XVI. The Impact of the Development Level of Digital Economy on the Export Trade Between China and Countries Along the "Belt and Road

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As an emerging economic form supported by new technologies, the development of the digital economy is changing the global economic pattern. It profoundly impacts the market pattern of international trade and the production organisation structure. Institutions and scholars also have different opinions on measuring digital economy development indicators. Much research is on the development of global trade in the digital economy. At present, the main research directions of the academic circle are the impact mechanism of the digital economy on international trade, the heterogeneous impact of the digital economy on the trade of different countries, and the impact on trade with other countries. This paper mainly studies the current situation and existing problems of the development of the digital economy, analyses the impact of the digital economy on China's export trade with countries along the "Belt and Road" through theoretical knowledge, and puts forward future policy suggestions based on the impact.

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1 The background and significance of the topic

After the Belt and Road Initiative was formally proposed in 2013, China, as the initiator, has vigorously coordinated the development of economic and trade cooperation with neighbouring regions, continuously improved the scale and quality of trade exchanges, and promoted the high-quality development of foreign trade. In 2018, the fifth World Internet Conference was successfully held. With the theme of "Creating a Digital World of Mutual Trust and Governance," the conference had in-depth discussions on the Internet, big data, and other topics.

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2 Literature review

2.1 Research on the development and measurement of the digital economy

At home and abroad, research on the evaluation system of the digital economy is mainly undertaken by government agencies or scientific research institutions, each approaching the topic from different perspectives. However, a comprehensive and unified index system for measuring the development of the digital economy has yet to be established.

Jiao et al. (2021) constructed a comprehensive evaluation index system of China's inter-provincial digital economy from the perspectives of digital foundation, innovation, application, and transformation thinking. Yang and Jiang (2021) included digital output in defining digital development indicators. They developed an index system based on digital industrialisation and industrial digitalisation, applying principal component analysis to assess digital development levels across Chinese provinces objectively. Wan, Luo, and Yuan (2019) built a model grounded

in previous digital economy indicator systems from the input-output perspective, incorporating the governance environment as a regulating factor throughout the digital economy's processes. Duan and Feng (2023) used the entropy method to construct an evaluation system for digital development, enhancing prior models by adding first-level indicators such as digital talent and digital trade status. Meanwhile, various official documents at home and abroad have proposed different frameworks for constructing a digital economy index system.

2.2 Research on the "Belt and Road" countries under the background of the digital economy

The digital economy influences countries along the Belt and Road in numerous ways, including promoting green economic performance, high-quality development, investment growth, and industrial upgrading.

Duan and Feng (2023) pointed out that the level of digital development among Belt and Road countries affects low-carbon green performance primarily through industrial structure optimisation and technological innovation. Their analysis also considered variations across income levels and institutional quality. Qi and Ren (2020) examined the impact of digital economy development on economic growth, trade, investment, and high-quality development in Belt and Road countries. Liu, Zhang, and Zeng (2022) also explored how the digital economy drives high-quality development along the Belt and Road by enhancing innovation and industrial upgrading.

2.3 Research on the impact of digital economy on international trade

With the widespread application of technologies such as artificial intelligence, the Internet, and cloud computing, the digital economy has become a significant engine of global economic growth. This section analyses the mechanisms through which the digital economy impacts international trade and how these impacts vary by country and trade type.

Impact mechanism of digital economy on trade status

First, the digital economy can significantly reduce trade costs by promoting trade. Enhanced information sharing reduces information barriers, improves efficiency, and mitigates issues related to information asymmetry. Chaney (2014) found that effective information communication in service trade can reduce trade costs by minimising information gaps between trading partners. Similarly, Sun (2017) proposed that using the Internet and ICT can overcome these barriers and reduce trade-related search and matching costs.

Second, developing a digital economy can reduce export inefficiencies, improve trade mechanisms, and expand international trade. Meijers (2014) and Abeliansky and Hilbert (2017) demonstrated that the application of the Internet and ICT significantly enhances the scale of global trade.

