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Policy Assessment and Path Choice of Digital Economy Cooperation between China and Japan

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Abstract: The digital economy is an important driving force for economic growth and transformation in countries around the world, and both China and Japan have introduced a large number of strategies and policies related to the digital economy at the national level. Although there is a good foundation for cooperation between China and Japan, and many successful cases of cooperation have been formed in the field of digital economy by virtue of their respective Advantages, there still have several challenges to China-Japan bilateral cooperation in the digital economy, such as the instability of bilateral political relations, the lack of a unified system of rules for international digital governance, and social difficulties, aging and childlessness for example. If China and Japan can correctly understand and deal with their differences, seek common ground while reserving differences, enhance their Advantages and avoid their Disadvantage, and take the RCEP as an opportunity to build unified and higher-level digital economic governance rules, their digital economic cooperation will achieve greater results.

Keywords: Digital Economy; Cooperation; Policy; Path.

1. Introduction

In the twenty-first century, with the rapid development of a new generation of information technologies, such as cloud computing, big data and artificial intelligence, the digital economy has become an important driving force for economic growth and economic transformation in countries around the world. International organizations such as the United Nations and the Organization for Economic Cooperation and Development have introduced various measures to promote the development of the digital economy, and the world's major economies are also scrambling to formulate strategies and policies for the development of the digital economy. China has significant advantages in the development of digital economy, and Japan also has relatively broad prospects for development. As two economic powers in East Asia and the world, the study of China and Japan's digital economy policies and cooperation in the field of digital economy is of great significance to the economic development of the two countries as well as East Asia and the world. This first requires a clear understanding of the digital economy and the scope it covers.

2. The Digital Economy

The term “Digital Economy” can be traced back to the 1990's. In 1995, the Organization for Economic Cooperation and Development (OECD) elaborated on the possible development trends of the digital economy. “The digital economy: Promise and peril in the age of networked intelligence” [1] published by American economist Don Tapscott in 1996 used the term Digital Economy and described the impact of the Internet on the economy and society. However, the book did not define the concept of digital economy; in May 1997, Japanese Ministry of International Trade and Industry (MITI) mentioned digital economy at the official level; the U.S. Department of Commerce in 1998, in the report “The Emerging Digital Economy”, referred to the digital economy as the “digital economy”. The U.S. Department of Commerce published “The Emerging Digital Economy” in 1998 [2], in which it summarized the characteristics of the digital economy as “the Internet is the infrastructure, information technology is the pioneering technology, the information industry is the leading and pillar industry, and e-commerce is the engine of economic growth” [3], and it has become one of the earliest advocates of the digital economy among governments. It became one of the earliest advocates of digital economy among governments. In the six years since then until 2003 (except for 2001), the U.S. government has released an annual digital economy report, which has played a very significant role in promoting the popularization of the idea of the digital economy in the early days. In March 2018, the U.S. Department of Commerce's Bureau of Economic Analysis (BEA) released the working paper “Defining and Measuring the In March 2018 the U.S. Department of Commerce's Bureau of Economic Analysis (BEA) released the working paper “Defining and Measuring the Digital Economy” [4] which defines the digital economy and provides the first measurement of the U.S. digital economy.

Table 1. Definitions of the digital economy

Institution	Definition	Coverage
BEA	Internet and ICT-related economic activities.	Digital infrastructure, e-commerce, data value and ICT-related services
OECD	All economic activities that rely on digital resources or are significantly enhanced by their use.	Digital technologies, digital infrastructure, digital services and data
G20	A range of economic activities that use digitized knowledge and information as a key factor of production, modern information networks as an important vehicle, and the effective use of ICT as an important driver of efficiency gains and economic structure optimization.	Upstream and downstream industries of data-enabled ICT production and services
UNCTAD	Activities of output and trade of goods and services through the Internet and ICT industries.	Digital technology and infrastructure, digital and ICT industries, digitalization of traditional industries
Cabinet Office of Japan	An economy in which digitized products, services, information, money, etc., circulate among individuals and businesses using the Internet as a medium.	ICT production and services
China Academy of Information and Communications Technology	A new economic form that takes digitized knowledge and information as key production factors, uses digital technology as the core driving force, uses modern information networks as an important carrier, and through the deep integration of digital technology and the real economy, continuously improves the level of digitalization, networking, and intelligence of the economy and society, and accelerates the restructuring of the economic development and governance model.	Data Valorization, Digital Industrialization, Industrial Digitization, Digital Governance

Source:(1) BEA. Defining and Measuring the Digital Economy. working paper, 2018.

(2) OECD. OECD Digital Economy Outlook 2020 [R/OL]. [2024-04-25].https://www.oecd.org/industry/oecd-digital-economy-outlook-2020-bb167041-en.htm.

(3)G20. G20 Digital Economy Development and Cooperation Initiative[R/OL].[2024-04-25]. https://www. mofa. go.jp/files/000185874.pdf

(4) UNCTAD. Digital Economy Report 2019 [R/OL]. [2024-04-25]. https: //unctad. org/ webflyer/ digital-economy-report-2019.

(5) Cabinet Office. Heisei 29th Annual Economic and Fiscal Report [R/OL]. [2024-04-25].https://www5. cao. go. jp/ j-j/ wp/ wp-je17/index_pdf.html

(6) China Academy of Information and Communication Research. A New Picture of the Global Digital Economy (2020)-New Dynamics of Sustainable Development under Great Changes [R]. October 2020.

As the table 1 shows, the definition of the concept of "digital economy" by domestic and foreign organizations has its own focus, and no unified standard has yet been formed. In the early stage, the definition of digital economy "focuses on the productivity of digital technology and emphasizes the application of digital technology industry and its marketization", while with the deep integration of digital technology and industry, the connotation of digital economy is constantly enriched, and "the focus has gradually shifted to the interpretation of the economic function of digital technology and the transformation of production relations by digital technology" [5]. As to the latest definition, all parties agree that data is the core element of digital economy, and the essence of digital economy lies in the new economic form formed by the application of information and communication technology based on data.

According to the definitions of different organizations and scholars, the scope covered by the digital economy is divided into narrow and broad. Usually, the digital economy in the narrow sense mainly includes economic activities around digital technology, i.e., the digitalization of ICT and other industries and traditional industries; while the digital economy in the broad sense can be further extended to the fields of digital governance and data circulation [6]. The National Bureau of Statistics of China (NBS) has released the Statistical Classification of the Digital Economy and its Core Industries (2021) [7], which divides the digital economy into two major parts: digital industrialization and industrial digitization, which is actually a narrow definition. Since digital governance and data circulation, especially the former, do not have a clear corresponding industry to be defined in economics, domestic scholars usually adopt a narrow standard when conducting quantitative research on digital economy (mainly measuring and analyzing the scale of the digital economy), but a broader scope will be involved in qualitative research. This paper also adopts this approach.

