomeration effect of enterprises on e-commerce B2B platforms, arguing that through e-commerce platforms, SMEs can generate low-cost advantages globally, effectively participate in domestic and international value chain division of labor [15], and the agglomeration effect drives continuous improvement in enterprise innovation capabilities, enabling enterprises to transform from the low end to the high end of the value chain, enhancing competitiveness, promoting domestic economic structural reform, and boosting economic growth.

In recent years, with strong national policy support and the development of internet technology, rural e-commerce has developed rapidly, playing a positive role in rural revitalization and rural economic transformation. Domestic scholars' research on rural e-commerce mainly focuses on development models, influencing factors, policy support, technological innovation, typical case analysis, and future development directions. The following is a detailed description of the current state of research on rural e-commerce in China from multiple dimensions.

Horizontally, it compares the regional differences in the economic impact of e-commerce between developed coastal areas in the east and less developed areas in the central

and western regions, analyzing the linkage between e-commerce development levels and regional economic development, and exploring the feasibility of e-commerce narrowing regional economic development gaps [22].

Simultaneously, it compares the differences in the economic contributions of e-commerce and traditional commerce and trade, highlighting the unique advantages of e-commerce in China's economic development in the new era. Through multi-dimensional comparisons, this study comprehensively grasps the stage-based, regional, and differentiated impact of e-commerce on the Chinese economy, deepening the research conclusions and providing a reference for formulating e-commerce development policies in different regions and at different stages.

Chapter 2 Impact of e-commerce on China's economy

2.1 Macroeconomic impact of e-commerce on China's economy

With the deepening of China's digital transformation, e-commerce has transcended the boundaries of domestic trade, developing into a comprehensive ecosystem integrating online transactions, logistics services, and digital finance [42]. Against the backdrop of initiatives such as the "Belt and Road Initiative," cross-border e-commerce, as an important extension of the e-commerce industry, is becoming a core force reshaping the operational logic of microeconomic entities such as enterprises, individual businesses, and consumers. Unlike the macroeconomic impact focused on aggregate indicators, the microeconomic effects of e-commerce (with cross-border e-commerce as its core driving force) are directly reflected in the production, operation, consumption behavior, and income changes of micro-entities, injecting vitality into the foundation of the national economy.

At the enterprise level, e-commerce lowers the market participation threshold and optimizes the operational efficiency of small and medium-sized enterprises (SMEs), while cross-border e-commerce further expands its development space beyond national borders. Traditional domestic SMEs and individual businesses often face constraints such as limited offline store coverage, high marketing costs, and difficulty in reaching distant markets. E-commerce platforms solve these pain points by providing low-cost online stores, precise marketing tools, and direct customer access channels [12]. For example, small and medium-sized enterprises (SMEs) in inland and border regions specializing in handicrafts, agricultural products, or light industrial goods can reach consumers nationwide through platforms like Taobao, JD.com, and Pinduoduo, reducing market expansion costs by 40% to 60% compared to traditional offline channels. As e-commerce deeply penetrates cross-border trade, these enterprises have gained access to global markets through platforms such as Alibaba International Station, Amazon Global Selling, and Wish. Without relying on traditional foreign trade intermediaries, they can directly receive orders from overseas consumers and small overseas businesses [55], shortening the transaction chain and increasing average profit margins by 20% to 30%. Furthermore, cross-border e-commerce

platforms provide enterprises with data analysis support on overseas market demand, enabling them to adjust product design, specifications, and pricing strategies in a timely manner. For instance, a small furniture manufacturer in Zhejiang Province used cross-border e-commerce data to discover a preference for compact, multifunctional furniture in the European market and subsequently adjusted its production lines—resulting in a 50% increase in overseas orders within a year.

This flowchart illustrates the progressive industrial transmission path from circulation system optimization to rural revitalization and the booming of cross-border e-commerce (figure 3).

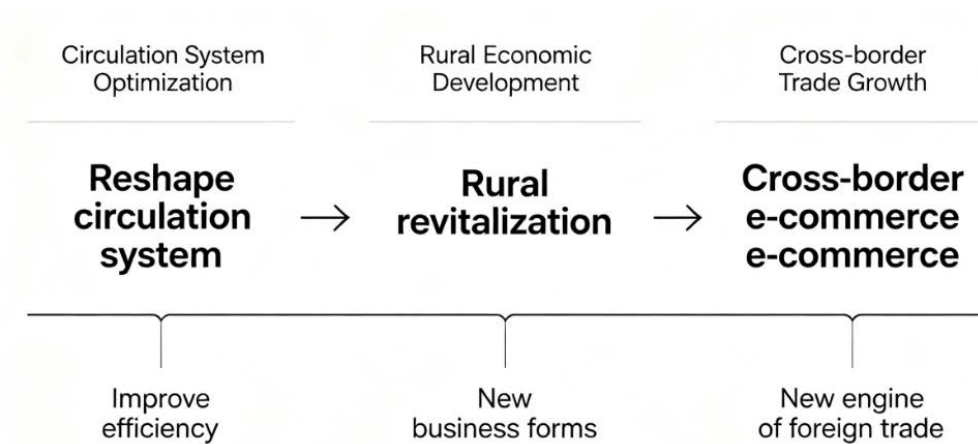


Figure 3 – Macroeconomic impact path of e-commerce [6]

Cross-border e-commerce brings multiple income sources for self-employed and border dwellers. In Yunnan’s Ruili, over 100,000 locals work in relevant businesses with modest startup costs, earning 5,000–20,000 yuan monthly, far above traditional earnings. Related packaging, logistics and translation industries also create flexible local jobs and curb labor outflow in border zones.

For consumers, e-commerce broadens product selections; remote rural shoppers gain access to nationwide and global commodities. In 2023, China had over 200 million cross-border e-commerce consumers, and streamlined supply chains cut commodity prices by 30%–40% versus offline shopping. Supported by cross-border direct mail delivering goods within 3–7 days and quality guarantee rules, shopping convenience and customer trust keep rising [10].

This line graph depicts the continuous upward growth trend of China's rural e-commerce transaction scale from 2013 to 2023, marking three core benchmark data points (figure 4).

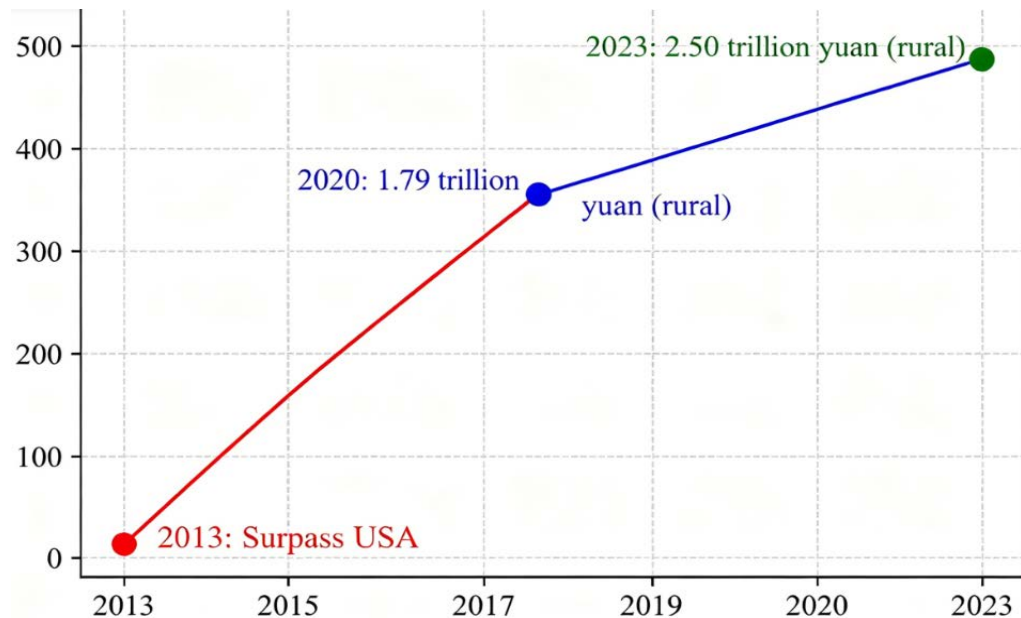


Figure 4 – China online retail scale (2013–2023) [10]

In conclusion, cross-border e-commerce-led online retail delivers notable microeconomic effects by helping SMEs expand business, creating personal income sources, diversifying consumer options and spurring industrial upgrade. Ongoing digitalization and opening-up will further expand its role to fuel China's high-quality growth [32].

As an essential engine for rural revitalization targeting three rural issues, rural e-commerce breaks geographic barriers to sell farm products nationwide and overseas, enriches rural residents' shopping alternatives, and facilitates rural industry growth, talent backflow and eco-friendly development. Combining literature review and empirical analysis, this paper explores rural e-commerce's development paths and empowerment mechanisms to offer theoretical and practical suggestions for rural modernization (figure 5).

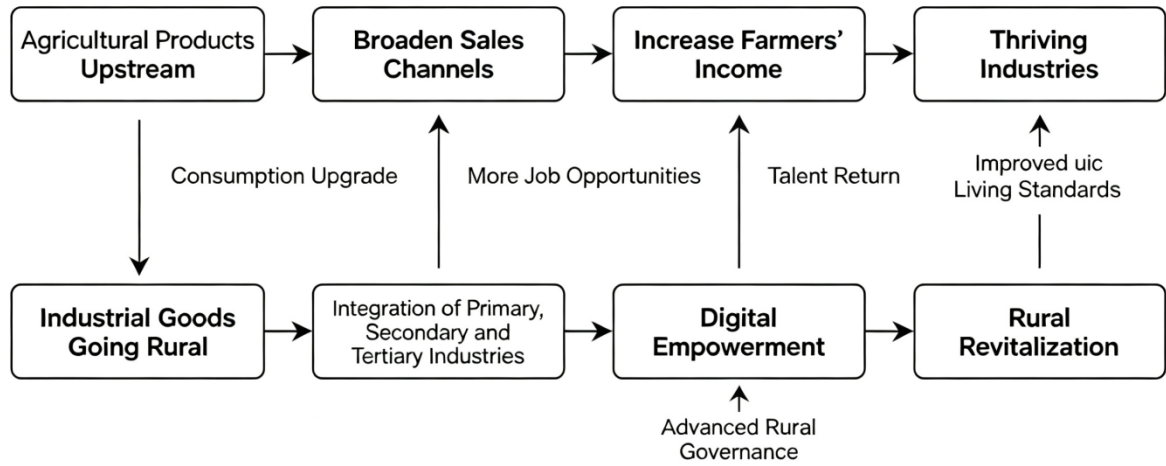


Figure 5 – Four major mechanisms of rural e-commerce in rural revitalization [18]

In the context of rural revitalization, the integrated development of e-commerce support and new agriculture, as an innovative model, can promote the sales of agricultural products and the transformation and upgrading of the agricultural industry. First, building e-commerce platforms for agricultural products integrates agricultural product information, supply chain management, and e-commerce sales functions, providing online sales channels for farmers and agricultural enterprises. The platform can offer services such as agricultural product display, price information, and quality certification, facilitating consumer purchases [21].

Simultaneously, the platform can support farmers' cooperatives and agricultural enterprises in product promotion and brand building. Second, providing customized services for agricultural products through e-commerce platforms allows for personalized customization of product packaging, weight, and specifications based on consumer needs. Consumers can choose agricultural products according to their preferences and place orders and receive delivery instantly. Third, establishing a traceability system for agricultural products, providing information on the production process, planting environment, and quality testing through e-commerce platforms, increases consumer trust and purchasing initiative. The traceability system can also help farmers and agricultural enterprises improve their product quality management and monitoring capabilities. Fourth, utilizing e-commerce platforms for crowdfunding sales of agricultural products allows consumers to pre-order

agricultural products, providing financial support during the growing season[6], helping farmers alleviate economic pressure. Crowdfunding sales also allow for early understanding of market demand and adjustments to agricultural production plans. By supporting e-commerce and integrating it with new agricultural development, the market promotion and sales capabilities of agricultural products can be improved, enhancing the income level and competitiveness of the rural economy. Simultaneously, it can promote the application and innovation of agricultural technology, drive the transformation and upgrading of the agricultural industry, and achieve sustainable agricultural development.

In 2015, the transaction volume of rural online retail reached 0.35 trillion yuan, marking the initial stage of steady industrial growth. Driven by the rural revitalization strategy and improved rural digital infrastructure, the market size jumped sharply to 1.79 trillion yuan by 2020, realizing a nearly five-fold increase within five years. Growth momentum remained robust afterward, with total rural online retail sales hitting 2.50 trillion yuan in 2023. According to the projected trend, the sector is expected to climb to 3.12 trillion yuan by 2025 [12], demonstrating that rural e-commerce has evolved into a core driving force stimulating rural consumption and underpinning high-quality rural economic development. The line graph reflects the sustained upward expansion of China's rural online retail market from 2015 to 2025 with concrete statistical indicators (figure 6).

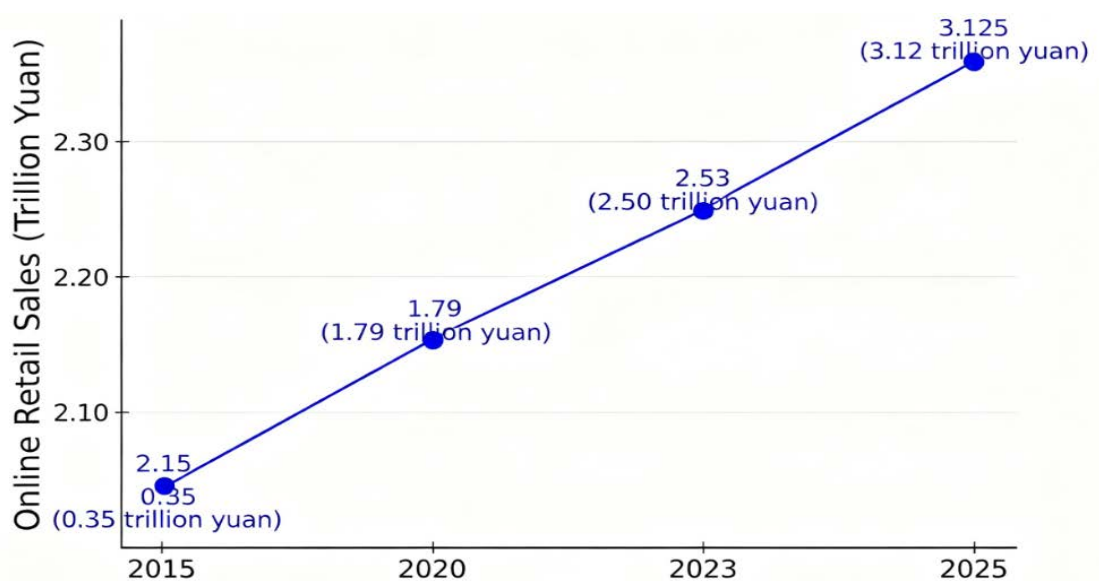


Figure 6 –Growth of rural e-commerce retail sales (2015–2025) [12]

Farmers can enhance product awareness through offline channels while simultaneously leveraging online platforms for widespread sales. Overall, the core concept of rural e-commerce is to promote the efficient operation of the rural economy and the rational allocation of resources. It provides farmers with convenient sales channels and more market opportunities, while also driving the transformation and development of the rural economy. Looking to the future, rural e-commerce is expected to play a more important role in increasing farmers' income, optimizing resource allocation, and promoting the adjustment of rural industrial structure. The development of rural e-commerce involves theoretical foundations from multiple disciplines, including economics, management, information technology, and sociology.

