




Blockchain Framework for Digital Learning and Information and Communications Technology

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Citation: J. Zheng, "Blockchain framework for digital learning and information and communications technology," *International Journal of Communication Networks and Information Security (IJCNIS)*, vol. 16, no. 1, pp. 19-32, Jan. 2024.

ARTICLE INFO

Received: 09 Nov 2023

Accepted: 03 Jan 2024

ABSTRACT

At present, the economic ties between countries worldwide are getting closer and closer. In a world where the internet industry is developing rapidly, Digital learning and ICT applications in blockchain have gradually matured. This paper takes digital learning and ICT blockchain application in e-commerce as the main research object, The rapid development of e-commerce has been promoted through the extensive application of digital learning and information and communication technology blockchain in e-commerce. Digital learning and information and communication technology solve the problems of e-commerce payment with encryption characteristics and security and openness in blockchain; At the same time, the information can be traced and cannot be tampered with to solve the quality problem of e-commerce goods. In a real sense to promote the sustainable development of the field of e-commerce, this study provides new ideas and guidance for the blockchain framework of e-learning and ICT in e-commerce.

Keywords: Blockchain Technology, Digitisation of Information, Electronic Commerce Across National Borders.

INTRODUCTION

With the continuous development of blockchain technology, digital learning and information and communication technology are popularized and applied in blockchain, using blockchain peer-to-peer networks, time stamps, and smart contracts as core technical support, encryption technology, and smart contracts to ensure the security of user transactions, smart contracts can solve the problem of user trust, so that users in the transaction process more convenient payment, more secure transactions, while reducing costs. At the same time, electronic information technology is being updated and developed, so that more and more people understand and understand the importance of blockchain technology. Just by using blockchain technology to integrate data and solve the problems existing in traditional cross-border commerce, e-commerce has ushered in unprecedented development opportunities [1]. Driven by the country's Belt and Road Initiative, cross-border e-commerce is booming as a new economic form [2]. The blockchain of digital learning and information and communication technology is widely used in e-commerce, which makes e-commerce flourish at the same time, but also faces various challenges. The most important one is that there are many loopholes and defects in the protection of consumer rights and interests in cross-border e-commerce, which leads to the infringement of the legitimate rights and interests of some consumers [3], and even causes the personal and property safety of consumers to be threatened. According to the statistics of the E-commerce Research Center, in the past year, China's cross-border e-commerce consumer complaints have focused on the quality of goods, logistics, and transportation, difficulties in returning or replacing goods, after-sales service and other issues, which have received widespread attention from the beginning.

By analyzing the development trend of e-commerce and various problems encountered, this paper makes use of the characteristics of digital learning and information communication technology blockchain framework [4],

such as decentralization, immutability, consensus trust mechanism, openness, anonymity, and cross-platform, targeted to solve the problem of product traceability in the e-commerce supply chain environment, the framework adopts a multi-chain structure to store data in the blockchain [5]. According to different data characteristics, data items are classified and allocated to different chains, and a data management model and a block structure model are proposed. The core methods and algorithms are developed to provide a comprehensive solution for e-commerce supply chain management. Blockchain technology is a revolutionary technology that solves the problems of e-commerce and helps traditional e-commerce overcome the bottleneck stage. In the future, blockchain technology will be combined with mature technologies such as 5G technology, Internet of Things technology, big data technology, and artificial intelligence technology to further promote the rapid development of e-commerce [6]. At the same time, it is also necessary to strengthen cross-border supervision of e-commerce, improve relevant laws and regulations, establish and improve institutional mechanisms, and effectively prevent and control potential risks in order to better promote the development of e-commerce with the blockchain framework of digital learning and information and communication technology [7].

Related Works

Characteristics of the Blockchain

Decentralization

The traditional communication chain is mainly centralized through a central database, adopting a hierarchical management mechanism. The main feature of a decentralized blockchain is to change this vertical management structure to create a distributed parallel chain enjoying the same rights so that different working nodes can realize each other's backups and adopt the same system of cryptographic identification to carry out collaborative work mechanisms. Thus [8], it can effectively guarantee the integrity and authenticity of information and improve the communication security coefficient, avoiding the problems of single-point trust and single-point failure existing in the traditional working mechanism to the greatest extent possible.

Openness

The blockchain system is open-source and only keeps the relevant personal information of the parties involved in the block transaction, etc., confidential, and the user can view the relevant information through a public interface.

Autonomy

The blockchain system network communication mechanism has transformed the traditional human-credit mechanism. The process of each node's work mainly relies on the unified norms and protocols to carry out the work [9], and any transmission of information, record exchange, and updating needs to be authenticated by each node with each other's authority. This approach effectively avoids the uncertainty of human operation and makes the system's defense mechanism more complete.

Information Immutability

Due to timestamping and distributed management infrastructure. It makes all the data stored in the blockchain enjoy the characteristics of being untameable and unforgeable [10]. During the transmission of information, it is first verified before it is added to the next block, and in the process, the mutual verification and storage of information is synchronized. So malicious deletion and theft from the outside world will have to pay a higher cost of time and technology; without full control of more than 51% of the working nodes of the blockchain, it is virtually impossible to complete the tampering of data [11].

Anonymity

Nodes in the system as a whole and the exchange must follow a fixed algorithm implementation of the interaction between the data simultaneously, do not need to be trusted by blockchain technology, and can be in their own rules of procedure. The effectiveness of the judgment for the corresponding activities [12]. So in the process of trade between the two parties. It can create a certain level of trust in each other's does not reveal a person's identity or the positive cumulative credit aspects of the user.

ANALYSIS AND APPLICATION OF INFORMATICS IN BLOCKCHAIN ARCHITECTURE

Blockchain in Electronic Commerce Across National Borders

Development Status of Domestic, Electronic Commerce Across National Borders in Recent Years

Due to the extensive use of digital learning and information and communication technology in the blockchain, the rapid development of e-commerce is promoted. As a new type of trade intermediary, a cross-border e-commerce platform closely links buyers and sellers at both ends of the platform through the advantages of blockchain in information and communication technology and digital learning. The role of digital learning and ICT in blockchain is analyzed by the development trend of e-commerce.

