VII. Can the Digital Economy Boost the Trade Position of Countries Along the Belt and Road?

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With the rapid development of digital technology, the digital economy has become an essential component of the global economy, injecting new impetus into international trade. With the "Digital Silk Road" development, the digital economy is becoming a new engine for economic and trade cooperation between China and countries along the "Belt and Road". This paper analyses the development level of the digital economy of countries along the Belt and Road through the TIMG index. It concludes that the overall development level of the digital economy of countries along the Belt and Road is still low and unbalanced, and the underlying reasons are analysed. Secondly, the impact of the digital economy on the trade status of countries along the route was analysed from three paths: trade costs, trade prices, and trade diversity. Finally, four relevant policy recommendations are proposed: digital technology, digital infrastructure, digital market, and digital governance.

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1 Introduction

1.1 Research background and significance

In the rapid development of international trade, from traditional goods trade to service trade and then to the emerging digital trade, data is gradually becoming a key production factor, and the digital economy industry is also gradually becoming the dominant industry (Gao, 2022). Global trade has gradually entered a critical period of digital transformation, and digital resources have gradually become the main competitiveness in international trade. The digitisation and networking of information have greatly improved production efficiency, optimised economic structure, and better promoted the integration and high-quality development of emerging and traditional industries in various countries. Therefore, the digital economy has, to some extent, promoted the high-quality development of trade and played a positive role in enhancing the current trade status of various countries.

Currently, China's digital economy is in a rapid development stage, with many new models and formats of digital economy emerging (Ren, 2022). With the continuous development of the "Belt and Road" initiative, the concept of digital economy has been gradually introduced into the "Belt and Road". At present, the role of developing a digital economy in promoting and deepening the construction of the "Belt and Road" has been emphasised by scholars in China. Li adopts the dynamic panel data method to measure the impact of the Internet on the gross domestic product (GDP) through the data of 65 countries/regions in the Belt and Road region from 1996 to 2014 and finds that the impact of the Internet on GDP is not limited to the countries along the Belt and Road region. These are not only China's key partners but also among the most significant countries in the world. Through R-factor analysis, it is found that countries along the "Belt and Road" should adopt various strategies according to their national conditions, actively build up their information industries, and jointly promote the development of the "Digital Silk Road".

Some studies take the countries and regions along the "Belt and Road" as examples to discuss the development of the digital economy. Eugenia suggests that under the Belt and Road Initiative, the digital economy of the Eurasian Economic Union plays an important role in the modernisation of the economy, new industrialisation, and

the establishment of cloud infrastructure (Lun & Liu, 2022). Zhuang discusses the development of the digital economy in the countries along the Belt and Road Initiative by region and puts forward some suggestions for the development of the Belt and Road digital economy. Some studies start from a macro point of view, integrating the digital economy with the Belt and Road and conducting related studies on the connotation of the Digital Silk Road. Xiang Kun believes that the strategic connotation and future development path of the Digital Silk Road are closely related to the development of the digital economy. According to Su, the "Digital Silk Road" relies on China's modern Internet technology to build network infrastructure based on cross-border e-commerce, mobile payment, and intelligent logistics systems and then establish cooperation mechanisms. Overall, in the construction of the Belt and Road Initiative, the digital economy, with its advantages of efficient allocation and innovation concentration, will continue to inject new kinetic energy into the participating countries of the Belt and Road Initiative and help them realise leapfrog development (Xu, 2022).

1.2 Research content and methods

Mainly based on the relevant data of the global digital economy development report, this paper analyses the current situation of the digital economy development of countries along the Belt and Road and concludes that the overall development level of the digital economy of countries along the Belt and Road is not high and remains unbalanced. Further, based on the secondary indicators of the measurement index, this paper analyses the causes of the current problems and examines the impact path of the digital economy on the trade status of countries along the Belt and Road. Finally, it puts forward corresponding policy recommendations from four aspects: digital economy infrastructure, digital technology, digital market, and improving digital governance.

This article mainly uses literature analysis and comparative analysis methods. By reviewing relevant literature on measuring the level of digital economy development and international trade both domestically and internationally, this paper summarises the literature from two aspects: the selection of measurement indicators for the level of digital economy development and its impact on trade, determining the research purpose of this article.

2 Connotation of digital economy

The digital economy was first proposed and defined by Tapscott (1996), who believed that the digital economy was first proposed and defined by Tapscott (1996), who believed that the digital economy is a new economic form based on the use of information and communication technology, pointing out the essential difference between the digital economy and the traditional economy. After this concept was put forward, it did not cause enthusiastic discussion in the academic community at that time. After entering the 21st century, the rapid development of the global Internet, ICT applications are changing day by day, and the digital economy has released great vitality and become an important force to pull economic growth, which has been widely concerned and highly valued by the industry, academia, as well as governments and institutions of various countries. In 2013, the International Trade Commission of the United States first proposed the concept of digital trade (Ma, 2022). In 2016, the G20 Summit launched a discussion on the digital economy and pointed out that the digital economy is a new economic form based on digital content as the production factor and on the basis of the characteristics of the elements, the characteristics of the carriers, and the sources of the driving force. Digital content is a production factor that relies on information networks and information technology, improves efficiency, and optimises the economic structure of economic activities.