Study on the impact of digital economy on trade of different countries

Wen, Chen, and Zhang (2023) examined the role of digital infrastructure in the Guangdong-Hong Kong-Macao Greater Bay Area and found it significantly boosted the region's foreign trade, with innovation and economic growth acting as transmission mechanisms. Wang (2022) analysed trade data between Jiangsu Province and RCEP countries and found that a 10% increase in digital economy development among trade partners leads to a 1.8% rise in bilateral import and export volume, confirming that digital economy development positively impacts trade.

2.4 Summary

Scholars across the globe have recognised the crucial role of the Internet and digital communication technologies in driving socio-economic development and have approached this topic from various disciplinary angles. Despite the proliferation of measurement models for the digital economy, no globally unified standard remains. Moreover, much research has focused on how the digital economy influences national economies and trade structures. However, most existing studies focus on China's digital economy and its bilateral trade effects, while literature explicitly addressing the digital economy development of Belt and Road countries and its impact on China's bilateral trade remains relatively limited.

3 Current situation of the digital economy

3.1 Connotation and current situation of the development of the digital economy

In recent years, China's digital economy has developed rapidly, ranking second globally in scale. The share of the digital economy in national GDP has continued to grow. Since the official proposal of the "Digital Silk Road" in 2017, China has intensified cooperation with Belt and Road countries in cutting-edge areas such as artificial intelligence, cloud computing, and quantum information, promoting innovation in the broader Belt and Road framework. Notable progress has also been made in constructing the China-ASEAN Information Port, and cross-border trade between China and Arab countries has flourished through the "Online Silk Road", reinforcing the role of the digital economy in driving regional development.

The digital economy fosters enterprise-level innovation in production models, facilitates industrial restructuring, and accelerates the emergence of new economic paradigms. From a value-transition perspective, data functions as a core production factor within the digital economy, with digital technologies enabling data transformation into valuable information. The evolution of network technologies has dramatically improved the efficiency of converting complex data into actionable insights, which has, in turn, transformed operational models across society and industry. Systematic and creative innovation underpins these developments, bringing unprecedented opportunities and significant challenges.

On the demand side, the digital economy actively uncovers both current and latent consumer needs through advanced communication technologies. The digital economy transforms traditional market mechanisms and business models by delivering personalised and customised services to diverse markets. As innovation in technologies such as the Internet and artificial intelligence continues, the digital economy is expected to serve as a transformative force in social and economic structures and a powerful engine for national and global economic growth.

3.2 Current problems in the development of digital economy

Network information security issues

With the widespread availability of network resources and the explosive growth of information and data, the digital economy has significantly enhanced industrial productivity and efficiency. However, this expansion also exposes enterprises, governments, and users to serious security risks, including breaches, unauthorised data use, and privacy violations. Ensuring information security has become a pressing challenge for all stakeholders.

Data gap problem

Significant disparities in resource endowment exist across different regions. The eastern coastal areas of China have made far more substantial progress in digital economic development than the western regions, intensifying regional imbalances. Additionally, from a demographic perspective, groups such as older people and individuals without internet access are often excluded from the benefits of digitalisation. These disparities create a "data gap" that must be addressed through inclusive digital strategies.

Regulatory policies lag behind

As digital technologies evolve, new industrial formats emerge, often overlapping and outpacing existing regulatory frameworks. The rapid emergence of new digital trading models and business practices requires timely regulatory responses. However, delays in formulating and implementing appropriate policies often result in regulatory gaps or overreach, leading to inefficiencies and inconsistencies in governance.

3.3 Measurement indicators of the digital economy

Digital infrastructure

The level of a country's digital infrastructure serves as a fundamental indicator of its digital economy development. Key metrics include the number of domain names, broadband access ports, mobile phone penetration rates, and the length of long-

distance cable lines. These elements reflect the basic conditions needed for digital economic activity.

