Study on the Business Environment of Digital Trade in Countries along the "Belt and Road"

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Abstract. This project aims to measure the digital trade environment of the countries along the "Belt and Road" from 2010 to 2019 by constructing an evaluation index system for the digital trade business environment. Through the fsQCA group analysis method, we explore the path of digital trade development and propose different development strategies for countries along the "Belt and Road" with different degrees of digitalisation.

Keywords: Business Environment; Digital Trade; "Belt and Road"; fsQCA Group Analysis Method.

1 Introduction

Under the background of the globalization of the digital economy, the powerful innovative vitality of digital technology has been demonstrated. Digital trade has become a new driving force for global economic growth and trade exchanges, while digital economic and trade cooperation has become a new mainstream in the field of cooperation of the"Belt and Road".[1]. However, the countries along the Silk Road are generally characterized by unbalanced development of informatization, weak digital infrastructure, imperfect digital public products, and very different digital market demands, so the focus of digital economic cooperation between China and the countries along the Belt and Road are different. Therefore, it is significant to assess the digital business environment of the countries along the route scientifically and put forward cooperation strategies according to the level of digital development of different countries, which is of great importance in accelerating the development of digital trade cooperation in the silk road.

1.1 The Definition of the Digital Business Environment

Digital business environment is accompanied by the development of the digital economy. Caused by the iterative rise of digital technology and the application of the economic system, digital technology has not only changed the business environment of the driving instrumental factors, but also constitutes an increasingly important content of

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the new business environment (Shi Chunlai, 2018) [2].More and more international organizations have incorporated digital business environment indicators into the country business environment evaluation system, calling for a new indicator system for country business environment evaluation.In 2017, UNCTAD took the lead in defining "digital business" in terms of digital startups and digital platforms[4].In 2018, the World Bank conducted a pilot evaluation of 21 countries and plans to evaluate a further 100 countries globally. In 2019, World Economic Forum constructed the Digital Business Environment Ease of Doing Business Index, which includes seven categories of indicators. (Wang Mengzi, 2021)[3].

This paper argues that the digital business environment is not only a result of the transformation and upgrading of the traditional business model by digital technology, but also a brand new environment designed to meet the innovation and development needs of market players in the digital economy. Therefore, this paper will focus on the connotation and characteristics of this new business environment, aiming to provide insights and guidance for the prosperity of enterprises in the digital economy. More and more international organizations have incorporated digital business environment indicators into the country business environment evaluation system, calling for a new indicator system for country business environment evaluation.

1.2 Basis for Selection of Indicators for Evaluation of Digital Business Environment

At present, there is a relative lack of literature on the assessment of the digital business environment. One of the more relevant studies is the one proposed by Wang Zhixin[5], which is a statistical measurement method for the digital trade business environment of the countries along the silk road. The study mainly constructs a six-dimensional evaluation index system, including basic carrier, customs environment, financial services, technical support, human capital and laws and regulations, to analyze and compare the digital trade environment in different countries. However, the focus of our study is not limited to the field of digital trade, but also involves the potential development level of national digital economy. In view of this, this study adjusts and expands the evaluation indexes. The aim is to provide a more comprehensive and integrated assessment of the digital business environment.

When constructing the digital business environment assessment index, this paper comprehensively considers the following key factors:

(1)Core factors of production for the digital economy. In addition to traditional capital, land and labor, the digital economy is extremely dependent on high-value data resources and talents with digital technology expertise. The quality and availability of data resources, as well as an adequate supply of highly skilled talent, are the core drivers of sustained growth in the digital economy.

(2)The dual requirements of digital infrastructure. The infrastructure on which the development of the digital economy depends not only includes physical infrastructure such as information networks, but also requires soft infrastructure in the form of a se-

cure network environment jointly constructed by the government and society. The popularization of information networks and the network security mechanisms are important prerequisites for ensuring the healthy of the digital economy.

(3) Inclusiveness of innovation and efficiency. The development of the digital economy has enhanced the efficiency of traditional economic activities, and optimized the economic and industrial structure. A market environment that encourages innovation and experimentation, as well as continued government investment in science and technology innovation, is critical to a digital economy.

