

Review

Innovation Helps with Sustainable Business, Law, and Digital Technologies: Economic Development and Dispute Resolution

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Abstract: This paper discusses the dispute resolution procedure that innovative digital commerce has adopted for the future for sustainable business. As digital trade becomes increasingly important for economic growth, trade-related disputes must be settled in both business and consumer situations. This study examines the advantages of using digital technology to resolve disputes involving digital trade and discusses how digital technology is changing traditional dispute resolution procedures. Conventional trade disputes differ from their digital counterparts because the digital sphere gives rise to more complex trade conflicts that require stronger regulatory resources. The utilization of digital technologies such as blockchain, artificial intelligence, innovation-based models, digital strategies, and others can enhance the efficacy of conflict resolution. Digital technology can assist in resolving disputes with digital trade, even though procedural fairness issues including prejudice and algorithmic opacity may also arise. The research highlights the importance of developing innovative techniques to set up trade dispute resolution procedures and building legal frameworks for jurisdiction, trial, and enforcement procedures in addition to stressing the usage of digital technology.

Keywords: digital technology; business performance; dispute resolution; economic development; innovation; artificial intelligence; law



Citation: Wang, S.; Li, Y.; Khaskheli, M.B. Innovation Helps with Sustainable Business, Law, and Digital Technologies: Economic Development and Dispute Resolution. *Sustainability* **2024**, *16*, 3910. <https://doi.org/10.3390/su16103910>

Academic Editor: Ionica Oncioiu

Received: 3 April 2024

Revised: 27 April 2024

Accepted: 1 May 2024

Published: 7 May 2024



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1. Introduction

The rise of digital technology has caused disruptive changes in many fields of society, and digital trade plays a crucial role in sustainable business. The roles of big data, cloud computing, artificial intelligence, and others in promoting sustainable growth and employment, as well as economic development, are becoming increasingly prominent [1]. However, the emergence of digital trade has also raised regulatory issues [2]. The frequent occurrence of digital trade, such as e-commerce, blockchain, smart contracts, artificial intelligence, big data, cloud computing, and encrypted assets, has sparked many new controversies. E-commerce markets generate millions of daily transactions, and disputes between buyers and sellers are inevitable [3,4]. Consumers in country A may purchase goods from an in-country supplier business (B) and raise disputes over delayed delivery and product quality due to electronic sales contracts on online platforms. It is crucial to enforce online consumer protection to ensure that online consumers are afforded the same level of protection as those engaged in the traditional commerce of innovation-based models. Digital trade and services differ significantly in that they are intangible, which can make it challenging to determine their worth and the degree of any possible harm. Because digital trade is globally interconnected, conflicts may involve several legal systems and countries, complicating the resolution process [5]. The large spread of cloud computing and the emergence of the software as a service (SaaS) paradigm have led to disputes arising from violations of service contracts [6]. Data and encrypted assets may become transaction targets, leading to novel controversies. In the context of blockchain technology and smart contracts, dispute resolution presents further difficulties. The complexity of smart contracts

may not always be compatible with traditional legal frameworks, creating ambiguity in the resolution of disputes [7]. Global digital trade sales have experienced a significant increase over the past decade. The opportunities related to an unprecedented spike in international digital trade contrast with the obstacles associated with the vulnerability of consumers [8]. Many online transactions involve fraud, scams, and product safety concerns, seriously affecting traders’ trust and confidence in financial technology. The development of digital trade requires effective dispute resolution mechanisms to quickly resolve disputes and overcome distrust among transacting parties. To resolve disputes and enhance the confidence of such parties, digital trade dispute resolution mechanisms have emerged.

The digital trade dispute resolution mechanism focuses on the institutional reform of traditional dispute resolution mechanisms, which will be carried out at the legal and regulatory levels involving new strategies and competitive businesses (Figure 1) [9]. On the other hand, the digital trade dispute resolution mechanism focuses on using digital technology to resolve digital trade disputes. Digital technology has been widely used in dispute resolution mechanisms, for example, online trials, digital evidence, the Internet of Things, artificial intelligence, extensive data analysis, and blockchain technology [10,11]. The machine learning ability of artificial intelligence can be used for rule retrieval, case reasoning, and the evaluation of litigation strategies and success rate [12]. Evaluating new dispute resolution mechanisms from a legal perspective is essential for strengthening dialogue between law and technology and establishing healthier ecosystems and better governance [13]. From the jurisdiction perspective, it is challenging to balance various interests in the jurisdiction of digital trade disputes. Determining which country’s court has jurisdiction over the case is complex. Territorial jurisdiction is the cornerstone of jurisdiction. Traditionally, a country has jurisdiction over all cases on its territory. However, the frequent cross-border flow of data nowadays challenges traditional jurisdictional rules. The nature of the Internet fundamentally undermines the conventional focus on physical factors such as time and space [14]. Traditional physical factors such as the place of contract performance and the location of property make it difficult to establish jurisdiction over digital trade disputes. Therefore, the General Data Protection Regulation of the European Union, which came into effect on 25 May 2018, clearly defines the place of actual influence of data flows as the connection point for special territorial jurisdiction [15].

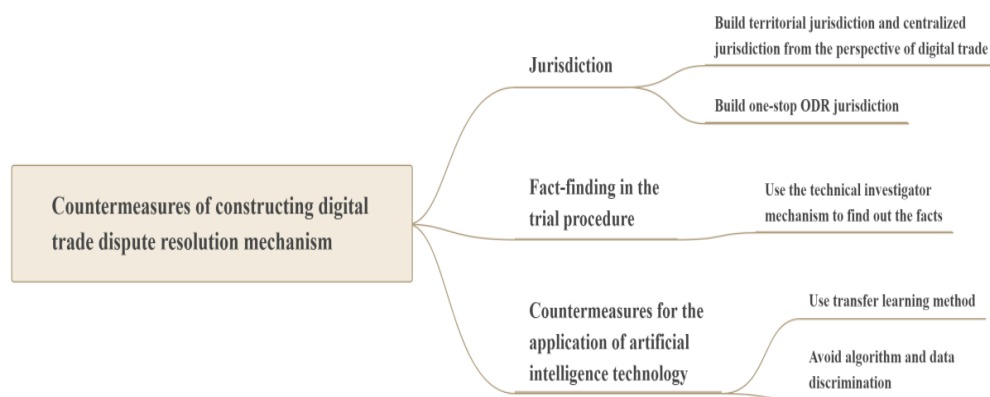


Figure 1. The countermeasures of constructing a digital trade dispute resolution mechanism.