The following are the main theoretical foundations for the development of rural e-commerce: E-commerce model theory, including B2B (business-to-business), B2C (business-to-consumer), and C2C (consumer-to-consumer) models, which provide theoretical support for the business models of rural e-commerce:

1 E-commerce ecosystem theory: this emphasizes the interaction and cooperation among e-commerce participants. The development of rural e-commerce requires the construction of an ecosystem involving farmers, businesses, government, and consumers. Information asymmetry theory posits that rural e-commerce, through information technology, reduces information asymmetry in agricultural product markets, helping farmers better understand market demand and price information. Transaction cost theory states that e-commerce reduces transaction costs, including information search costs, negotiation costs, and monitoring costs, making transactions in rural areas more efficient. The diffusion of innovation theory explains how new technologies and ideas spread and are adopted within social systems [32]. As an innovation, the promotion and popularization of rural e-commerce can be analyzed using this theory. Rural economic development theory emphasizes promoting rural economic development through technological progress and industrial upgrading. As an emerging economic form, rural e-commerce can drive rural industrial restructuring and increase farmers' income.

2 Urban-Rural integration theory: rural e-commerce helps narrow the urban-rural gap and promotes the flow of resources and integrated development between urban and rural

areas [22]. Technology Acceptance Model (TAM): This model explains how users accept and use new technologies. The development of rural e-commerce needs to consider farmers' acceptance and willingness to use information technology.

3 Digital divide theory: rural areas face gaps in information technology infrastructure and digital skills. The development of rural e-commerce needs to address these digital divide issues.

4 Supply chain integration theory: the development of rural e-commerce requires integrating agricultural production, processing, logistics, and sales to form an efficient supply chain system.

5 logistics and supply chain management theory: the success of rural e-commerce depends on an efficient logistics system. Supply chain management theory provides theoretical support for optimizing logistics in rural e-commerce.

6 Social network analysis theory: the development of rural e-commerce relies on the formation and expansion of social networks. Social network theory can help analyze the relationships and interaction patterns among participants in rural e-commerce [45].

Marketing theory identifies product, price, place, and promotion (4Ps) as core elements of marketing, and the development of rural e-commerce requires integrating these elements into market promotion [12]. Brand building theory posits that agricultural product branding in rural e-commerce is a crucial means of enhancing market competitiveness, providing guidance for brand strategies.

Policy support theory argues that government policy support is vital for the development of rural e-commerce, analyzing the promoting effect of policies. Institutional change theory recognizes that the development of rural e-commerce involves institutional change, providing insights into the institutional environment of rural e-commerce. The analysis provides a theoretical framework.

Sustainable development theory dictates that the development of rural e-commerce needs to consider economic, social, and environmental sustainability, providing guidance for its long-term development.

These theoretical foundations offer multi-faceted analysis and guidance for the development of rural e-commerce, helping to understand its complexity and application in

different environments. It emphasizes leveraging market mechanisms to flexibly adjust the matching degree between supply and demand. On the supply side, the rural e-commerce service system established by rural e-commerce activities achieves the integration of information flow, capital flow, and logistics. Utilizing the advantages of big data information collection and analysis, it effectively breaks through the original spatial and temporal limitations of agricultural product production and transactions. The integration of data elements enables... Production lines can be flexibly adjusted to achieve on-demand production by matching market supply and demand (Liu Pingfeng and Zhang Wang, 2021) [27]. This resolves excess capacity and creates advanced momentum, promoting coordination between agricultural products and the market.

Rural e-commerce leverages this advantage to stimulate and guide consumption while also driving and guiding the optimization of the supply side. This positive interaction between supply and demand continuously attracts new resources and optimizes existing resource allocation, giving rise to new business forms and models such as emerging technology industries, and promoting the digital transformation of the economy. Simultaneously, with the support of the "e-commerce entering villages" policy, the vast internet resources and platforms that rural e-commerce markets have successfully accessed undoubtedly represent a huge profit space with unlimited potential waiting to be explored. This transformation not only broadens the development path of the rural economy but also... This has made rural markets highly attractive investment markets (Sun Zheyuan and Liu Yan, 2022), allowing rural areas to attract more industrial products and services resources [44].

Close collaboration between upstream and downstream sectors of the industrial chain has accelerated the integration of rural primary, secondary, and tertiary industries, leading to a diversified industrial structure and a sound market system. This, in turn, helps to improve the technological content and added value of industries, thereby stimulating the potential vitality of the domestic market and facilitating the domestic economic cycle. On the demand side, the virtual digital consumption model supported by the digital economy has greatly stimulated residents' consumption potential and vitality. Thanks to the deep empowerment of digital technology, refined digital analysis can meet consumers'

personalized needs and drive consumption upgrades. Furthermore, the rise of e-commerce platforms has greatly simplified consumption processes through integrated information systems. With the continuous improvement and popularization of e-commerce platforms, more and more consumers are enjoying this convenient and efficient shopping method, further accelerating the growth of consumer demand and the pace of consumption upgrading. In addition, the continuous innovation of digital financial products provides consumers with more financial options, greatly enhancing residents' consumption capacity. This expansion of domestic demand injects strong momentum into the sustained and healthy development of the economy (Yang Yang and Deng Fei, 2024) [54].

At the same time, innovative e-commerce models have driven the development of related industries, such as logistics packaging, e-commerce training, and e-commerce customer service, enriching the employment options for rural residents and attracting more external resources and talent. The development of rural enterprises has significantly promoted non-agricultural employment for residents and alleviated the relative poverty of local farmers (Wei Xiaohai et al.) [50]. The policy of "e-commerce entering villages" has narrowed the information gap and income disparity between urban and rural areas (Huang Yuting and Pan Jianwei, 2023), and the coordinated development between urban and rural areas helps to form a more balanced economic structure and provide a more stable foundation for the domestic economic cycle [21].

Based on this, this paper proposes H1: the "e-commerce entering villages" policy can promote the smooth flow of the domestic economic cycle. Rural e-commerce, as a powerful driving force, is deeply exploring and integrating Internet resources with traditional rural elements, leading rural industries and technology equipment to continuously move towards emerging technology fields. At the same time, the digital upgrading of infrastructure will inevitably be accompanied by the improvement of rural mechanization level and agricultural production efficiency (Huang Yuting and Pan Jianwei, 2022) [22]. For example, big data analysis can help farmers better understand the impact of the "e-commerce entering villages" policy on China's domestic economic cycle development. Market demand enables differentiated competition and optimal layout of agricultural products. Smart agricultural

irrigation systems and intelligent pest and disease detection systems, among other intelligent tools, optimize agricultural production processes, ensuring high yields at low cost.

This process promotes profound changes in agricultural production methods and provides strong support for achieving rural revitalization and integrated urban-rural development. Based on this, this paper proposes H2: The "E-commerce Entering Villages" policy can smooth the internal economic cycle by improving agricultural production efficiency. The low threshold of rural e-commerce and the social effect of familiar rural communities have laid a solid foundation for the promotion and development of e-commerce activities in rural areas (Tian Ye and Xia Jiezhong, 2024) [46].

The low-threshold start-up capital has greatly stimulated entrepreneurial enthusiasm and willingness to participate, breaking down barriers to upward mobility for low-income groups (Fang Shile, 2024) [16]. Farmers' entrepreneurship and employment have become a key link connecting the internal cycle of the rural economy, and a fresh source of vitality for the diversification and sustainable development of the rural economy. First, under the active guidance of the pilot policy, financial institutions at all levels have significantly increased their credit investment in the "agriculture, rural areas, and farmers" sector (Bu Jiewen, 2023), providing strong financial support for micro and small enterprises through innovative financial products and service models [6]. Farmers have made full use of funds and credit sources to actively explore and innovate diversified business methods. This has driven investment and development in emerging fields, thereby promoting employment and income growth for villagers and creating a positive demonstration effect and industrial cluster effect. Secondly, e-commerce in rural areas can compensate for the inherent disadvantages of remote geographical locations.

E-commerce platforms, with their convenience, significantly reduce intermediate links and operating costs in agricultural product sales, accelerating the flow of goods from production to consumers, and substantially increasing farmers' sales revenue and residents' disposable income. This increase in income further stimulates farmers' investment and entrepreneurial motivation, effectively promoting the integration of rural and urban industries and the close connection between upstream and downstream enterprises. Finally, the continuous emergence of entrepreneurial activities will create more supply and demand.

Innovation and expansion on the supply side, such as technological innovation, design optimization, or improvements in production methods, provide more choices on the demand side. The diversification and upgrading of consumer demand brought about by innovative entrepreneurship further promotes innovation and improvement on the supply side, forming... This has fostered a positive interaction between supply and demand, providing a continuous driving force for the domestic economic cycle in institutional economics research [27]. The increasing entrepreneurial activity is undoubtedly a crucial force in facilitating this cycle. Based on this, this paper proposes H3: the "e-commerce entering villages" policy can facilitate the domestic economic cycle by promoting resident entrepreneurship [21].

The rise of rural e-commerce has not only built new channels for agricultural product circulation and helped further increase sales, but it has also significantly promoted the transformation and upgrading of the rural industrial system. On the one hand, e-commerce platforms have proposed stricter standards for agricultural product quality supervision, packaging development, and brand building. This market-driven demand compels agricultural producers (including individual farmers and large-scale agricultural enterprises) to continuously improve standardized production processes, focus on enhancing the core quality of agricultural products [56], and accelerate the pace of agricultural product brand cultivation, ultimately prompting traditional agricultural models to shift towards refined operation and standardization.

The shift towards modern agriculture combines standardized production with branded competition. On the other hand, the continued development of rural e-commerce has effectively driven the coordinated development of supporting industries such as warehousing management, logistics and distribution, packaging design, and agricultural product processing within rural areas. This creates favorable conditions for the deep integration of the primary, secondary, and tertiary industries in rural areas, thereby achieving a systematic optimization of the rural industrial structure. Specifically, for agricultural products to achieve e-commerce operation, it is not only necessary to deeply process primary agricultural products to increase their added value, but also requires the support of an industrial system consisting of multiple links such as warehousing, packaging, logistics,

and operational management [55]. The effect of this industrial chain extension directly promotes the vigorous development of the secondary and tertiary industries within the county. Furthermore, the popularization of rural e-commerce helps improve farmers' information literacy, enhances their market sensitivity and adaptability, and thus promotes the modernization of the entire rural economy.

This table 1 classifies four mainstream rural e-commerce operating modes from platform, government, cooperative and live-streaming dimensions. Each mode matches typical platforms, unique strengths and applicable agricultural product categories respectively. Such differentiated operation choices help rural merchants select suitable sales channels according to product attributes.

Table 1 – Comparison of Major Development Models of Rural E-commerce [52]

Model	Representative Platform	Core Advantages	Applicable Scenarios
Platform-Driven	Taobao, JD.com, Pinduoduo	Large traffic, wide coverage	Mass agricultural products, daily necessities
Government-Led	Suichang Market, Demonstration County	Policy support, well-developed system	County-level public services, infrastructure
Cooperative Model	Production Area Cooperatives	Standardization, branding	Specialty fruits and vegetables, livestock and poultry
Social Live Streaming	Douyin, Kuaishou	Strong interaction, high conversion rate	Fresh produce, handicrafts

Models Cross-border e-commerce, as a new e-commerce business model, has developed rapidly worldwide with advantages that traditional trade cannot match. In 2021, the total global e-commerce sales reached US\$ 4.9 trillion, with a year-on-year growth rate of 17% [15], twice the growth rate of global trade. From the perspective of the industry distribution of digital platforms, in 2020, among the digital platforms with more than US\$ 10 billion in sales worldwide, 24% of the digital platforms were concentrated in e-commerce business. In the same year, the scale of the cross-border e-commerce market in the Asia-Pacific region reached US\$ 450 billion, accounting for 53.6% of the global cross-border e-commerce market, leading the world. The contributions of China and neighboring countries such as ASEAN are indispensable (figure 7 and 8).

