

Study on the influence of digital trade barriers on international trade and countermeasures

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Abstract

This study examines the impact of digital trade barriers on international trade and proposes countermeasures, which holds significant theoretical value and practical significance. The research context is that existing literature often focuses on traditional trade barriers while lacking systematic analysis of unique policy tools in digital trade. This study aims to refine the theoretical framework for digital trade governance and assist companies in managing cross-border digital trade risks. Using a mixed research approach, including literature review and case studies, the study systematically analyzes the types, motivations, and economic impacts of digital trade barriers on international trade. The main conclusions highlight that digital trade barriers significantly hinder the cross-border flow of digital services and products, increase compliance costs for businesses, and affect the competitiveness of service exports and the smooth operation of global value chains. Policy recommendations emphasize building a flexible regulatory system, etc. to address the challenges posed by digital trade barriers and promote the healthy development of international trade.

Keywords

Digital trade barriers; International trade impact; Enterprise risk

1. Introduction

1.1 Research background

The current international trade sector is undergoing a profound transformation from traditional trade models to digital trade models. However, existing research often focuses on traditional trade barriers, lacking systematic analysis of the unique policy tools and their impacts in digital trade. Digital trade barriers have become key factors constraining the cross-border flow of digital products and services. In light of this, this study aims to thoroughly analyze the types, motivations, and economic impacts of digital trade barriers on international trade, with the goal of refining the theoretical framework for digital trade governance and providing theoretical support and practical guidance for companies to effectively address cross-border

digital trade risks.

1.2 Research significance

The theoretical value of this study lies in refining the theoretical framework for digital trade governance. Existing research often focuses on traditional trade barriers, lacking systematic analysis of unique policy tools in digital trade . By clarifying the types, motivations, and economic effects of digital trade barriers, we can promote the development of a governance theory that balances efficiency and security. In practice, the study aims to assist companies in managing cross-border digital trade risks. For example, multinational corporations face challenges such as increased compliance costs and restricted market access, necessitating adaptive strategies based on policy dynamics. This study provides risk warnings and compliance pathways through literature review and case studies for businesses.

1.3 Research status at home and abroad

1.3.1 Research on the types of digital trade barriers

He Yaping (2025) explored the impact of digital trade rules and barriers on the export of digital services, analyzing how digital trade barriers have become a significant factor influencing the cross-border flow of digital services in the context of the digital age. Lin Shuoyan, Li Jiazhan, Lin Leye, and Song Dandan (2025) focused on the potential impact of digital trade barriers on global value chains, revealing through empirical research that these barriers may hinder the smooth operation of global value chains and reduce global economic efficiency. Uzule Kristine and Verina Natalija (2023) systematically reviewed the types of digital barriers encountered during the digital transformation process, providing a theoretical framework for understanding the diversity and complexity of digital barriers. These studies collectively enrich the theoretical system of digital trade barrier types, providing valuable references for addressing digital trade barriers and promoting the development of digital trade.

1.3.2 Research on the economic impact of digital trade barriers on international trade

Hu Jiajia, Zhang Ming, and Chen Yongqiang (2025) analyzed the impact of digital trade barriers on China's service export competitiveness, particularly from the perspective of the threshold effect of technological innovation, revealing how digital trade barriers influence service exports through their impact on technological innovation. Qi Junyan and Qiang Huajun(2021) systematically studied the impact of digital trade barriers on the complexity of service exports, providing a new perspective for understanding how digital trade barriers shape international trade structures. Xiaping Guo (2024) explored the impact of digital trade barriers on international business and proposed corresponding countermeasures, offering a reference for the international community in addressing digital trade barriers. Huang Ming

(2023) focused on the impact of digital service trade barriers on the three dimensions of domestic digital service exports, providing empirical evidence for evaluating the economic effects of digital trade barrier. These studies collectively form a research system on the impact of digital trade barriers on international trade economics, offering rich theoretical support and practical guidance to policymakers, businesses, and academia.

1.4 Research methods and innovations

This study employs a mixed research methodology: it reviews policy evolution and academic debates through literature analysis and reveals the mechanisms of barriers by examining typical cases at home and abroad. The innovations are twofold: first, it focuses on policy frontiers, incorporating new regional rules like the Digital Economy Partnership Agreement (DEPA) into the analytical framework to explore the possibility of multilateral cooperation; second, it proposes a "tiered governance" framework, advocating for differentiated regulation based on data sensitivity to reconcile sovereignty claims with trade facilitation. This framework offers new insights for building an elastic international digital governance system.

