

Impacts of Blockchain Technology on Trust through Payment, Circulation and Credit Systems in Cross-border E-commerce

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Abstract

Blockchain technologies provide new ideas for the improvement of cross-border e-commerce platforms. The applications of blockchain in cross-border e-commerce have important and practical influences on trust. Much literature focuses on the effects of blockchain technological innovation in the field of Fintech. However, there is a lack of the research on how blockchain impacts trust. This study analyzes the impacts of blockchain technology on trust in cross-border e-commerce from the perspective of three core modules: payment system, circulation system and credit system. To facilitate the analysis, a model was proposed to capture how blockchain affects trust through the three modules in cross-border e-commerce. Three hypotheses are proposed: blockchain have positive impacts on (1) payment system, (2) circulation system and (3) credit system in cross-border e-commerce.

Keywords

Blockchain Applications, Cross-border E-commerce, Trust, Cross-border Payment, Traceability.

1. Introduction

With the accelerated development of cross-border e-commerce and the growing scale of online shopping consumers, China's e-commerce is in a critical transitional phase of a new round of innovation and development. The integration and development of online and offline channels has not yet fully formed, cross-border e-commerce market issues remain unresolved, and industry development opportunities and challenges coexist. In order to solve these problems, the application of blockchain technology to the cross-border e-commerce field is one of the best ways. Therefore, the application of blockchain technology in cross-border e-commerce has important practical significance[1].

Blockchain is a distributed digital ledger that is used to record transactions across thousands of computers around the world so that the record cannot be altered without the alteration of all subsequent blocks and the collusion of the network[2]. Besides, it is a trustworthy system as it allows the participants to verify and audit transactions inexpensively without a third-party, which strongly reduces the risk of a backdoor transaction and unauthorized intervention[2]. Blockchain has many characteristics, such as autonomous, distributed, immutability, and contractual. These characteristics of blockchain architecture bring several advantages, such as durability, transparency, verifiability and process integrity[3]. The blockchain provides us with secure, transparent, anonymous, decentralized, low-cost, and reliable data or asset transactions in a decentralized network[4]. Blockchain uses security technology, consensus mechanism, smart contracts and distributed ledgers to initially solve the trust problem between enterprises within the network, and provides strong support for the realization of the collaboration of IT systems across enterprises. For example, IBM first proposed the concept of BaaS (blockchain as a service) in 2016. BaaS is a service platform, and

the company hopes to use blockchain similar to the way Infrastructure-as-a-service (IaaS), Platform-as-a-service (PaaS), and Software-as-a-service (SaaS) are used, in order to provide services to customers[5].

Cross-border e-commerce activities are inseparable from the three attributes of logistics, information flow and capital flow[6]. Therefore, this study analyzes the impacts of applying blockchain technology on trust through payment system, circulation system and credit system three aspects in cross-border e-commerce, comparing existing cross-border e-commerce technologies.

2. Literature Review

The blockchain is a distributed ledger technology in the form of a distributed transactional database, secured by cryptography, and governed by a consensus mechanism[7]. The distributed record and traceable characteristics of the blockchain are of great value for the establishment of e-commerce platforms, supply chain management and product traceability. Most critically, the blockchain can establish a more stable consensus and trust mechanism for many nodes distributed across the supply chain, and as a centralized platform, this trust mechanism can reduce many unnecessary litigations and disputes.

At present, the research on the practical application of blockchain technology in China mainly focuses on financial currency[8], medical[9], education[10] and energy[11], sharing economy[12], supply chain management[13] and other fields. The application of blockchain on e-commerce field mainly focuses on information security, logistics and cross-border development in China[14]. For example, Qingyang Ding et al[15] combines the Internet of Things technology with the distributed storage architecture of blockchain to make up for the anti-counterfeiting loopholes of products and ensure the authenticity and availability of transmission information. Bin Zhang et al[16] believe that it is necessary to solve the problems of lack of cross-border e-commerce logistics facilities, redundant service processes and low technical level by improving the legal policies and optimizing the cooperation mode of enterprises. Hong Jin et al[17] proposed that the foundation of cross-border e-commerce lies in the integration of industrial information, and the globalization layout and enterprise transformation and upgrading can help China's cross-border e-commerce achieve sustainable development. Xiaheng Zhang[18] classified the cross-border e-commerce types into three categories according to the types of products operated by the platform, the flow of products, and the attributes of trading entities.