2 Digital Business Environment Indicator Construction and Evaluation Methods

2.1 Indicator Construction

The following aspects are mainly considered when constructing indicators related to the business environment of digital trade. First, data completeness and accuracy. The data of the selected indicators should be as comprehensive and complete as possible, so as to avoid affecting the assessment results due to missing or inaccurate data. Second, the hierarchical structure and internal logical relationship between the indicators are considered to ensure that the selected indicators can comprehensively represent the key dimensions of the business environment for digital trade. This study sets six first-level indicators, including digital infrastructure, data governance environment, digital financial services, digital Innovation, digital human capital, and legal environment safeguard, which is further subdivided into nineteen second-level indicators. Thirdly, reliability, the indicators selected in the article need to be real and reliable, and the sources of data should be reliable.

Digital infrastructure is refined into internet penetration rate, number of secure Internet server users and fixed broadband utilization rate; data governance environment is refined into data infrastructure composite score, availability of basic data, normality of data service and maturity of data use; digital financial services is refined into financial inclusiveness in digital finance, convenience of digital finance and activity in digital finance; digital innovation is refined into investment in research and development, information and communication technology and innovation capability; digital human capital is refined into education level, education investment and labor market efficiency; legal environment safeguard is refined into policy transparency, efficiency of government in resolving regulatory conflicts and Whether regulations are strictly enforced. One relevant study is the one proposed by Kovtoniuk et al.[6], which constructs an evaluation index system for the digital trade business environment of leading countries.

2.2 Data Processing

In this paper, 55 countries along the silk during the period of 2010-2019 are selected as the research sample, and the sample countries are selected based on the available data.

In the process of data collection, comprehensive indicator data were collected as much as possible. Some missing data were supplemented by interpolation and extrapolation to ensure the completeness of the data. In order to quantitatively assess the digital trade business environment of each country, this paper adopts the entropy value method to calculate the weights of each indicator, and accordingly calculates the comprehensive scores of each country for ranking analysis. For the limitations of the entropy value method in dealing with time series data, this paper refers to Jing Tan [7]'s research on regional natural resource efficiency under the perspective of new urbanization based on panel data from 2005-2017 for the treatment of data.

2.3 Discussion of Results

The weighting results of the entropy method show that digital innovation dominates with 53.482%, followed by digital infrastructure (14.667%), legal environment (12.236%), digital financial services (10.745%), data governance environment (5.245%), and digital human capital (3.625%). These weights determine the overall evaluation score of digital business environment of the countries along the silk road.

Time-series analysis shows that the digital business environment of the countries along the silk road has shown a steady improvement since 2010, with the average index recording 0.270 in 2010 and rising to 0.287 in 2013, an increase of 6.28%. In particular, the Belt and Road Initiative was proposed in 2013, which injected new vitality into the digital economy and accelerated the process of improving the digital business environment in countries along the route. By 2016, the average index further increased to 0.326. By 2019, this growth trend continued, with the average index reaching 0.343, a cumulative increase of 26.94% since 2010. The above data not only reveals the positive impact of the Belt and Road Initiative on the development of the digital economy in the countries along the route, but also emphasizes the key role of digital innovation in promoting the improvement of the business environment. At the same time, it points out that countries need to continue to strengthen the construction of digital infrastructure, enhance digital financial services and other aspects of cooperation, in order to further optimize the digital business environment.

A composite score of 55 countries on digital business environment was ranked to filter out the top five countries from 2010 to 2019, with the top six countries scoring Austria, China, Singapore, Estonia, Israel and South Korea, with China replacing Estonia in the top five countries after 2013. The average values of the six dimensions of digital business environment data for the leading countries are shown in Fig.1:

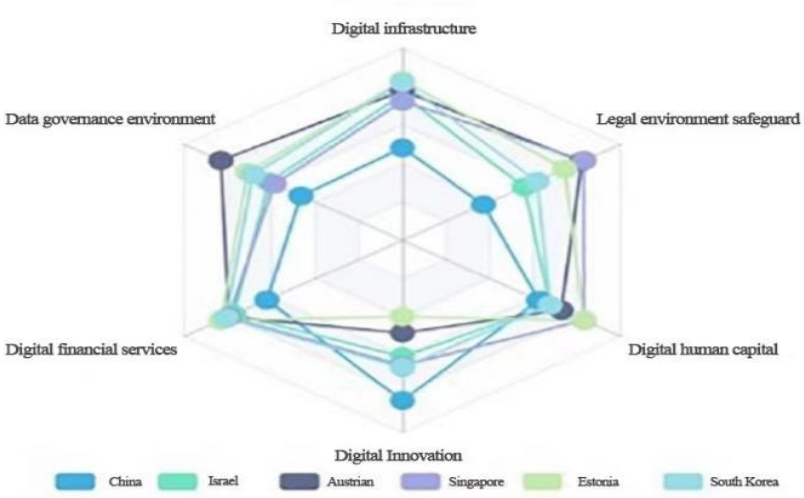

Fig. 1. Six-Dimensional Radar Chart of Doing Business in Leading Countries

Depending on the main driving force for the development of the digital economy, leading countries can be categorized as: market-led, government-led, consumer-led, and innovation-led.

Market-led refers to the dominant role of Internet platform companies, with related data resources and assets led by leading companies, with little or no government intervention, and the allocation of resource elements mainly relying on market supply and demand solutions. For example, South Korea is a typical country.

Innovation-led refers to technological innovation as the core, committed to breakthroughs in core technologies, build data security defense system, and in this way to promote industrial digital transformation. China is a prime example.

Consumer-led means that consumers place a high value on data value and personal privacy, demanding a certain amount of power in data allocation and pushing governments to impose regulation on digital platforms in pursuit of a fairer business environment for the digital economy. Austria is a typical consumer-led country.

Government-led means that the government promotes the development of the digital economy through the formulation of policies and management tools, and regards it as a strategic direction for national development, with establishing data governance laws and regulations, and integrating the digitization of the entire industry. Singapore is the representative country.

Among the 55 countries, we have likewise filtered out the five countries at the bottom of the rankings during 2010-2019 for comparative analysis. Uzbekistan, Algeria, Cambodia, Guyana, Bangladesh, and Pakistan are among the countries along the silk road that perform poorly in terms of digital business environment. The average values of the six dimensions of Doing Business for the bottom-ranked countries are shown in Fig.2:

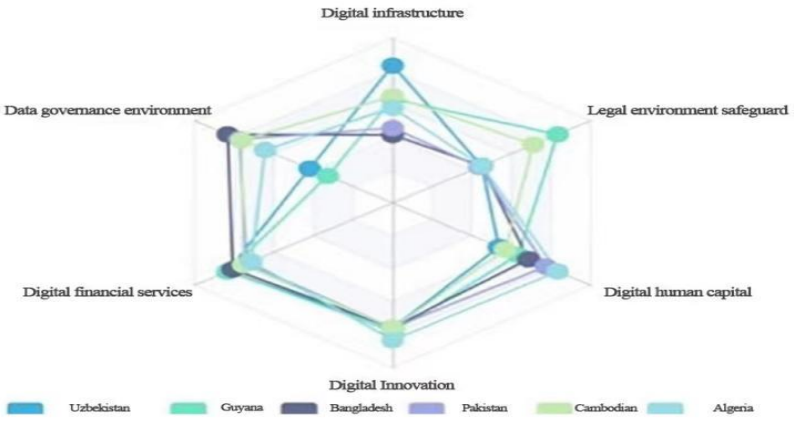

Fig. 2. Six-Dimensional Radar Chart of Doing Business in Lagging Countries

The situation in lagging countries is largely similar.

Bangladesh, Pakistan and Algeria have significant shortcomings in the digital business environment. Bangladesh's digital infrastructure is relatively underdeveloped, with its below-average telecom and broadband penetration rates leading to low internet penetration and slow digital market development. Pakistan's broadband service penetration rate is only 42.4%, and the lack of data center resources hinders the progress of digital infrastructure. Moreover, it was not until 2018 that Pakistan enacted a digital policy, but the regulatory system in terms of digital economy development remains inadequate. Algeria is in a similar situation to Pakistan, facing challenges in the areas of digital infrastructure, legal environment, and financial services. Algeria ranked 162nd in the 2017 Index of Economic Freedom. In addition, mobile payments are not popular in the country, credit card usage is low, and cash payments are still dominant. The shortcomings of these countries in the digital business environment limit the potential of their digital economy. Uzbekistan performs better than other laggards in terms of digital infrastructure and digital financial services, with a cell phone penetration rate of 71.8 percent, 98 percent of settlements covered by mobile communication base stations, and 70 percent mobile broadband coverage. However, the main problem faced by the country was the low level of education, with only 27.7 per cent of the employed population having received tertiary education, leading to a shortage of innovative digital talent and thus limiting the ability to innovate and develop digital technologies.