In recent years, domestic, Electronic commerce across national borders transaction volume has been equivalent to traditional e-commerce in the past few years and has maintained its continuous growth due to the state's support for Electronic commerce across national borders policies. The overall reform and innovation of the industry and Electronic commerce across national borders are constantly developing. It is a catalyst for domestic and foreign trade growth. It is becoming a new growth area. "2023" data published by the E-commerce Research Centre shows that domestic [13] and electronic commerce across national borders practitioners continue to grow in transaction value. The specific growth figures are shown in Figure 1. In 2018, the transaction scale of China's cross-border e-commerce maintained a continued growth trend compared with previous years, thanks to the national policy support for cross-border e-commerce and the overall reform and innovation of the industry. The continuous development of cross-border e-commerce is promoting the growth of China's foreign trade and becoming a new growth point. According to the data released by the E-commerce Research Center, the transaction scale of China's cross-border e-commerce in terms of employees, 2018-2021 China's e-commerce industry directly employed 3.9 million people (18.18%), 5 million people (28.2%), 5.8 million people (16%), 6.8 million people (17.24%). The number of indirect employees was 33 million (32 percent), 42 million (27.27 percent), 51 million (21.42 percent), and 58.5 million (14.7 percent).

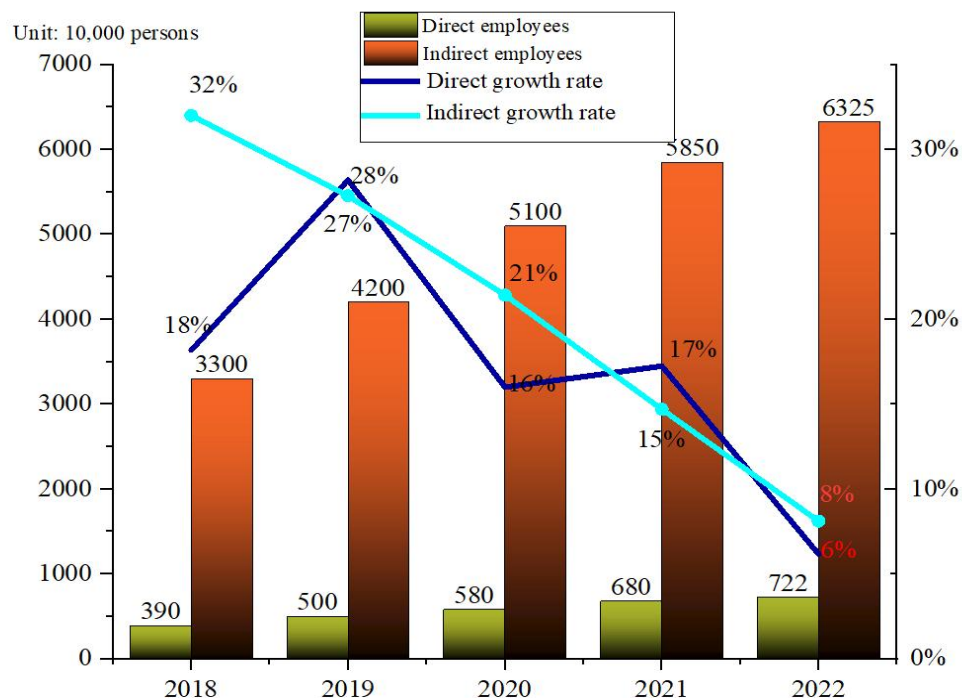


Figure 1. E-commerce Industry Employee Size and Its Growth Rate Data Chart

E-commerce is developing rapidly. China's economy cannot grow without the aggressive development of domestic enterprises, which provide services such as transport and communications and are vital to the country's economic development. The government has taken various policy measures to support its growth and development to foster a thriving online business environment. According to the company's estimates, it is expected to generate more than USD 3 billion in revenue that year alone. The company expects to suffer 1.3 billion USD in losses in sales and marketing costs for products, including significant new product development costs. With the rapid expansion of e-commerce worldwide, traditional shopping methods have dealt a severe blow, and online shopping is becoming a trend. Given the rapid growth of China's foreign trade and the increasing demand

for imports at the same time the international economic situation is changing, and several new features and patterns are emerging. The domestic market will appear in the development of Electronic commerce across national borders in the coming years. Brands are slowly entering the international arena, with exports and imports being the main forms of expression. Over the next several years, with the progressive improvement of the national policy environment, just as the system of Logistics across national borders continues to be robust and perfect, China's foreign trade industry will augurate new Opportunities for growth. It will push the Electronic commerce across national borders industry to flourish! Electronic commerce across national borders, is a booming industry for many reasons, including huge demand from overseas e-commerce markets, and the restructuring and modernisation of foreign trading companies.

According to Table 1, the proportion of cross-border e-commerce transactions in the total value of China's imports and exports is shown, in the import and export structure of China's Electronic commerce across national borders in 2018, the proportion of exports is still greater than imports, but the gap is narrowing year by year [14]. The mainstream trend in our country is that the brand goes overseas to explore the market, which shows that the proportion of exports occupies a dominant position in the import and export structure. In the export of Electronic commerce across national borders, There are many reasons for the industry's rapid progress; for example, overseas markets have huge market demand, foreign trade enterprises pursue transformation and upgrading, and the development of the industry has also attracted more enterprises. However, exports also show a downward trend because the proportion of imports is also growing because of the domestic consumption upgrade; the expansion of imports caused by the policy, but also to the import market, has brought huge space for development. Due to the active support of the policy, foreign products can enter our country through Electronic commerce across national borders; the characteristics of Electronic commerce across national borders reduce the transaction link and upgrade the trade process so that Chinese consumers can better get the products provided by overseas brands. From 2018 to 2023, China's Electronic commerce across national borders transaction scale imports.

The rapid development of China's e-commerce has made China's international trade activities, including imports and exports the second-largest trading country globally and the third-largest after the US and Japan. However, because of the impact of the epidemic, China's foreign trade faces enormous challenges, therefore, we also need to see clearly the situation of international trade in the future, take proactive measures to respond to it, and better cope with the upcoming opportunities and challenges.