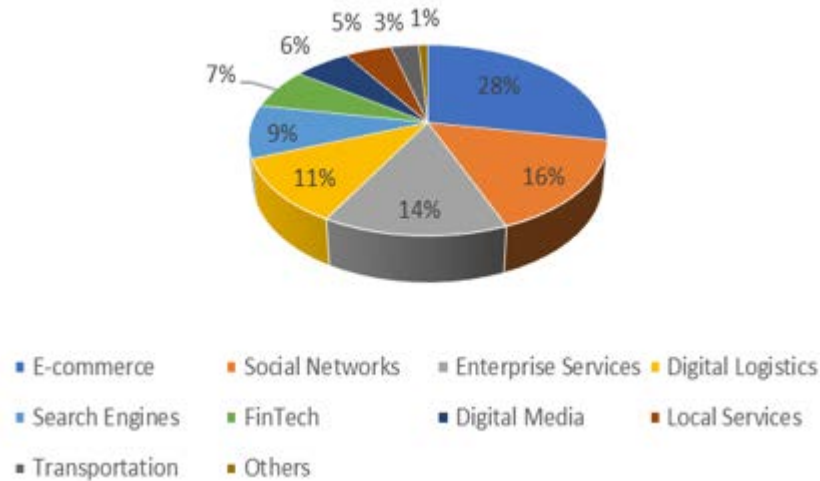


Figure 7 – Global digital platform industry distribution in 2024 [15]

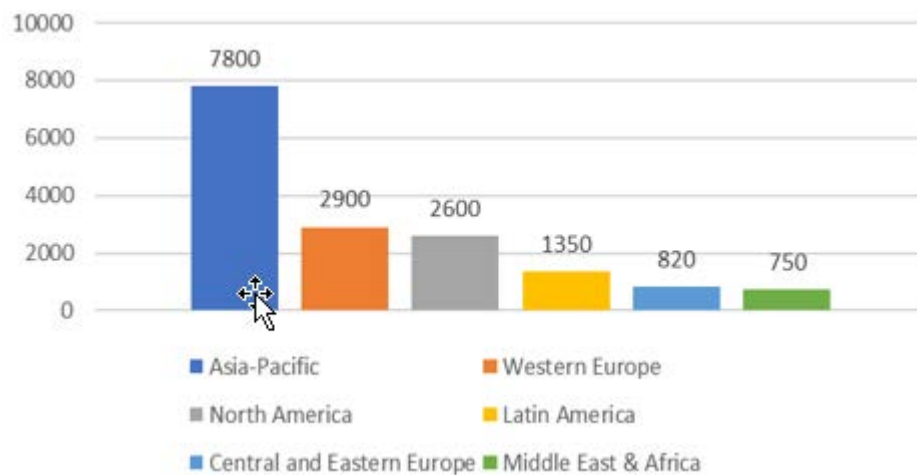


Figure 8 – Global cross-border e-commerce regional scale (USD Billion) in 2024 [15]

With the deepening of the Belt and Road Initiative, my country and its neighboring countries have engaged in comprehensive and in-depth cooperation in the field of cross-border e-commerce. To promote the rapid development of cross-border e-commerce in border areas, the State Council has established 26 comprehensive pilot zones for cross-border e-commerce in eight major border provinces and regions in different batches (see tables 2), becoming a new highlight and driving force for promoting my country's border economic and trade cooperation in the new era [44].

Table 2 – Distribution of Cross-border E-commerce Comprehensive Pilot Zones in Border Provinces and Regions (Simplified Version) [44]

Table Province	Region Number	Core Cities
Heilongjiang	4	Harbin, Suifenhe, Heihe, Tongjiang
Jilin	4	Changchun, Hunchun, Jilin, Yanji
Liaoning	5	Dalian, Shenyang, Fushun, Yingkou, Panjin
Inner Mongolia	4	Hohhot, Chifeng, Manzhouli, Ordos
Xinjiang	3	Urumqi, Kashgar, Alashankou
Yunnan	4	Kunming, Dehong, Honghe, Dali
Guangxi	4	Nanning, Chongzuo, Liuzhou, Hezhou

This map (figure 9) shows the geographical layout of China's cross-border e-commerce comprehensive pilot zones across border provinces. These pilot sites are mainly concentrated in frontier regions including Heilongjiang, Xinjiang, Yunnan and Guangxi adjacent to overseas markets.



Figure 9 – Distribution of cross-border e-commerce pilot zones [49]

This table 3 lists three representative border ports along China's neighboring borders and their concrete cross-border e-commerce operating data. Distinctive growth performances in Suifenhe-Hunchun, Khorgos and Ruili fully verify the robust development momentum of frontier cross-border commerce.

Table 3 – Typical Achievements in Cross-border E-commerce Development in Border Areas [44]

Table Border	Table Border	Core Data
China-Russia Border	Suifenhe, Hunchun	Hunchun Cross-border E-commerce: 50-fold growth in 3 years
China-Kazakhstan Border	Khorgos	247.5% growth in the first half of 2022
China-Myanmar Border	Ruili	Jewelry live streaming sales exceed 10 billion yuan annually

The Development of Cross-Border E-commerce on the China-Kazakhstan Border – With the deepening of the Belt and Road Initiative, Xinjiang, leveraging its geographical advantage of connecting the east and west, has vigorously cultivated new forms of cross-border e-commerce. In 2021, Xinjiang's cross-border e-commerce import and export volume reached 2.07 billion yuan, an increase of 152.4%; in the first half of 2022, Xinjiang's cross-border e-commerce import and export volume reached 2.12 billion yuan, a year-on-year increase of 247.5%, exceeding the total volume of the previous year. Although Xinjiang's cross-border e-commerce started relatively late overall, compared with the past, the online sales and online procurement penetration rates of Xinjiang's foreign trade enterprises are showing an increasing trend. Neighboring countries, including Kazakhstan, are paying close attention to cooperation with Xinjiang in cross-border e-commerce and related fields, promoting the development of border trade with Xinjiang through the "cross-border e-commerce + border trade" model. For example, in 2018, Kazakhstan and China signed a Memorandum of Understanding on E-commerce Cooperation.

On May 15, 2021, the Xinjiang-Kazakhstan Khorgos International Border Cooperation Center's cross-border e-commerce "air bridge" was officially opened, adding a new channel for China-Kazakhstan cross-border e-commerce exports. The opening of the "air bridge" allows overseas buyers' cross-border e-commerce parcels to be centrally declared in the Khorgos Comprehensive Bonded Zone after arrival in Khorgos (figure 10). Following customs inspection, the parcels are then loaded into containers and transported to the cooperation center. From there, they are lifted by the air bridge's specialized hydraulic grab hooks and transported to the Kazakh side of the cooperation center, where they are loaded onto receiving vehicles and shipped to other countries.



Figure 10 – Typical achievements in border e-commerce [22]

Following the establishment of the cross-border e-commerce comprehensive pilot zone in Urumqi, in January 2022, the State Council officially approved the establishment of cross-border e-commerce comprehensive pilot zones in Kashgar Prefecture and Alashankou City in Xinjiang. This has brought significant benefits to cross-border e-commerce cooperation between Xinjiang and neighboring countries such as Kazakhstan.

The development of cross-border e-commerce along the China-Myanmar border—With the continuous advancement of the "Belt and Road" initiative, economic factors such as capital, technology, talent, and management from China have provided strong support for the rapid development of Myanmar's transportation, communication, and network infrastructure. This has enabled Myanmar's telecommunications industry to achieve a leapfrog development from 2G to 4G, laying a material foundation for the development of Myanmar's cross-border e-commerce industry. In 2016, the first China-Myanmar cross-border e-commerce industrial park was launched in Ruili, Yunnan, the largest inland port in Southwest my country.

From 2018 to 2022, the State Council approved the establishment of comprehensive cross-border e-commerce pilot zones in Kunming, Dehong Dai and Jingpo Autonomous Prefecture, and Honghe Hani and Yi Autonomous Prefecture, creating platforms for high-quality imports and exports for China-Myanmar and China-Vietnam cross-border e-commerce. In the Honghe area, the innovative export model of "cross-border e-commerce + border trade" has attracted hundreds of enterprises to the area; the Dehong area has established a cross-border e-commerce supervision station, and in 2021, Dehong

Prefecture's cross-border e-commerce import and export volume accounted for more than half of the province's total. The new business model of jewelry and jade live streaming in Ruili, Dehong Prefecture, is developing rapidly [13].

A site visit to the Duobao City Jewelry Live Streaming Industrial Park in the China-Myanmar Friendship Street revealed that Ruili currently has more than a dozen e-commerce live streaming bases, with more than a dozen online live streaming platforms such as Taobao, Douyin, Huoshan, Kuaishou, and Xigua Video having established operations in these bases. According to staff at the LiVE Live Streaming Base Operation and Management Office in Ruili, the live streaming of jewelry and jade has attracted tens of thousands of people from China and Myanmar to gather here to conduct jade trading live streams. In 2020, the transaction volume of Ruili's jewelry and jade live streaming industry exceeded 10 billion yuan, and Ruili City was awarded the title of "Top 100 E-commerce Demonstration Counties". From 2019 to 2021, the year-on-year growth rates of Yunnan Province's cross-border e-commerce import and export volume were 1213%, 217%, and 317%, respectively. The Belt and Road Initiative has become a key new driving force for promoting the development of China's border economic and trade cooperation, forming a synergistic effect with the rapid expansion of e-commerce, and reshaping China's regional economic landscape and foreign trade dynamics.

China's border stretches for more than 22,000 kilometers, bordering 14 neighboring countries, and has long been an important gateway for cross-border exchanges. However, before the implementation of the Belt and Road Initiative, these regions faced structural bottlenecks such as insufficient infrastructure, fragmented trade networks, and limited market access, which restricted the full utilization of their geographical advantages. The Belt and Road Initiative's core principles of "mutual benefit, win-win cooperation, joint consultation, joint construction, and shared benefits" directly address these challenges, while e-commerce, as a digital bridge, amplifies the initiative's macroeconomic effects.

Firstly, the Belt and Road Initiative drives border regional integration into global value chains with e-commerce boosting trade facilitation. Per General Administration of Customs statistics, China's border cross-border e-commerce import and export hit 1.2 trillion yuan in 2023 [17], rising 18.5% year-on-year, and Belt and Road economies took up

65% of the total. Online platforms help inland SMEs directly reach Central Asian, Southeast Asian and Eastern European markets via border hubs, cutting transaction costs by 30%–40%. As a landmark project, China-Kazakhstan Khorgos International Border Cooperation Center combines cross-border logistics, customs clearance and payment, processing over 50 million parcels yearly and elevating the proportion of high-value-added exports including electronics and processed farm goods.

Secondly, massive Belt and Road infrastructure investment exceeding 300 billion yuan since 2013 in transboundary railways like China-Laos Railway, highways, logistics parks and cross-border digital facilities shortens border logistics time by half and enables same-next-day delivery between core border cities and adjacent capitals. The Pingxiang Cross-border E-commerce Industrial Park alongside China-Vietnam border generates over 20,000 local posts and draws 500+ e-commerce firms, lifting per capita GDP of Yunnan, Guangxi by 12%–15% in a decade and easing coastal-inland development disparity.

Thirdly, institutional reforms fueled by the Initiative include 15 national border e-commerce pilot zones, streamlined customs rules and electronic origin certification recognition with 28 Belt and Road nations. Boosted financial cooperation advances CIPS, lowering cross-border payment dependency and exchange rate risks. Accordingly, cross-border e-commerce's proportion of total border trade climbed from 8% (2015) to 23% (2023) as a core export booster [48].

To sum up, the Belt and Road Initiative unlocks border e-commerce potential by removing infrastructure, institutional and market obstacles, lifting trade volume, optimizing industrial layout and consolidating China's standing in global digital economy. Its economic benefits will keep expanding alongside continuous initiative advancement and e-commerce technical upgrading.

2.2 Microeconomic impact of e-commerce on China's economy

Employment is the foundation of people's livelihood, the source of wealth, and an important guarantee for social stability and sustained and healthy economic development. Rural labor employment plays a crucial role in increasing farmers' income and rural

revitalization [50]. The Third Plenary Session of the 20th CPC Central Committee proposed the employment goals of "improving the employment-first policy" and "establishing a sound mechanism for promoting high-quality and full employment." However, the overall skill level of China's rural labor force remains low, failing to meet the market's urgent demand for skilled workers. This has led to the long-term coexistence of the contradictory phenomena of "difficulty in finding employment" and "difficulty in recruiting workers." Under severe employment pressure, flexible employment forms, represented by self-employment, individual business, and the gig economy, have broken down traditional labor relations, stimulated new vitality in the rural employment market, and become a powerful support for expanding farmers' employment channels and increasing their income.

This dual-axis line chart illustrates e-commerce's driving effect on domestic employment and consumption from 2020 to 2025. The blue line shows employment rose from 60.15 million in 2020 to a projected 98.6 million by 2025. Meanwhile, the green curve reflects total consumption climbing from 37.21 trillion yuan to an expected 55.75 trillion yuan over the same period (figure 11). The synchronous upward trend verifies e-commerce's stable boosting function on job creation and resident consumption expansion.

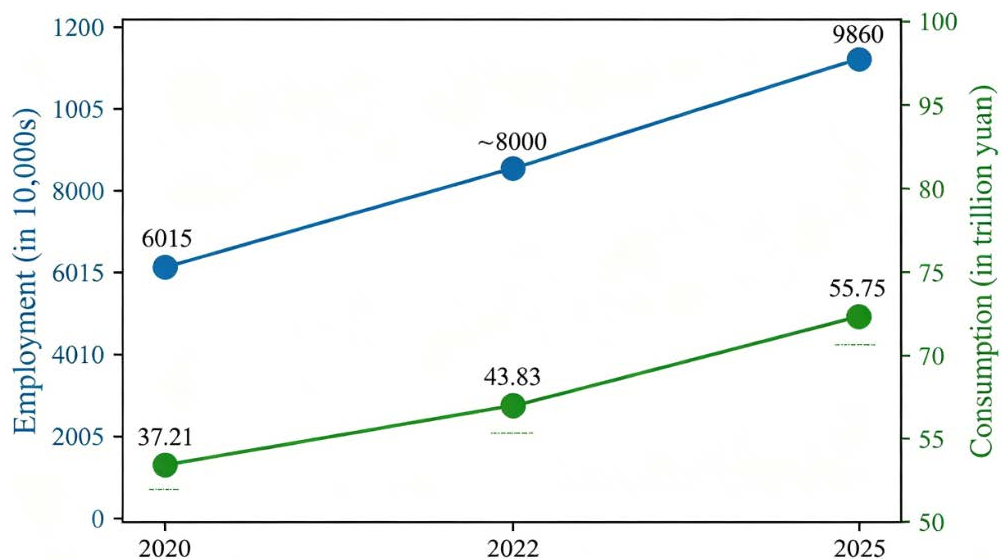


Figure 11 – E-commerce drives employment and consumption (2020–2025) [7]

With the continuous development of the digital economy, e-commerce has gradually become an important engine for empowering the new dual-circulation development pattern

and contributing to the construction of a unified market. The "China Digital Economy Development Research Report (2024)" by the China Academy of Information and Communications Technology shows that in 2023, the digital penetration rates of my country's primary, secondary, and tertiary industries were respectively... The corresponding digital technology innovation and development, at 10.78%, 25.03%, and 45.63%, have brought new business formats, models, opportunities, and employment forms to the market. E-commerce, as a concentrated manifestation of the digital economy in market transactions, is an important supplement to physical transactions, creating numerous opportunities for flexible employment of rural laborers. E-commerce platforms have become new agricultural tools, and live-streaming sales have become new forms of agricultural work.