According to statistics from the International Monetary Fund, the value of digitally delivered services increased fourfold from 2005 to 2022, with an annual growth rate of 8.1%. Digitally delivered services account for 54% of service export trade [16]. In China, in 2020, there were 225,699 lawsuits related to data and 47,098 lawsuits related to e-commerce. Moreover, the number of litigation cases related to blockchain, artificial intelligence, cloud computing, and encrypted assets increased by 10–50 times between 2017 and 2020 [17]. Centralized jurisdiction is a particular form of jurisdiction. Certain foreign-related commercial cases are in the jurisdiction of fixed courts. For example, in China, internet courts have been established in Hangzhou, Beijing, and Guangzhou to exercise centralized jurisdiction over

digital trade disputes This jurisdictional model enhances the efficiency and professionalism of the trial procedure; in addition, it is necessary to pay attention to the role of arbitration, mediation, and negotiation mechanisms in resolving digital trade disputes [18]. Arbitration, mediation, and negotiation mechanisms have lower costs and higher efficiency in resolving digital trade disputes.

The facts of digital trade cases are very complex, and it is necessary to rely on technical investigation mechanisms to assist in identifying the facts of the case. Facts can be provided by lawyers or expert witnesses from both parties in a factual investigation. Therefore, China has established the institution of technical investigators when dealing with cases involving technical expertise such as patents, integrated circuit layout design, technical secrets, computer software, etc. Moreover, relying on the machine learning capabilities of artificial intelligence to accelerate the efficiency of resolving digital trade cases is also crucial. Artificial intelligence dramatically influences the dispute resolution procedure, which can significantly improve the efficiency of the trial procedure. In 2017, there were over 8 million first-instance civil cases in China. However, there are only 100,000 cases that were closed, but with the construction of artificial intelligence, the situation has significantly improved [19]. Enforcement procedures are also an important topic discussed in this article. Some digital trade cases can be directly self-executed through platform mechanisms, such as internet platforms providing private dispute resolution and enforcement based on the platform's agreement [20].

2. Methodology

This methodology section outlines the approach and methods employed to investigate the role of digital technology and the innovations of digital trade dispute resolution mechanisms. The study aims to examine how to use digital technology in resolving digital trade disputes and how to reform the dispute resolution mechanism. The study involves a combination of research methods to gather data, analyze relevant literature, and draw conclusions. An extensive literature review of academic journals, books, reports, and relevant documents was conducted to gather a comprehensive understanding of the role of digital technology and how to improve the procedure of the digital trade dispute resolution mechanism. These findings contribute to the existing digital trade dispute resolution mechanism system and provide information for decision-makers, legal experts, and relevant stakeholders to make informed decisions and address current and future dispute resolution challenges (Figure 2). First, it comprises an in-depth investigation of the particular B2C and B2B exchanges in the context of the economy, looking at how digital technologies affect these exchanges. Second, it includes gathering data from multiple sources, including economic indicators, industry reports, and technical trends. Furthermore, it integrates both qualitative and quantitative analytical methodologies to comprehend the consequences of digital technology on economic advancement. The goal of this thorough technique is to reveal the complex relationships that exist between digital, B2B, and B2C technologies in economic development.

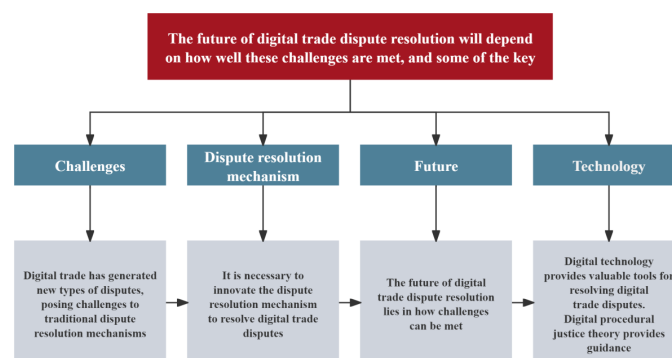


Figure 2. Model showing the key findings on the future of digital trade dispute resolution.

2.1. Theory of Procedural Justice and Analysis

John Rawls argued that procedural justice is not subordinate to substantive justice, a distinction that holds great importance in judicial justice. Procedural justice can be categorized into three groups based on its relationship with substantive justice [21]. The first category is pure procedural justice. There is only one pre-established rule in this procedure, and there is no objective criterion to ascertain the fairness of the procedure's results. As long as the legitimacy standards of the serving procedure are followed, the correctness of the substance of the legal instrument will not impact the fairness of the serving procedure, for example, the process through which a court establishes the facts and correctly applies the law. Nevertheless, it is a fact that judges usually have a restricted timeframe and procedural flexibility to analyze the evidence and reach an unbiased conclusion thoroughly. Hence, devising specific procedural protocols to generate substantial justice outcomes would be impractical. In other words, procedural justice is inherently imperfect. This is the third type of procedural justice described by John Rawls, also called poor procedural justice. Poor procedural justice refers to distinct substantive standards that evaluate the fairness of outcomes beyond the procedure itself. Given the impossibility of creating a flawless process, a method must produce results that meet the requirements. To summarize, procedural justice holds intrinsic value in all three dimensions mentioned earlier, irrespective of whether it is pure or intertwined with substantive justice [22].