OECD (2017) takes the manifestation of the digital economy as a starting point and defines economic activities that are transacted and delivered through digital means as digital economic activities. Different from the previous definition, BEA (2019) defines the digital economy from the perspective of digital transactions, digital media, and digital infrastructure, and for the first time, digital infrastructure is included in the connotation of the digital economy, making the definition more concrete. Xu (2020) expands the connotation of the digital economy to digital transactional products based on which the goods, services, and data traded through digital means are included in the digital economy. The goods, services, and data traded are included, affirming the value of data output in the development of the digital economy (Li, 2022).

The China Academy of Information and Communication Research (2020) breaks down the digital economy from the perspective of the value added to the industry, arguing that digital industrialisation and industrial digitisation constitute the main content of the digital economy and that digital governance and data valorisation are brand-new connotations that cannot be ignored in the process of the integration of the digital economy with the economy and society (Jiang & Duan, 2021). This definition of the scope reflects the dynamic change of the connotation level of the digital economy in the process of development. Also, it adds a new note to the traditional factors of production, productive forces, and production relations (Chen, 2020).

In 2021, the National Bureau of Statistics (2021) issued the Statistical Classification of the Digital Economy and Its Core Industries (2021), which defines the scope of the digital economy in terms of demand orientation, international comparability, a foothold in the present, and a focus on the practical as the starting point. It defines the scope of the digital economy into five categories, namely "digital product manufacturing," "digital product service," "digital technology application," and "digital factor-driven industry" as the core industries of the digital economy (Yu & Guo, 2022). These are "digital product manufacturing," "digital product service," "digital technology application," and "digital factor-driven industry" as the core industries of the digital economy, as well as the "digital efficiency enhancement industry," which integrates with the efficient development of traditional industries. For reasons of statistical data availability and continuity, the definition of the digital economy by the NBS does not reflect the role of the digital economy in improving quality and efficiency in social governance, while the rest of the definition is roughly the same as that of the China Academy of Information and Communications Technology. Although there are some differences between the two definitions of the scope of the digital economy, they basically reflect the main connotations of the digital economy and are the two broad definitions of the digital economy with a high degree of acceptance (Ruan, 2021).

3 Analysis of the current status of digital economy development in countries along the "Belt and Road"

3.1 Low overall level of development

Since 2013, the overall development of the global digital economy has shown an upward trend, and the digital economy has gradually become an important part of the construction of the "Belt and Road" and a breakthrough for future international cooperation. Regarding the measurement of the level of development of the digital economy, the report of the Global Digital Economy Development Index measures the level of development of the digital economy of each country based on the TIMG index, which includes the level of digital technology, digital infrastructure, digital market, and digital governance of each country.

Table 1: Regional distribution of the top 20 countries in the TIMG index

Region	Country	Rank
European	United Kingdom	3
	Germany	4
	Netherlands	5
	France	7
	Switzerland	9
	Finland	11
	Sweden	13
	Denmark	15
	Belgium	16
	Norway	18
	Ireland	19
Asian	Singapore	2
	Japan	6
	China	8
	South Korea	10
	United Arab Emirates	17
	Israel	20
North America	United States	1
	Canada	12
Oceania	Australia	14

According to the 2023 Global Digital Economy Development Index Report, Table 1 shows that the top 20 countries in terms of the level of development of the digital economy are mainly concentrated in the European region, followed by the Asian region. Only four countries, namely Singapore, China, the United Arab Emirates, and Belgium, belong to the countries along the Belt and Road Initiative, so it can be

seen that the overall development level of the digital economy in the countries along the Belt and Road Initiative is not high.

3.2 Uneven levels of development among countries

From the current data, the digital economy of the countries along the Belt and Road has the problem of uneven development. The level of digital economic development of the countries along the Belt and Road, in accordance with the TIMG index for sorting, selects the top 20 countries to form Table 2. It can be seen that the first-ranked Singapore has a TIMG index as high as 87.55, while the twentieth-ranked Latvia has a TIMG index of only 60.47, indicating that digital economic development is relatively weak.

