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International Legal Safeguards for the Digital Economy and Digital Finance: The Impact of the European Union's Data Act on Cross-Border Data Flows and Its Implications for China's Data Governance Framework

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Abstract. The EU Data Act has established a relatively complete legal regulation system for cross-border data flow, focusing on data accessibility, privacy protection and innovative development. This paper makes a critical analysis of the relevant provisions of the Data Act. While affirming its advantages in promoting standardized data sharing mechanism and strengthening users' rights, it points out that the Act may increase the compliance cost of enterprises, and there are problems such as unclear application of cross-border law enforcement. By comparing the Data Act with China's Personal Information Protection Law and Cyber Security Law, the paper discusses the reference significance of its balanced governance idea to China's data governance system. This paper analyzes the practical challenges faced by data transfer between China and Europe, such as differences in regulatory concepts and technical barriers, evaluates the compatibility between the Data Act and the global data governance paradigm, and proposes that China can learn from its core principles of strengthening data portability and system interoperability on the basis of safeguarding data sovereignty to help the high-quality development of digital economy. The concept of fair and orderly data flow advocated by the EU's Data Act provides an important reference for China to improve the data governance framework and promote the facilitation of digital trade between China and the EU.

Keywords: Cross-border data flows, Data Governance, Privacy protection, China, Global Regulatory Framework

1. Introduction

The EU Data Act is an important legislative progress in the field of non-personal data supervision. Its goal is to build a balanced and competitive data ecosystem by improving data accessibility, strengthening the subject position of users and ensuring system interoperability. Relying on the Personal Information Protection Law and the Cyber Security Law, China has formed a relatively mature data governance system, and the EU Data Act provides a sample for inspection and reference. This paper is not limited to the introduction of clauses, but from the practical effect,

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critically analyzes the role of Data Act in promoting the innovation and fairness of data governance, and refines the experience and enlightenment that can be applied to China's data governance strategy.

2. EU-China cross-border data transfers

The EU's Data Act brings both development opportunities and new challenges to cross-border data transmission between China and Europe, especially in the fields of Internet of Things and global supply chain. The interoperability standards established by the Act will help China's Internet of Things enterprises to incorporate the data generated by the EU into the global business system, and promote China-EU cooperation in the fields of intelligent manufacturing and intelligent terminals.



Figure 1. EU-China trade in goods from 2014 to 2024

From 2014 to 2024, the trade of goods between the EU and China showed a clear fluctuating trend: EU's exports to China increased from 164.7 billion euros in 2014 to a peak of 230 billion euros in 2022 and 2023, and fell by 12.5% to 200 billion euros in 2024. This change may be affected by economic and geopolitical factors; EU's imports from China increased sharply from 302.1 billion euros in 2014 to 560 billion euros in 2022, and decreased by 4.9% to 500 billion euros in 2024. China remains the EU's largest source of imports, accounting for 21.3%, reflecting the EU's strong dependence on Chinese goods. In order to solve the problem of cross-border data flow, China can explore a reciprocal data sharing mechanism that conforms to the spirit of the Data Act and safeguards national interests. Through bilateral data mutual recognition and interoperability agreements, we will improve the efficiency of data transmission between China and Europe and support the trade development of IoT-related industries. This kind of regulatory coordination needs to balance economic interests with regulatory autonomy through meticulous negotiations, creating conditions for deepening China-EU digital cooperation.

3. Implications for China's data governance farmework

3.1. Integrating user-centric principles

Taking China's intelligent manufacturing field as an example, a hypothetical user-centered data sharing framework can be constructed to analyze the relationship between the accessibility of non-personal IoT data and the innovation output of SMEs. The research hypothesis is that the expansion of non-personal Internet of Things data acquisition channels is positively related to the improvement of SMEs' innovation ability.

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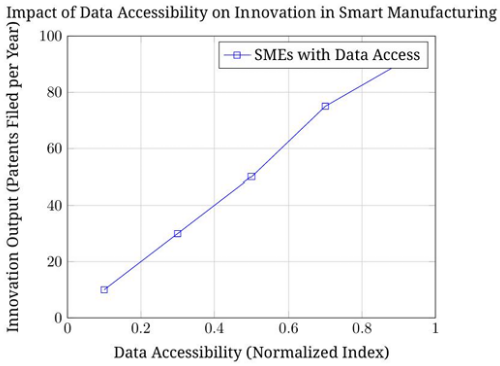


Figure 2. Hypothetical correlation between non-personal IoT data accessibility and innovation output in China's smart manufacturing sector

3.2. Advancing interoperability standards

Article 28 of the Data Act emphasizes the adoption of standardized and machine-readable data formats to realize seamless cross-platform data connection. This idea can provide a reference for China to improve the global adaptability of the Internet of Things and artificial intelligence ecology [1]. At present, domestic technology enterprises such as Alibaba and Tencent mostly adopt their own systems, which restricts data exchange to a certain extent and is not conducive to international cooperation [2]. Learning from the standardized format of the Data Act will help China's Internet of Things and artificial intelligence systems better integrate into the global supply chain, attract foreign investment and stimulate innovation vitality [3].

To promote the implementation of interoperability standards, China needs to balance the data localization policy with international standards. China's current rules require some data to be stored and processed in China. The feasible path is to implement industry-specific exemptions for non-sensitive and non-personal data (such as Internet of Things data generated by smart devices) and encourage cross-border flow. For example, the implementation of a unified data format in the field of intelligent manufacturing can promote the cooperation between Chinese enterprises and EU enterprises and enhance the competitiveness of the international market [4].