Professor Robert S. Summers built upon John Rawls' theory of justice to create the concept of procedural justice further. He introduced two distinct conceptualizations of procedural justice value orientations: result value and process value. Robert S. Summers argues that these two value orientations are mutually reinforcing. To break away from conventional notions that excessively prioritize the result value, one must confront the significance of the process value. The result value is obtained from the traditional concept of procedural instrumentalism, which recognizes the procedure as a means to achieve a favorable outcome. It also acknowledges the process's intrinsic value, highlighting its virtues, such as democratic participation in governance, procedural rigor, and humanism [23]. The concept put out by Robert S. Summers is widely recognized. Increasingly, scholars are avoiding the conflict between procedural instrumentalism and procedural departmentalism by striving to achieve a harmonious coexistence and integration of both value orientations [24,25].

Professor Paul Stancil examines the efficacy of process value from a legal and sustainable standpoint. First and foremost, a procedure must prioritize correctness, encompassing elements such as scientific design, the neutrality of procedure implementation, and rationality. Second, the execution of the process must consider the marginal effect rule of cost and benefit. To attain the level of precision mentioned above, it is essential to strike a balance between the expenses and advantages of system design and implementation while also preventing a reduction in benefits and the occurrence of spillover benefits. According to Professor Ric Simmons, the efficacy of process value can be assessed based on three criteria. Firstly, it involves examining whether decision-makers treat individuals with dignity and respect. Secondly, it consists of evaluating the neutrality of decision-makers. Lastly, it involves considering the decision-maker's credibility, which encompasses factors such as the openness and reasonableness of the procedure. Traditional procedural justice theory needs to be combined with digital justice. The theoretical contribution of this article lies in proposing the theory of digital procedural justice based on traditional procedural justice, emphasizing the impact of digital technology on dispute resolution in digital trade. Applying the theory of digital procedural justice to digital trade dispute resolution mechanisms is conducive to promoting the efficiency, transparency, and fairness of the process [26].

2.2. Theory of Digital Procedural Justice

Currently, there is no universally accepted and definitive definition of digital procedural justice, and scholars have solely focused on discussing the theory of digital justice. The author posits that digital procedural justice centers around three key facets. It is essential to consider whether the decision treats the procedure audience in a manner that upholds their

dignity and shows respect. Professor Jerry L. Mashaw is an exemplary academic in dignity theory. Mashaw, Jerry L. highlighted that the crux of the validity of procedural justice resides in the extent to which decision-making procedures uphold and elevate human dignity and self-worth. This value is intrinsic to the process itself and is seen in the public's involvement, the process's transparency, the safeguarding of privacy, and other related factors. The procedure's structure can either enhance or diminish the audience's dignity, and establishing rules is necessary to limit the protection of this dignity [27]. Mashaw, Jerry L.s' position remains significant today, serving as a vital guiding principle for establishing digital rights. From the standpoint of digital procedural justice, it is undeniable that the audience of the digital trade dispute settlement mechanism procedure benefits from the digital rights that are inherent to the procedure. Rules and regulations can be established for data management and preservation so that only pertinent and essential data are gathered and kept to resolve disputes and reduce any privacy concerns connected to the use of digital technologies for dispute resolution, adhering to data protection laws, and incorporating privacy impact evaluations. The integration of these comprehensive strategies for striking a balance between the necessity of protecting sensitive information and the use of digital technology ultimately fosters confidence and trust in digital dispute resolution processes [28].

The primary cause for undermining decision-maker neutrality is algorithms' discriminating characteristics [29]. The motivations for algorithmic discrimination stem from human beings, and designers integrate value notions into the algorithmic design, embedding them into public behaviour and consciousness [30]. Detecting discriminatory ideas might be challenging. An instance of this is the use of the COMPAS algorithm software in 2016 to compute the likelihood of reoffending [31]. It has been verified that the creators of the COMPAS software did not deliberately participate in racial prejudice and did not utilize the criminal's race data when identifying the likelihood of reoffending. Nevertheless, the algorithm's decision-making led to racial bias. The COMPAS software is not a unique instance. Algorithm discrimination may come from unintentional behavior by designers or existing biases in the dataset [32]. Eliminating this prejudice cannot be accomplished by a solitary paradigm. The ways to eliminate discrimination must be diverse. For example, in analyzing the model or the training, various taxonomies of algorithmic bias that distinguish the bias sources are established. Several procedures are addressed with the use of algorithms for bias detection and reduction. Adding channels for user feedback and paths for contesting algorithmic judgments can help ensure that algorithm-driven conflict resolution is more equitable and accountable. These steps can help eliminate algorithmic bias and opacity and ultimately promote more fairness and transparency in digital dispute resolution procedures, especially when paired with continuing research and stakeholder participation [33].

3. Synthesis

The frequent prevalence of digital trade mentioned below inevitably leads to many disputes. Disputes are defined as specific disagreements on facts, laws, or regulations related to the rejection or opposing assertion of a claim by one party or another party's statement of a claim. Digital trade disputes arise from digital trade, such as e-commerce, crypto assets, big data, cloud computing, artificial intelligence, blockchain, and communication services [34].

3.1. *The US International Trade Commission*

The United States International Trade Commission defines the idea of digital trade mainly from a narrow perspective. Digital trade is focused primarily on digital delivery trade, covering only a tiny amount of physical goods. Digital trade refers to delivering products and services through the Internet, smartphones, network-connected sensors, and other related devices [35]. These products and services involve six types: Internet infrastructure and networks, cloud computing services, digital content, e-commerce, industrial applica-

tions, and communication services. Among them, trade involving Internet infrastructure is the only type of physical goods trade, while the remaining networks, cloud computing services, digital content, e-commerce, industrial applications, and communication services belong to products or services that can be digitally delivered. In essence, USITC believes that most goods trade that relies on Internet ordering and sales should not be included in the scope of digital trade unless such goods trade is a digital trade infrastructure that showcases digital trade technology, such as robots, cloud computing infrastructure, and drones, and also plays a fundamental supporting role in other digital trade [36].