3. China and Japan's Digital Economy Development Strategies and Policies

As the second and third largest economies in the world, China and Japan, like other countries, have actively explored the field of digital economy. Both sides have introduced a large number of strategies and policies related to the digital economy at the national level and set up dedicated digital economy management departments to accelerate the industrial layout of the digital economy.

3.1. China has a Clear Strategic Deployment of Digitalization and a Clear Path of Promotion

China's digital economy policy started with the big data policy, and the government attaches great importance to the top-level design and comprehensive planning of digital economy development at the national strategic level, forming a top-down policy system for digital economy development.

Since the 18th National Congress, China has put forward the goal of implementing the strategy of network power and the national big data strategy, promoted the development of the digital economy as a national strategy, and introduced a series of policies and measures to support the development of the digital economy. Since 2017, "digital economy" has been written into the Government Work Report for many years in a row, and "digital China" was written into China's "14th Five-Year Plan for National Economic and Social Development" in 2021. In 2021, "Digital China" was included in China's "Fourteenth Five-Year Plan for National Economic and Social Development". In order to give full play to the role of the digital economy in promoting industrial transformation and upgrading, the Chinese government has also issued the "14th Five-Year Plan for the Development of the Digital Economy", "14th Five-Year Plan for the Development of Intelligent Manufacturing", and "Overall Layout Plan for the Construction of Digital China", to further clarify the development goals and key tasks of the digital economy. In October 2023, the National Data Bureau was formally established, and since then, China has had a full-time department to coordinate and promote the planning and construction of digital China, digital economy, and digital society.

With policy support and the efforts of market players, China's digital economy has achieved rapid development, and has become one of the countries in the world with the friendliest environment, strongest momentum, and widest application of digital economy development. As seen in Figure 1, during the period of 2011-2022, the total scale of China's digital economy has grown 6.15 times, ranking second in the world for many consecutive years; the compound annual growth rate is as high as 16.34%, with a strong capacity for sustained growth; and the proportion of the digital economy in the GDP has also increased year by year, from 15.2% in 2011 to 41.5% in 2022.

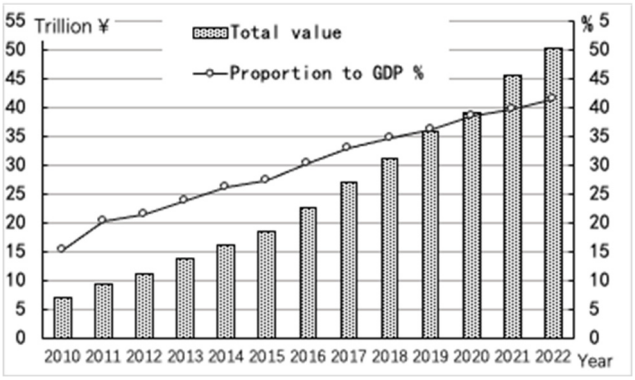

Figure 1. Changes in China's Total Digital Economy (2010-2022)

Source: Compiled from the White Paper on the Development of China's Information Economy and the Report on the Development of China's Digital Economy issued by the China Academy of Information and Communications Technology in various years.

3.2. Japan's Digital Economy Policies Started Early, but Advancement has been Relatively Slow

Japan's digital technology innovation at the national level, digital economy development planning can be traced back to the then Prime Minister Yoshiro Mori (Yoshiro Mori) put forward in 2001, "e-Japan strategy", the first-time digitalization was established as a national strategy in Japan. Encouragement of digitalization has also become the goal of former Japanese Prime Minister Shinzo Abe, from the construction of information technology to the construction of a smart society and super-smart society, the Abe government has introduced a series of strategies and plans, but unfortunately these policies have not been effectively promoted and implemented, resulting in Japan's digital economy policy is at a strategic disadvantage compared to other major economies, and the development and competitiveness of the digital economy is in a weaker position than that of other developed countries. The development and competitiveness of the digital economy is also at a disadvantage compared to other developed countries. According to the "Digital Riser Report" by the European Center for Digital Competitiveness of the European School of Advanced Business Studies (ESCP), Japan, which was ranked second in the G7 in 2019, had not perform well in digital competitiveness in 2020, and was ranked at the bottom of the G7.

Table 2. G7 Digital Riser 2019 and 2020 Rankings

Ranking	2020 report	2021 report
1	France	Canada
2	**Japan**	Italy
3	Canada	France
4	United Kingdom	United States
5	United States	United Kingdom
6	Germany	Germany
7	Italy	**Japan**

Source: ESCP Business School. Digital Riser Report 2020 [R/OL]. [2020-09-01].https://digital-competitiveness.eu/wp-content/uploads/ESCP_Digital-Riser-Report_2020-1.pdf.

ESCP Business School. Digital Riser Report 2021 [R/OL]. [2021-09-01].https://digital-competitiveness.eu/wp-content/uploads/Digital_Riser_Report-2021.pdf

Since then, in light of the aging population and the impact of COVID-19, the government of Yoshihide Suga, recognizing that Japan was lagging behind in digitalization, has begun to focus on digital reforms as the main goal of Japan's economic recovery after the epidemic, and has been pushing forward with a "Digital New Deal".

In June 2021, Japan launched the National Data Strategy (NDS), which aims to "build a citizen-centered digital society with efficiency and trust" [8] through the use of digital twin technology. In order to implement the NDS and to address the phenomenon that the development of the digital economy is dominated by multiple ministries and is highly compartmentalized, the Japanese government established the Digital Agency in September 2021, based on the Cabinet Secretariat's Information Technology and Strategy Office (IT Office), which is under the direct authority of the Prime Minister of Japan, and is responsible for integrating the digital economy management functions that are dispersed among the various ministries and agencies [9]. The main government agencies and their responsibilities related to the development of the digital economy in Japan are listed in Table 3.

Table 3. Major government departments related to the development of digital economy in Japan

Department	Main responsibilities
Prime Minister's Office	Responsible for building and managing information systems in each ministry, and formulating overall development plans and reform policies for the digital economy.
Cabinet Office	Formulates and implements research programs related to the digital economy, promotes digitization of the government, etc.
Ministry of Economy, Trade and Industry (METI)*	Responsible for the promotion of IT utilization, policy planning for the development of the information and content industry, trade and international cooperation related to the digital economy, and cybersecurity, etc.
Ministry of Internal Affairs and Communications (MIC)	Formulates strategies for ICT industry development, ICT technology R&D and utilization promotion, policy formulation and management in the field of electrical communications, international cooperation in the field of information and communications, etc.

*Note: Formerly the Ministry of International Trade and Industry.
Source: Ministry of Commerce, "Country (Region) Guide for Outward Investment Cooperation (Japan) 2022 Edition," p. 74

In addition to promoting reforms in government departments, the Kan administration is also actively promoting digital transformation in industry, education, and society. It has formulated three major digital strategies, "Comprehensive Data Strategy", "Science, Technology and Innovation Basic Plan 2021-2025" and "Comprehensive Innovation Strategy 2021" with the intention of enhancing industrial digitization and digital industrialization in all aspects, from the construction of digital infrastructure to the development of digital technology applications.