2. Core types and formation mechanisms of digital trade barriers

2.1 Definition and classification of digital trade barriers

Digital trade barriers refer to the regulatory measures that impose restrictions on the cross-border flow of digital products and services through legal, policy or technical means. They can be divided into direct barriers and indirect barriers.

Direct barriers are characterized by administrative compulsion or technical intervention, primarily including: 1) data localization requirements, which mandate the storage or processing of specific types of data within the country through legislation. For example, China's Data Security Law stipulates that "important data" must be stored domestically, while Russia requires the localization of personal data for its citizens[1]; 2) algorithmic review mechanisms, which manifest as restrictions on algorithm transparency, content filtering rules, or application scenarios. 3) electronic payment restrictions, which include setting up payment security certifications that do not meet international standards, etc.

Indirect barriers stem from institutional differences and policy frictions, typically manifested as: 1) regional standards for intellectual property protection diverging, such as the US-Mexico-Canada Agreement (USMCA), which mandates extended digital copyright protection, while developing countries struggle to implement these provisions due to technological limitation[2]; 2) disputes over the imposition of digital taxes, with some EU member states unilaterally levying digital service taxes (DSTs) at rates as high as 3%-7.5%, conflicting with the US principle of "fair market tax," leading to trade friction between the US and EU.

2.2 Multi-dimensional analysis of formation causes

The generation of digital trade barriers is the result of the interweaving of national security, economic interests and institutional differences, and its evolution path shows a significant "policy nesting". National security concerns form the core driving force. Based on data sovereignty theory, countries view data as a strategic resource and restrict cross-border flows to prevent geopolitical risks. For example, China's Cybersecurity Review Measures require operators of critical information infrastructure to purchase "secure and trustworthy" products, effectively creating technical supply chain barriers. The logic of industrial protection is manifested in the asymmetric support for strategic industries. Developed countries consolidate their competitive advantages through rule dominance: the United States promotes the free flow of cross-border data under "digital liberalism," clearing obstacles for domestic tech companies to expand; developing countries, on the other hand, foster local digital enterprises through market access restrictions. Institutional differences and conflicts stem from the irreconcilability of governance paradigms. The EU's GDPR is centered on the principle of "rights-based," demanding strict compliance with data processing and imposing substantial penalties. In contrast, the Asia-Pacific CBPR adopts an "enterprise self-certification" model, focusing on enhancing data flow efficiency. This institutional gap forces multinational corporations to adapt to multiple standards. For instance, as disclosed by Julie Brill, Deputy Chief Legal Counsel of Microsoft, Microsoft has invested over 1,600 engineers in the GDPR project to transform its data management system, while simultaneously complying with CBPR necessitates restructuring data processing procedures in the Asia-Pacific region.

3. Analysis of the impact of digital trade barriers on international trade

3.1 Theoretical mechanism

Digital trade barriers impact international trade systematically through two major pathways: the trade cost effect and the market access effect. The trade cost effect manifests as a structural increase in corporate compliance costs. For instance, after China implemented its Data Security Law, core data exports must undergo security assessments, which take 45 days or more per assessment, directly increasing the time cost of cross-border data flow. Chinese enterprises going global need to deal with 134 data regulations including GDPR. To meet the compliance requirements of the EU, AliExpress has increased its operating costs by 870 million yuan annually. Market access effects manifest as direct or indirect market exclusion. A typical case is TikTok's setback in the Indian market: In 2020, India banned 59 Chinese apps citing "national security," causing ByteDance to lose over \$6 billion in market valuation. Quantitative analysis shows that an increase in the DSTRI causes more harm to importers than exporters[3], indicating that the existence of barriers makes it more difficult for enterprises to enter the target country's market.

3.2 Related research

At the macro level, there is a significant negative correlation between the OECD countries 'digital restrictions index and service trade flows[3]. Panel data analysis from 2014 to 2020 indicates that for every one-unit increase in the DSTRI, digital service exports will significantly decrease, with the impact elasticity of intellectual property protection being the highest and Regional Trade Agreements (RTAs) can partially offset the impact of barriers[3]. RTAs with deep digital clauses increase the average digital service trade flow of contracting countries by 37%, but these provisions must cover core areas such as data flow and mutual recognition of privacy. At the micro level, small and medium-sized enterprises are more significantly constrained by digital trade barriers. According to the "2023 Cross-border E-commerce Compliance Cost Research Report" by the China Council for the Promotion of International Trade Research Institute, among enterprises encountering data localization requirements, 41.2% have withdrawn from the target market due to their inability to bear compliance costs, with an average order loss rate of 26.7%.