For countries along the silk road where the digital business environment is lagging behind, common challenges include lagging behind in the construction of digital infrastructure, the lack of widespread access to digital financial services, a weak foundation for data governance, and a lack of support for digital innovation. When engaging in digital economic and trade cooperation with these countries, China needs to give full play to its own advantages and characteristics in the field of digital technology, prioritize the promotion of cooperation in the construction of digital infrastructure, and help these countries improve their digital business environment and promote the healthy development of their digital economy through technology export and knowledge sharing.

3 Evaluation Methodology

3.1 Configuration Analysis Method

The biggest problem of traditional regression analysis is that it can only explore the influence of a single variable on the results. However, the variables are interacting and influencing each other, and the combination of multiple factors can offset the side effects caused by the absence of key factors. Therefore, this paper applies fsQCA to analyze the influence factors of business environment in a comparative way, beyond the limitation of individual non-linear variables on the results. Starting from the level of "linkage effect", we use fuzzy mathematics and Boolean algebra to analyze the cases, so as to identify the development paths constituted by the combination of different factors.

3.2 Calibration of Results

Due to the lack of adequate theoretical support and empirical evidence, this paper follows the mainstream fsQCA research paradigm to minimize subjective bias in calculations. It sets the complete affiliation point, intersection point, and complete unaffiliated store of the outcome variable (total trade) at 95%, 50%, and 5% respectively, along with a consistency threshold of 0.9 1for necessary conditions. The analysis indicates no conditions with a consistency level above 0.9, suggesting no clear factors promoting or hindering economic development. The paper's raw consistency is 0.8, with a frequency threshold of 1, and follows the mainstream practice of interpreting intermediate solutions with additional parsimonious solutions. The table below summarizes the group analysis of 2019 compared to 2010, meeting the required coverage and consistency levels of 0.5 and 0.8 respectively.

3.3 Analysis of Results

Table 1. Economic development grouping pathway of 2010

	Outcome variable: total trade				
antecedents	FAC1	FAC2	FAC3	FAC4	FAC5
Digital infrastructure	●	●	⊗	⊗	⊗
Data governance	●	·	●	⊗	●
Digital financial	●	●	⊗	·	·
Digital Innovation	·	●	●	●	●
Digital human capital	·	·	⊗	⊗	·
Legal environment	●	●	⊗	⊗	⊗
Original coverage	0.587	0.584	0.287	0.236	0.279
Unique coverage	0.047	0.042	0.061	0.020	0.014
Consistency	0.828	0.895	0.808	0.944	0.962
Overall coverage	0.7452				
Overall consistency	0.796				

Table 2. Economic development grouping pathway of 2019

	Outcome variable: total trade		
antecedents	FAC1	FAC2	FAC3
digital infrastructure	·	·	⊗
Data governance	·	·	·
Digital financial	·	·	⊗
Digital Innovation	●	●	●
Digital human capital	⊗	·	⊗
Legal environment	·	·	⊗
Original coverage	0.4579	0.5804	0.3244
Unique coverage	0.0355	0.1581	0.0966
Consistency	0.9535	0.8527	0.8547
Overall coverage	0.7125		
Overall consistency	0.8288		