After Fumio Kishida came to power, he continued to promote the digital economy policy as a priority of governance and a national strategy, and put forward strategic plans such as the "Comprehensive Strategy for the National Vision of the Digital Garden City" and "WEB 3.0". Among them, the "Comprehensive Strategy for the National Vision of the Digital Garden City" [10] aims to address the problem of polarization in the metropolitan area and to promote local revitalization in order to narrow the gap in regional development. WEB3.0" is regarded by Akira Taira, the head of the NFT Policy Research Working Group, as one of the pillars of the Kishida government's comprehensive economic policy of 'Specialized New Capitalism of Japan' [11]. "WEB3.0, due to its decentralized characteristics, has found a way to overtake Japan's digital economy, which was lagging behind in the 'Web 2.0' era due to the competitive disadvantage of Internet platform companies [12]. Digital economy contents such as "accelerating research on the development conditions of Web3.0 fields such as blockchain, NFT, and metaverse" and "Society 5.0" were added to the "Basic Policy for Economic and Financial Management and Reform in FY2022" [13], the first policy of Kishida's administration. The Japanese government has made artificial intelligence and quantum technology a key direction for the strategic deployment of digital industries, and has further increased its support for budgetary investments in semiconductors, the digital economy, and 5G infrastructure communications equipment. For example, in less than three years, the Kishida administration has allocated about 4 trillion yen (about $26.7 billion) to support the development of Japan's domestic semiconductor industry. These plans and policies reflect the Kishida administration's strategic intent to seek Japan's return to global leadership in the digital economy.

4. Foundation of China-Japan Digital Economy Cooperation

4.1. Hardware and Software Basis for Cooperation

China has many hardware and software advantages in the field of digital economy, including more complete information infrastructure, complete industrial system, large domestic market and a wide range of digital technology application scenarios, etc., which can support the rapid development of the country's digital economy.

China is a global leader in information infrastructure, having built the world's largest fiber optic network and mobile broadband network. By the end of 2022, China has built and opened a total of 2.312 million 5G base stations, accounting for more than 60% of the world's total [14]. 5G is regarded as a huge engine that will drive the development of the information industry and socio-economic development in the next 10 years. According to IHS forecast, 5G will boost global market sales by $13.1 trillion in 2035, and China's 5G market is expected to reach nearly half of the global scale. During the same period, Japan's 5G market size is equivalent to a quarter of China's market.

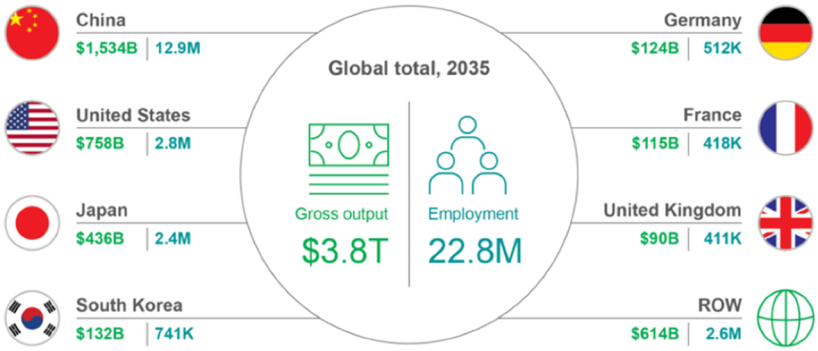

Figure 2. Spatial distribution of the 5G global value chain in 2035
Source: IHS Market. The 5G Economy in a Post-COVID-19 Era.2020:4.

China is also the only country in the world that has all the industrial categories in the United Nations Industrial Classification. Relying on the solid industrial foundation and huge market demand, China's industrial Internet is booming. The average growth rate of installed industrial robots reached 13% in 2017-2022, and the total number of installed robots accounted for more than half of the world's in 2022. Industrial Internet has covered 49 major categories of the national economy (including full coverage of 41 industrial categories), and the value added of China's core industrial Internet industry reached 1.26 trillion yuan in 2022, and is expected to reach 1.35 trillion yuan in 2023 [15].

In addition to its leading information infrastructure and independent and complete industrial system, China is also a superb market that can provide a huge application market and huge amounts of data for the development of digital technology. With the world's second largest population of 1.4 billion, China has a huge number of internet users and a 5G penetration rate that is way ahead of other countries. According to the Digital China Development Report (2022), China will have 1.067 billion Internet users in 2022, with an Internet penetration rate of 75.6%, 561 million 5G users, and 1.845 billion mobile Internet end-users, making it the first country in the world to realize the “Superman of Things”. Instant messaging, Instant messaging, online video, short video, online payment and online shopping have become the most popular applications used by Chinese Internet users, which has made China's Internet platform companies and e-commerce and mobile payment development among the world's leaders. China's Advantages in other areas of the digital economy are detailed in Table 4.

Table 4. Comparison of Advantages and Disadvantage of Digital Economy Cooperation between China and Japan

Area	China	Japan
Population	Advantage: more than 1.4 billion people (18% of the world's population, ranked second), large market size. Disadvantage: aging and less children problem is worsening.	Advantage: more than 120 million people (1.73% of the world, ranked 11th). Disadvantage: aging and less children problem is worsening.
Information Infrastructure	Advantage: Global leader in network infrastructure.	Disadvantage: network infrastructure is relatively backward.
Industrial system	Advantage: complete industrial categories and system.	Advantage: predominantly technology-intensive industries.
Digital technology level	Advantage: global leader in 5G technology; number of supercomputers ranks first in the world, total supercomputing power ranks third in the world; Beidou system, satellite Internet key technologies have made major breakthroughs. Disadvantage: small number of core patents.	Advantages: semiconductor technology among the world's leading; industrial robotics industry chain is complete and has many core technologies; breakthroughs in artificial intelligence, big data processing performance; more core patents.
Level of industrial digitization	Advantages: huge scale and high output value of industrial IoT application; wider application of industrial robots; high application rate of artificial intelligence technology. Disadvantage: uneven levels of digital transformation in the three industries. Low digitalization penetration rate of primary and secondary industries.	Advantages: well-developed electronics and information technology manufacturing industry; high digitalization penetration rate of primary and secondary industries. Disadvantage: low rate and narrow scope of application of digital technology.
Development level of digital industry	Advantage: first in the world in terms of the scale of 5G industry; has large Internet platform enterprises. Disadvantage: relatively low share of digital industry in GDP.	Advantage: digital industry accounts for more than 50% of GDP. Disadvantage: weaker development of digital platforms.
Degree of social informatization	Advantage: high Internet penetration rate, global leader in Internet application; global leader in 5G penetration rate.	Disadvantage: low Internet penetration rate, especially narrow coverage of electronic payment.
Digital talents	Disadvantage: large gap of digital talents; unbalanced distribution of industries and regions	Disadvantage: unbalanced distribution digital talents in regions, Tokyo's unipolar dominance.
Trade in digital products	Advantages: Increased reliance on China in Japan's digital product manufacturing sector (electronic information manufacturing). Disadvantage: digital service products' market share in Japan decreases year by year.	Disadvantage: digital product manufacturing sector's advantage in China has weakened; digital service products' market share in China is low.