3.2. Sustainable Cooperation and Development

The OECD believes that the definition of digital trade is still controversial, but consensus has gradually been reached [37]. The OECD released the handbook on measuring digital trade in 2023. The handbook categorizes digital trade into two layers: digitally ordered and digitally delivered. This concept is broader than the definition of digital trade by the United States International Trade Commission. The first aspect is digitally requested trade. According to the OECD, the idea of digitally requested trade primarily focuses on the technique of collecting rather than the buying or selling of specific goods or services, the parties involved, the payment mechanism, or the delivery channel [38]. In its early stages, digital trade mainly consisted of trade that was ordered online. As it progressed, it evolved into a trade that was supplied digitally [39]. The next aspect is digitally delivered trade. Digitally delivered trade refers specifically to exchanging digital services instead of tangible goods. These digital services fall under the first category of cross-border supply and the fourth category of consumption abroad in the framework of service trade under the General Agreement on Trade in Services (GATS). They rely on artificial intelligence, cloud computing, big data, and digital platform services. However, a significant proportion is attributed to the cross-border supply, while a relatively lesser share is attributed to consumption abroad [40].

3.3. Development of Digital Trade in China

According to the China Digital Trade Development Report 2021 released by the Ministry of Commerce of China, digital trade is a series of foreign trade activities with data resources as the key production factor, modern information networks as an essential carrier, and the effective use of information and communication technology to promote efficiency improvement and structural optimization. On the one hand, digital trade has brought disruptive innovation in various fields through digital technology and services, spawned many new business forms and models of trade, and become a new highlight of international trade. On the other hand, digital trade strengthens the sharing of information and technology elements among industries through data flow, promotes the deep integration of manufacturing and service industries, and drives the digital transformation of traditional sectors [41].

3.4. Characteristics of Digital Trade

Digital trade is characterized by virtualization. Manifested in the delivery elements of virtualization, virtualization transactions, and virtualization transmission methods. The so-called delivery elements of virtualization refer to digital products and services themselves, which are composed of virtualized data and information. Virtual transactions refer to transactions generally conducted through virtualized Internet platforms. The virtualization transmission method refers to the transmission of digital products and services that do not rely on physical means, but on electronic transmission. Digital trade is centered around cross-border data flows. Digital trade includes the sales of consumer products and the provision of online services on the Internet and supports the flow of data in the global value chain. Therefore, the United States regards cross-border data flow as a fundamental digital product and service prerequisite. Similarly, the EU Digital Trade Strategy also points out that the ability to collect, aggregate, and transmit data across borders may become a critical

driver of innovation, productivity, and sustainable competitiveness. Therefore, it called for a strict prohibition of unreasonable data localization requirements in free trade agreements, and it is believed that eliminating such requirements should be the top priority, but the prerequisite is to comply with relevant data protection legislation [42].

The trend of digital trade relying on cloud computing for storage and processing is becoming increasingly evident. The Office of the United States Trade Representative pointed out that cloud computing services can be divided into three categories: software cloud services (SaaS), infrastructure cloud services (IaaS), and platform cloud services (PaaS). Software cloud services refers to software or applications hosted on cloud infrastructure and accessed through the Internet. Infrastructure cloud services refers to large server networks that provide data storage and processing capabilities. Platform cloud services refers to specialized platforms companies use to develop software and applications supported by cloud infrastructure [43]. Based on the abovementioned cloud services, the Internet is increasingly shifting to the cloud. Although not all digital trade is based on cloud computing, the trend of digital trade is increasingly reliant on cloud computing. For example, cloud computing services can provide lower-cost data analysis services. By utilizing these data storage and analysis resources, companies can provide continuously expanding digital products and services to meet the needs of enterprises and consumers for better and faster digital content, e-commerce, and communication services. According to statistics, 70% of global Internet traffic in 2015 went through cloud data centers, a significant increase compared to 2011. The US is the largest cloud service market and the location of some of the largest cloud service providers. For example, American companies such as Amazon Web Services, Google Cloud Platform, Microsoft, and IBM are those who created the largest cloud service providers in the global market. The data shown in Table 1 were obtained from some cases published by China Judgments Online.

Table 1. Data obtained from China Judgments Online.

Dispute Types	E-Commerce	Data	Crypto Assets	Big Data	Cloud Computing	Artificial Intelligence	Blockchain	Communication Services
2012	96	1791	0	1	2	1	0	6
2013	303	6803	0	2	5	0	0	54
2014	1521	28,769	4	3	30	2	0	266
2015	2898	39,082	5	17	54	2	0	331
2016	9934	82,587	17	67	171	4	1	894
2017	18,975	112,665	52	650	286	27	17	1055
2018	27,876	150,808	133	986	707	78	140	1123
2019	37,600	193,134	376	2415	984	226	621	575
2020	47,098	225,699	535	3338	1231	612	917	611

The Supreme People's Court of The People's Republic of China: China Judgements Online.

3.5. Characteristics of Digital Trade Disputes

Digital trade disputes stem from frequent transactions in digital trade. Digital trade disputes may occur in 3–5% of digital trade transactions, which is a considerable proportion [30]. According to data from the United States Conference on Commerce and Development, the global digitally ordered trade amounted to USD 26.7 trillion in 2019 and is projected to grow by 60% from 53% in 2021 [44]. Global statistics indicate that the total value of digital services exported in 2019 amounted to USD 319.259 billion, accounting for 52.0% of service exports and 12.9% of all exports [45]. The digital economy field has supported the global economy's rapid growth. Digital trade sales have increased by 69%. In addition, the sales growth rate of the top 100 digital multinational companies is five times faster than that of the traditional top 100 companies [46]. Another essential feature is that digital technology provides a valuable tool for settling digital trade disputes [47]. Digital trade disputes encompass many facts of digital trade. These cases have very novel facts and significant online features, so, digital technology is crucial for resolving digital

trade disputes. The application of artificial intelligence in trials is an important issue. In Estonia, the Ministry of Justice has designed a robot judge to adjudicate small digital trade claims disputes below EUR 7000. In addition, the United States Conference on Trade and Development (UNCTAD) launched the Artificial Intelligence Power Cognitive Trade Advisor project in October 2018, encouraging the use of artificial intelligence to assist in the trial of digital trade cases [48]. Moreover, online tribunals, big data, cloud computing, blockchain, and other technologies are also widely used to solve digital trade disputes; this paper compares the existing representative research literature in Table 2 [49].