According to the "Digital Rural Development Research Report - Logical Architecture, Key Breakthroughs, and Sustainable Model Exploration (2024)" by the China Academy of Information and Communications Technology, my country's rural e-commerce online retail sales have increased from 353 billion yuan in 2015 to 2.5 trillion yuan in 2023. a scale expansion exceeding... Seven times. Furthermore, initiatives such as the "Agricultural Cloud Action," "Agricultural Assistance Action," and "Golden Production Area Plan" launched by e-commerce platforms like Pinduoduo, Taobao, and Douyin have significantly boosted the vitality of rural e-commerce and encouraged flexible employment among rural laborers [7].

Existing research indicates that the development of the digital economy can significantly promote non-agricultural employment by fostering flexible employment choices through job creation and internet information effects, thereby promoting farmer innovation, entrepreneurship, and employment transformation. Rural e-commerce can increase the probability of rural entrepreneurship and drive the development of related industries such as logistics and warehousing, thus expanding rural employment capacity and increasing the probability of non-agricultural employment. Existing research mainly focuses on the impact of the digital economy on flexible employment. While research has focused on the driving effect of e-commerce on flexible employment in rural areas and its promotion of non-agricultural employment for rural laborers, few studies have specifically examined the impact and transmission pathways of e-commerce on flexible employment in rural areas. Therefore, this paper uses data from the China Household Finance Survey (CHFS) and

county-level Taobao village data from Alibaba Research Institute [3] to construct a two-way fixed effects model. From a micro perspective, this paper reveals how e-commerce stimulates flexible employment for rural laborers by alleviating liquidity constraints, improving human capital levels, and promoting industrial upgrading.

E-commerce creates employment opportunities. The rise of rural e-commerce has led to the development of corresponding supporting industries, giving rise to a number of new... Emerging employment models, such as live streamers, delivery drivers, food delivery workers, and e-commerce bloggers, directly create numerous job opportunities through their flexible and diverse employment methods. Secondly, there is the effect of industrial structure upgrading. The booming development of e-commerce has led to the emergence of digital industry clusters, such as the constantly emerging "Taobao Villages," which are new entrepreneurial cluster models formed by combining traditional industries with e-commerce, driving the transformation of rural employment structure towards higher value-added industries. Thirdly, based on the specific characteristics of agricultural products in particular production areas, e-commerce also plays a role in connecting supply and demand markets, and online and offline markets.

On the one hand, unlike the mandatory requirements of traditional business models on operating time and location, e-commerce platforms and workers are mostly flexible in their organizational models. Workers can work remotely with the help of the Internet and e-commerce platforms, making it easier to balance work and life, thus increasing the entrepreneurial willingness of rural laborers [5]. On the other hand, e-commerce reduces the cost of starting a business, broadens the channels for rural residents to search for and obtain information, and has advantages such as low entry barriers, low technical difficulty, and small initial capital investment, thus increasing the possibility of rural residents succeeding in online entrepreneurship. Based on this, hypothesis H1 is proposed the development of e-commerce increases the flexible employment of rural laborers (table 4). The development of e-commerce has accelerated the promotion and application of digital technologies, significantly improved the level of inclusive finance in the region, and effectively helped flexible workers alleviate financing difficulties and reduce financing costs.

Table 4 – Three Major Effects of E-commerce on Rural Employment [5]

Effect	Path	Result
Job Creation	Live Streaming, Express Delivery, Customer Service, Packaging	Increased Flexible Employment Positions
Industrial Upgrading	Primary Industry to Tertiary Industry, Taobao Village Agglomeration	Improved Employment Quality and Income
Lowered Entrepreneurship Barriers	Low Capital, Low Technology, Online Stores	Increased Probability of Farmers Starting Businesses

From the perspective of capital demand, online transaction records on e-commerce platforms can help rural residents accumulate credit, and business activities conducted through e-commerce platforms can significantly increase rural residents' income levels, improve credit credibility and loan amounts, reduce the financial exclusion of farmers by traditional financial institutions, and thus significantly increase the probability of farmers obtaining credit. From the perspective of capital supply, e-commerce platforms, based on users' sales behavior and data, can build a more accurate individual credit identification system and cooperate with MYbank to provide credit support to online users. According to the 2023 annual report of MYbank, a subsidiary of Ant Group [37], as of the end of 2023, over 2.6 million farmers obtained loan quotas through the "Farmer Instant Loan" service jointly launched by the Big Data Development Center of the Ministry of Agriculture and Rural Affairs. 535 000 farmers received credit for the first time, effectively promoting farmers' business activities on the platform.

The development of e-commerce enhances farmers' human capital by expanding learning opportunities and improving digital skills, thereby increasing opportunities for flexible employment for the rural workforce. On the one hand, e-commerce, a new business model based on the internet, is characterized by low marginal cost and high openness. This helps low-income farmers expand their social networks and learn skills at low cost, enhancing their professional abilities and employment competitiveness, thereby broadening employment possibilities and increasing opportunities for flexible employment. On the other hand, e-commerce operations, in turn, require rural laborers to master basic digital skills (such as using e-commerce platforms, mobile payments, and data analysis tools),

creating a "learning by doing" effect. This skill learning effect will further spill over to families and communities, improving the digital literacy of the regional workforce.

Based on this, the development of e-commerce promotes the upgrading of rural industrial structures, creates more non-agricultural employment opportunities, and promotes flexible employment for rural laborers. The development of e-commerce not only promotes the structural optimization and industrial upgrading of the rural economy on the supply side, prompting the transfer of labor from traditional primary and secondary industries to the higher value-added tertiary industry, but also promotes the upgrading of residents' consumption structure on the demand side, contributing to the transformation of rural industrial structures. This industrial upgrading facilitates job potential tapping and career transitions during digital transformation, providing a large number of flexible employment opportunities for rural laborers, absorbing surplus labor from urban and rural areas, and reshaping the social employment structure (table 5).

Table 5 – Growth of Online Retail Sales in Rural China [37]

Year	Rural E-commerce Retail Sales (Trillion Yuan)	Scale Change
2015	0.35	Base Period
2020	1.79	5-fold growth in 5 years
2023	2.50	Over 7-fold growth in 8 years
2025	3.12	Approximately 8.9-fold growth in 10 years

With the rapid development and intensified competition in the e-commerce industry, companies are constantly raising their educational requirements for e-commerce talent. In the past, the e-commerce field may have placed more emphasis on practical experience and skills, rather than considering academic qualifications as the sole evaluation criterion. However, as the industry gradually develops and improves, more and more companies tend to value the educational background of job seekers during recruitment and selection, using it as an important reference factor. With the expansion of the higher education system and the advancement of professional education in the e-commerce field, the industry is attracting more and more highly educated talent, thereby raising the overall educational level of the industry.

Against the backdrop of the rapid development of the e-commerce industry, companies' demands for and adaptability of fresh graduates are showing new characteristics. As the e-commerce industry continues to mature and standardize, companies' demands for fresh graduates are also constantly changing. Current trends show that employers are more inclined to assess the overall qualities of applicants and their potential for development. Companies hope to introduce "fresh blood" with these qualities and cultivate them into key forces for the organization's future through systematic training and development programs. Newcomers to the e-commerce field have demonstrated extremely high adaptability and development potential. Given that the industry encompasses a broad knowledge base spanning multiple disciplines such as marketing, data analysis, and information technology, young professionals entering the workforce can acquire and master the necessary expertise and skills quickly through continuous learning and practice. The rapid expansion of e-commerce has not only reshaped traditional business operations but also brought unprecedented challenges and opportunities to talent development and the labor market. Faced with this transformation, universities, enterprises, and individuals all need to adapt actively and jointly promote the cultivation of e-commerce talent and the healthy development of the job market. Universities should strengthen cooperation with enterprises to jointly build a talent cultivation system that meets market demands [49].

With the rapid development of information technology, e-commerce has permeated people's daily work and life. As an advanced business platform that balances supply and demand, it has completely changed the traditional transaction environment and information exchange model, not only breaking through the limitations of time and space in consumption but also greatly optimizing resource allocation efficiency. Previously passive, price-focused consumer purchasing decisions are gradually shifting to active participation and value recognition, with long-term interaction gradually replacing one-off transactions. In this context, exploring the impact of e-commerce on consumer behavior and the market economy has certain practical significance. Changing Consumer Behavior Patterns. First, it provides purchasing decision support. E-commerce shopping is convenient and personalized; intelligent recommendation and precision marketing software can provide customers with purchasing decision support. For example, algorithmic recommendation

technology can provide targeted product information, such as price information and product reviews [57], based on consumers' historical browsing information, purchasing preferences, and various behavioral data during the shopping process, improving shopping efficiency while increasing decision satisfaction.

This schematic diagram summarizes three core consumption transformations driven by e-commerce development (figure 12). It covers enriched consumption options featuring globalized, diversified and personalized commodity supply. E-commerce cuts shopping cost by removing intermediate links and launching regular preferential marketing activities. Round-the-clock shopping and home delivery also greatly upgrade overall consumption convenience for users.

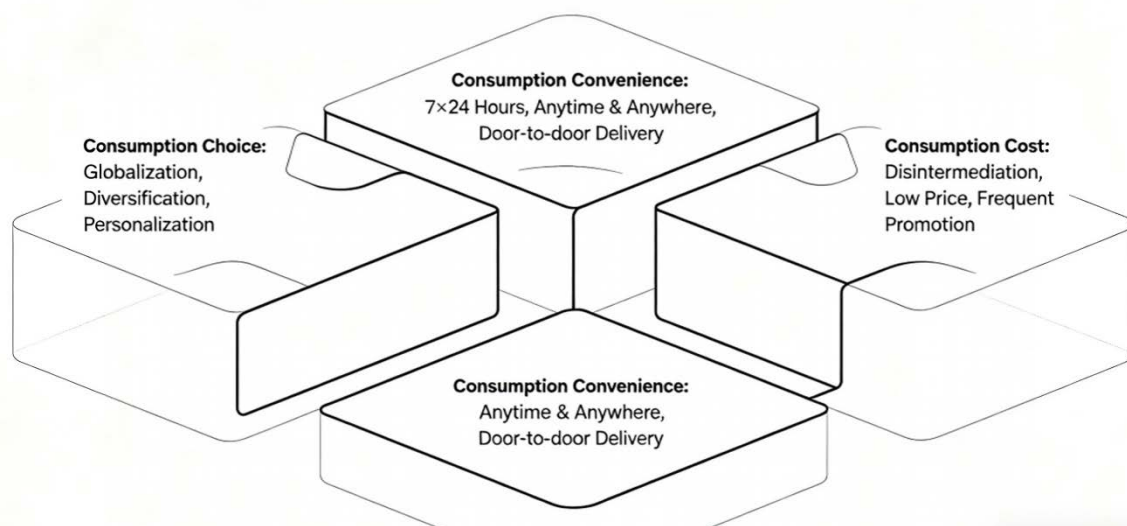


Figure 12 – Three core changes e-commerce brings to consumers [57]

In traditional offline consumption models, consumers' choices are often limited by the physical stores, product categories, and inventory levels in their local area. This is especially true in third- and fourth-tier cities, counties, and rural areas, where consumers have limited access to high-quality, imported, and niche products from first-tier cities, resulting in significant geographical limitations in their consumption choices [22]. The emergence of e-commerce has completely broken down these geographical barriers, building an online bridge connecting global goods and consumers. This allows consumers, regardless of their location, to conveniently access goods and services from all over the

country and even the world, greatly expanding the boundaries of consumer choices and effectively meeting their diverse, personalized, and differentiated needs [23].

In terms of product categories, e-commerce platforms cover all categories of daily necessities, from basic daily necessities like grains, oils, rice, and fresh fruits and vegetables, to durable consumer goods such as home appliances, digital products, clothing, shoes, hats, and cosmetics, and further to service products such as books, audio-visual products, education and training, travel services, and healthcare, almost covering all consumer needs. Taking mainstream e-commerce platforms like Tmall, JD.com, and Pinduoduo as examples, their product SKUs (Stock Keeping Units) number in the tens of millions, far exceeding any large offline supermarket. Consumers can easily find the products they need on these platforms without having to travel to multiple physical stores. For instance, rural consumers previously found it difficult to buy branded home appliances, imported skincare products, and high-quality agricultural supplies. However, through e-commerce platforms like Pinduoduo and JD.com's rural channels, they can directly purchase the same products as urban consumers, no longer limited by geographical location. For young consumers who appreciate niche culture and pursue individuality [54], platforms like Taobao and Xianyu offer handmade products, original designs, and retro goods, satisfying their diverse consumption needs and making personalized consumption possible (table 6 and 7).

Table 6 – E-commerce vs. Traditional consumption model [54]

Dimension	Traditional	E-commerce
Region	Limited	Global coverage
Time	Fixed hours	7×24 hours
Variety	Limited	Massive SKUs
Price	High markup	Low direct price
Information	Asymmetric	Transparent

E-commerce removes time restrictions to support round-the-clock shopping unlike time-bound brick-and-mortar stores. Office workers and elderly users can complete purchases at home or spare time without trips to physical outlets, matching modern fast-paced lifestyles.

Table 7 – Comparison of e-commerce and traditional consumption models [55]

Dimension	Traditional	E-commerce
Geographical Restriction	Strong, limited by store coverage	None, nationwide/global shopping
Time Restriction	Fixed business hours	24/7 operation
Product Variety	Limited	Millions of SKUs
Price Level	Higher, multi-level markup	Lower, direct from manufacturer
Information Access	Asymmetric	Transparent, price comparison available, reviews available

It also breaks geographical limits; shoppers with internet-connected phones or computers can place orders at home, on commutes or trips and get doorstep delivery, reshaping traditional shopping scenarios.

In terms of lower consumption costs, e-commerce shortens circulation chains via direct factory-to-consumer sales and cuts intermediate markup. Manufacturers running official flagship stores on Tmall and JD sell commodities at prices 20%–50% below offline counterparts. Compared with physical shops burdened by rent and labor expenses, online merchants save fixed store costs. Platforms including Pinduoduo optimize supply chains to slash operational spending and launch affordable niche products. Intense industry competition brings frequent promotions: Double Eleven, Double Twelve and 618 feature discounts, coupons and flash sales; group-buy on Pinduoduo and JD's coupon rebates further reduce consumers' actual shopping expenditure.

2.3 Impact of e-commerce on traditional retail industry

With the rapid development of the internet, e-commerce (e-commerce) is playing an increasingly important role in traditional retail. E-commerce has not only improved the consumer shopping experience but also created new growth opportunities for businesses. In future development, e-commerce will continue to play a vital role and lead the retail industry towards digital and intelligent transformation (figure 13).