Table 1. Changes in the Share of Cross-border E-commerce Transaction Size in China's Import and Export Value

vintages	Import /export amount		Transaction size		Import/export ratio
	rates	speed up	rates	speed up	
2018	30.51	9.7%	28.2	15.91%	92.43%
2019	31.55	3.4%	31.53	24.46%	99.93%
2020	32.16	1.9%	32.1	22.28%	99.8%
2021	39.09	21.5%	33.54	19.65%	85.8%
2022	42.06	7.7%	35.05	18.75%	83.33%

As blockchain continues to evolve and innovate in communication technology and digital learning, the e-commerce business is developing rapidly, and more and more people are participating in online shopping. Especially in 2020, the neoconservative epidemic has fully broken out, so many users choose online shopping. China has become the number one e-commerce market and e-commerce export base globally, and its share of total global trade is growing every year. While cross-border electronic commerce has gradually become an integral and important component of international business. Due to the rapid development of Internet technologies and the rapid transformation in international commerce, international e-commerce has been widely promoted worldwide and very successful. China has also gradually realized the important role that cross-border electronic commerce plays in promoting the transformation of trade patterns facilitating the growth of foreign trade, and enhancing the competitiveness of businesses. Since the mode of Electronic commerce across national borders development in China has yet to be fully explored, it is difficult for people to have an accurate understanding of its developmental state. Furthermore, there is currently less literature on Electronic commerce across national borders in China. Consequently, there is a need for a comprehensive and systematic analysis and synthesis of the current features of Electronic commerce across national borders in China to gain a better understanding of its development patterns and trends, Accenture and AliResearch pointed out in a report released in January 2021 2020, although affected by the epidemic, Electronic commerce across national borders B2B transaction scale will reach 34 trillion US dollars. The number of Electronic commerce across national borders participants will increase from 30.9 billion in 2014 to 900 million in 2020. Since 2020 [15], due to the impact of the epidemic, Logistics across national borders have been restricted; however, according to the Blue Book of Overseas

Development of Enterprises: Report on Overseas Development of Chinese Enterprises (2020) jointly released by Beijing Enterprise International Management Research Base of the University of International Business and Economics and Social Sciences Academic Press on January 13, 2021[16], it is expected that the global Electronic commerce across national borders transaction scale will exceed 1 trillion US dollars in 2020. The average annual growth rate is as high as 30% to achieve rapid growth.

In 2019, as 5G rolls out, internet infrastructure is becoming more sophisticated the construction of a global logistics network is gradually maturing, and Electronic commerce across national borders is in a high growth trend." "In recent years, the retail model of Electronic commerce across national borders has developed rapidly, and policy support has also improved. The proportion of Electronic commerce across national borders mode will account for 24.4% of B2C transaction volume in 2022, and IS is expected to further increase to 25.1% by 2023.

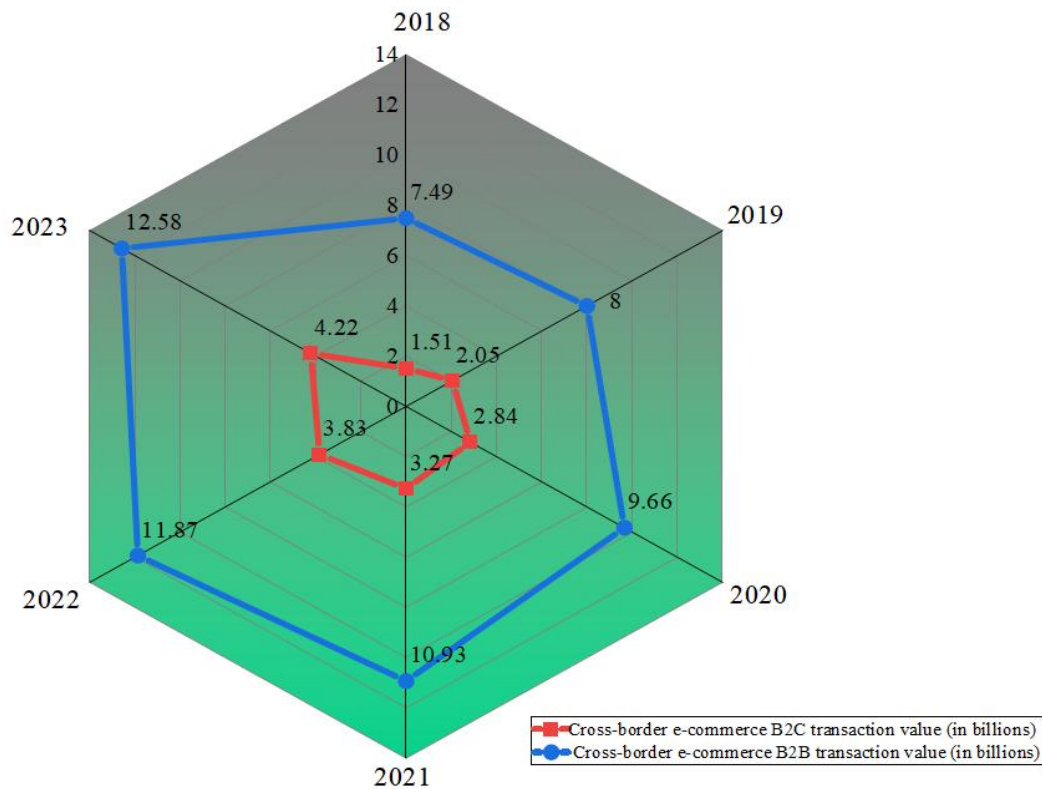


Figure 2. B2B/B2C Turnover (2018-2022)

The combination of blockchain with digital learning and information and communication technology has changed the traditional e-commerce transaction mode by utilizing the characteristics of blockchain decentralization, security, and openness, further promoting the import and export transaction mode of cross-border e-commerce, and making the transaction amount continue to increase. The B2B and B2C transaction data are shown in Figure 2.