During the second Internet revolution, Japan established a strong competitive advantage in electronics and information technology manufacturing, which has supported the country's digital development. According to the China Academy of Information and Communications Technology [16], Japan's digital economy as a share of GDP in 2022, and the digital penetration rate of primary and secondary industries are higher than the average level of major countries, and are in the second tier of the world. However, the scale of Japan's digital economy has been lower than the United States, China and Germany, more than 1 trillion U.S. dollars in 2022, ranking fourth in the world.

Currently industrial robots have become an important tool to promote the digital transformation of manufacturing. Japan's industrial robotics industry chain is complete and has a lot of core technology, the production of industrial robots nearly four-fifths exported to foreign countries. And China is the world's largest user of industrial robots, industrial robot applications have covered the national economy 60 industry categories, 168 industry categories; 2017-2022 industrial

robot installation average growth rate of 13%, the total installed capacity in 2022 accounted for more than half of the global proportion.

Although Japan has a world-leading advantage in ICT manufacturing, it has not been able to transform this traditional advantage into a new type of competitive advantage in the digital economy era, and compared with other digital economy powers, Japan lags behind in both digital infrastructure development and digital technology application. As of March 2022, Japan's 5G coverage rate is about 30%, and mainly covers urban areas, while the Japanese government aims to reach 95% by the end of 2023, 97% by the end of 2025, and 99% by the end of 2030, and the number of 5G base stations is planned to increase to 210,000 by the end of 2023 [17]. Of the total number of 5G essential patents, Japanese companies accounted for about 10.7% of the total, while the US, China and Europe accounted for 18.2%, 15.8% and 13.2% respectively [18]. In terms of digital technology penetration, according to Japan's "White Paper on Information and Communication" [19], China's AI adoption rate in energy, finance, healthcare, and media is 86%, 86%, 83%, and 89% respectively, while Japan's is only 38%, 42%, 23%, and 60%. Among the world's leading digital platform companies, Japan has almost no digital giants that can compete with Google, Apple, and Facebook in the United States, and Alibaba, Baidu, and Tencent in China.

To summarize, both China and Japan possess strong technological strength and innovation capabilities. China has made significant progress in areas such as digital infrastructure, 5G communications, big data, and artificial intelligence, and the breadth and depth of digital technology applications are higher than in Japan. Japan, on the other hand, has a leading position in areas such as precision manufacturing and industrial robotics, and has the advantage of original innovation such as core standards, core patent inventions and core underlying chips that support the development of the digital economy. Therefore, the cooperation between the two countries in the field of digital economy can give full play to their respective technological and industrial advantages and promote the innovative application of digital technology.

4.2. Close Trade Relations between China and Japan in Digital Products

In the field of digital product manufacturing, China's importance to Japan's electronic equipment products has been increasing year by year, and at present, up to 45% of Japan's exports of such products flow to China, and imports of such products from China also occupy about one-third of Japan's market. Japan's importance to China is weakening, although the scale of imports and exports is improving, but the proportion is declining year by year. To a certain extent, it can be seen that Japan's dominance in the field of digital product manufacturing is gradually weakening, while its dependence on China is increasing.

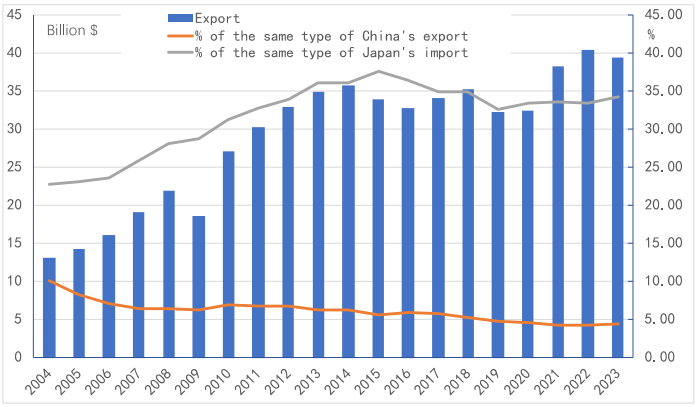

Figure 3. China's export in digital products to Japan (electronic equipment)

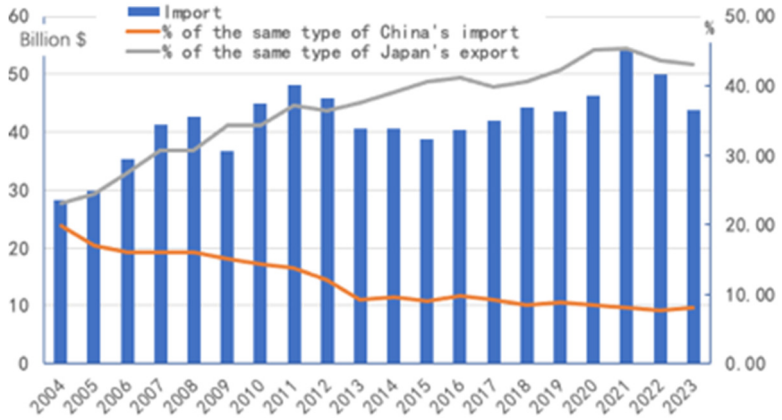

Figure 4. China's import in digital products from Japan (electronic equipment)

Source: ITC database.

Regarding the trade of products in the category of telecommunications, computer and information services, the WTO database currently only has data on Japan's trade with China from 2014-2021. From the data, China-Japan digital trade in services is relatively weak, with Japan's exports to China accounting for less than 7% of Japan's exports of

similar products for a long period of time, and the scale of exports expanding basically year by year from 2014, and then falling sharply to $332 million in 2021 after reaching a high point ($681 million) in 2020; while imports from China retain a relatively large scale, in terms of trend, imports from China share of Japan's imports of similar products has been on a downward trend. This shows that the market position of Chinese digital service products in Japan is declining, and the advantages of cooperation between the two sides in the service industry have not been greatly reflected in the trade field.

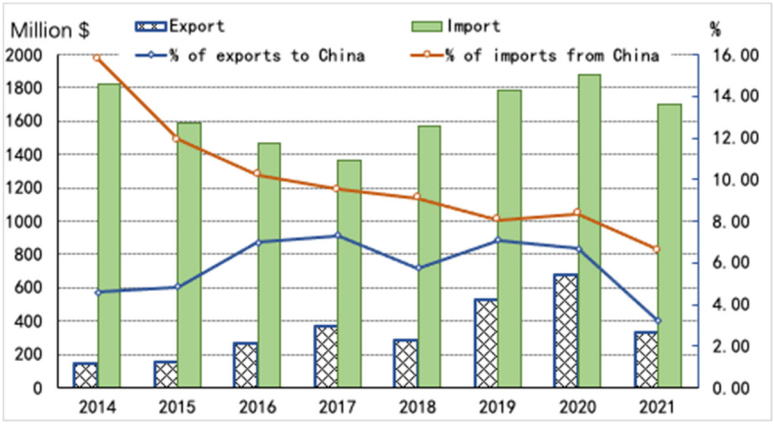

Figure 5. Japan's Trade in Digital Products with China (Telecommunications, Computer and Information Services)
Source: WTO database.