3.3. Simplifying compliance for small and medium enterprises

The Data Act requires enterprises to build interoperable systems and provide data access according to the principles of fairness, reasonableness and non-discrimination (FRAND), and the related compliance costs put greater pressure on SMEs [5]. This problem suggests that China should build a more simplified regulatory framework to provide support for the development of small and medium-sized enterprises. The security and compliance requirements set by China's current Cyber Security Law and Personal Information Protection Law are relatively complex, which raises the threshold for SMEs to participate in cross-border data flow. Learning from the FRAND principle of the Data Act, the establishment of a hierarchical and classified compliance system, and differentiated obligations according to the enterprise size and data sensitivity degree, will help to enhance the fairness of the development of SMEs [6].

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3.4. Mitigating trade tensions

Article 27 of the Data Act imposes restrictions on the transfer of data to third countries, which may conflict with international trade rules such as the General Agreement on Trade in Services. Similarly, the data localization requirements in China's Cyber Security Law and Personal Information Protection Law have also been criticized by the EU and other trading partners for restricting cross-border data flow, causing trade friction [7]. The governance ideas of the Data Act provide a direction for China to align with global trade rules, alleviate friction and strengthen cooperation. China can promote the harmonization of domestic data supervision rules with global standards by participating in international mechanisms such as the APEC cross-border privacy rules system [8].

4. Comparative analysis with global data governance paradigms

4.1. Alignment with global data governance trends

The EU Data Act regulates non-personal data generated by IoT devices in a market-driven way, strengthens user rights and economic competitiveness, and is consistent with international governance directions such as the OECD Data Flow Principles and the G7 "Free Flow of Trusted Data" initiative [9]. However, the governance logic of this bill is obviously different from China's state-centered data governance model [10]. China's model relies on the Personal Information Protection Law and the Cyber Security Law, giving priority to data sovereignty and national security [11]. Through the comparison of the two paradigms, it can be seen that China can explore a hybrid governance path that takes into account global integration and domestic demand through China-EU bilateral dialogue and participation in the APEC cross-border privacy rules system [12]. The Data Act is user-centric and requires data holders to provide access to data in accordance with FRAND principles, which is highly consistent with the OECD data flow principles. The Bill grants individuals and enterprises the right to access IoT data, promotes the development of artificial intelligence, intelligent manufacturing and other fields, and helps build a data-driven economy [13].

4.2. Opportunities for hybrid approaches in China's data governance

The interoperability principle of the Data Act provides a reference template for China to establish a trust mechanism for cross-border data flow on the premise of adhering to data sovereignty. The APEC Cross-border Privacy Rule System is committed to promoting mutual recognition of privacy frameworks among members, and is a pragmatic platform for China to align with global standards. China can integrate the standardized data format concept of the Data Act into the process of participating in the system, improve the compatibility of the Internet of Things, artificial intelligence ecology and the global market, and then attract foreign investment and promote innovation.

4.3. Challenges and considerations

China's state-centered supervision model is essentially different from the market-driven logic of the Data Act, and directly copying the framework of the Act faces many practical obstacles. The Data Act gives the private sector a higher level of autonomy, while China's regulatory system emphasizes central coordination, implementing user-centered and interoperability standards, and it is necessary to make corresponding adjustments to existing laws such as the Cybersecurity Law. In addition, connecting with global frameworks such as CBPR and DFFT may make China's data localization policy face international attention, and it is necessary to promote international cooperation while

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adhering to data sovereignty through diplomatic communication. Despite many constraints, the practical experience of the Data Act in promoting innovation through data openness and interoperability is still worth exploring a hybrid governance model that integrates global rules with domestic needs.

5. Opportunities and challenges for China

5.1. Opportunities for regulatory enhancement

The EU Data Act emphasizes users' right to obtain non-personal data and establishes data interoperability standards, which brings important opportunities for the development of China's digital economy, especially in the fields of artificial intelligence and Internet of Things. The bill requires data holders to open IoT data in accordance with the FRAND principle, and provides institutional guarantee for enterprises and individuals to mine the value of data and carry out innovative applications [14]. China can learn from relevant principles and release the economic potential of non-personal data, which is in line with China's development goals in the fields of intelligent manufacturing and artificial intelligence. For example, allowing Chinese enterprises to obtain and share non-sensitive IoT data can promote innovation in smart cities, intelligent connected cars and other fields, and enhance their global competitiveness.

5.2. Challenges in regulatory alignment

The EU has not yet recognized China's data adequacy according to GDPR, which makes it more difficult to transfer personal data. Chinese enterprises need to meet both sets of regulatory requirements in China and Europe at the same time. This fragmented regulatory environment raises compliance costs and is not conducive to SMEs entering the EU market. To solve this problem, China can learn from the ideas of the Data Act and explore mutual recognition agreements or industry-specific data sharing frameworks. For example, we signed bilateral agreements around non-sensitive IoT data, relied on the FRAND principle of the Act to ensure the fairness of data access, and promoted cross-border flow while taking into account security. At the same time, it participated in the APEC cross-border privacy rules system to help China's rules align with global standards, reduce compliance costs and build a trusted environment for cross-border data flow.

6. Conclusion

The EU's Data Act has formed an innovative governance framework for cross-border data flows, which has a profound impact on China-EU digital trade. China can promote the alignment of domestic data supervision rules with global standards by optimizing compliance mechanisms, promoting data interoperability, and conducting bilateral dialogue between China and the EU, so as to alleviate trade frictions and achieve fair and orderly data flow. Future research can further explore how China can integrate the core principles of the Data Act into the local governance system, and balance the multiple goals of economy, law and security in China-EU digital trade.

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