Development History of Electronic Commerce Across National Borders Platform

Amazon and eBay were founded in 1995 and are now the number one Electronic commerce across national borders platform in the world with a global reach. Since its inception, they have been committed to the exploration of the European market, thereby paving the way for Electronic commerce across national borders development. The development of China's Electronic commerce across national borders platforms can be broken down into three distinct stages of development between the initial sprouting and today's maturity, a journey from nothing to something. The first stage is that during the period from 1999 to 2004, cross-border electronic commerce went through a process of development known as the 1.0 stage. Domestic, Electronic commerce across national borders is still in its infancy at this time, mostly based on third-party payment, and has not formed a complete business model and industrial chain but merely provides logistics warehousing and other related services. China debuted in Electronic commerce across national borders with the formal establishment of Alibaba International in 1999, the first to combine traditional international commerce with emerging Internet technology. During this time, however, Electronic commerce across national borders platforms provided only online business where both parties to the transaction obtained the information they needed online and completed the transaction in an offline manner. Secondly, from 2004 to 2015, known as the cross-border e-commerce 2.0 stage, this period

of cross-border e-commerce began to grow. In 2004, online trading came into being, and cross-border e-commerce platforms began to gradually transition from information matching in the embryonic period to online trading in the growth period. Finally, since 2013, it has been called the 3.0 stage of cross-border e-commerce [16], that is the maturity period. 2013 is also known as the first year of cross-border e-commerce, and in 2015, the launch of Alibaba International's website insurance business marked a comprehensive online transformation of China's cross-border e-commerce. As can be seen from Table 4, at present, the development of China's cross-border e-commerce platform is still in a mature stage, and the application of various technologies will promote it to provide better services for both sides of the trade, thus promoting the development of foreign trade.

Table 2. Level of Cross-border E-commerce Development in Selected Countries

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
China	0.29	0.422	0.505	0.668	0.823	0.970	1.124	1.167	1.305	1.444
Argentina	-1.046	-1.020	-1.008	-0.981	-0.966	-0.929	-0.906	-0.884	-0.850	-0.817
Australia	0.180	0.213	0.261	0.219	0.223	0.223	0.243	0.255	0.265	0.276
Brazilian	-1.023	-1.003	-1.013	-0.935	0.897	-0.880	-0.853	-0.818	-0.763	-0.708
Canadian	0.298	0.313	0.346	0.424	0.469	0.427	0.375	0.331	0.292	0.253
French	0.47	0.497	0.495	0.529	0.555	0.555	0.532	0.516	0.507	0.499

Domestic, Electronic Commerce Across National Borders Goods Quality Issues

Due to the characteristics of information and communication technology in blockchain, such as immutable, transparent, and anonymous transactions, untampered data, and traceability, blockchain technology is widely used in e-commerce and plays a key role in quality traceability.

When consumers purchase cross-border goods through Electronic commerce across national borders, they involve a large number of transaction entities, mainly suppliers, Electronic commerce across national borders enterprises, logistics enterprises, customs, quality inspection, and other departments. During the entire transaction process, problems with any one of the trading entities may harm the quality of cross-border goods [17]. In the meantime, with the rapid development of the Electronic commerce across national borders industry, consumer demand for the purchase of cross-border goods continues to rise; therefore, for Electronic commerce across national borders enterprises, improving the quality of product services, strengthening after-sales service has also become an urgent matter, only then can provide more high-quality, convenient services for the majority of consumers. Because producers are far from consumers, consumers cannot obtain the truest information about the production, quality control, etc., of commodity transactions in Electronic commerce across national borders, and therefore the authenticity of cross-border commodities cannot be determined. In turn, many consumers get the goods but find that the quality of goods can not reach the level promised by the merchant website [18], and there are many cross-border goods completely fake! As a result, the complaint rate of cross-border e-commerce platforms remains high. The complaint rate of cross-border e-commerce platforms such as Ocean Terminal, Vipshopl, CDFG, and Kaola is shown in Table 3. As a result, the more serious the problem of commodity quality in cross-border e-commerce, the more consumers distrust it. Cross-border e-commerce has been hit by consumers' reduced purchasing power and reluctance to buy overseas goods.

Table 3. Complaints about Cross-border E-commerce Platforms

Flat-roofed building	Refunds	Transport issues	High transport costs	Quality of goods	else
Ocean Terminal	28.8%	9.1%	8.7%	13.2%	1.2%
Vipshopl	15%	7.2%	4.9%	11.2%%	2.3%
CDFG	18.9%	5.6%	3.1%	12.3%	1.5%
koala	12.5%	8.6%	6.1%	9.8%	1.7%

China's Electronic Commerce Across National Borders Payment Problem

Digital technology has the characteristics of tracking, encryption, and high reliability of systems and data in the blockchain, which has changed the traditional transaction mode of commerce and made e-commerce transactions more secure and convenient.

When consumers purchase non-domestic goods, they need to exchange currencies in a unified manner, and certain procedures will be incurred during currency exchange. The handling charges and time spent by different institutions are shown in Table 4. to account for differences in currencies in different regions and countries to ensure that transactions are conducted correctly. The emergence and development of cross-border electronic commerce offer an opportunity to address this issue. The booming development of cross-border electronic commerce has made third-party platform payment the most widely adopted method of cross-border payment at this time. This includes a variety of forms, such as online credit card payments and online bank payments. In

cross-border electronic commerce, users' personal information is typically stored on international websites, and user identifiers and passwords are often found on foreign websites. Users' information is, therefore, vulnerable to illegal theft. Leakage of user information can lead to risks such as theft of account funds and the swiping of bank cards, some of which carry transaction risks across geographic and national borders [19]. At present third-party payment institutions in Electronic commerce across national borders provide a single service that is unable to meet the needs of customers across different countries or regions. The purchase of cross-border goods has been met with widespread consumer resistance due to concerns about the leakage of information about users. Cross-border bank payments in this context face substantial security challenges. If a cross-border bank does not ensure the secure and efficient processing of customer identification information, it can cause payment disruptions or even loss of funds. In the Electronic commerce across national borders sector, authenticating transactions is a very complex and time-consuming task. In addition, the high complexity of the transaction authentication process means that buyers have to wait patiently for quite a long time for the transaction to be finalized, which is a rather complex procedure. This prevents consumers from enjoying the convenience and benefits of Electronic commerce across national borders. The lack of authentic and reliable transaction documents on Electronic commerce across national borders platforms makes it difficult for consumers to accept the price and quality of cross-border goods and therefore affects their shopping experience [20]. This seriously affects the validity of cross-border payments.