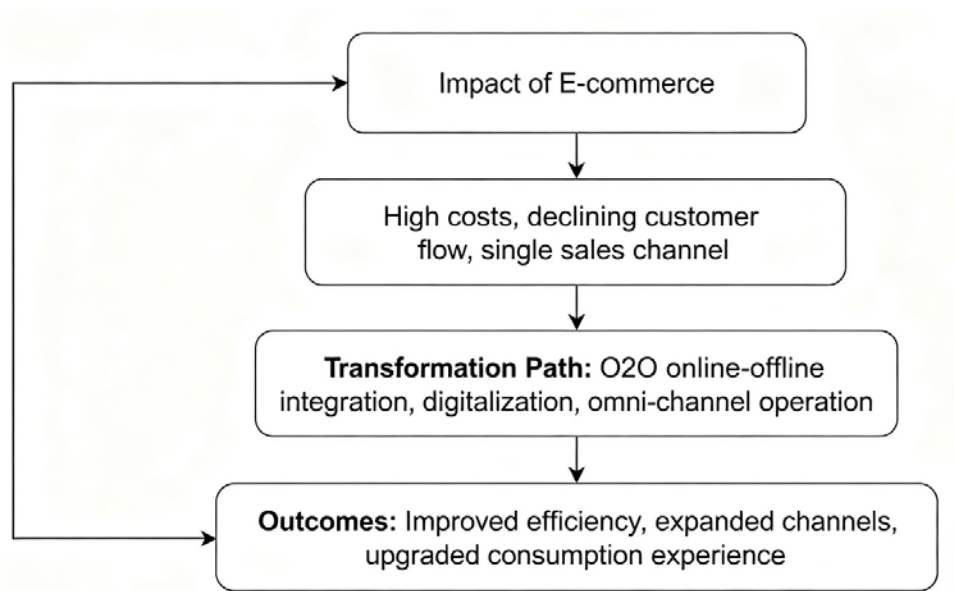


Figure 13 – The impact of e-commerce on traditional retail and its transformation path [4]

This figure sorts out e-commerce’s multifaceted influences and corresponding transformation paths for traditional retail. It covers channel expansion, fiercer market competition, rising cost pressure as well as offline-online integration, digital upgrading and optimized customer service. These six dimensions jointly depict how physical retailers adapt and upgrade amid digital commerce shocks (figure 14).

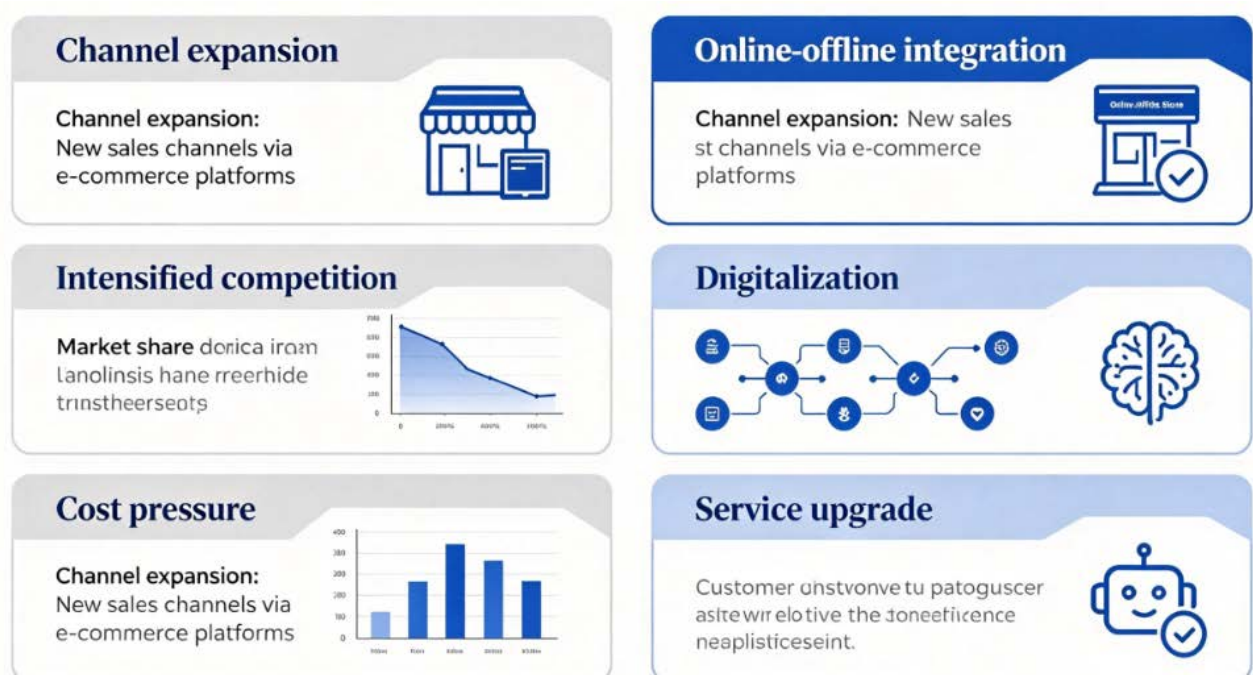


Figure 14 – E-commerce impact on traditional retail & transformation path [35]

With continuous technological advancements and changing consumer demands, e-commerce will play an increasingly important role in future development [35]. First, Consumers will be able to shop more conveniently on mobile devices and enjoy a faster, more stable network experience. Second, the application of artificial intelligence (AI) in e-commerce will become a future trend. Through AI technology, e-commerce platforms can better understand consumer needs and meet their personalized shopping requirements through in-depth analysis and learning of consumer data. This allows consumers to enjoy a more convenient and satisfying shopping experience, while also enabling businesses to more accurately target their markets and improve sales performance. Furthermore, e-commerce platforms, through big data analytics, can gain in-depth understanding of consumer purchasing behavior, preferences, and other information. This allows businesses to obtain more comprehensive market insights, understand consumer trends, competitor dynamics, and future development directions. Based on these insights, businesses can formulate more precise marketing strategies and decisions to adapt to market changes and meet consumer needs. Finally, the integration of e-commerce and offline retail will become increasingly close. In the future, traditional retail stores will place greater emphasis on online-offline integration. Through the operation and brand promotion of e-commerce platforms, traditional retail enterprises can expand sales channels, increase brand exposure, and achieve seamless online-offline sales connections [8]. This online-offline integration creates more sales opportunities for enterprises and enhances their competitiveness.

On the one hand, e-commerce, through internet platforms, breaks down the geographical limitations of the traditional retail industry. Consumers can choose goods globally, no longer limited to local retail stores. Traditional retailers face competitors from across the country and even the world, greatly expanding their market reach, but also increasing competitive pressure. On the other hand, traditional retail mainly relies on physical stores for sales, while e-commerce provides consumers with online shopping channels. Businesses use self-built e-commerce platforms or join third-party e-commerce platforms to sell products [9]. Online sales channels offer advantages such as low cost, large display space, and rapid information dissemination, forcing traditional retailers to expand and integrate their channels.

This table 8 quantifies e-commerce’s pulling effect on employment and domestic consumption from 2020 to 2025.

Table 8 – E-commerce drives employment and consumption growth [8]

Year	E-commerce Related Employment (10,000 people)	E-commerce Consumption Volume (Trillion CNY)
2020	6015	37.21
2021	7145	42.30
2022	About 8000	43.83
2023	8650	47.56
2024	9280	51.28
2025	9860	55.75

Both the number of relevant jobs and total consumption value maintain continuous yearly upward growth throughout the research period. The synchronized rising data demonstrates e-commerce’s stable positive contribution to China’s macroeconomic development.

E-commerce is having a significant impact on the job market and consumption levels. E-commerce is creating new job opportunities and enhancing consumption levels by providing more choices and convenience. Regarding employment, the development of the e-commerce industry is creating numerous new job opportunities, including e-commerce platform operation and management, online marketing, data analysis, logistics, and delivery. In terms of consumption levels, e-commerce has boosted consumer spending by providing more product choices and shopping convenience. Through e-commerce platforms, consumers can easily compare the prices and features of different products, enabling them to make more informed purchasing decisions.

The development of e-commerce has intensified market competition. New e-commerce companies are constantly entering the market, attracting consumers with innovative business models and marketing strategies. Traditional retailers not only have to compete with their peers but also with e-commerce companies for market share, leading to a proliferation of competitive tactics such as price wars, service wars, and marketing wars. In the e-commerce era, a company's competitive advantage has changed. Besides traditional factors such as product quality and brand awareness, logistics speed, data analysis

capabilities, and customer relationship management have become new competitive advantages. E-commerce companies with strong technological capabilities and data processing abilities are better able to meet consumer needs and gain a competitive edge.

The widespread adoption of mobile devices is a significant driving force behind the development of e-commerce. With the proliferation of smartphones and tablets, consumers only need to carry their smartphones or tablets to shop anytime, anywhere[11]. Whether on a bus, in a coffee shop, or on the comfortable sofa at home, shopping has become incredibly convenient. The application of big data and artificial intelligence (AI) is a significant factor in e-commerce. Big data analytics provides in-depth insights into consumers' purchasing habits, interests, and preferences. By mining and analyzing this data, e-commerce companies can better understand consumer needs and provide customized products and services. E-commerce platforms, leveraging big data analytics, can accurately predict product demand and sales trends, allowing for timely adjustments to inventory and procurement strategies. AI also plays a crucial role in e-commerce. Through technologies such as machine learning and natural language processing, e-commerce platforms can implement intelligent shopping guides and customer service functions. For example, AI technology can provide personalized product recommendations and shopping suggestions based on consumers' historical purchase records and personal preferences. AI technology can also provide consumers with instant customer support and Q&A through intelligent chatbots, improving user experience. The application of big data and AI not only makes e-commerce more personalized and precise but also brings more business opportunities to retailers. By analyzing consumer data, businesses can understand market trends and competitor strategies, thereby adjusting their business models and marketing strategies. In addition, big data analytics can help businesses refine their operations, optimize supply chain management and logistics services, and improve efficiency and reduce costs[9].

Chapter 3 Challenges and future prospects of e-commerce development

3.1 Challenges of e-commerce development

China's e-commerce started in the late 1990s, experiencing its nascent, growth, and explosive growth phases. In 2013, it became the world's largest online retailer, playing an irreplaceable role in the circulation revolution, industrial upgrading, consumption expansion, and employment support. However, as the industry shifts from "high-speed growth" to "high-quality development," contradictions in market structure, industrial synergy [18], regulatory systems, regional layout, technology, and talent have gradually emerged, forming multiple challenges that restrict the sustainable and healthy development of e-commerce.

Severe homogenization of market competition, fading traffic dividends, and increasing profitability pressure. After more than two decades of development, my country's e-commerce market has formed a relatively stable competitive landscape, with comprehensive e-commerce platforms, social e-commerce, live-streaming e-commerce, content e-commerce, and cross-border e-commerce coexisting. However, the high degree of homogenization in business models, product supply, and marketing methods has become a common problem in the industry. Comprehensive e-commerce platforms are highly similar in terms of product categories, promotional activities, and service content. Live-streaming e-commerce and social e-commerce primarily rely on low prices to attract traffic and drive sales of blockbuster products, lacking product differentiation and brand recognition. Many small and medium-sized businesses and platforms lack core technologies, unique supply chains, and brand barriers, forcing them into price wars and traffic wars, leading to a continuous compression of the industry's overall profit margins.

From a traffic perspective, the traditional demographic dividend of e-commerce has largely peaked. my country's internet user base and online shopping penetration rate are approaching saturation, and the cost for platforms and merchants to acquire new users is rising year by year. Data shows that the cost of acquiring a single active user on mainstream domestic e-commerce platforms has risen from less than 100 yuan in 2015 to 300-500 yuan

in 2023 [1], with some vertical sectors even exceeding 800 yuan. High traffic costs, coupled with fixed expenses such as logistics, packaging, after-sales service, and platform commissions, have led many small and medium-sized businesses to face the dilemma of "increased order volume but decreased profits," while platforms also face slowing revenue growth and increasing pressure to achieve profitability [14].

The cross-border e-commerce sector also faces fierce competition. With the increasing global e-commerce penetration rate, a large number of Chinese sellers have flocked to emerging markets such as Southeast Asia, Europe, America, and the Middle East, leading to prominent issues of product homogenization and low-price competition [32]. Simultaneously, rising trade protectionism in some countries, tightened policies on overseas platforms, tariff adjustments, and stricter intellectual property regulations have further increased the operational risks and compliance costs of cross-border e-commerce. Small and medium-sized cross-border e-commerce enterprises lack the resilience to withstand risks, resulting in a significant decline in operational stability [15].

Low level of supply chain digitalization and low industrial collaboration efficiency. The core competitiveness of e-commerce relies on an efficient, stable, and digitalized supply chain system. However, my country's e-commerce supply chain currently suffers from prominent problems such as insufficient collaboration, low standardization, lagging digital transformation, and weak risk resistance.

In the agricultural sector, the upstream flow of agricultural products remains a weak link in the e-commerce supply chain. my country's agricultural production is mainly carried out by small-scale farmers, resulting in low levels of standardization, grading, and branding, leading to inconsistent product quality. Cold chain logistics coverage is low, and the loss rate of fresh agricultural products during storage and transportation is as high as 15%–25%, far lower than the level of less than 5% in developed countries. The lack of unified quality certification and traceability systems for most agricultural products makes it difficult to meet the demands of online consumers for safety, quality, and stable supply, hindering the high-quality development of rural e-commerce.

In the manufacturing sector, the integration of e-commerce and manufacturing is insufficient. Many traditional manufacturing enterprises still rely primarily on offline

wholesale and OEM production, with slow digital transformation. Production plans are out of sync with online consumer demand, leading to both shortages of popular items and stockpiles of slow-moving goods. While the C2M (Consumer-to-Manufacturer) model has been promoted, most SMEs lack flexible production capabilities and data integration capabilities, making it difficult to achieve on-demand production and rapid response, resulting in low supply chain responsiveness and efficiency.

The mismatch between the logistics system and e-commerce development persists. Rural logistics suffers from significant shortcomings in the "last mile," with high costs, slow delivery times, and low network coverage in remote counties and villages [9]. Cross-border logistics faces problems such as long delivery times, high costs, complex customs clearance, and uneven distribution of overseas warehouses. Lack of data sharing and information asymmetry between upstream and downstream enterprises in the supply chain[18], coupled with insufficient coordination in order processing, inventory management, logistics, and payment, leads to high fulfillment costs, numerous after-sales disputes, and directly impacts consumer experience [10].