4.3. Status of China-Japan Digital Economy Cooperation

4.3.1. Cases and Modes of Digital Industry Cooperation

Table 5. Typical cases of cooperation between China and Japan in the field of digital economy

China	Japan	Fields	Main contents
Alibaba	Tokyo Olympics Sports	Broadcasting + Cloud Computing	Utilizing cloud technology to support the official website of the Olympics and broadcasting on the cloud; providing cloud refueling solutions; creating the first “digital cloud badge” in the history of the Olympics, realizing functions such as “touch dating”, “digital business card” and “step”. Digital business card” and ‘step logging’ functions.
Pony Smart	Toyota	Automobile + Intelligent Software	Toyota automobile equipped with self-driving system.
Ada International	Panasonic	Elderly service + digital technology	Elderly community construction, health management and senior living services.
National Palace Museum	Toppan Printing Co.	Cultural heritage + printing and digital technology	Creation of the Institute for Digitization and Application of Cultural Assets of the Forbidden City, and cooperation in cultural heritage preservation and digitization application.
Nanjing Azure Technology Co.	Sumitomo Mitsui	Insurance + services + digital technology	Relying on Azure's IoT and industrial Internet technologies, we will jointly build a digital and intelligent risk solution platform to serve various fields such as the hazardous chemical industry, industry and trade, automobile manufacturing, and construction equipment enterprises.
Jiangsu Meike Solar Energy Technology Co.	Hitachi Group	PV industry + digital technology	Carry out the intelligent and digital transformation of photovoltaic manufacturing enterprises, and implement the construction of digital factories, intelligent warehouse management systems, and the construction of automated three-dimensional warehouses.
Tsinghua University	Hitachi Group	Scientific Research	To carry out digital research cooperation in various fields such as energy, transportation, digital city, health and pension, etc., resulting in a number of patents, papers and research reports.
Alibaba Group	Japanese retail companies, e-commerce platforms, logistics companies, payment institutions, etc.	Platform + Retail	Apply advanced technologies such as big data and artificial intelligence to improve user experience, and jointly promote the optimization and intelligence of platform data analysis and precision marketing, logistics networks, supply chain management, and cross-border payment, etc.
Huawei	Japanese operators	Telecommunications	Jointly promote the construction and commercialization of 5G networks. The two sides are engaged in in-depth cooperation in 5G technology research and development, network construction, and application innovation.
Tencent	Kadokawa, Bandai Namco, Aiming and other Japanese game companies	Entertainment field	To carry out cooperation in product development, marketing and technology application, etc., and to utilize artificial intelligence, big data, cloud computing and other technologies to innovate game functions, and to enhance the user experience and interactivity of game products.
Haier Group	Panasonic, Sanyo Electric, etc.	Electric appliance production + automation technology and robot manufacturing	To carry out joint R&D and application in the fields of intelligent upgrading of production lines, intelligent warehousing and logistics.

Source: Collected and organized based on Internet information.

The digital industries of China and Japan are complementary, and the two sides have formed successful cooperation cases in many fields by taking advantage of their respective strengths (see Table 5 for details).

As the typical cases show, digital industry cooperation between China and Japan exists not only in the traditional labor- and capital-intensive manufacturing sector, but also extends to technology-intensive industries such as telecommunications and photovoltaics, with cooperation cases in the service industry taking a greater advantage. The industries on the Chinese side are more widely distributed, while those on the Japanese side are mostly traditional advantageous manufacturing enterprises, such as Hitachi, Panasonic and Toyota.

According to the research of China Academy of Information and Communication Technology (CAICT) and Nomura Research Institute (NRI) on the current situation of Sino-Japanese cooperation [20], it is found that the Sino-Japanese digital industry presents a diversified cooperation situation, and according to the type of cooperation (three types of product output, technology output, and value co-creating) and the level of cooperation (three levels of products and equipment, software services, and platform ecology), it can be formed into a total of nine cooperation modes of 3X3 (see Table 6 for details). In addition to the traditional direct output of digital products and the direct output of standardized software solutions, high value-added cooperation modes, such as joint innovation of platform services, have also been developed between China and Japan.

Table 6. Cooperation Modes of Digital Industry between China and Japan

Platform ecology	Cross-border expansion of standardized platform services	Localized customization of platform services	Joint innovation of platform services
Software services	Direct export of standardized software solutions	Localized customization of software application technology	Joint development of software application technology
Products and equipment	Direct delivery of standardized digital products	Localized development of digital products	Joint development of new generation digital products
	Product output	Technology output	Value co-creating

Source: CAICT, NRI

4.3.2. Scientific Research Cooperation

China and Japan have also carried out many scientific research collaborations in the digital field, such as the Hitachi Group in the previous case, which has established an R&D center with Tsinghua University to jointly carry out industry-university-research collaborations on digital technology innovation around a number of key areas, such as energy, transportation and mobility, and health and aging.

However, it should also be seen that the international research partnership between China and Japan in some cutting-edge science and technology fields is not close enough. For example, in the field of artificial intelligence, the degree of inter-country academic paper cooperation between China and Japan is only ranked in the seventh place, which is a huge gap compared with that of the United States, the European Union, and the United Kingdom, etc., and the gap with Singapore, which is in the first place, is also widening (see Table 7).

Table 7. Number of Internationally Collaborative Papers on AI Research in China Unit: Piece

2010		2016		2021	
Nation	Quantity	Nation	Quantity	Nation	Quantity
United States	4074	United States	10659	United States	18113
European Union	1031	European Union	2790	European Union	5984
United Kingdom	796	United Kingdom	2089	United Kingdom	4758
Canada	563	Australia	1744	Australia	3707
Australia	530	Canada	1439	Canada	2964
Japan	**518**	Singapore	1171	Singapore	2070
Singapore	439	**Japan**	**794**	**Japan**	**1439**
France	244	Germany	663	Germany	1395
Germany	240	France	633	France	1228
Namibia	232	South Korea	374	South Korea	886

Source: China Academy of Information and Communication Research. Global Digital Industry Strategy and Observation Report (2021). (2021-12-01) http:// www. caict.ac.cn/kxyj/qwfb/ztbg/202201/P020220128646458439671.pdf

5. Challenges of Digital Economy Cooperation between China and Japan

Although the economic and trade relations between China and Japan continue to deepen and develop, the bilateral relationship is still unstable, and the cooperation between the two sides in the field of digital economy is facing many serious challenges.