Digital industry transformation

Another critical measurement dimension involves the degree of digital transformation within industries. This can be assessed through indicators such as the number of patents filed by Belt and Road countries, the number of enterprises engaged in e-commerce, and the proportion of total sales derived from digital channels. These indicators help capture the extent of digital integration in business operations.

4 China's analysis of the export trade status of countries along the "Belt and Road"

4.1 Total export trade of China to countries along the Belt and Road

Since implementing the Belt and Road Initiative in 2013, trade cooperation between China and countries along the Belt and Road has intensified significantly. China has promoted high-quality economic development by leveraging its national resources, talent, and technology advantages, thereby creating a mutually beneficial cooperation framework within the initiative.

By September 2023, China had signed over 230 cooperation documents related to the Belt and Road with more than 150 countries and over 30 international organisations. As of 2022, the total GDP of these participating countries exceeded 22 trillion USD, accounting for approximately 23% of global GDP and representing a population of nearly 3.7 billion—about 47% of the worldwide total.

In 2023, China's total import and export volume reached USD 5.94 trillion, a year-on-year decrease of 5%. Exports amounted to USD 3.38 trillion (down 4.6%), imports to USD 2.56 trillion (down 5.5%), and the trade surplus was USD 823.2 billion (down 1.7%).

Between 2013 and 2021, China's export trade with central Belt and Road countries grew from USD 558.07 billion to USD 1,049.53 billion. In 2022, trade with Belt and Road countries reached USD 2.07 trillion, marking a 15.4% year-on-year increase–11 percentage points above the national foreign trade growth rate. Exports reached USD 1.18 trillion (up 15.7%), and imports reached USD 891.3 billion (up 15%).

In 2022, trade with Belt and Road countries accounted for 32.8% of China's total foreign trade, surpassing the 30% threshold for the first time. This share has risen steadily, from approximately 25% in 2014 to 29.3% in 2019, and has remained around 29% in subsequent years. The 2022 data underscores the growing significance of Belt and Road trade within China's foreign trade structure.

E-commerce cooperation has emerged as a new driver of trade under the Belt and Road framework. In 2020, China's cross-border e-commerce trade volume rose by 28.6% to 198 billion yuan, with export growth reaching 44.1%. By the end of 2022, China had signed memorandums of understanding on Digital Silk Road cooperation with 17 countries and established bilateral e-commerce cooperation mechanisms with 23 countries.

4.2 China's analysis of the export trade structure of countries along the Belt and Road

From 2013 to 2023, China's exports to Belt and Road countries have been dominated by electronic equipment and mechanical instruments. These sectors accounted for USD 278.73 billion in 2013 and USD 543.28 billion in 2021, comprising 51.8% of total exports to Belt and Road countries—showing substantial growth.

Exports of textiles, footwear, and hardware products (HS Code Chapters 50–83) also expanded from USD 194.45 billion to USD 276.02 billion over the same period, accounting for 26.3% of total exports in 2021. However, this category showed volatility, notably declining in 2020 due to the COVID-19 pandemic.

Exports of mineral chemicals, plastics, rubber, and wood products (HS Code Chapters 25–49) exhibited the fastest growth—from USD 6.19 billion in 2013 to USD 190.13 billion in 2021—at an average annual growth rate of 53.4%. The gradual deepening of trade and economic ties under the Belt and Road Initiative has optimised China's export structure and driven robust export trade development.

4.3 Problems in China's export trade with countries along the Belt and Road

The trend of anti-globalisation hinders China's trade with Belt and Road countries

The global trade environment has become increasingly volatile, with rising protectionist measures—particularly from the United States—encouraging some countries to erect trade barriers. These developments have negatively affected regional trade cooperation within the Belt and Road framework. For example, in April 2021, the Australian federal government cancelled a Belt and Road agreement between China and the state of Victoria, disrupting established trade dynamics.

Diverse trade entities among Belt and Road countries

Trade relations between China and Belt and Road countries must overcome differences in political systems, religious and ethical norms, languages, and cultural values. These variations often lead to trade barriers. However, the digital economy offers new opportunities to bridge these divides by enabling digital cultural exchange and increasing localisation of Chinese products. It also supports mutual cultural understanding, fostering economic collaboration through digital integration.