Table 4. Breakdown of Charges for Overseas Telegraphic Transfer Remittances by Ordinary Personal Customers of Banks

	Fee	Fee	Transfer time
BoC	0.1% of remittance amount ¥50 to ¥260 per transaction	¥150 each	Approx. 2 to 3 working days
China Construction Bank	0.1% of remittance amount ¥20 to ¥300 per transaction	¥80 each	Approx. 3 to 5 working days
ICBC	0.1% of remittance amount ¥50 to ¥260 per transaction	¥150 each	Approx. 2 to 3 working days
Agricultural Bank of China	0.1% of remittance amount ¥20 to ¥200 per transaction	¥80 each	Approx. 3 to 5 working days
CMB	0.1% of remittance amount ¥20 to ¥150 per transaction	¥150 each	Approx. 2 to 5 working days
Bank of Communications of China	0.1% of remittance amount ¥50 to ¥150 per transaction	¥150 each	Approx. 3 to 5 working days

RESULTS AND DISCUSSION

Using the characteristics of blockchain technology in digital learning, supported by core technologies such as peer-to-peer networks, time stamps, and smart contracts, it provides strong support for the common development of traceable payment, logistics and other industries. In the last few years, governments around the world have introduced relevant policies to actively promote the promotion and enforcement of blockchain in different areas in China. With time over time, the government has shown an increasing focus and foresight on the application and development of information technology in blockchain technology and has endorsed and promoted it as a truly national strategy [21]. China's situation Today, China has entered the stage of rapid digital economic development, The state provides a lot of policy support for the development of blockchain technology, and the relevant support policies are shown in Figure 3. The transformation and digital upgrading of industries is in a period of accelerated development. At the same time, China has introduced several policies on blockchain and the IoT industries to encourage innovation in the industry regulation of business practices and the promotion of healthy and orderly blockchain. As the policy continues to be implemented, The technology and blockchain industry of China will be further developed, bringing more value to the social economy and assisting in the transformation and upgrading of the real economy.

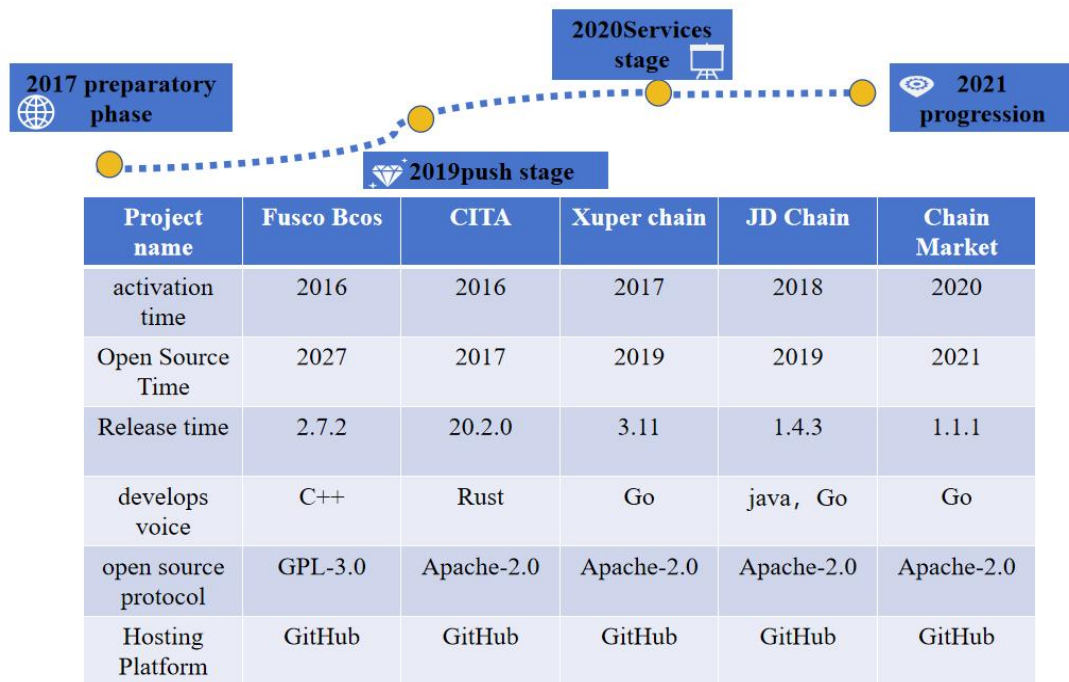


Figure 3. Inventory of Blockchain Policy Attitudes in China

Blockchain technology has been widely used in Electronic commerce across national borders. Tmall International has developed a cross-border traceability system based on blockchain technology to achieve the full traceability function of cross-border commodity information. The blockchain system launched by Jingdong Global Shopping can realize functions such as commodity traceability and real-time supervision of cross-border logistics. According to the "2020 Blockchain Traceability Service Innovation and Application Report", after the e-commerce enterprises entered the blockchain anti-counterfeiting tracing service, the sales volume of nutrition and health care and maternal and infant milk powder products increased by 41% and 14% [22], respectively, The rate of brand re-purchase of fresh seafood, nutrition and health care, maternal and infant milk powder and beauty and skin care products increased by 41%, 27%, 51%, and 58% respectively.