5.1. Japan Follows the U.S. "de-Chinaization" Policy

In recent years, the U.S. has regarded China as the biggest threat to its global hegemony, and has pressured China in various fields, especially in the field of technology, restricting the export of technology to China, banning China's 5G technology, and suppressing Chinese enterprises, and launching the "Four-Square Chip Alliance" in conjunction with Taiwan, Japan, South Korea, and other regions with a comparative advantage in the production of high-value semiconductors, constructing a "Four-Square Chip Alliance" against China. "To build barriers to China's technological proliferation.

In the context of the intensification of the game between China and the United States, the Japanese government, however, to cooperate with the United States to contain China, deeply involved in the international affairs of China's "decoupling and breaking the chain". In the U.S.-led construction of cutting-edge semiconductor "de-Chinaization" framework, and trade, supply chain, clean energy and anti-corruption composition of the "Indo-Pacific Economic Framework (IPEF)", Japan has played a role in the "India-Pacific Economic Framework (IPEF)". In 2018, in line with the U.S. ban on the procurement of Huawei and ZTE equipment by government agencies, Japan also published guidelines for the procurement of equipment by government agencies, requiring the avoidance of equipment that poses a risk of data leakage [21]. In 2022, under the strong impetus of the Kishida administration, Japan passed the "Economic Security and Safety Promotion Act" [22], which allows the government to screen the equipment of core infrastructure companies to reduce the risk of cyberattacks; and attempts to build a supply chain system that is not dependent on China, in order to achieve the purpose of containing China's technological progress while taking the opportunity to promote the development of its own emerging industries and form a comparative advantage over China. In July 2023, Japan formally introduced export restrictions on 23 types of semiconductor manufacturing equipment, the relevant links and technical issues to control, in addition to friends of the United States and China, Taiwan and other 42 countries and regions, other countries are required to obtain a separate license from the Japanese Ministry of Economy, Trade and Industry (METI), [23] which in fact, in the form of a "white list" will be excluded. On April 26, 2024, the METI further expanded the scope of export control to include four categories of semiconductor and quantum-related technologies.

Japan following the U.S. industrial policy of containing China will be a major challenge to China's cooperation with Japan in the digital economy.

5.2. The Absence of a Unified International Digital Governance Rule System

Data has become a new production factor in the era of digital economy and is an important basic and strategic resource for all countries. Data market construction and market rule construction all need to carry out the corresponding policy and institutional definition to provide the necessary protection, such as data trade, cross-border e-commerce, etc., which involve a large number of cross-border transactions, and many of the original systems and regulatory mechanisms are no longer applicable. Current digital rules basically exist in bilateral or plurilateral free trade agreements or digital economy agreements, but the level of digital governance and regulation varies greatly among countries, and a unified system of digital governance rules has yet to be formed at the international level, with the pattern of global digital governance being characterized by fragmentation, regionalization and fragmentation [24].

5.2.1. Risks of Cross-border Flow of Data

Modern information networks enable the rapid flow of data, but frequent interaction and sharing, but also brings a variety of risks and challenges, and with the development of the digital economy these risks are increasingly prominent, mainly including data security and privacy risks, such as data leakage, theft, tampering, forgery, misuse, etc., and security and privacy risks caused by the risk of national security and national sovereignty risk, legal and regulatory risks, payment and systemic financial risks, etc. How to prevent and deal with these risks, promote the safe utilization and circulation of data, and accelerate the design and improvement of data governance systems are common challenges faced by China and Japan.

5.2.2. Japan's Digital Rules

In terms of global digital rulemaking, the claims and practices of the U.S. and the EU are highly influential. Through the General Data Protection Regulation (GDPR), the EU has constructed the strictest data privacy protection rules in history; the U.S. has pushed for the free flow of data across borders by virtue of its huge advantages in digital technology and enterprises, and constructed a digital alliance with ideological lines; Japan , on the other hand, has integrated into the digital market and digital rules alliance between the US and Western developed countries by harmonizing with the US and Europe in terms of high-level digital trade rules [25]. On the basis of absorbing the experience of building cross-border data flow policies in the US and Europe, Japan has gradually formulated and improved its own data governance-related laws and institutions. For example, in terms of cross-border data flow governance, Japan has inherited the U.S. principles of free flow of data and industry self-regulation, and the government has done as little or as little as possible to intervene in data flows. Therefore, before the revision of Japan's Personal Information Protection Law in 2015, the governance of cross-border data flow in Japan was basically in the state of "three selves" of freedom, voluntariness, and self-regulation [26]. After the revision of the Personal Information Protection Law came into effect in 2017, the governance of Japan's cross-border data flow began to shift to the free flow of rules and regulations, and formed a government-led, multi-party governance system with the participation of civil society. Japan has also adopted a multi-party governance model with the participation of the private sector. Japan also promotes the safe circulation and exploitation of various types of data, including personal and industrial data, through the design of systems such as data trading markets and information banks.

At present, Japan is in a leading position in the international arena in the formulation of certain digital rules, and has participated in the formulation of a large number of bilateral and plurilateral digital trade rules, and has taken a leading position in some international trade agreements, such as the Comprehensive and Progressive Trans-Pacific Partnership (CPTPP), which was promoted and signed by Japan after the United States withdrew from the TPP, and the "Trusted Trust" program, which is aimed at solving problems in the areas of

privacy, data protection, intellectual property rights, and security. Japan is one of the main proponents of the Trusted Data Free Flow Initiative (DFFT), which aims to address privacy, data protection, intellectual property rights, and security issues, and has played an important role in the Regional Comprehensive Economic Partnership (RCEP). Japan has also concluded bilateral agreements on digital rules, such as the Japan-Europe Economic Partnership Agreement (EPA), the Japan-U.S. Digital Agreement, and the Japan-UK Economic Partnership Agreement (EPA). However, on the whole, Japan is closer to Europe and the U.S., and with the exception of the RCEP, Japan does not share norms in the digital domain with China.

5.2.3. Differences in Digital Rules between China and Japan

Due to the different levels of development between China and Japan coupled with the influence of the great power game, China and Japan have big differences on some core issues of digital rules, which has become one of the challenges to promote the cooperation between the two countries' digital industries, such as privacy and data protection in cross-border data flow, and disclosure of government data.

Japan's population has a general awareness of personal privacy protection, and the government has paid special attention to emphasizing privacy and data protection when formulating digital rules, which led to Japan's first adequacy determination by the European Commission as soon as the EU's GDPR came into effect [27]. China, on the other hand, emphasizes data as a strategic national asset and implements a management-enhanced data governance model that allows for extensive government regulation of personal data. In terms of cross-border data flows, it insists on localized data storage requirements, and data exiting the country is subject to security assessments, among other things.

Although China has also formulated a lot of rules on digital economy, at this stage, the development of China's digital economy focuses more on industrial upgrading, technology research and development, talent cultivation, and planning for building a digital society, while there is still room for improvement in the areas of digital governance and digital security, in particular, the leakage of personal data privacy, the monopolization of data by unicorn enterprises, and data misuse are still occurring frequently.