Table 2. Analysis of the literature.

Author(s)	Dispute Type	Type of Dispute Resolution Mechanism	Type of Digital Technology	Key Points
Sanjeev Bhaskar (2022) [50]	Digital assets and blockchain	Online litigation in court	Blockchain	Litigation proceedings require the use of blockchain technology to locate, search, and seize digital assets
Mrinali Komandur (2017) [51]	E-commerce	Online litigation in court	Online platform	Jurisdiction should be determined using digital connection points rather than physical connection points
Jianing Sang (2021) [52]	E-commerce, big data, cloud computing	Online litigation in court	Blockchain, online platform, 5G	China's Internet courts have provided good experience in resolving digital disputes. These experiences are reflected in jurisdiction, trial, and enforcement procedures
Huang-Chih Sung (2020) [53]	E-commerce, big data, cloud computing	Online litigation in court	Artificial intelligence	Artificial intelligence technology can predict judgment results, automatically submit data, and improve judicial efficiency
Karolina Mania (2015) [54]	E-commerce	Online arbitration and mediation	Online platform	Online arbitration and mediation can effectively alleviate the pressure on the judicial system
Davide Carneiro (2012) [55]	E-commerce	Online litigation in court, arbitration, and mediation	Artificial intelligence	The use of techniques from AI can provide data, analyze cases, and facilitate message and document exchange

Table 2. Cont.

Author(s)	Dispute Type	Type of Dispute Resolution Mechanism	Type of Digital Technology	Key Points
Joyce W. Chen (2022) [56]	Digital assets and blockchain	Online arbitration	Online platform	Crypto assets have decentralized characteristics. The advantages of online arbitration lie in confidentiality, flexibility, and efficiency, which are more conducive to solving the justice of encrypted assets
A. U. Janssen (2021) [57]	Smart contract	Online arbitration and mediation	Online platforms, smart contracts, and artificial intelligence	The combination of smart contracts and dispute resolution can efficiently resolve digital trade disputes. Arbitration and mediation make up for the deficiencies of the court

This paper compares the existing representative research literature. From the analysis of the literature, it can be seen that digital technology has been widely used in the resolution of digital trade disputes. These disputes include, but are not limited to, e-commerce disputes, smart contract disputes, blockchain disputes, digital asset disputes, big data disputes, and cloud computing disputes.

4. Discussion and Challenges

4.1. Mechanism for Digital Trade Dispute Resolution

Employing traditional dispute resolution mechanisms to address digital trade issues is impractical and unsuitable. Hence, developing a novel, all-encompassing, and diverse approach to addressing digital trade disputes is imperative. Establishing a dispute resolution mechanism is conducive to enhancing traders' confidence, providing basic guarantees for trading, and promoting further trading growth.

The digital trade dispute resolution mechanism encompasses a comprehensive framework of laws, regulations, operational procedures, and institutions that collaborate harmoniously to provide a practical and mutually advantageous approach for resolving digital trade disputes between commercial entities. One aspect to consider is the litigation method used by domestic courts. Online courts have been established in cities including Wuhan, Hangzhou, Beijing, and Guangzhou. On 15 July 2020, the cross-border trade court of Hangzhou Internet Court was established to focus on the trial of cross-border digital trade, Internet intellectual property, and other disputes that the grass-roots people's court should accept within the jurisdiction of Hangzhou. The ODR mechanism includes institutions such as arbitration courts and mediation procedures. For example, the Jiangbei district of Nanjing has created a dedicated digital trade commercial mediation platform to address and settle disputes related to digital trade. Additionally, certain arbitration committees, like the Chongqing arbitration commission, have formulated specific arbitration rules that apply to digital trade disputes. In 2021, the UK jurisdiction taskforce published digital dispute resolution rules; the rules are designed to quickly and cost-effectively resolve commercial disputes, especially disputes involving new digital technologies such as encrypted assets, cryptocurrency, smart contracts, distributed ledger technology, and fintech applications.

When contrasting digital dispute resolution with traditional techniques, digital solutions are more effective, transparent, and efficient; when deciding between digital and traditional dispute resolution, the best course of action would be determined by considering the nature of the dispute and the particular needs of the parties involved.

4.2. Challenges in DTDRM of Jurisdiction

From a broad viewpoint, the inability to establish a clear jurisdiction is the most significant breach of procedural fairness. The relationship between jurisdiction and procedural justice is twofold. Firstly, jurisdiction sets the fundamental basis for initiating the legal process, without which procedural justice cannot be ensured. Secondly, jurisdiction establishes reliable regulations for selecting the appropriate procedure, preventing unpredictability. When examining the jurisdictional problems related to settling digital trade disputes between commercial entities, they can be classified into court jurisdiction and ODR (Online Dispute Resolution) jurisdiction. It is well recognized that other than jurisdiction agreed to by the parties themselves, courts prioritize the formation of judicial jurisdiction based on considerations such as residence, location of goods, and the site of behavior [58,59]. Nevertheless, digital commerce disputes sometimes lack a strong correlation with the tangible realm, resulting in frequent setbacks in establishing territorial jurisdiction and centralized jurisdiction systems based on this. Firstly, territorial jurisdiction relies on traditional physical connection points that are incompatible with digital trade. Regional jurisdiction derives from territorial jurisdiction. However, establishing jurisdiction over digital trade disputes based on territorial jurisdiction faces significant difficulties. Digital trade disputes do not have a solid territorial nature. Consequently, the connection between territorial jurisdiction and the physical world is weak and difficult to trace, hindering the realization of digital procedural justice [60,61]. Professor Dan Jerker B. Sanderson pointed out that although territorial jurisdiction is the essential principle of jurisdiction, the frequent interaction of digital trade in today's society has reduced or even trampled on the authority of traditional territorial jurisdiction.