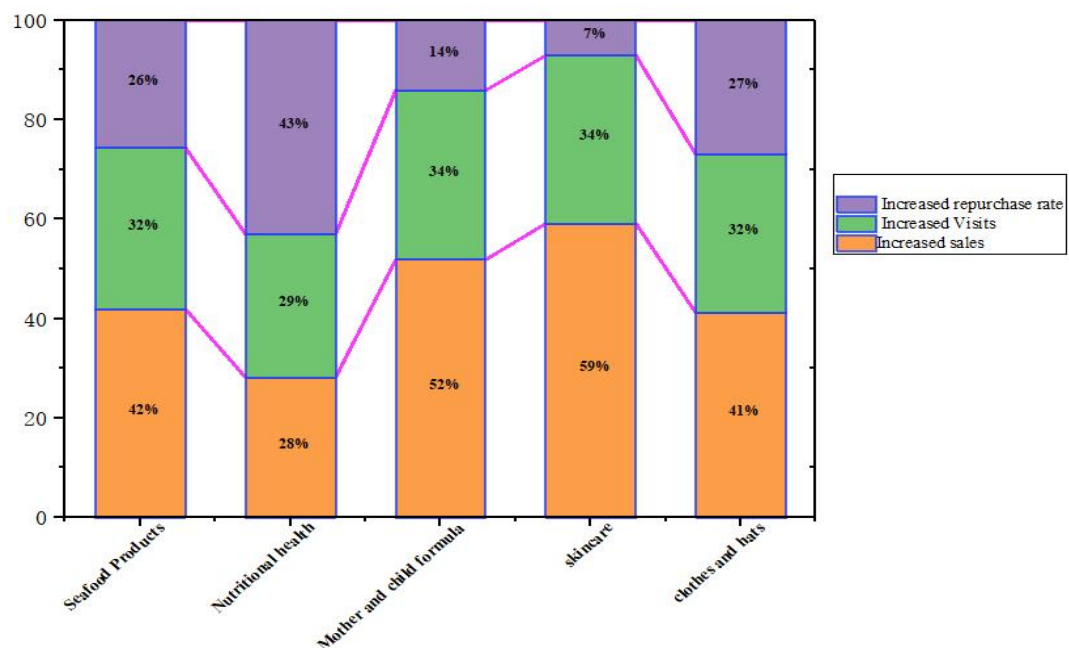


Figure 4. Performance of Indicators After Going Online with Blockchain Anti-counterfeiting and Lake Tracking Service

Blockchain Solves the Problem of Cross-border Commodity Quality

Blockchain technology has the characteristics of information traceability and immutability, and its application in the field of Electronic commerce across national borders can realize the traceability of cross-border commodity information and reduce the probability of cross-border commodity quality problems. The quality traceability process solved by blockchain technology is shown in Figure 5. To solve the trust problem faced by cross-border goods, Tmall International has established a cross-border commodity quality traceability system based on blockchain technology. According to the "Tmall International cross-border Commodity Quality Traceability System Evaluation Research Report" released by the China Institute of Standardization, this system established by Tmall International with blockchain technology as the core links cross-border commodity production, transportation, quality inspection, customs declaration, and other links [23].

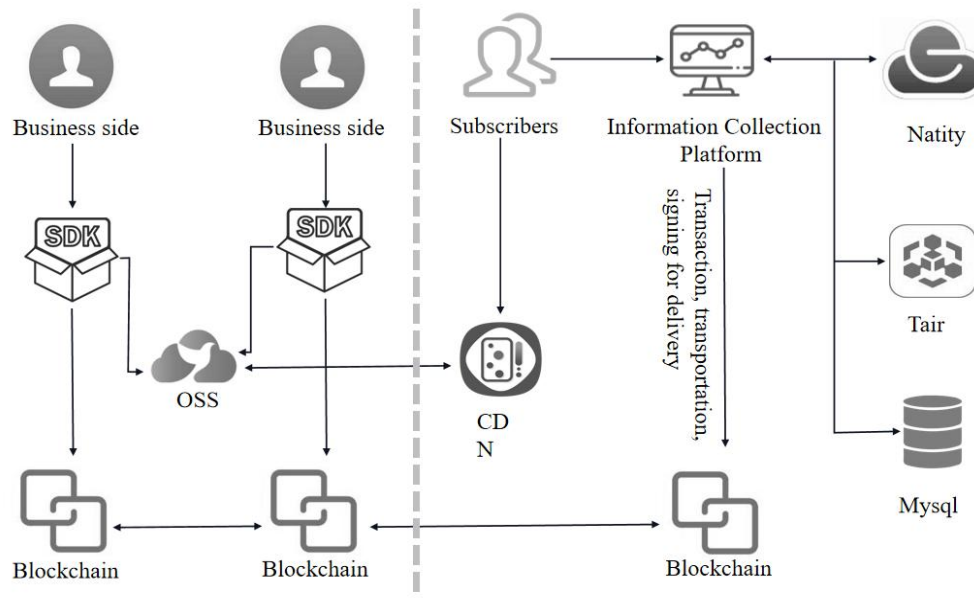


Figure 5. Traceability Flowchart Using Blockchain Technology

According to the process of consumers buying cross-border goods, the quality traceability system includes three parts: overseas production, overseas transportation, and domestic transportation. The overseas production part mainly involves the field verification of the commodity production enterprises, the quality inspection of the daily production and inventory of the production enterprises, and the international logistics and shipment supervision of the production products after the production of the production enterprises [24]. The overseas transportation part mainly involves the verification of cross-border commodity circulation channels, overseas quality inspection enterprises to sample goods, send samples for inspection, and issue detailed inspection reports, as well as Logistics across national borders enterprises in the transportation of nodes monitoring and other links. The domestic transportation part mainly includes the whole process of connecting cross-border goods from overseas ports to domestic warehouses and the uploading of logistics information for domestic logistics to deliver goods to consumers [25].

Blockchain Should Solve the Problem of Digital Cross-border Payments

For cross-border payments, in 2016, China Merchants Bank developed a cross-border direct link clearing system based on blockchain technology. After this, the Bank of China completed the first international remittance business under blockchain technology in China. In the second half of 2018, the Bank of China adopted a cross-border payment system using blockchain, and successfully completed the international remittance of US dollars between Xiongan, Hebei, China, and Seoul, South Korea; this is the first international remittance business completed by a domestic bank using a self-developed blockchain payment system, Significant progress made by the Bank of China in the application of blockchain technology for international payments. The Bank of China's international remittance using the blockchain cross-border payment system has the advantages of fast remittance speed and no reconciliation; the Bank of China is using blockchain technology to further enhance the security and transparency of international payments. By using the blockchain cross-border payment system, the Bank of China can quickly complete the trusted sharing of payment transaction information between participants on the blockchain platform, and it can complete the payment of customer accounts in a few seconds, achieve real-time query of the status of transaction management, real-time tracking of fund dynamics [26]. At the same time, this allows the bank to write off accounts in real-time, real-time information on account positions, and improve the

efficiency of liquidity management. Blockchain applications in the banking industry are gradually landing, although so far, they have landed in small numbers; the blockchain sector is still receiving a lot of attention until the Bank of China realizes the use of a blockchain payment system to complete international remittances between the two countries, Alibaba completed the world's first cross-border blockchain remittance business, and the world's first cross-border renminbi clearing business using blockchain technology was also completed by China Merchants Bank together with Wing Long Bank and Wing Long Shenzhen Branch. These projects have marked the significant progress that China's blockchain technology has made in the field of international payments.