The regulatory system is mismatched with new business models, increasing the difficulty of market governance. E-commerce is characterized by cross-regional operations, virtualization, high-frequency iteration, and dispersed entities, posing a significant challenge to the traditional regulatory model, which is primarily offline, localized, and static. Problems such as lagging regulation, incomplete rules, and insufficient coordination are prominent.

First, market disorder remains a significant issue. False advertising, counterfeit goods, fake reviews, fabricated sales figures, and price fraud are rampant in new business models such as live-streaming e-commerce, short-video e-commerce, and mini-program e-commerce. Consumers face lengthy rights protection processes, difficulties in providing evidence, obtaining compensation, and holding individuals accountable, leading to frequent incidents of consumer rights infringement [34].

Second, platform competition and data security supervision need improvement. Some platforms engage in monopolistic and unfair competition practices such as "choose one of two," price discrimination based on big data, unreasonable commissions, and restrictions on

merchants' independent operations, squeezing the survival space of small and medium-sized businesses and undermining a fair competitive environment. At the same time, e-commerce platforms exhibit irregularities in the collection, storage, use, and sharing of user information, increasing the risks of data leakage, abuse, and illegal transactions, threatening personal privacy and information security.

Third, there is insufficient coordination in the supervision of cross-border e-commerce. Cross-border e-commerce involves multiple departments, including customs, taxation, foreign exchange, market supervision, and postal administration. Regulatory standards, processes, and data are not yet fully integrated, leading to problems such as cumbersome customs declarations, long tax refund cycles, and inconvenient cross-border payments for businesses. Some gray-area customs clearance practices, underreporting of prices, and the sale of infringing goods still exist, hindering the standardized development of the industry.

Uneven regional and urban-rural development, significant disparities in resource allocation. My country's e-commerce development exhibits a clear pattern of eastern regions leading, central regions catching up, and western regions lagging behind; cities are densely populated while rural areas are underdeveloped. Regional and urban-rural imbalances are prominent, becoming significant factors hindering the inclusive development of e-commerce.

Regionally, eastern provinces and cities such as Guangdong, Zhejiang, Jiangsu, Shanghai, and Beijing, leveraging their advantages in industrial clusters, transportation location, digital infrastructure, and human capital, have long led the country in e-commerce transaction volume, number of platforms, number of practitioners, and innovation capabilities. While the central and western regions have developed rapidly with policy support, they still lag significantly in network infrastructure, logistics systems, industrial base, and digital literacy, resulting in low e-commerce penetration, a single business model, and limited driving force [2].

Urban-Rural Integration: Urban e-commerce has entered a stage of refinement, quality improvement, and intelligentization, while rural e-commerce still focuses on primary agricultural products and low-priced daily necessities, with low levels of branding,

standardization, and scale. The lack of digital skills among rural residents, a shortage of e-commerce talent, and high logistics costs have led to a situation where "industrial goods go to the countryside" smoothly but "agricultural products go to the city" difficultly, and a two-way circulation pattern between urban and rural areas has not yet been fully formed. The empowering role of e-commerce in rural economy, farmers' income growth, and rural revitalization still has significant room for development.

Furthermore, the integration of domestic and foreign trade is not high. Domestic e-commerce and cross-border e-commerce are fragmented in terms of rules, standards, supply chains, and marketing systems. Both domestic trade enterprises facing obstacles in transitioning to cross-border trade and foreign trade enterprises returning to the domestic market face obstacles, making it difficult to efficiently allocate resources between the two markets.

Insufficient depth of technology application and shortage of multi-skilled talent. Technology and talent are the core support for the high-quality development of e-commerce, but currently, my country's e-commerce industry still faces problems such as superficial technology application, insufficient supply of high-end technologies, and an imbalanced talent structure.

In terms of technology application, the adoption of technologies such as big data, artificial intelligence, cloud computing, blockchain, and VR/AR in the e-commerce field is not high. Most enterprises only use these technologies for superficial aspects such as advertising, customer service responses, and product recommendations, with insufficient application in core scenarios such as supply chain forecasting, intelligent production, risk control, cross-border compliance, and data security[26]. Data silos between platforms and merchants are widespread, and the value of data is not fully realized. Meanwhile, technical safeguards such as cybersecurity, algorithm compliance, and system stability are insufficient, leading to risks such as hacker attacks, system crashes, and data loss.

Regarding talent supply, the e-commerce industry is rapidly iterating, resulting in a surge in demand for multi-skilled personnel in areas such as technology development, data analysis, cross-border operations, live-streaming e-commerce, brand management, and supply chain optimization. However, university majors and curriculum content are out of

sync with actual market demands, emphasizing theory while neglecting practical skills. Rural areas, central and western regions, and small and micro enterprises generally face a talent dilemma of "difficulty in attracting, retaining, and training," with a severe shortage of front-line practical talent in areas such as live-streaming operations, cross-border e-commerce, and rural e-commerce, hindering industry innovation and upgrading.

From the perspective of industrial economics, the five major obstacles summarized above are mutually interrelated and form a restrictive closed loop that restricts the high-quality transformation of domestic e-commerce. Excessive homogeneous competition triggered by saturated traffic dividends compresses corporate profit margins, which directly reduces enterprises' available capital input for supply chain digital upgrading and new technology research and development. Insufficient digital transformation of upstream agriculture and manufacturing further leads to undifferentiated commodity output, intensifying low-price competition across online markets. Meanwhile, mismatched regulatory rules lag behind emerging business modes such as live streaming and social commerce, leaving speculative low-cost copycat merchants in a regulatory grey area and disrupting the benign market competition order [43]. Uneven regional resource distribution and talent shortages then amplify all the above drawbacks: backward digital infrastructure and insufficient skilled workforce in central, western and rural areas make it harder for local merchants to realize differentiated operation and intelligent supply chain construction.

Empirical data from nationwide e-commerce industrial surveys can further verify the interactive relationship of these challenges. According to industrial tracking statistics, over 60% of small and medium e-commerce entities in underdeveloped inland regions rank insufficient supply chain capability and talent scarcity as top two operational difficulties, while more than half of platform-based enterprises in eastern coastal cities regard vicious homogenization competition and rising user acquisition cost as core operating pressure. In cross-border tracks, multiple adverse factors overlap obviously: global market homogenized commodity competition plus overseas stricter trade supervision raise compliance costs, and domestic cross-border sellers' inadequate mastery of localized operation technologies and shortage of international compound talents further enlarge overseas operating risks.

The structural problems of China's e-commerce are also rooted in the historical development logic of the industry. In the past rapid expansion stage dominated by demographic bonus and dividend of low logistics cost, most market participants prioritized rapid scale expansion rather than long-term capacity building including brand cultivation, core technology R&D and supply chain optimization. Low industry access threshold attracted massive startup merchants without industrial resource advantages, laying the groundwork for pervasive homogeneous competition when market stock growth slowed down after 2020 [17]. Different industrial chains such as agriculture, manufacturing and modern service industry have uneven digital foundation, resulting in varying paces of integration with online retail and widening the whole-industry synergy gap.

From international comparative dimension, developed economies' e-commerce sectors experienced similar growing pains during their transition from rapid expansion to refined development. European and American online retail markets once suffered from serious price-oriented homogeneous competition in early development period, and relevant countries optimized market structure via strict anti-unfair competition laws, standardized intellectual property protection and targeted industrial support policies to guide enterprises shifting toward differentiated product development. Such overseas mature governance experience provides referable ideas for China to resolve existing industry constraints, yet direct copying is infeasible due to distinct industrial foundation, resource endowment and market consumption characteristics between China and western countries.

In addition, external uncertain factors including global economic fluctuation, frequent adjustment of international trade policies and periodic geopolitical risks continuously inject new variables into domestic e-commerce's challenge system. Cross-border e-commerce bears the brunt of overseas policy changes, while domestic consumption fluctuation indirectly changes online shopping demand structure and intensifies stock competition among existing merchant [20]. Under such compound internal and external pressures, the resolving of China's e-commerce multiple dilemmas cannot rely on single market adjustment or separate policy intervention, and needs systematic coordinated improvement covering market standardization, supply chain reconstruction, regulatory upgrading, balanced regional resource allocation and multi-level talent cultivation in the long run.

3.2 Future trends in e-commerce development

Against the backdrop of deepening digital economy development, accelerated construction of the domestic and international dual circulation, continuous consumption upgrading, technological breakthroughs, and continuous policy improvement, Chinese e-commerce will enter a new stage of parallel development characterized by standardization, intelligence, integration, greening, and globalization, exhibiting five core trends.

Technology-driven comprehensive deepening, intelligentization becomes a core competitive advantage. Artificial intelligence, big data, cloud computing, the Internet of Things, blockchain, 5G, VR/AR, and other digital technologies will transform from auxiliary tools into core engines for e-commerce development, driving intelligent upgrades across the entire process, supply chain, and scenarios.

Artificial intelligence will be widely applied in areas such as intelligent shopping guides, intelligent customer service, precision marketing, traffic allocation, and risk control, improving operational efficiency and user experience [34]. Big data will connect data across the entire supply chain, including production, distribution, retail, logistics, and after-sales service, enabling accurate demand forecasting, dynamic inventory optimization, and flexible production [21]. Blockchain technology will be widely applied in areas such as agricultural product traceability, cross-border payments, product anti-counterfeiting, and copyright protection, enhancing transaction credibility and security [30]. VR/AR, metaverse, and other technologies will drive the implementation of new scenarios such as immersive shopping, virtual malls, and virtual try-on/makeup trials, reshaping the online consumer experience [23].

Technological innovation will drive e-commerce from "traffic-driven" to "technology-driven and efficiency-driven," giving platforms and companies with technological barriers, data capabilities, and algorithmic advantages a stronger competitive edge.

Continuous business model innovation and deep integration of online and offline channels. E-commerce will further break down boundaries and deeply integrate with the real economy, forming an ecosystem of multi-business symbiosis and diversified

development. Online-to-offline (O2O) integration will move from channel complementarity to full-domain integration. Traditional retail, supermarkets, catering, home furnishing, cultural tourism, and health industries will be fully digitized, and models such as "offline experience, online ordering, instant delivery, in-store pickup, and door-to-door service" will become the norm. The integration of e-commerce and manufacturing will deepen [13], with C2M customized production rapidly becoming widespread, driving the transformation of manufacturing towards digitalization, flexibility, and service orientation.

New business models such as live-streaming e-commerce, social e-commerce, content e-commerce, interest-based e-commerce, and community group buying will shift from unregulated growth to standardized quality improvement, and from "competing on low prices" to "emphasizing brands, quality, and service." Rural e-commerce, senior citizen e-commerce, cross-border e-commerce, green e-commerce, and second-hand recycling e-commerce will rapidly emerge, meeting multi-level, personalized, and quality-oriented consumer demands. E-commerce platforms will evolve from single transaction channels into comprehensive lifestyle service ecosystems integrating commodity trading, content creation, social interaction, local life services, and digital services.

Cross-border e-commerce moves towards high-quality development. Under the wave of economic globalization and digital trade, China's global e-commerce layout will continue to deepen, with cross-border e-commerce shifting from "scale expansion" to "quality improvement." The cross-border e-commerce industry is witnessing the coordinated development of B2B, B2C, C2C, and O2O models [48]. Overseas warehouses are becoming more scaled, intelligent, and networked, and cross-border logistics, payment, customs clearance, and after-sales systems are continuously improving, significantly reducing the costs for SMEs going global. Chinese e-commerce platforms, technologies, services, and standards are accelerating their international expansion, continuously increasing their influence in global digital trade.

Meanwhile, localized operations have become a core competitive advantage for cross-border e-commerce [49]. Platforms and sellers will deeply adapt to the target market's language, culture, consumption habits, regulatory policies, and payment preferences, achieving localization of products, marketing, services, and supply chains, thereby

enhancing brand recognition and user loyalty. China will participate more deeply in the formulation of global e-commerce rules, promoting international cooperation in areas such as data flow, trade facilitation, intellectual property, and consumer protection, and building an open, inclusive, and fair global e-commerce ecosystem [52].

The three core developmental directions including intellectualization, online-offline integrated innovation and coordinated globalization-localization layout are driven jointly by digital technological iteration, domestic consumption structural upgrading and dual-circulation national economic strategy. These developmental trends are not independent from one another but interpenetrate, interact and promote mutual advancement in real industrial operation, reshaping the whole industrial value chain of China's e-commerce from production end to terminal consumption end. Intelligent digital technologies serve as the fundamental underlying support for the realization of O2O comprehensive integration and cross-border localized refined operation, while the expansion of diversified business scenarios derived from online and offline fusion creates massive landing application fields for AI, big data, blockchain and immersive interactive digital technology, accelerating the commercialization process of cutting-edge digital innovation achievements.

Domestic consumption upgrading remains the most essential endogenous driving force transforming the overall competitive logic of the e-commerce industry. After decades of popularization of online shopping, Chinese consumers have gradually stepped out of the consumption era dominated by low-price sensitivity, and consumer demands are increasingly inclined toward product diversification, personalized customization, shopping scene experience and full-cycle after-sales guarantee [12]. Such fundamental demand change has forced live-streaming e-commerce, community group buying and social commerce, which previously relied entirely on low-price dumping to seize market share, to abandon extensive price wars and transfer core competition focus to independent brand building, product quality control and differentiated service system construction. A batch of emerging segmented e-commerce tracks spring up rapidly to match hierarchical market demands, including senior-oriented customized e-commerce, green circular recycling e-commerce, characteristic rural specialty e-commerce and health consumption vertical e-commerce. Every segmented track relies on differentiated market positioning to avoid

redundant homogeneous competition, optimizing the overall market structure of domestic e-commerce step by step.