The general territorial jurisdiction is the basic principle of extraterritorial commercial jurisdiction, the plaintiff–defendant principle. Commercial lawsuits brought against citizens or legal persons are usually governed by the court of the defendant's place of residence, habitual residence, or location. Take the general territorial jurisdiction as an example. It is difficult for ordinary territorial jurisdiction to solve digital trade disputes with decentralization and anonymity, such as metaverse, cryptocurrency, or blockchain disputes. Taking cryptocurrencies as an example, Messier T and Yehya M.A argue that in some cases, cryptosystems are untrustworthy and unpredictable, and the anonymity of relevant parties makes it difficult to establish territorial jurisdiction and seek court settlement. The transactions and execution of cryptocurrency rely on the public ledger of blockchain for recording, but the actual execution of currency transfer from one person to another depends on the execution of various mathematical puzzles that validate blockchain, which means that specific transactions may not be recorded correctly in the public ledger promptly [62]. Even if the parties have obtained the other party's IP address, in reality, in cryptocurrency transactions, the IP address is not entirely reliable and may even be isolated from many jurisdictions, making the establishment of jurisdiction even more difficult. The same issue exists in disputes over high privacy, decentralization, and anonymity in the blockchain metaverse [63].

The scope of centralized jurisdiction is too narrow. Centralized jurisdiction is a particular form of jurisdiction that refers foreign-related commercial disputes to fixed courts for jurisdiction. The advantage of centralized jurisdiction lies in providing courts with convenient conditions with jurisdiction. For example, Internet courts can have efficient trial capabilities for digital trade cases based on advantageous conditions such as judges' professional knowledge, trial techniques, and trial procedures, forming a convenient court that facilitates the litigation of parties, improves litigation efficiency, and improves the level of digital procedural justice. Internet courts have been established in Hangzhou,

Beijing, and Guangzhou for digital trade disputes, implementing centralized jurisdiction over disputes. While achieving significant results, there are also some issues. Regarding jurisdiction issues, the primary manifestation is that the scope of jurisdiction is too narrow. The centralized jurisdiction of Internet courts originates from the 2018 Provisions of the Supreme People's Court on Several Issues Concerning the Trial of Cases by Internet Courts. Upon examination of its provisions, there are many shortcomings. Firstly, they exclude digitally ordered trade, not through e-commerce platforms. Online shopping contracts must be signed or fulfilled through e-commerce platforms before they can be subject to the jurisdiction of Internet courts.

4.3. Challenges in ODR Jurisdiction

Online Dispute Resolution (ODR) is an alternative solution to traditional litigation, which can significantly reduce the adverse effects on litigants who cannot hire lawyers and substantially improve court efficiency and sustainable benefits [64]. The establishment of ODR jurisdiction over digital trade disputes does not rely on physical connection points such as the place of contract performance, the location of the object, or the place of infringement. Instead, the parties' autonomy in choosing jurisdiction is significant. Online dispute resolution originated from e-commerce, which can provide affordable dispute resolution methods for disputing parties. E-commerce is the initial development form of digital trade. Therefore, online dispute resolution is closely related to digital trade dispute resolution. The number of digital trade disputes is relatively large. If only the court is used to resolve conflicts, it will cause tremendous judicial pressure on the court. Online dispute resolution can effectively share the pressure on the court and provide affordable dispute resolution mechanisms for the parties. One-stop online dispute resolution consolidates alternative dispute resolution mechanisms such as negotiation, mediation, and arbitration on the same platform, enhancing dispute resolution capabilities and providing fast electronic solutions and cross-border law enforcement [65].

The problem is mainly manifested in the lack of one-stop ODR jurisdiction. The construction of a one-stop ODR jurisdiction refers to the integration of dispute resolution mechanisms outside the platform and dispute resolution mechanisms within the platform. The dispute resolution mechanisms outside the platform are mediation and arbitration, which lie in the ability to rely on the court to guarantee enforcement. The disadvantage is also apparent. The disadvantage is the lack of flexibility and high opportunity costs. The dispute resolution mechanism within the platform is negotiation and mediation within the platform. Its advantage lies in its ability to rely on the platform to promptly obtain the information and data involved in disputes to handle disputes quickly and professionally [66]. The Asia Pacific Sustainable Cooperation (APEC), as an example, has adopted this model. Specifically, in August 2019, APEC approved the APEC ODR Collaborative Framework for Cross-Border B2B Disputes, encouraging the establishment of an ODR one-stop dispute settlement platform that combines negotiation, mediation, arbitration, and internal dispute settlement mechanisms within the platform, allowing the platform to exercise one-stop jurisdiction over digital trade disputes [67]. In response, as mentioned earlier, whether it is digitally delivered or digitally ordered trade, ODR-embedded jurisdiction has unique advantages for dispute settlement. However, unfortunately, in the digital trade dispute settlement mechanism, only a few institutions have implemented embedded jurisdiction to establish an ODR one-stop dispute settlement platform that integrates negotiation, mediation, arbitration, and internal dispute settlement mechanisms. The experiences of the Guangzhou Arbitration Commission and the China International Sustainable and Trade Arbitration Commission are worth learning from. A multi-track jurisdiction should be established; by connecting with professional digital trade commercial mediation institutions and internal dispute settlement mechanisms on the platform, the parties can choose dispute settlement procedures independently through agreements [68,69].

4.4. Challenges in DTDRM of Trial Procedure

The trial procedures for digital trade disputes generally include preparation before the trial, investigation during the trial, debate, and final judgment procedures, all involving technology investigation. The trial personnel must use the technology investigation mechanism to convert opaque and difficult-to-understand information into understandable legal substantive details. Fact-finding effectively identifies false information on social media and digital platforms and promotes the fairness of dispute resolution. If there is false information between the parties involved in digital trading, this information would be submitted to the tribunal. If such false information is contained on digital platforms, it may be difficult for judges to distinguish between true and false information. Even litigants with superior digital technology may forge false information or engage in false contracts because algorithms are full of advanced technology and lack transparency [70,71]. Most adjudicators lack professional knowledge of digital trade, especially when facing intelligent contracts, blockchain, and source code. In the process of information games, they are weaker than one or even multiple parties involved, making it difficult to effectively identify the facts of the case and clarify the key points of the dispute. If the parties mislead the adjudicators or conceal the truth for their benefit, the technology investigation will be more difficult. Therefore, the trial personnel must rely on the mechanism of technology investigation to uncover the mystery of digital trade disputes. The technology investigation mechanism uses expert jurors, expert assistants, expert consultations, technical investigators, technical appraisal, and other methods to assist trial personnel in hearing complex, specialized cases.