3.3 Heterogeneity effects

Industry Differences: The impact on the ICT industry is significantly greater than that on traditional sectors. The World Bank's "2022 Digital Trade Report" shows that data restrictions have shortened the global value chain of the ICT industry by approximately 13 links. US export controls and algorithm reviews have led to a 15% to 30% increase in the export cost of Chinese enterprises to the US. Some enterprises have been forced to abandon the North American market. In contrast, traditional manufacturing industries are less affected by digital barriers due to their reliance on offline channels and physical intermediates.

Country Differences: Developing countries face obstacles in technology catch-up, while developed countries strengthen their rule dominance. According to the 2022 Digital Services Trade Restrictions Index released by the OECD, the average DSTRI of developing countries is higher than that of developed countries. At the same time, the technological complexity of digital service exports in developing countries is more significantly negatively affected by restrictive measures on cross-border data flows[4]. India's data localization policy, though protecting local platforms, reduces the spillover effect of digital technology in foreign direct investment (FDI) by 17.6%, slowing down the technological upgrading of local enterprises. Developed countries, on the other hand, the "data free flow" clause in the USMCA agreement has increased North American digital service trade concentration by 23%, while the EU's GDPR has compelled about 65% of global multinational corporations to adjust their data governance structures, effectively forming a monopoly on technical standards.

4. Typical case study

4.1 Restrictions on cross-border data flows: take the failure of the EU-US Privacy Shield agreement as an example

The game of rules between the EU and the US over cross-border data flows can be traced back to the 2000 Safe Harbor Agreement, whose core conflict lies in the tension between data privacy protection and national security interests. The essence of policy conflicts lies in the irreconcilability of governance paradigms: the EU, with the GDPR as its cornerstone, has established a data sovereignty system based on "rights-based" principles, demanding that data recipients provide "substantially equivalent" levels of protection[5]; in contrast, the US, under the Cloud Act, advocates for "long-arm jurisdiction," treating data as corporate assets and emphasizing free flow. The failure of the "Privacy Shield" agreement directly increases compliance costs and operational risks. Taking Meta as an example, its 2022 financial report shows that in order to meet GDPR requirements by storing EU user data on local servers, data center assets incurred a cost of \$1.34 billion, and annual data management costs increased by nearly 40%.

4.2 Digital Service Tax Dispute: Trade friction between France and the United States

Since 2019, France has imposed a 3% digital services tax on digital companies with global revenues exceeding 750 million euros and French revenues exceeding 25 million euros. The policy rationale is to address the issue of "base erosion and profit shifting" (BEPS). The United States views the DST as a "discriminatory tax," violating Article 2 of the General Agreement on Trade in Services (GATS), which stipulates "most-favored-nation treatment." In 2020, the U.S. imposed retaliatory tariffs of 25% on about \$1.3 billion worth of French goods, including wine and cheese. The WTO rules' adaptability controversy focuses on two points: Tax base determination conflict: DST uses user engagement as the tax base, whereas current international tax rules rely on the existence of a legal entity (PE) principle. Legitimacy of unilateral measures: The United States invoked Section 301 of the Trade Act of 1974 to impose sanctions, but the WTO Dispute Settlement Body (DSB) ruled that such unilateral measures violate Article 23 of the Understanding on Dispute Settlement Rules and Procedures (DSU), highlighting the failure of multilateral rule coordination.

4.3 Regional Synergy in the Asia-Pacific: Breakthroughs and Limitations of RCEP Digital Trade Rules

The innovation of electronic signature mutual recognition and non-invited commercial information provisions in Chapter 12 of the RCEP has achieved rule breakthroughs in the following areas: Electronic signature mutual recognition mechanism: For example, China, Japan, and South Korea have launched a pilot program for cross-border mutual recognition of electronic business licenses, reducing the enterprise registration period. Non-invited commercial information regulation: This is the first time a multilateral agreement has clearly defined "Uninvited Commercial Electronic Information", requiring senders to provide a unsubscribe mechanism and compressing the complaint handling time for spam emails, reducing compliance

costs effectively. The limitations of RCEP are concentrated in the flexible design of data flow provisions: Differential Management During Transition Periods: Less developed countries like Cambodia and Laos have been granted a five-year delay in implementing data flow related obligations, exacerbating the fragmentation of rules.