Table 5. Cross-border Payment Solutions

Projects	Whether blockchain	TPS
BTC	YES	5-7
ETH	YES	20-30
EOS	YES	3996
VISA	NO	56000
PayPal	NO	100000
Alipay Double 11	NO	491000

In the existing traditional international payment business, cross-border payment transaction information needs to be transferred and processed among many banks, including not only domestic banks but also international banks; this not only costs more manpower and time to complete the CBC payment business but also makes it impossible for customers of cross-border payment business to know the status of transaction processing and fund dynamics in real-time. The process is too complicated to make the user experience poor, The traditional payment process of e-commerce is shown in Figure 6, but also has the risk of leaking personal information and transaction information resulting in the loss. In the existing traditional international payment business, problems such as high management fee standards, long capital transfer time, and many blind spots of operation risk limit the development of Electronic commerce across national borders in China.

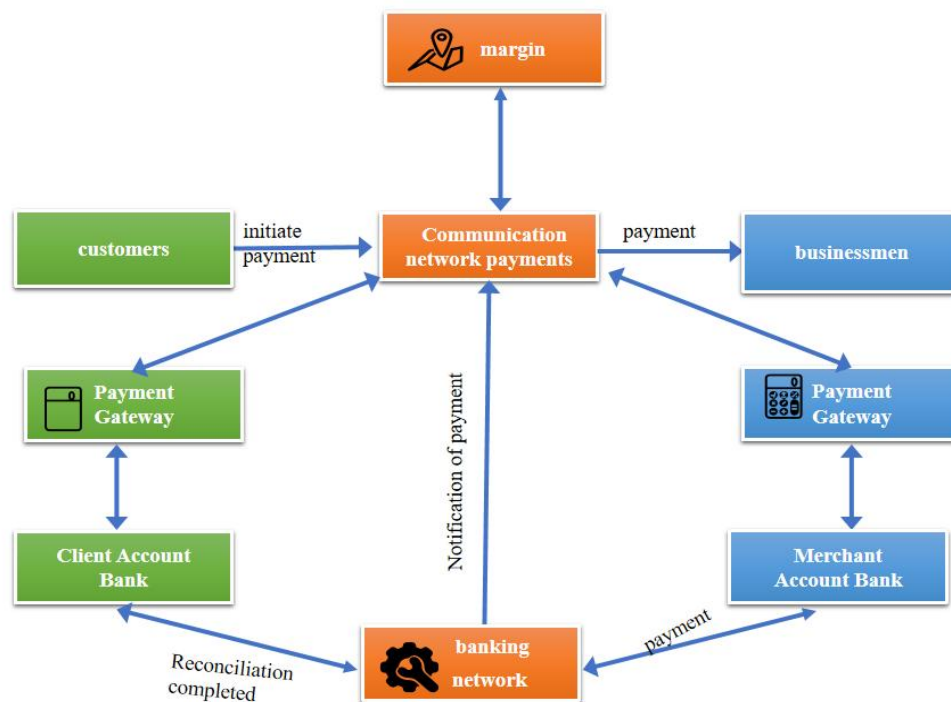


Figure 6. Traditional Cross-border Payment Process

The most important difference between the use of blockchain technology in Interstate payments and traditional Interstate payments is the change in the payment process [27]. This change presupposes the decentralization of the system. Decentralization is achieved by allocating transactional information storage between multiple servers to ensure that each user has access to the data on each server. Completion of transactions through the creation of a virtual trading platform in a networked environment. In this way, transactions become more convenient, secure, and transparent, thereby effectively reducing transaction costs, The payment process optimized with blockchain is shown in Figure 7. At the same time, it also provides consumers with a more convenient shopping experience [28].

One of the easiest transaction models in centralized thinking is the transaction process of the centralized payment process, and it is this model of centralized transactions that is currently being adopted for cross-border payments. Third-party organizations play a significant role in cross-border transactions; however, their failure to adequately safeguard funds and data security is the root cause of the vulnerability of cross-border transactions to third-party shocks. Due to the centralized approach to cross-border payments, this is associated with several security risks, even though the agent's tier structure may result in higher fees for cross-border payments than the addition of domestic ones. The blockchain can perform multi-party identity authentication, effectively protecting the private information of users from being leaked, And by the smart contract operation of every node in the blockchain, it can solve the "trust crisis" existing in the traditional Internet model [29]. Big data analytics is an important foundation for building new business models and achieving customer value and can be used to optimize business operating strategy and marketing methods and improve business profitability.