Inadequate financial service systems in Belt and Road countries

Some Belt and Road countries face challenges related to underdeveloped financial service infrastructures and incomplete social credit information systems. For instance, certain African regions still lack robust legal systems and a sufficient network of banking services. These shortcomings hinder practical trade cooperation with China.

The promotion of digital finance offers a potential solution. Countries can build and refine their social credit systems by leveraging big data. Additionally, digital payment systems can compensate for inadequate banking infrastructure and facilitate smoother export trade processes.

5 The impact of the digital economy on export trade between China and countries along the "Belt and Road"

The advancement of the digital economy significantly contributes to the growth of export trade between China and countries along the Belt and Road. Indicators such as per capita GDP and trade openness, alongside the development of digital technologies, jointly foster the stable expansion of trade relations. The digital economy reduces operational costs for Chinese export-oriented enterprises, broadens the range and diversity of trade participants, and accelerates technological innovation. It becomes a vital engine for promoting international trade by lowering trade barriers and expanding transaction opportunities.

The digital economy can reduce trade costs

The digital economy penetrates all stages of international trade via Internet platforms and big data technologies, thereby reducing trade costs and increasing the profitability of export-oriented enterprises. It optimises cost structures by minimising information asymmetries and streamlining processes such as data collection and customs clearance. Lower trade costs enhance product competitiveness and support the expansion of export trade.

The digital economy can expand the scope of transactions

Digital platforms help overcome communication barriers in international trade, facilitating smoother and more efficient exchanges between trading parties. These platforms also create opportunities for small and medium-sized enterprises (SMEs) to enter global markets, thus challenging the traditional dominance of large multinational corporations. Moreover, the digital economy improves the accessibility and accuracy of commodity information, helping consumers make more informed decisions and expanding market reach.

The digital economy promotes trade development through technological progress

Digital technologies stimulate innovation and enhance professional knowledge and information circulation, creating a collaborative and dynamic technology ecosystem. Export entities benefit from digital platforms that optimise financing, contract execution, and settlement methods, thereby reducing transaction risks and fostering a more secure and efficient trade environment.

6 Policy suggestions

Under the Belt and Road Initiative framework, the integration of digital and traditional industries has given rise to new economic opportunities, presenting great potential for developing China's export trade with participating countries. To further promote trade transformation and the international competitiveness of China's foreign trade, the following policy recommendations are proposed:

Seize the opportunity of digital economic development to address anti-globalisation

The rapid rise of digital trade, including cross-border e-commerce and digital services, has injected new vitality into China's export sector. China should leverage this momentum to counter anti-globalisation trends by deepening international cooperation in digital trade and expanding its influence in global trade networks.

Strengthen digital infrastructure development in Belt and Road countries

The foundation of a thriving digital economy lies in robust digital infrastructure. Given the uneven levels of digital development across Belt and Road countries, China should collaborate with its partners to accelerate the construction of Internet infrastructure and improve the overall layout of the digital economy. Multidimensional cooperation can enhance digital capacity and, in turn, support trade development across the region.

Improve digital economy legislation in Belt and Road countries

As data becomes the core asset of the digital economy, safeguarding data security is paramount. However, many countries along the Belt and Road lack comprehensive legal frameworks to govern digital trade, leaving regulatory gaps and increasing the risk of data breaches. China should promote the formulation and harmonisation of digital trade rules, advocate for secure and transparent digital trade environments, and support the modernisation of regulatory systems in partner countries.

7 Conclusion

This paper examined the current state of China's export trade with countries along the Belt and Road. It explored how the digital economy can promote this trade through cost reduction, expansion of transaction scope, and technological innovation. It also identified key challenges facing China's trade relations with these countries and proposed policy solutions based on the development of the digital economy. Overall, leveraging digital transformation provides a strategic pathway for enhancing the quality and sustainability of China's international trade under the Belt and Road Initiative.

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