5. Suggestions on coping with digital trade barriers

5.1 Strategies at the national level

On the one hand, building an elastic regulatory system. China is exploring a regulatory model that balances security and efficiency through the pilot program of "data classification management" in free trade zones. According to the Data Security Law and the Cybersecurity Law, data is categorized into three levels: core data, important data, and general data. Core data is prohibited from leaving the country, important data must undergo security assessments, and general data can flow freely. On the other hand, participating in the formulation of international rules. China is accelerating its integration into the global digital governance system. In 2021, it formally applied to join the DEPA, focusing on core provisions such as cross-border data flow and non-discriminatory treatment of digital products. It has also jointly proposed the "Digital Silk Road" initiative with ASEAN, exporting technical standards in areas like cross-border e-commerce and electronic payments.

5.2 Innovation of international coordination mechanism

Drawing on the experience of Hainan Free Trade Port, promote the "non-prohibited means entry" negative list system: except for prohibited measures listed in the list such as the export of genetic data, other areas are presumed open. At the same time, efforts are being made to establish "digital rules of origin," offering tariff reductions for digital products that meet local data processing standards, incentivizing multinational corporations to adapt locally. Improving the WTO multilateral negotiation mechanism for e-commerce: In July 2024, the WTO website published the "Joint Statement Initiative on E-commerce", with Article 11 specifically addressing "tariffs on electronic transmissions", filling the gap in digital trade rules. In the recent WTO e-commerce negotiations, China's proposed "Data Flow Safe Harbor" plan received support from multiple developing countries, providing regulatory exemptions for eligible data flows, ensuring national security.

5.3 Enterprise response plan

Compliance capacity building: Leading enterprises achieve localized compliance by setting up regional data hubs. Alibaba Cloud deploys data centers in 25 regions globally, adopting a "data mirroring + edge computing" architecture: raw data is stored at local nodes, with only analysis results transmitted across borders. This not only meets the EU GDPR requirement of "minimizing data transmission", but also keeps data transmission latency within 46 milliseconds. Blockchain technology applied to cross-border intellectual property rights confirmation: Ant Chain estab-

lished a cross-border digital copyright protection platform, using blockchain technology to achieve cross-border rights confirmation, handling over 100,000 cases, with efficiency increased by 50%.

6. Conclusion and Prospect

6.1 Main conclusions

The core characteristics of digital trade barriers currently manifest in three aspects: "fragmented rules, weaponized technology, and generalized security." On the rule level, countries construct differentiated regulatory systems based on data sovereignty, industrial protection, and institutional differences. On the technical level, algorithmic scrutiny and data localization have become new non-tariff barriers. On the security level, national security concerns have been generalized into a universal rationale for restricting data flow. The inhibitory effect of digital trade barriers on global trade varies between industries and countries. Industry Heterogeneity: The ICT industry has suffered significantly more damage than traditional sectors. Country Heterogeneity: Developing countries face obstacles in technology catch-up, while developed countries strengthen their rule dominance. OECD data shows that the DSTRI of developing countries is generally higher than that of developed countries, resulting in a slower growth rate of the technological complexity of their digital service exports.

6.2 Research Prospects

Digital RMB (e-CNY) demonstrates three breakthrough potentials in the field of cross-border payments: Technological substitution: By participating in the Multilateral Digital Currency Bridge (mBridge) project, digital RMB can achieve real-time cross-border settlement with Hong Kong dollars and UAE dirhams, reducing transaction costs effectively in the SWIFT system, and avoiding the "long-arm jurisdiction" risk associated with US dollar clearing. Rule compatibility: Under the RCEP framework, digital RMB can promote mutual recognition of electronic signatures and payment standards. For example, in the pilot of the Guangdong Hong Kong Macao Greater Bay Area, the digital RMB has supported interconnection with the Fast Payment System (FPS) in Hong Kong, and the cross-border payment failure rate has decreased from 3.2% before the pilot to 0.7%. Institutional constraints to be addressed: The current cross-border application of digital RMB is still constrained by capital account controls and the inertia of the international monetary system[6].

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