In terms of open government data, in June 2012, Japan's High ICT Social Development Strategy Headquarters (IT Strategy Headquarters for short) released the Digital Administration Open Data Strategy, taking a key step in the openness of government data in Japan. The IT Strategy Headquarters and the Cabinet Council of Japan have since then issued a series of policies related to the openness of government data. In 2016, the Cabinet released Japan's first “Promotion of Government-Civilian Data Utilization”, which is dedicated to the utilization of data, as well as the “Promotion of Government-Civilian Data Utilization”, which is a key step in the openness of government data. In 2016, the Cabinet issued Japan's first Basic Law for Promoting the Utilization of Data by Government and Citizens, which provides unified regulations and guidance on government data openness from the legal level. In December 2019, the Cabinet Council passed the Digital Government Implementation Plan, marking that government data openness has become a key strategic element in Japan's transformation to a digital society.

China's government data openness policies and regulations are mostly local government regulations or normative documents, and relevant supporting policies are not yet sound. Open government data platforms are the main way to access government information and open data, but there are big differences in data openness among platforms, and there are problems such as incomplete coverage of data openness, inconsistency in data openness standards, untimely data updates, low percentage of dynamic data, and real-time data that are not easy to access, and so on.

According to the Open Data Barometer (ODB) [28] (to be updated to Global Data Barometer (GDB) in 2020) jointly developed by the World Wide Web-Foundation and the Open Data Institute (ODB), Japan's global ranking has increased from its initial ranking to a higher one, from its initial 15th place to 7th place, placing it in the excellent class (champions) alongside other advanced Western countries. China has moved up to 24th place from 61st, but the gap with Japan is still relatively large, especially the low scores on the impact and implementation of open government data.

5.3. Social Dilemmas Such as Aging and Childlessness and Disaster Response

5.3.1. Aging and Childlessness

Currently, the total population of Japan has been declining for many years, and the problems of aging and childlessness are serious. Japan is one of the earliest countries in the Asian region to enter into aging, Japan entered into an aging society in 1971, and 24 years later in 1995 entered into a deeply aging society. Japan's population has been declining for 13 consecutive years, in 2023, the death of the population up to 1,463,570,000, while only 617,450,000 newborns, the natural population decreased by 846,120,000 [29], the proportion of the population aged 65 years and over that year was more than 29%. Severe aging has prompted Japan to lead the world in innovation in smart manufacturing and smart services, but oligomerization has led to a conservative society as a whole, and the application scenarios for the digital industry have become increasingly limited.

China is also facing aging and childlessness issues. China has officially entered an aging society since 2000, with 7% of the population over the age of 65, a figure that reaches 15.4% in 2023, a mortality rate of 7.87 per 1,000, and a newborn birth rate of 6.39 per 1,000, [30] with the natural population growth rate negative for two years in a row.

The social dilemma of aging and childlessness also brings the problem of insufficient supply of digital talents. A study found that China's current number of digital talent gap is large, according to estimates, China's digital talent gap in 25 million to 30 million, and the gap continues to expand [31]. In a study of digital talent in representative cities around the world [32], it was pointed out that there is an imbalance in the regional and industry distribution of digital talent in China, with digital talent concentrated in developed coastal cities, where they account for a higher proportion in the ICT industry, mainly in the software and IT service industry, followed by manufacturing and finance. China's digital talents have certain advantages in the field of artificial intelligence and robotics, but other digital capabilities, especially innovation in some key core areas, are still significantly lower than the world's average level of composite, and the proportion of digital application talents is also relatively small, which also makes the representative cities in China under study relatively lagging behind in terms of the penetration rate of disruptive skills (e.g., machine learning, genetic engineering, etc.).

5.3.2. Natural Disasters

Influenced by its special geological structure and topographical features, Japan has one of the highest frequencies of natural disasters such as earthquakes, typhoons and volcanic activity in the world. As a result, Japan has rich experience in disaster prevention and response, and has a mature system of disaster prevention work. Natural disaster prevention is also an opportunity for the Japanese government to promote data openness, and the practice of government data openness in the field of disaster prevention is quite fruitful. However, Japan is relatively inefficient in disaster rescue and relief, for example, in 2024, two or three days after a strong earthquake struck the Noto Peninsula in Japan's Ishikawa Prefecture, large-scale rescue work was really carried out.

China is also a region prone to earthquakes and typhoons, and in recent years the frequency of natural disasters has become more frequent and the damage more severe due to the effects of global climate change. Therefore, how to utilize digital facilities and technologies for disaster prevention, mitigation, and relief will be a meaningful area of cooperation between China and Japan in the digital economy.

6. Path Options for Digital Economy Cooperation Between China and Japan

Recently, due to the changes in the international situation, Western developed countries led by the United States have politicized the issues of trade and science and technology, and Japan, as an ally, has become the front-runner of the U.S. in its efforts to check China, and the politicized way of thinking and initiatives to deal with the economic issues will inevitably lead to the damage of the interests of both China and Japan. Since 2022, trade in goods between China and Japan has declined for two consecutive years, and the total import and export of goods between China and Japan for the whole year of 2023 amounted to 317.999 billion U.S. dollars, which is 10.7 percent lower than the same period of the previous year, exceeding that of 2022, which was 3.7 percent. Unlike 2022, imports and exports of bilateral trade between China and Japan were both down in 2023, by 12.9% and 8.4% respectively [33]. It can be seen that competition and confrontation are not in the interest of both sides.

6.1. Change Identity, Correctly Position the Relationship Between the Two Sides

Japan has been deeply influenced by Chinese culture since ancient times, and the two countries have a long history of exchanges and cooperation in the areas of economy, culture, education, etc. In modern times, many of Japan's political systems and policies are close to those of the U.S. Therefore, there is a close relationship between Japan, China and the United States. As Prof. Fujiwara Hiroshi, the “godfather” of Japan's digital economy, said, Japan should be committed to promoting the establishment of a mutually beneficial and win-win relationship between China and the United States [34]. If Japan can look at the problem from the perspective of development, correctly recognize and deal with differences, “seek common ground while reserving differences”, change its current role, and take advantage of its close relationship with the United States and China to serve as a bridge of communication and cooperation between the two sides, China and Japan in the field of digital economy cooperation will be very promising.

First, establish a high-level dialog mechanism to strengthen policy communication and coordination. First, strengthen high-level dialogues between the two governments to conduct in-depth exchanges on digital economy development strategies, policy cooperation and rule-making, so as to increase trust and clear doubts and promote the synergistic development of the digital economy of the two countries; second, we can set up a sound policy communication channel through regular meetings, information sharing and workshops, etc., to ensure that the policies of the two sides in the development of the digital economy converge with each other.

Second, we should actively play the role of civil society and build a bridge of civil communication and a platform for dialog to help bilateral digital economy cooperation. For example, various types of market cooperation can be carried out between cities, at the regional level and with international organizations in terms of building a credible environment for enterprises, constructing a data circulation mechanism and utilizing industrial policies for early and pilot implementation.