In terms of court proceedings, it is necessary to improve the system of technical investigators further. Specialized investigators have become the operational core of the technology investigation mechanism in the trial of digital trade cases. Since 2014, China has established a system of technical investigators and issued relevant documents such as the framework opinions on several issues concerning the pilot reform of the judicial system and the interim provisions on several issues concerning the participation of technical investigators in litigation activities in intellectual property courts [72,73]. With the support of these documents, technical investigators have unique advantages. Firstly, they have more substantial neutrality relative to mechanisms such as expert assistants and expert witnesses. Specialized investigators do not represent the interests of any party involved and are more likely to gain the trust of both parties and the trial personnel. The investigation results of technical facts are more objective and desirable. Secondly, specialized investigators are suitable for the entire trial stage and can serve as a communication bridge between judges, expert jurors, expert consultants, and other technical investigation mechanisms [74]. Thirdly, digital mode management should be implemented. For example, according to the Measures for the Administration of Intellectual Property Technology Investigators in Zhejiang Province, the appointment, selection, and management of intellectual property technology investigators are all carried out through the establishment of a digital management model of databases and online platforms, which particularly highlights the efficient and reliable elements of digital justice. However, it is regrettable that the scope of application of technical investigators is very narrow and limited to digital trade disputes involving intellectual property rights. For example, giving examples of how fact-checking campaigns have effectively disproved false information in the political sphere, on social media, and in traditional media might offer useful lessons to bolster the case even further and illustrate the point. Additionally, investigating various scenarios like elections, health crises in the public arena, and, possibly, environmental challenges can provide a thorough grasp of the significance and effect of fact-checking in various fields [75].

4.5. Lack of Case Support for Artificial Intelligence Applications

The scarcity of digital trade dispute cases makes it difficult for artificial intelligence to gather data models. Artificial intelligence is based on datasets, and massive data integration is the cornerstone of using complex artificial intelligence [76]. However, the proportion of digitally ordered and digital delivery disputes is still relatively low compared to traditional

trade disputes. The scarcity of digital trade dispute cases highlights the discriminatory issue of artificial intelligence. The discriminatory nature of artificial intelligence is a commonplace issue. Predictive analytics driven by AI can provide insights into the probability of specific outcomes based on past data, helping decision-makers in dispute resolution procedures make well-informed choices. However, there are drawbacks and difficulties when using AI to analyze data in digital trade disputes in which AI systems unintentionally reinforce or magnify pre-existing biases in the data, which is a major cause for concern as it can result in unfair or incorrect outcomes. It might be difficult to train AI models to adjust to new types of data and emerging behavioral patterns given the dynamic and ever-evolving nature of digital trade and technology [77]. This discrimination stems from the distortion of algorithms and insufficient interpretation and disclosure of algorithms. If left untreated, the use of artificial intelligence in resolving digital trade disputes may continuously highlight and amplify this discriminatory nature [78]. Using artificial intelligence to review digital trade cases means collecting massive amounts of data and achieving machine self-learning. However, the scarcity of digital trade dispute cases reduces the accuracy of artificial intelligence’s machine learning and deep learning, making it challenging to obtain universal results. Instead, it is easy to incorporate individual discriminatory and biased data into the final results. For the settlement of digital trade disputes, this discriminatory nature leads to incorrect prediction of judgment results, incorrect push of similar cases, and errors in artificial intelligence translation.

4.6. Analysis of Economic Development and Digital Dispute Resolution

The automation and standardization provided by digital dispute resolution methods can help to lessen ambiguity and produce more predictable results, which could minimize the total risk and expense of dispute resolution for consumers and enterprises. But it is crucial to consider potential drawbacks such as the initial outlay for technology, the requirement for digital literacy, and the necessity of making sure that everyone can make use of the advantages of digital conflict resolution, even those with limited access to technology. The research makes significant insights into the possible cost savings, efficiency improvements, and wider consequences of deploying digital dispute resolution processes for businesses and consumers by undertaking an extensive economic impact analysis.

Therefore, it is necessary to establish a digital trade dispute resolution mechanism based on the traditional trade dispute resolution mechanism. Traditional dispute resolution procedures are suitable for resolving disputes over physical factors, but not digital trade disputes involving virtual elements. For example, in terms of jurisdiction, digital trade disputes emphasize virtual and data-driven characteristics. However, the traditional dispute resolution procedure emphasizes geographical characteristics in the physical sense such as property location and contract performance place. Therefore, the digital trade dispute resolution mechanism needs to establish digital jurisdiction instead of blindly emphasizing physical connection points. In addition, in the trial of digital trade disputes, the case facts of the dispute resolution mechanism may be very complex and contain digital technology challenges (Figure 3). The trial personnel need the help of technical investigators. Moreover, the digital trade dispute resolution mechanism puts more emphasis on the use of digital means such as artificial intelligence, which can effectively enhance the efficiency of dispute resolution.

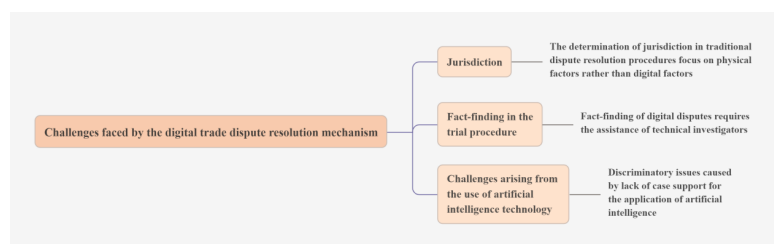


Figure 3. The challenges faced by the digital trade dispute resolution mechanism.