In terms of intelligent industrial transformation, generative artificial intelligence represented by large language models has brought revolutionary changes to all operational links of e-commerce beyond traditional algorithm application boundaries. Apart from conventional scenarios such as intelligent customer service and precision user portrait marketing, generative AI can automatically design differentiated commodity copywriting, short-video marketing scripts and targeted regional promotion plans according to regional consumption customs, seasonal consumption rules and group consumption preference data, greatly cutting merchants' manual content development cost and shortening product market launch cycle. Combined with IoT intelligent warehouse sensing equipment and full-link big data statistics, AI-driven supply chain prediction can accurately predict future regional commodity demand fluctuation, realize dynamic real-time stock allocation between different storage nodes and effectively restrain two major industry pain points of out-of-stock for hot-selling goods and overstock of unsold commodities that have troubled e-commerce manufacturing cooperation for years. Blockchain technology will form a complete closed-loop traceability system covering agricultural planting, raw material processing [37], logistics transportation and terminal retail, effectively solving the long-standing credibility problems of agricultural product quality uncertainty and counterfeit commodities on online platforms. Meanwhile, VR, AR and metaverse immersive shopping modes are accelerating pilot commercialization in high unit-price industries such as furniture, luxury cosmetics and clothing, breaking the limitation of traditional picture-text online display and building a new interactive consumption experience system.

Online and offline deep integration will further blur the dividing line between physical retail and digital e-commerce, pushing all entity service industries to complete comprehensive digital transformation. Physical supermarkets, catering chains, home furnishing stores and scenic spot cultural consumption gradually realize unified inventory management of offline physical stores and online flagship stores under one brand, with instant local distribution, self-pickup at physical outlets and door-to-door customized service becoming mainstream consumption options. The deepened combination between e-

commerce and manufacturing industries continuously optimizes the C2M customized production ecological system. With the help of big data demand collection from online terminals, traditional foundry manufacturers can transform from passive order receiving to active customized production oriented by terminal consumer demand, promoting China's processing manufacturing to step out of low-profit OEM trap and move toward high value-added independent customized production and brand development. As the integration deepens, mainstream comprehensive e-commerce platforms will gradually evolve from simple commodity transaction channels into comprehensive life service ecological carriers covering commodity trading, short-video content production, social interaction [28], local life services and digital financial auxiliary services, forming multi-industry symbiotic development ecology.

For cross-border e-commerce's globalization plus localization dual development trend, China's outbound digital trade layout will realize layered expansion across global markets in the next decade. Mature markets including Europe, North America and Japan will focus on refined localized brand operation, while emerging markets in Southeast Asia, the Middle East, Latin America and Africa keep expanding market scale driven by cost advantage and commodity diversification. Continuous improvement of overseas warehouse networking and intelligent upgrading of cross-border logistics greatly reduce the comprehensive logistics cost of small and medium-sized Chinese export merchants, lowering the threshold for domestic small factories to participate in global digital trade.

Localized operation covers multiple dimensions including commodity adaptation, marketing localization, payment channel docking and after-sales service localization: sellers adjust product specifications, packaging design and functional configuration according to target countries' climate characteristics, consumption culture and legal access standards; adopt local mainstream social media and live streaming channels for product promotion; connect regional mainstream third-party payment tools to improve consumers' payment convenience. Meanwhile, China continuously participates in global digital trade rule formulation, promotes international coordination on cross-border data flow, intellectual property protection and trade facilitation clauses, creating a more open institutional environment for Chinese cross-border e-commerce brands to go global [23].

Green e-commerce will grow into an indispensable implicit core development trend derived from the above three major directions, closely linked with intelligent supply chain optimization and cross-border sustainable trade development. Intelligent route optimization based on big data cuts invalid transportation mileage of logistics vehicles and reduces carbon emissions of commodity circulation; standardized green packaging popularization lowers the waste pollution generated by express delivery; localized nearshore production layout of cross-border commodities avoids long-distance transnational repeated transportation and realizes energy conservation and emission reduction, conforming to global carbon neutrality development goals and increasingly strict overseas green trade access regulations.

Nevertheless, the full-scale landing of all aforementioned forward-looking trends still faces multiple phased obstacles in short and medium term. High upfront investment cost of intelligent equipment restricts digital upgrading progress of most small-scale individual merchants; cross-border full localized operation needs long-term accumulation of overseas legal policy, market culture and consumer data; full-domain online-offline integration requires continuous improvement of rural and remote area logistics infrastructure. Therefore, the industrial upgrading of e-commerce will advance progressively by regions and by industry segments, and the overall high-quality development blueprint will be completed in phases with continuous market evolution and supporting policy implementation.

3.3 Policy recommendations for high-quality development of e-commerce

To effectively address challenges, grasp development trends, and fully unleash the empowering role of e-commerce in the economy and society, policy recommendations are proposed from five aspects: technology, industry, regulation, region, and talent [57].

Strengthen technological innovation and application to solidify the digital foundation. Increase support for R&D in core technologies such as artificial intelligence, big data, blockchain, and the Internet of Things; encourage enterprises, universities, and research institutions to jointly build innovation platforms and break through key technological bottlenecks [34]. Promote the deep application of technologies across all scenarios,

including supply chain, production, marketing, risk control, traceability, and security, to improve the industry's digitalization and intelligence levels. Improve data security, algorithm supervision, and privacy protection systems; standardize data collection, use, and transaction behaviors; and safeguard the bottom line of security (figure 15).

(1) Strengthen Technological Innovation	(2) Deepen Industrial Collaboration	(3) Improve the Regulatory System	(4) Promote Balanced Regional and Urban-Rural Development	(5) Enhance Talent Training
<ul style="list-style-type: none"> • AI, big data, blockchain applications 	<ul style="list-style-type: none"> • Cross-sector partnerships, partnerships, supply chain integration 	<ul style="list-style-type: none"> • Digital tax policies, consumer protection laws 	<ul style="list-style-type: none"> • E-commerce infrastructure in rural areas, reas, regional logistics hubs 	<ul style="list-style-type: none"> • E-commerce courses, skill certification programs

Figure 15 – Policy Recommendations for high-quality development [36]

Deepen industrial collaboration to build an efficient and stable supply chain. Promote the deep integration of e-commerce with agriculture, manufacturing, and service industries; support the standardization, branding, and cold chain logistics system construction of agricultural products; and promote the C2M flexible production model [2]. Improve urban and rural logistics, cross-border logistics [25], and intelligent warehousing networks; address shortcomings in rural logistics; and expand overseas warehouse coverage [36]. Promote data sharing and business collaboration between upstream and downstream of the supply chain to achieve integrated production, supply, and sales, reduce fulfillment costs, and improve response efficiency.

Improve the regulatory system and create a fair and standardized development environment. Improve e-commerce laws and regulations, accelerate the improvement of regulatory rules for new business models such as live-streaming e-commerce, cross-border e-commerce, and social e-commerce, and intensify efforts to combat counterfeit and substandard products, false advertising, fake reviews, and price discrimination based on big data [51]. Strengthen anti-monopoly and anti-unfair competition supervision of the platform economy to protect the legitimate rights and interests of small and medium-sized businesses

and consumers. Promote cross-departmental and cross-regional collaborative supervision, simplify customs declaration, tax refund, and payment procedures for cross-border e-commerce, and improve regulatory efficiency and convenience [10].

Promote balanced regional and urban-rural development and facilitate the integration of domestic and foreign trade. Increase investment in digital infrastructure, logistics systems, and public services in the central and western regions and rural areas, deeply implement the "Digital Commerce Revitalizes Agriculture" initiative [31], and strengthen rural e-commerce talent training and brand cultivation [8]. Promote the orderly transfer of e-commerce resources from the eastern region to the central and western regions, and promote coordinated and differentiated regional development. Improve the alignment of domestic and foreign trade standards, mutual recognition of certifications, and regulatory coordination, support enterprises in making full use of both domestic and international markets, and promote the high-quality development of border e-commerce [30]. Strengthen talent cultivation and introduction, and improve the talent support system. Optimize the curriculum of e-commerce majors in universities, strengthen practical teaching, school-enterprise cooperation, and internships to cultivate compound talents with technical, operational, management, and cross-border skills [33]. Conduct large-scale e-commerce skills training for rural areas, small and medium-sized enterprises, and flexible employment personnel to improve the digital literacy and employability of the entire population. Improve talent incentive and service policies to attract high-end e-commerce talents to the central and western regions, rural areas, and small and micro enterprises, and solve the talent shortage problem.

The five-dimensional policy system focusing on technological innovation, industrial synergy, regulatory improvement, balanced regional layout and talent cultivation forms a targeted matching governance framework aiming directly at the five categories of industry bottlenecks. Each type of policy targets corresponding practical pain points in e-commerce development, and all five policy dimensions coordinate and complement each other to jointly pave the institutional path for realizing the intelligent, integrated and globalized future development trends. The overall policy design follows the basic governance logic of "targeting existing drawbacks, guiding industrial transformation and releasing long-term

development potential”, combining short-term rectification measures for prominent market chaos and long-term systematic layout for industrial fundamental capacity construction [56].

In the implementation of technological innovation supporting policies, tiered fiscal incentive and differentiated tax preference become two core executable policy tools classified by enterprise scale and project attribute. Central finance and provincial-level local finance jointly set up special digital economy development fund, which allocates subsidy funds in gradient mode: large-scale e-commerce platform enterprises that invest in cutting-edge core technology R&D such as underlying blockchain architecture and general industrial AI algorithm can obtain high proportion of R&D financial allowance plus additional pre-tax deduction of research expenditure; small and medium-sized merchants and grassroots industrial producers cannot afford independent high-cost digital transformation [48], so government constructs open public digital service platforms covering big data analysis, intelligent demand forecasting and commodity anti-counterfeiting traceability to provide low-cost or free technical services for small entities, lowering the technical upgrading threshold of the whole industry.

Meanwhile, relevant competent authorities continuously perfect supporting laws and administrative provisions concerning data security, user privacy protection and algorithm filing supervision, dynamically adjust regulatory boundaries synchronizing with technological iteration progress. On one hand, strict constraint is imposed on illegal excessive collection, cross-border unauthorized transmission and underground trading of user personal information; on the other hand, prudent inclusive supervision is adopted for emerging algorithm application and new digital technology trials to avoid excessive rigid supervision restraining industrial technological innovation vitality. Government-university-industry cooperative R&D projects are also vigorously encouraged by policy, guiding colleges, research institutes and market enterprises to jointly tackle core technical bottlenecks existing in supply chain digitalization and cross-border compliance risk control, accelerating the transformation from laboratory scientific research achievements to practical commercial application.

Industrial synergy promotion policies take full-chain supply chain optimization as core starting point to solve the problem of low coordination efficiency among agriculture,

manufacturing and e-commerce service industry. Policy-driven investment is concentrated on rural cold chain logistics infrastructure construction and nationwide intelligent warehousing network layout, making up the long-standing short board of insufficient fresh agricultural product cold chain coverage and serious loss in transportation [49]. Relevant industrial departments issue targeted preferential policies to support standardized grading, unified quality certification and regional public brand cultivation of characteristic agricultural products, laying foundational conditions for stable large-scale online sales of rural specialties. For manufacturing industry, administrative guidance and financial incentives are combined to popularize C2M flexible customized production mode, push traditional OEM processing factories to connect online terminal consumption big data, realize production plan linkage with real-time market demand and reduce inventory backlog and out-of-stock losses caused by information isolation between production end and sales end. In cross-border supply chain field[33], policy supports domestic enterprises to accelerate the construction of overseas intelligent warehouse clusters in core overseas consumption markets, perfect cross-border multi-modal logistics docking system and simplify supporting customs clearance auxiliary procedures, substantially cutting the comprehensive operating cost of Chinese SMEs developing overseas cross-border business. Besides hardware infrastructure construction, policy actively promotes the establishment of supply chain upstream and downstream information sharing mechanism, breaking data isolation and information asymmetry between raw material suppliers, processing manufacturers, e-commerce sellers and logistics service providers, optimizing overall circulation efficiency of the whole industrial chain and cutting comprehensive order fulfillment cost.

Regulatory optimization policies adhere to the principle of inclusive prudential supervision for new business forms and strict law enforcement against illegal market behaviors, constructing fair and standardized market competition ecology. Legislation and supplementary detailed rules keep pace with emerging e-commerce modes, continuously improving regulatory clauses applicable to live-streaming e-commerce, mini-program shopping and cross-border social e-commerce, filling previous regulatory blank areas for emerging business innovations. Law enforcement departments increase crackdown intensity

on counterfeit goods, false propaganda, manipulated commodity reviews and big data-enabled price discrimination [50], rectifying long-standing market disorder that harms consumer rights and legitimate interests of standardized operators.

Anti-monopoly and anti-unfair competition supervision of platform economy is normalized and institutionalized to curb improper platform behaviors including forced “choose one of two” exclusive cooperation and arbitrarily raising platform commission charges, safeguarding the survival space of small and medium-sized merchants in the market. In cross-border regulatory field, policy promotes cross-department collaborative supervision reform among customs, taxation, foreign exchange management and market supervision departments, building unified cross-border e-commerce digital supervision information platform to realize inter-departmental data interconnection and business synergy. Such institutional optimization simplifies cross-border customs declaration, export tax rebate and cross-border fund settlement procedures, shortens processing cycle of related businesses and effectively reduces the compliance cost of cross-border operating enterprises, while targeted governance is carried out against irregular gray customs clearance and underreported commodity price behaviors to standardize the long-term healthy development of cross-border industry [52].

Balanced regional and urban-rural development policies focus on bridging the development gap between eastern developed regions and central-western backward areas as well as urban and rural digital divide. Central finance increases special transfer payment for digital infrastructure and rural logistics network construction in central and western provinces and remote counties, continuously advancing the implementation of Digital Commerce Revitalizes Agriculture special project. Policy guides mature e-commerce industrial resources, advanced operation experience and excellent brand resources from eastern industrial clusters to orderly transfer to inland central and western regions, realizing differentiated coordinated industrial layout according to local resource endowment and industrial advantages of different regions. In the field of internal and external trade integration [6], policy pushes the docking of domestic commodity inspection standards and international overseas market access certification standards, promotes mutual recognition of product qualification certificates at home and abroad, removes institutional obstacles for

domestic manufacturers switching between domestic online retail and cross-border export business, and supports border e-commerce industrial park construction to expand the integration channel of domestic and foreign dual markets.

Talent support policy forms a multi-level training and introduction system matching the industry's compound talent demand from school education, social vocational training and high-end talent introduction three dimensions. Colleges are encouraged to revise e-commerce major curriculum settings, strengthen school-enterprise in-depth cooperation and off-campus practical internship courses to fix the disconnection between textbook theoretical content and real market industrial iteration. Governments at all levels organize regular large-scale free digital skill training targeting rural practitioners, small and medium enterprise staff and flexible online operators to improve the overall digital literacy of grassroots labor force [21]. A series of preferential policies such as housing subsidy, employment allowance and settled household registration support are issued to attract high-end cross-border operation, intelligent technology and supply chain management talents to flow into central-western regions, rural areas and micro-enterprises, easing the structural talent shortage restricting backward regional e-commerce development.