Table 2: Top of TIMG index for countries along the Belt and Road in 2021

Rank	Country	TIMG exponents
1	Singapore	87.55
2	China	81.42
3	United Arab Emirates	76.18
4	Israeli	75.91
5	Malaysia	74.03
6	India	72.17
7	Russian	71.43
8	Saudi Arabia	70.46
9	Turkey	70.13
10	Estonia	68.88
11	Poland	67.86
12	Indonesia	66.41
13	Czech Republic	65.83
14	Lithuania	65.24
15	Thailand	63.77
16	Cyprus	62.64
17	Greece	61.55
18	Hungary	61.18
19	Slovenia	60.98
20	Latvia	60.47

The setting of the TIMG index includes four indicators: digital technology, digital infrastructure, digital market, and digital governance. According to the sub-indicators, the countries along the Belt and Road that rank highest in the TIMG index, such as Singapore, the United Arab Emirates, and Israel, all have advantages in these four indicators. Singapore ranks 6th globally in the Digital Technology

Index, while Israel ranks 10th globally. Singapore ranks second globally in the Digital Infrastructure Index, while the United Arab Emirates ranks 17th globally. Singapore and Israel both rank in the top 20 globally in the Digital Market Index rankings. Singapore ranks first in the world in the Digital Governance Index.

From the TIMG index level, the overall level of digital economy development of countries along the Belt and Road is extremely low, and there is a serious imbalance between regions. From the current development status of the digital economy in Singapore, the United Arab Emirates, and Israel, it can be seen that digital technology, digital infrastructure, digital markets, and the level of government digital governance all play a crucial role in promoting the development of the country's digital economy. Therefore, improving and promoting them requires starting from these aspects.

4 The impact path of digital economy on the trade status of countries along the "Belt and Road"

4.1 Digital economy and trade costs of countries along the Belt and Road

The digital economy gives full play to the advantages of Internet technology, strengthens direct access to information and rapid circulation, enables all kinds of economies to cooperate, compete, and communicate on an equal footing more economically and efficiently, promotes the flattening of the business structure, and significantly reduces the cost of each trade link (Zhang & Song, 2017).

First, the interconnection of the digital economy of the economies along the "Belt and Road" guarantees the timeliness, globality, and interactivity of information communication, greatly improves the level of information facilitation, and effectively alleviates the problem of information asymmetry in international trade (Jullien, 2012; Schor, 2017; Huang et al., 2019).

Second, the digital "One Belt and One Road" utilises a networked infrastructure platform to promote trade enterprises to eliminate intermediate distribution links, making the matching of production and consumption more efficient. The Internet removes time constraints and spatial barriers between trading partners, improves the

efficiency and frequency of communication, and reduces the cost of information for trade negotiations (Hagar et al., 2019; Hagiu, 2012; Freund, 2016).

Third, the rapid promotion of the digital economy in the "Belt and Road" has significantly improved logistics enterprises' utilisation and analytical capabilities regarding digital technology and big data. It has broken country boundaries in global trade, reduced transportation costs in the "Belt and Road," and accelerated the transformation of the logistics system to smarter storage control and management. Additionally, the logistics system of the economies along the route is developing into a more efficient and frequently communicating network, further supporting intelligent warehousing control, goods sorting, and order processing.

4.2 Digital economy and trade price formation in Belt and Road countries

On the one hand, the digital economy expands the operating margins of trading enterprises, enhances market competition, and significantly improves the transparency of trade prices (Chen, 2020). The construction of the digital "Belt and Road" has made it easier for production enterprises along the route to access the dynamics of global competition, resulting in more rapid decisions to enter or exit the international market. At the same time, new business opportunities, new consumer markets, and Internet business models have attracted a large number of cross-industry enterprises to participate in global trade competition (Sun, 2020). The more firms integrate into the international market with the same product, the more intense the competition becomes, leading to lower prices of goods.

On the other hand, the digital economy has the characteristics of being shareable, replicable, and having unlimited use, which can effectively reduce some of the fixed and marginal costs directly transferred by enterprises to consumers. This leads to a reduction in the price of bilaterally traded products and impacts the traditional cost-pricing paradigm (Li, 2020). At the same time, the use of digital technology improves the efficiency of supervision, tracking, and evaluation in the trade process, enhances price transparency, and indirectly inhibits unreasonable product pricing.

4.3 Digital economy and trade diversity in countries along the Belt and Road

On the one hand, the digital economy expands the operating margins of trading enterprises, enhances market competition, and significantly improves the transparency of trade prices (Jiao, 2020). The construction of the digital "Belt and Road" has made it easier for production enterprises along the route to access the dynamics of global competition, resulting in quicker decisions to enter or exit the international market. However, new business opportunities, new consumer markets, and Internet business models have attracted a large number of cross-industry enterprises to participate in global trade competition (Sun, 2020). The more firms integrate into the international market with the same product, the more intense the competition becomes, leading to lower prices of goods.