5. Conclusions

Digital trade has become an essential part of sustainable development. Related digital trade disputes occur frequently. The digital trade dispute resolution mechanism is the fundamental guarantee of solving digital trade disputes. The traditional trade dispute resolution mechanism cannot meet the needs of digital trade dispute resolution. The institutional innovation of the dispute resolution mechanism and the application of digital technology have played a vital role in constructing the digital trade dispute resolution mechanism. The dispute resolution mechanism provides the necessary framework and principles for resolving digital trade disputes. The dispute resolution mechanism establishes the rules of jurisdiction, trial, and enforcement. However, it is essential to solving the problem that the traditional dispute resolution mechanism cannot decrypt digital trade disputes well, which is also reflected in the three aspects of jurisdiction, trial, and enforcement. In addition, combining digital technology and digital trade dispute resolution mechanisms can form a strong synergy effect. Digital technology provides a powerful tool to solve complex disputes. However, it also brings problems in digital programs, such as algorithm discrimination, algorithm black box, and data set distortion. In the trial and enforcement process, digital technology is inevitable, but it is necessary to ensure digital procedural justice in the process of trial and enforcement. Improving the traditional trade dispute resolution mechanism and paying attention to the application of digital technology need to be carried out from three aspects: jurisdiction, trial, and enforcement.

5.1. Endorsement

The settlement mechanism of digital trade disputes between commercial entities and the difficulty in establishing judicial jurisdiction lies in the incompatibility between traditional physical connection points and digital trade and the narrow scope of jurisdiction. The difficulty in establishing ODR jurisdiction lies in the lack of one-stop jurisdiction construction. The corresponding countermeasures are proposed below to address these issues. Firstly, territorial jurisdiction: As mentioned earlier, digital trade disputes do not have solid territorial characteristics, challenging the traditional regional jurisdiction system. Based on this, the following suggestions are proposed: firstly, in terms of ordinary restricted jurisdiction, in the new type of digital trade disputes, the plaintiff's residence is used as the connection point for regional jurisdiction, providing a predictable and practical jurisdiction basis for decentralized and anonymous digital trade disputes such as metaverse, cryptocurrency, and blockchain disputes. Secondly, territorial jurisdiction: As mentioned earlier, physical connection points such as the place where traditional contracts are performed, the place where contracts are signed, the location of the property, the place of infringement, and the location of the property available for seizure are also not compatible with emerging digital trade disputes such as metaverse, cryptocurrency, and blockchain disputes [72]. It is necessary to update the traditional special domain jurisdiction rules to meet the call of the digital age. The General Data Protection Regulation (GDPR) of the European Union, which came into effect on 25 May 2018, provides a good mirror for this. Article 3 of the GDPR clarifies that the actual place of influence of the data flow is used as a connection point for a particular territorial jurisdiction, even if the data controller or processor does not have an entity in the EU, as long as it provides goods or services to data subjects within the EU. Alternatively, monitoring the activities of data subjects occurring within Europe applies to this law.

As far as the fact-finding of the trial procedure is concerned, it is necessary to apply technical investigators in digital trade dispute resolution, establish a database of technical investigators, and classify them according to the categories of digital trade disputes, and select, apply, and manage technical investigators in a digital system. In addition, when using artificial intelligence technology to improve the efficiency of dispute resolution, it is necessary to use the transfer learning method to obtain data from other kinds of dispute cases and avoid algorithm discrimination and data discrimination. When it comes to the enforcement of digital trade property, it may rely on private companies with digital

technology to assist in the implementation, because the court may not have the ability to enforce digital property. In the process of judicial enforcement, it is necessary to effectively supervise private companies through algorithm filing, algorithm evaluation, and algorithm accountability mechanisms.

The specialized international tribunals or arbitration panels are knowledgeable on digital trade and dispute settlement. These specialized organizations could guarantee consistent and well-informed decision-making and aid in the resolution of conflicts about cross-border digital trade, promote uniformity and predictability in the worldwide enforcement of such rulings, and may also push for the creation of standardized protocols and processes for the recognition and enforcement of outcomes of digital dispute resolution. All things considered, the plans might promote global collaboration, lay down precise rules for dividing up the relevant jurisdictions, and offer means of successfully enforcing the decisions made in digital trade dispute settlements in many legal systems.

5.2. Future Direction of Research

It would be beneficial to investigate how blockchain technology and smart contracts might improve the dispute resolution processes in digital trade as future research directions. Furthermore, investigating how technology, economic growth, and legal considerations intersect with dispute resolution could offer insightful information about how the field is changing. An interesting field of research might be examining how artificial intelligence and machine learning algorithms can facilitate the resolution of disputes in the digital trade and technology industries. Furthermore, considering the possibilities of developing global guidelines and standards for digital trade dispute resolution processes may help create a more unified and effective international framework. The future of digital dispute resolution could be greatly impacted by developments in quantum computing. The ability of quantum computing to process data quickly and in parallel may make it possible to perform more advanced predictive analytics, anomaly detection, and pattern recognition, which would improve the precision and effectiveness of evidence analysis in digital trade disputes. Maintaining the security of digital dispute resolution procedures, new cryptographic standards, and encryption methods may need to be developed and used as quantum computing progresses. It can offer important insights into the changing landscape of dispute resolution procedures and the necessity of keeping up with technological advancements for efficient and secure digital trade dispute resolution by examining the potential effects of quantum computing and other emerging technologies on the future of digital dispute resolution.

Author Contributions: Conceptualization, methodology, writing—original draft preparation, S.W.; validation, formal analysis, writing—initial draft, resources, Y.L.; data curation, investigation, legal analysis, writing—original draft preparation, M.B.K.; writing—review, editing, visualization and supervision, M.B.K. and Y.L.; project administration and funding acquisition, S.W. All authors have read and agreed to the published version of the manuscript.

Funding: Research on Accelerating the Construction of Free Trade Ports (23JZD027).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Conflicts of Interest: The authors declare no conflicts of interest.

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