In the whole policy implementation cycle, dynamic evaluation and real-time revision mechanism is essential. Government departments regularly conduct industrial tracking research to collect policy landing feedback from merchants [31], platforms and consumers, adjust unreasonable policy clauses in a timely manner aiming at newly emerging market risks and industrial changes, and coordinate the synchronous propulsion progress of five types of policy measures to avoid disjointed implementation between different policy modules, steadily promoting China's e-commerce industry to complete the shift from past extensive scale expansion toward sustainable high-quality development in the long run.

Conclusion

E-commerce platforms, with their convenience, significantly reduce intermediate links and operating costs in agricultural product sales, accelerating the flow of goods from production to consumers, and substantially increasing farmers' sales revenue and residents' disposable income. This increase in income further stimulates farmers' investment and entrepreneurial motivation, effectively promoting the integration of rural and urban industries and the close connection between upstream and downstream enterprises. Finally, the continuous emergence of entrepreneurial activities will create more supply and demand. Innovation and expansion on the supply side, such as technological innovation, design optimization, or improvements in production methods, provide more choices on the demand side. The diversification and upgrading of consumer demand brought about by innovative entrepreneurship further promotes innovation and improvement on the supply side, forming. This has fostered a positive interaction between supply and demand, providing a continuous driving force for the domestic economic cycle in institutional economics research. The increasing entrepreneurial activity is undoubtedly a crucial force in facilitating this cycle.

E-commerce has grown into a core driving force for China's economic transformation and high-quality development, and its role in promoting macroeconomic growth, micro-subject empowerment and industrial structure optimization is irreplaceable. It has broken the constraints of geography and time, effectively promoted the two-way circulation of urban and rural commodities, supported the strategy of rural revitalization, and boosted the development of new forms of foreign trade such as cross-border e-commerce. For consumers, e-commerce has greatly improved consumption convenience and reduced spending costs; for the job market, it has created a large number of flexible employment opportunities and promoted entrepreneurship and employment of rural labor and college graduates; for traditional retail and manufacturing industries, it has forced industrial digital transformation and improved overall operational efficiency. The development practice of China's e-commerce has formed a unique model dominated by platforms, with rapid

business iteration and strong industrial driving force, which has become an important part of the digital economy.

At the same time, the transformation from high-speed growth to high-quality development of China's e-commerce is facing multiple realistic bottlenecks. Homogeneous competition and traffic dividend fading lead to increased operational pressure and declining profit margins; the low level of supply chain digitalization, especially the non-standardization of agricultural products and the low efficiency of cold chain logistics, restricts the improvement of industrial collaboration capacity; the regulatory system lags behind the development of new business forms, and problems such as counterfeit goods, data security and unfair competition are still prominent; the development gap between regions and urban and rural areas is obvious, and the central and western regions and rural areas are restricted by infrastructure and talents; in addition, the insufficient depth of technology application and the shortage of compound talents further restrict the innovative upgrading of the industry. These problems need to be solved systematically in the process of future development.

Looking forward, China's e-commerce will move towards intelligence, integration, standardization and globalization, and continue to release huge development potential. Driven by digital technologies such as artificial intelligence, big data and blockchain, the industry will shift from traffic-oriented to technology and efficiency-oriented, and the integration of online and offline will be more in-depth. Cross-border e-commerce will adhere to the combination of globalization and localization to better integrate into the global digital trade system. To support the high-quality development of e-commerce, efforts should be made in technological innovation, supply chain collaboration, regulatory improvement, balanced regional development and talent training. With the continuous optimization of policies and the continuous improvement of industrial ecology, e-commerce will further play the role of economic empowerment, provide sustainable impetus for China's economic transformation and upgrading, and contribute more to the construction of a new development pattern of domestic and international dual circulation.

References

- 1 Alibaba Research Institute. Research Report on China's E-commerce User Acquisition Cost Changes. URL: <https://www.alibabagroup.com/en-global/insights/reports> (Accessed date: 26.05.2026).
- 2 Alibaba research institute. C2M flexible production and manufacturing transformation report. URL: <https://www.alibabagroup.com/en-global/insights/reports> (Accessed date: 26.05.2026).
- 3 Alibaba research institute. China TAOBAO village development report. URL: <https://www.alibabagroup.com/en-global/insights/reports> (Accessed date: 26.05.2026).
- 4 Alibaba research institute. New retail development white paper. URL: <https://www.alibabagroup.com/en-global/insights/reports/new-retail-2024> (Accessed date: 26.05.2026).
- 5 Alibaba research institute. Report on China's e-commerce economy development. URL: <https://www.alibabagroup.com/en-global/insights> (Accessed date: 26.05.2026).
- 6 Bu J. W. Inclusive finance support for rural e-commerce entrepreneurship under the "E-commerce into Villages" policy // Rural Finance Research. 2023. № 12. P. 45–53.
- 7 China academy of information and communications technology. Digital rural development research report. URL: https://www.caict.ac.cn/kxyj/baogao/202405/t20240520_428932.htm (Accessed date: 26.05.2026).
- 8 China chain store & franchise association. China retail digital transformation report. URL: https://www.ccfa.org.cn/portal/cn/xxfb/hybg/202403/t20240315_487621.html (Accessed date: 26.05.2026).
- 9 China federation of logistics & purchasing. China e-commerce logistics development report. URL: https://www.cflp.org.cn/xxfb/hybg/202404/t20240425_498763.html (Accessed date: 26.05.2026).
- 10 China federation of logistics & purchasing. China rural logistics development report. URL: https://www.cflp.org.cn/xxfb/hybg/202311/t20231120_479231.html (Accessed date: 26.05.2026).

- 11 China internet network information center. 53rd statistical report on internet development in China. URL: https://wwwwww.cnnic.net.cn/hlwfzyj/hlwxxzbj/hlwtjbg/202403/t20240322_71863.htm (Accessed date: 26.05.2026).
- 12 Choshin M., Ghaffari A. E-commerce as a marketing tool for enterprises // Marketing Research Review. 2017. №1. P. 34–40.
- 13 Department of commerce of Yunnan province. Ruili cross-border e-commerce live streaming industry development report. URL: https://swt.yn.gov.cn/xxgk/zfxxgkpt/fdzdgknr/ghxx/202312/t20231215_289654.html (Accessed date: 26.05.2026).
- 14 E-commerce research center of 100EC. China e-commerce market data monitoring report. URL: <https://www.100ec.cn/zt/report/> (Accessed date: 26.05.2026).
- 15 Emarketer. Global e-commerce sales forecast 2021-2025. URL: <https://www.emarketer.com/content/global-e-commerce-sales-forecast-2021> (Accessed date: 26.05.2026).
- 16 Fang S. L. Low-Threshold entrepreneurship and upward mobility of low-income groups in rural areas // China Soft Science. 2024. № 3. P. 67–76.
- 17 General administration of customs of China. Cross-border e-commerce import and export statistics. URL: <http://www.customs.gov.cn/customs/302249/zfxxgk/2799825/4827131/index.html> (Accessed date: 26.05.2026).
- 18 General administration of customs of China. Cross-border logistics supervision and efficiency report. URL: <http://www.customs.gov.cn/customs/302249/zfxxgk/2799825/4769254.html> (Accessed date: 26.05.2026).
- 19 Grinshaw D. J., Daniel E. M. E-commerce adoption in UK small businesses // Journal of Small Business Management. 2013. № 2. P. 78–85.
- 20 He M. E-commerce and international trade: a cost perspective // International Trade Journal. 2011. № 5. P. 45–52.
- 21 Huang Y. T., Pan J. W. Digital infrastructure upgrading and agricultural production efficiency improvement: evidence from the "E-commerce into Villages" Policy // China Rural Economy. 2022. № 9. P. 36–52.
- 22 Huang Y. T., Pan J. W. The effect of rural e-commerce on narrowing urban-rural income gap // Economic Geography. 2023. № 5. P. 145–153.

- 23 I-research consulting group. China metaverse e-commerce development report. URL: <https://www.iresearch.com.cn/Report/Detail/12968.html> (Accessed date: 26.05.2026).
- 24 Joshi P. Rural e-commerce and market competitiveness // Indian Journal of Agricultural Economics. 2012. № 3. P. 89–94.
- 25 Kalakota R., Whinston A B. Electronic commerce: A manager's guide. Boston : Addison-Wesley, 1997. 102 p.
- 26 Liu M., Zhao Q. E-commerce and the evolution of traditional retail competition landscape in China // Journal of Business Research. 2023. №7. P. 162–172.
- 27 Liu P. F., Zhang W. Research on the mechanism of rural e-commerce promoting supply-demand matching in domestic circulation // Journal of Agricultural Economics. 2021. № 11. P. 45–58.
- 28 Liu Y. Research on China's mobile e-commerce development status and countermeasures // Modern Business. 2012. № 17. P. 56–57.
- 29 Ma F. EU E-commerce legal system and its enlightenment to China // Legal System and Society. 2015. № 23. P. 92–93.
- 30 Ministry of agriculture and rural affairs. Digital agriculture and rural development report. URL: http://www.moa.gov.cn/nybg/b/2023/dq/202312/t20231211_6438972.htm (Accessed date: 26.05.2026).
- 31 Ministry of agriculture and rural affairs. Digital commerce revitalizes agriculture initiative implementation report. URL: http://www.moa.gov.cn/xw/bmdt/202310/t20231025_6387956.htm (Accessed date: 26.05.2026).
- 32 Ministry of commerce of the people's republic of China. China cross-border e-commerce development report. URL: <http://www.mofcom.gov.cn/article/ztxx/202402/20240229387923.shtml> (Accessed date: 26.05.2026).
- 33 Ministry of education of the people's republic of China. E-commerce professional talent cultivation guide. URL: http://www.moe.gov.cn/s78/A08/gjs_left/moe_742/s3876/202403/t20240319_1128976.html (Accessed date: 26.05.2026).

34 Ministry of industry and information technology. AI application in e-commerce industry white paper. URL: https://www.miit.gov.cn/xwdt/gxdt/yjbg/art/2024/art_12897543.html (Accessed date: 26.05.2026).

35 Ministry of industry and information technology. 5g application development white paper. URL: https://www.miit.gov.cn/zwgk/zcwj/wjfb/tz/art/2024/art_9876543210abcdef.html (Accessed date: 26.05.2026).

36 Ministry of transport of the people's republic of China. Rural logistics network construction plan (2023-2025). URL: https://www.mot.gov.cn/zcwj/zcwj_yzc/202305/t20230512_3689215.html (Accessed date: 26.05.2026).

37 Mybank. 2023 annual report. URL: <https://www.mybank.cn/about/annual.html> (Accessed date: 26.05.2026).

38 National bureau of statistics of China. Statistical data on e-commerce in China. URL: <https://www.stats.gov.cn/tjsj/tjbz/dzsw/> (Accessed date: 26.05.2026).

39 National development and reform commission, state council information office. 11th five-year plan for e-commerce development in China. URL: <https://www.ndrc.gov.cn> (Accessed date: 26.05.2026).

40 Pon F. Research on enterprise e-commerce business process reengineering // Journal of Management Science. 2001. № 2. P. 36–42.

41 Shao J. UNCITRAL model law on electronic commerce // Journal of International Trade & Economic Cooperation. 2000. № 4. P. 56–61.

42 Sherah Bl. E-commerce and the development of SMEs // Journal of Enterprise Development. 2018. № 4. P. 56–62.

43 Standing committee of the national people's congress. E-commerce law of the people's republic of China. URL: http://www.npc.gov.cn/c2/c30834/201905/t20190521_281583.html (Accessed date: 26.05.2026).

44 State council of the people's republic of China. Notice on approving the establishment of the seventh batch of cross-border e-commerce comprehensive pilot zones. URL: http://www.gov.cn/zhengce/zhengceku/2023-11/07/content_5915628.htm (Accessed date: 26.05.2026).

45 Sun Z. Y., Liu Y. The investment value and development potential of rural e-commerce market under the background of digital economy // China Business Review. 2022. № 8. P. 72–79.

46 Tian Y., Xia J. C. The social network effect and entrepreneurship promotion mechanism of rural e-commerce // Management World. 2024. № 1. P. 123–135.

47 Turban E. Electronic commerce 2018: Managerial, social and organizational perspectives. London : Pearson, 2018. 58 p.

48 Unctad. Global digital trade and e-commerce report. URL: <https://unctad.org/publication/global-digital-trade-and-e-commerce-report-2023> (Accessed date: 26.05.2026).

49 Wang L., Li Y. E-commerce talent cultivation model based on university-enterprise cooperation // Journal of Higher Education Management. 2023. № 17(2). P. 112–120.

50 Wei X. H., Liu J., Zhang Y. Rural e-commerce, non-agricultural employment and poverty alleviation in China // China Agricultural Economic Review. 2022. № 14(3). P. 456–472.

51 World bank. E-commerce and rural development policy report. URL: <https://www.worldbank.org/en/topic/ruraldevelopment>.https://www.wto.org/english/tratop_e/ecom_e/ecom_reports_e.htm (Accessed date: 26.05.2026).

52 World trade organization. E-commerce rule-making progress report. URL: https://www.wto.org/english/tratop_e/ecom_e/ecom_reports_e.htm (Accessed date: 26.05.2026).

53 Yang X. Characteristics and development trends of e-commerce // Commercial Times. 2014. № 22. P. 67–68.

54 Yang Y., Deng F. Digital finance empowers consumption upgrading and domestic economic cycle // Finance & Trade Economics. 2024. № 2. P. 112–126.

55 Zhang L. Research on HP's e-commerce business model innovation // Enterprise Economy. 2012. № 9. P. 45–48.

56 Zhang S. G. Urban-Rural factor flow and domestic economic cycle smoothing under digital empowerment // Journal of Finance and Economics. 2023. № 7. P. 89–102.

- 57 Zhang Y., Wang H. Algorithmic recommendation and consumer decision-making in e-commerce // Journal of Consumer Behavior. 2024. № 23(1). P. 78–92.
- 58 Zheng Sh., Lv Q. Research on the concept and essence of e-commerce // China Business and Market. 2013. № 7. P. 56–61.
- 59 Ziaul V. The impact of e-commerce on enterprise costs and productivity // Journal of Business Research. 2015. № 3. P. 112–118.
- 60 Zong Q. Research on foreign social e-commerce development model // International Business Research. 2013. № 6. P. 78–83