According to Table.1, by analyzing the grouping of the conditions of Doing Business 2010, it is possible to derive five paths for the development of the digital economy.(1) The development of digital economy can be effectively promoted by taking the improvement of infrastructure, the maturity of data governance, the popularization of mobile payment, the completeness of the legal system, and the abundance of digital talents. The typical representative country is Austria.(2) The development of a digital economy can also be realized with the improvement of infrastructure, the popularity of mobile payment, the vitality of digital innovation, the completeness of laws and regulations and the abundance of digital talents. The typical case country is Singapore. (3) Mature data governance and highly dynamic digital innovation can also effectively promote the development of the digital economy in a digital business environment characterized by imperfect infrastructure, unpopularity of mobile payments, insufficient digital talent and incomplete laws and regulations. China is the typical case country. (4) Against the backdrop of imperfect infrastructure, immature data governance, insufficient digital talent, and incomplete laws and regulations, the innovative capacity of digital technology as a core condition and the popularization of mobile payments as a peripheral condition can partly make up for some of the incomplete conditions of the business environment. Israel is the typical case country.(5) Under the circumstance of imperfect infrastructure, laws and regulations, the development of digital economy can be effectively realized with the maturity of data governance,digital technology innovation ,the popularization of mobile payment and the abundance of digital talents. South Korea is the typical case country.

According to Table.2, by analyzing the grouping of business environment development conditions in 2019, 3 typical paths for the advancement of digital economy development can be found.(1) In the digital environment where digital talents are lacking, innovation in digital technology, perfect digital infrastructure, popularization of mobile payment, transparent government regulation, and a complete legal system are the marginal conditions that can promote the development of the digital economy. South Korea belongs to this type of development path.(2) The development of the digital economy is driven by high innovation as the core condition and improved digital infrastructure,

data security review, popularization of mobile payment and improvement of the legal system as the peripheral conditions. As one of the digital economy powerhouses, Singapore is the typical case country.(3) Under the conditions of imperfect digital infrastructure, lack of security of mobile payment, lack of digital talents, and unsound laws and regulations, the availability of data and high motivation of digital innovation will drive the development of digital economy. China belongs to this type of development path.

4 Conclusion

This project has obtained the following conclusions through the measurement of the evaluation indexes of the digital business environment of the countries along the silk road and the study of the development paths calculated by fsQCA group analysis:

There are distinct types of leading countries in digital business environment. Leading countries can be categorized as market-led, government-led, consumer-led, and innovation-led in promoting their digital business environments. This classification reflects the significant differences in the strategies and focus adopted by different countries in optimizing their digital business environments.

The development shortcomings of countries lagging behind in the digital business environment are prominent. Lagging countries generally have deficiencies in a number of key dimensions, such as digital infrastructure, data governance, data security and digital innovation capacity, and it is urgent for these countries to realize all-round synergistic development in the above-mentioned areas. In particular, digital infrastructure, which is fundamental to the development of the digital economy, should be a priority area of attention and investment for these countries.

The development path of the digital economy needs to be dynamically adjusted and optimized. In 2010, the countries along the route were still at a relatively early stage of digitization and faced many challenges and deficiencies. During this period, development paths were diversified, and countries had a wide range of options to determine their own digital economy development routes according to their own circumstances. However, with the passage of time, especially in some countries, the digital business environment has been significantly improved with the continuous improvement of digital infrastructure, the growing soundness of data governance regulations and the strengthening of digital regulatory capacity. These advances have not only optimized the foundation of the digital economy in each country, but also provided fertile soil for digital innovation, making it the main engine driving the development of the digital economy. As a result, countries need to pay more attention to the role of innovation when formulating and adjusting their digital economy development strategies. Digital innovation is not only about the application and research of new technologies, but also includes breakthroughs and innovations in policy making, business model exploration and cross-border cooperation. This means that, in order to seize new opportunities in the development of the digital economy, countries need to constantly review and optimize their development paths and pay more attention to the central role of innovation in economic transformation.

In view of this, under the digital economy cooperation framework of the Belt and Road Initiative, China should deepen its cooperation with the countries along the route, so as to jointly enhance the level of digital economic and trade cooperation. China should also strengthen and deepen its cooperation with other countries in the areas of digital infrastructure, data governance, digital finance, digital innovation, and digital manpower, and to improve its rule of law environment and give full play to its unique advantages in the field of digital economy, so as to realize mutual benefits and win-win results with the countries along the route. At the same time, China should improve the rule of law environment in our country, give full play to our unique advantages in the field of digital economy, realize mutual benefits and win-win situation with the countries along the route, and jointly promote the prosperous development of the regional digital economy.

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