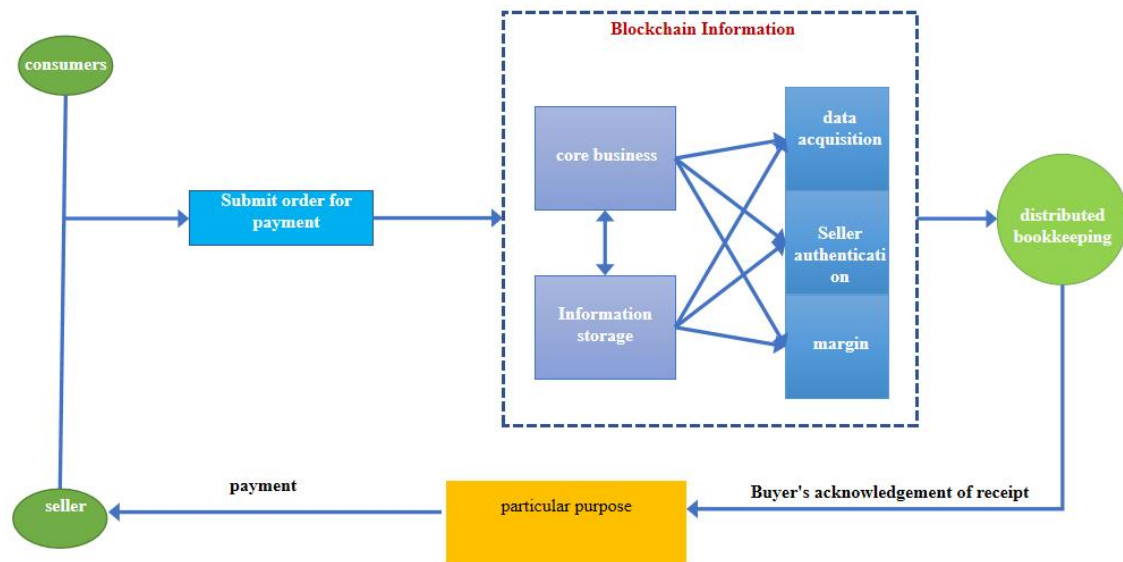


Figure 7. Decentralised Payment Process

Based on the simplest payment process, build a simplified decentralized new transaction model. After the buyer submits the order and makes the payment, The system uses blockchain technology to store and publish transfer information in a broadcast format so that all nodes in the blockchain can receive transaction information data [30]. Users can receive funds or goods directly from the blockchain. The seller has received payment and completed delivery of the goods, the transaction information has been stored in the blockchain and published in foreign broadcast format, and finally, the buyer completes the transaction by creating a clean system. The decentralized model can know that the transaction process has fundamentally changed. First, everyone's ledger stores exactly the same information, so if one participant's information changes, it doesn't affect the others. The original transaction records on the ledger, these original information are proof of the completion of the transaction process [31]. These changes in the payment process are, on the one hand, due to the change of the traditional mode of centralization, and on the other hand, the advantages of the distributed storage mode of blockchain technology are reflected. The authenticity and credibility of the cross-border transaction process are realized through the information backup party of multiple nodes, and everyone in the blockchain can also maintain common data. They can also monitor each other's behavior during trading [32].

In traditional cross-border transactions, accounting records are carried out separately between the two parties, which not only consumes a lot of human resources and time costs but also affects the settlement efficiency by adjusting the contradictions between them. With blockchain technology, all transaction clearing records are chained, secure, transparent, tamper-proof, and traceable: the efficiency of smart payments is greatly enhanced. The use of smart contracts can also enable the automatic settlement of a full range of transactions, especially in e-commerce payment schemes. This can greatly reduce costs and errors [33].

CONCLUSION AND THE PROSPECT OF ELECTRONIC COMMERCE ACROSS NATIONAL BORDERS

Conclusion

Digital learning and blockchain of information and communication technology are widely used in e-commerce, making cross-border e-commerce rapidly develop from the 2.0 stage to the 3.0 stage of cross-border e-commerce. It marks that China's cross-border e-commerce has achieved a comprehensive online transformation, and the development of China's cross-border e-commerce platform is still in a mature stage, and the application of blockchain technology will promote it to provide better services for both sides of the trade, thus promoting the development of foreign trade. Many problems have also emerged, which should actively explore the relevant solutions, using the centralized characteristics of blockchain and immutable data records, to solve the problem of product quality traceability, so as to improve product service quality, strengthen after-sales service, and provide consumers with more high-quality and convenient services. The traceability, encryption and security of blockchain ensure the smooth progress of e-commerce transactions and promote cross-border e-commerce enterprises to integrate the online shopping process with blockchain technology on a large scale, forming a cross-border e-commerce blockchain system. The system can provide more detailed and more authentic product quality information, provide safer and faster cross-payment methods, and well solve the difficulties faced by cross-border e-commerce, and well meet the online shopping needs of cross-border e-commerce users.

Future Development

In the internet era, Electronic commerce across national borders has become a new way of trading across borders. While Electronic commerce across national borders in China has been developing rapidly in recent years, it is still in its infancy, and there are many challenges that need to be overcome. With the rise of new industries such as live shopping in which they operate has grown in complexity and sophistication the challenges they pose will expand and become more varied. Therefore, China must strengthen its governance and leadership over Electronic commerce across national borders in order to promote the modernization of its economy. To meet the increased demand for Electronic commerce across national borders orders, it is not enough to simply solve the problems of logistics, payment, product quality and maintenance, especially in the context of the epidemic, the Electronic commerce across national borders model will face increasing challenges and risks. Although blockchain technology has gone some way to alleviating many of the challenges faced by e-commerce as it crosses national borders, The consensus algorithm, however, has yet to find a viable solution to the high latency, computational cost, encryption, globalized communication technology and high storage space required to store the same data. The popularisation and application of blockchain technology are constrained by various factors, including but not limited to environmental conditions, technical constraints and other aspects. So, given the close integration of research and e-commerce across national borders, the scope of blockchain technology still needs to be further explored and expanded.

Future research is expected to integrate blockchain technology with mature and established technologies such as 5G technology, IoT technology, big data technology and artificial intelligence technology to further extend the scope of the existing Electronic commerce across national borders model. By making Electronic commerce across national borders convenient, it can make its position in e-commerce as important as that of its domestic counterparts; secondly, it requires a joint effort between the government and the companies concerned to foster a healthy and stable development of Electronic commerce across national borders. In the area of Electronic commerce across national borders, we need to explore how to take advantage of the decentralized nature of blockchain technology to increase transaction efficiency and reduce costs, and thus further enhance the competitiveness of Electronic commerce across national borders in China. In addition, we need to keep a close eye on the latest evolving trends in blockchain technology and the corresponding trends in token trading policies in various countries around the world in order to promote faster integration of more efficient and cost-effective tokens into Electronic commerce across national borders transactions and thus fully exploit the potential of blockchain's value shifting stream.

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