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5 Suggestions for promoting the development of digital economy in the countries along the "Belt and Road"

5.1 Improving Digital Technology

Technology plays a crucial role in the development of anything, and the advantage of talent reserves is a crucial step in achieving technological progress. Therefore, governments of various countries should strengthen the construction of talent teams, ensure the enrollment rate of higher education, and further improve the digital literacy of the people (Lan, 2020).

In terms of methods, we should encourage school-enterprise cooperation, create a comprehensive ICT skills learning platform, support students to actively participate in ICT construction projects, and focus on the two-way cultivation of students' thinking and practical abilities. From the perspective of the government, in order to meet the demand for human capital, efforts need to be made to cultivate professional and applied talents and establish a complete ICT skills training network, which requires a more effective allocation of research funding for universities and ICT-related industries. From a communication perspective, universities and ICT-related industries should be encouraged to carry out large-scale and deep-level school-enterprise cooperation, enhance the intensity and speed of talent cultivation, and lead the establishment of high-tech talent training bases to improve further the level of skills training (Yang & Liu, 2020).

At the same time, attention should be paid to the research and development output related to the digital economy, the protection of digital technology patents, and the creation of a favourable environment for the progress of digital technology.

5.2 Accelerate the construction of digital infrastructure

For countries along the "Belt and Road" that have short board effects on information infrastructure, priority should be given to building and improving their digital infrastructure, ensuring the universality, convenience, and security of digital infrastructure, and creating hardware conditions for the development of the digital economy. Strengthening policy communication is an important measure for the construction of the "Belt and Road." Strengthening policy communication and interconnecting the core and foundation of digital economy development is an important measure for the construction of the "Belt and Road" (Li & Zhang, 2020).

From the data in Table 2 above, we can see that China's digital economy is at a high level of development, its information infrastructure is relatively complete, and its information technology is highly export-oriented and competitive. China should actively participate in the construction of the "Belt and Road" digital economy and leverage its advantages (Xiang, 2017).

Therefore, China should actively participate in the construction of the "Belt and Road" digital economy and leverage its advantages. On the one hand, the government should actively encourage the information industry and high-tech industry to "go global" and provide these enterprises with policy support and preferences. On the other hand, China's transnational development of the digital economy helps to learn from the development experience of other countries, further expand the market, promote connectivity construction, and provide countries along the route with higher-level and quality products and services.

5.3 Actively exploring the digital market

To promote the improvement of information technology's external and competitive level, countries along the Belt and Road should encourage domestic enterprises to cooperate with advantageous digital economy enterprises, starting from the supply and demand sides, and explore new trade and investment rules for e-commerce in the world today. Actively developing new service trade, such as education, tourism, and culture, should be a priority, along with focusing on building high-level open platforms. Strengthening coordination among countries along the Belt and Road in cross-border e-commerce, currency swaps, electronic payments, and other financial mechanisms can facilitate international market expansion. Additionally, adopting cross-border trade service systems and other innovative models will help open up diversified markets.

With the rapid progress of emerging technology industries such as big data and artificial intelligence, the upgrading and transformation of the industrial economy has also entered a rapidly evolving phase. Countries and regions with high levels of digital skills are increasingly utilising online banking and e-commerce platforms. These national enterprises not only leverage digital technology to improve efficiency and productivity but also expand their markets through online sales, which continue to grow at an accelerated pace.

Based on these trends, the overall overseas comprehensive layout of the "Belt and Road" is being strategically planned. This includes improving the working mechanism, strengthening supporting policies and financial frameworks, ensuring the efficiency of each stage of implementation, and advancing the construction of

logistics, commerce, services, integration modules, and other critical infrastructure components.

5.4 Improving the level of government digital governance

Countries along the Belt and Road should pay more attention to the construction of digital government, promote the sharing of government data, strengthen the digital performance ability of governments at all levels, and improve their digital governance level. To create a favourable business environment for the development of relevant digital economy enterprises, it is essential to establish appropriate digital economy laws and regulations. Additionally, providing better and more comprehensive protection for intellectual property rights in the digital economy will further enhance the development level of the country's digital economy.

6 Conclusion

Based on the TIMG index, this paper finds that by 2023, only four countries along the Belt and Road have entered the top 20 in the world in terms of digital economy development, and the overall development level remains low. The ranking of countries along the Belt and Road indicates that the development level among participating nations is uneven.

As a new economic development model, the digital economy not only retains the general characteristics of the traditional economy but also introduces new features driven by digitisation, which can enhance the trade status of countries along the route through various pathways. Therefore, in response to the complex global economic environment, countries along the Belt and Road should actively enhance their digital technology, strengthen the construction of digital economy infrastructure, vigorously explore the digital market, and improve their digital governance frameworks to fully leverage the potential of the digital economy in promoting economic growth and trade.

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