6.2. Take RCEP as an Opportunity to Build Unified and Higher-Level Digital Economy Governance Rules

RCEP is the largest free trade agreement in the world with the largest participating population, the most diversified membership structure, and the largest economic and trade scale, and it is also the only regional free trade agreement that China and Japan are directly involved in together. RCEP's rules in the field of e-commerce and digital economy provide a rare experimental platform and historical opportunity for China to carry out a higher level of digital economy governance and cooperation with Japan and other RCEP members.

Japan and China are both Asian countries, and in terms of digital economy governance, they do not necessarily have to follow the U.S. model or the European model. The two sides can, on the basis of RCEP, explore the construction of a new cooperation model of mutual trust, mutual benefit and win-win situation, and try out some rules higher than those of RCEP at an early stage, and then gradually improve the level of bilateral cooperation.

6.2.1. Establishing New Norms for Safe and Orderly Cross-border Data Flows

Considering the possible security risks associated with the free flow of cross-border data, RCEP adopts a flexible data regulation model that encourages cross-border data flows while retaining an exit mechanism. This coincides with Japan's purpose of retaining a public purpose exclusion clause in the relevant CPTPP provisions.

However, as can be seen from the preceding analysis, there are still some differences between China and Japan, with Japan's attitude towards cross-border data favoring free flow, while China implements stricter government regulation. Therefore, in order to establish new norms for safe and orderly cross-border data flows, it is necessary for the two governments to harmonize data security-related laws, regulations and policy measures, and to improve the level of mutual trust between the two sides on the basis of the implementation of the RCEP's flexible data regulation model.

First, joint efforts should be made to promote mutual recognition as “white-listed” countries. China can learn from the “white list” rule in Japan's Personal Information

Protection Act, strengthen the country's ability to assess cross-border data flows, and include some countries and regions in the scope of free movement based on the status of personal data protection and the principle of reciprocity, so as to provide an institutional basis for China and Japan to recognize each other's "white lists". China and Japan should work together to promote mutual recognition as "white list" countries. Provide an institutional foundation for China and Japan to recognize each other's "white lists".

Second, share each other's experience in digital economy governance and promote the interconnection of standards. For example, a consensus can be reached on the criteria for identifying sensitive and shareable data, and bilateral trust and cooperation can be promoted through the use of tools such as the Osaka Vision for the Free Flow of Trusted Data (DFFT) to form fair international rules and technical norms for the cross-border flow of data that take into account both freedom and security. Enterprises and research institutes on both sides can also be encouraged to participate in the development of international standards to promote the mutual recognition and application of the standards of the two countries in a wider regional and international context.

Third, each side will choose regions with better digital economy development in their own countries for early and pilot implementation, such as Shanghai, Shenzhen, Hainan and Tokyo. Utilizing the advantages of China's FTZ system innovation, establish cross-border data flow free zones or data free port pilots in specific regions, and improve cross-border data flow solutions in terms of infrastructure, technology and policies [35].

Finally, strengthen bilateral regulatory cooperation and improve regulatory effectiveness. China and Japan can explore the construction of regulatory mechanisms and dispute resolution mechanisms for the data factor market, and work together to combat cross-border data leakage, cybercrime and other illegal behaviors through information sharing and joint law enforcement, so as to safeguard the security and privacy protection of data flows.

6.2.2. Build a New Digital Economy System of Mutual Benefit and Win-Win Situation

To establish a new digital economy system of mutual benefit and win-win situation, it is necessary to establish the concept of a community of destiny in cyberspace, and on the basis of recognizing the differences in the systems and values of various countries, China and Japan can carry out the exploration of cooperation in the digital economy around the well-being of the individual, data security, global competitiveness and other aspects [36].

For the well-being of individuals, it is necessary to adhere to the concept of "people-oriented and goodness-oriented" and to shape the concept of technology for good. China and Japan can establish better norms and regulatory systems to address the risks of privacy leakage, algorithmic discrimination and legal liability in the application of smart technologies. For example, for scenarios such as manufacturing, finance, education, healthcare, and travel, which are currently more widely used, they can cooperate to develop a mutually recognizable testing platform and have a third-party platform conduct compliance assessments to prevent related risks.

In terms of data security, adhere to the principles of transparency, openness, fairness and controllability, establish a mutual trust system for the whole industry chain, and focus on strengthening the in-depth cooperation between core technology and supply chain. Within the technological framework system trusted by both sides, promote Chinese and Japanese enterprises to carry out research and development of artificial intelligence and other emerging technologies; enhance the application of Internet technology in the supply chain, and cooperate to develop digital supply chain practice solutions adapted to the needs of their own countries, so as to enable highly digitalized operation of logistics, information flow and capital flow in cross-border transactions.

In terms of global competitiveness enhancement, on the one hand, selecting digital industries with a basis for cooperation to carry out in-depth cooperation, such as open cooperation in the fields of digital economy infrastructure construction, smart cities, smart manufacturing, digital healthcare, digital low-carbon industry, etc., to realize the complementary advantages of key industries of China and Japan. On the other hand, we will expand the coverage of digital economy rules, such as expanding the scope of RCEP member countries and deepening multilateral digital economy cooperation; China will benchmark CPTPP and improve the level of digital economy rules; we will play an active role in APEC to build consensus among countries; and we will promote Sino-Japanese digital economy cooperation in third-party markets under the framework of the "One Belt, One Road" construction. Promote Sino-Japanese cooperation in the third-party market under the framework of the "Belt and Road" construction.

6.3. Utilizing the Strengths of Both Sides to Co-Create Digital Social Transformation

As mentioned earlier, both China and Japan have many social and public problems, such as the serious situation of aging and childlessness, and frequent natural disasters. Japan's use of new digital economy technologies to solve these public problems has resulted in many achievements, especially in the areas of smart travel and tourism, smart healthcare and education, smart elderly care, digital disaster prevention and mitigation, and a large number of application cases. China can learn from the experience of Japan's local governments and private companies in promoting the construction of smart cities through citizen association, and explore the operation and business model of smart city construction projects with Japan, so as to build an elderly-friendly digital society focusing on user convenience and personal privacy; draw on Japan's rich experience in utilizing open datasets to solve public problems, and give full play to its own advantages in digital facilities and application technologies, and cooperate with Japan in disaster prevention, mitigation and mitigation. Japan to develop digital economy cooperation in areas such as disaster prevention, mitigation and relief.

In the development of digital economy, digital talent is a key element in the transformation of digital society, and the development of both the Chinese and Japanese digital economy and society cannot be separated from sustained innovative talent. China and Japan can take advantage of the open-source and open collaboration ecology to aggregate the innovative forces of China, Japan, South Korea, India, etc., establish a multi-party joint mechanism and cooperation system for the training of digital talents by educational institutions, research institutes, and enterprises in each country, and regularly organize international academic conferences, seminars, forums, and vocational exchanges and technical trainings to improve the professional level of digital

talents in the two countries; and coordinate the development of a unified supervisory and managerial system of certification and evaluation of digital talents. Set up an independent third-party certification organization to ensure the fairness, transparency and rigor of digital talent certification.

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