Most foreign applied research based on blockchain technology is mainly focused on finance, Business and industrial, Governance, Data management, Healthcare management, Supply chain management, energy and other fields. In the field of e-commerce, the research on blockchain focuses on the innovation of specific things in e-commerce. Davide Carboni[19] proposed an anonymous reputation feedback system based on the Bitcoin blockchain; Richard Dennis et al.[20] built a platform merchant credit rating system based on blockchain technology to ensure the authenticity and traceability of the evaluation information and eliminate the unreality of the network rating information; Alexander Schaub et al.[21] expanded the application of the blockchain in the merchant credit rating system, realizing online commenting on merchants truly with high privacy of buyers information.

Most of the literature on blockchain focuses on the technological innovation of blockchain on one aspect of e-commerce, lacking overall and meticulous research. There are few literatures to research impacts of applying blockchain on trust of cross-border e-commerce. Our study analyzes the impacts of applying blockchain on trust in cross-border e-commerce, comparing existing cross-border e-commerce technologies.

3. Impacts of Applying Blockchain in Cross-border E-commerce

3.1. Blockchain and Cross-border E-commerce Payment System

When trading with existing cross-border e-commerce technology, commissions are charged for cross-border payments. Although the traditional wire transfer can directly reach the payee account, the cost is higher. It mainly consists of two parts: the handling fee for the remittance amount and the telecommunications fee related to the number of remittances. In addition, at the time of remittance, there is still an intermediate deduction fee, and it is impossible to predict the deduction amount during the remittance process. And now the Internet can only transmit information and cannot transmit value. For example, copying pictures and videos to others, but not copying money to another person. Furthermore, the global economic system depends on that individuals and organizations trust other entities to create, store, and distribute essential records[7]. E-payments that attempt to maintain a flexibility and efficiency for users as much as possible, it has been often naturally advocated as a flexible service to allow to use a trustee (e.g., a trusted third party for completing the transactions) in the system. However, the choice of a third party, while increasing flexibility, might also reveal some preference of users, thus reducing the privacy of them.

The Blockchain system takes the place of the trusted third party. It contains the payment history of all transactions in circulation. For examples, "A Blockchain Based Approach towards Overcoming Financial Fraud in Public Sector Services" by Hissu Hyvaärinen, Marten Risius, and Gustav Friis presents a blockchain based solution for overcoming tax fraud in cross-border payments of dividends[22]. They propose a solution in which a blockchain keeps track of where and when taxes have been paid to on the one hand avoid double taxation and on the other hand avoid tax evasion. Zhong Lin et al[2] proposed a secure versatile light payment (SVLP) system based on blockchain which possesses the properties of security, privacy, low power consumption, flexibility, off-chain payments, and offline payments.

All people in the blockchain reach a consensus of trust. All transactions have no intermediary and are peer-to-peer. If the reconciliation is modified, then all copies are also synchronized. Every transaction record can be queried. The blockchain will store the blocks of the current transaction to the entire network. Only when all nodes verify that the transaction is valid, the block is linked to the main chain and the transaction information is permanently saved. The whole process does not need to be audited by the central organization, and the transaction information is highly transparent, real storage, and cannot be falsified. Each node shares the real-time ledger, which saves transaction costs and accounting costs, and ensures transaction security and continuity. The advantage is very obvious in terms of cross-border payments.

Applying blockchain technology to cross-border remittances and removing third-party financial institutions can enable users to complete cross-border payment at a faster rate and at a lower cost. Basically, they can do real-time payments like local transfers. Save money, save time, safety, openness and transparency. This helps increase efficiency and reduce financial risk. Taking the third blockchain technology summit in 2017 as an example, international business giants Citibank and Nasdaq are collaborating to develop a complete blockchain global payment solution with the Chain Core, a blockchain platform of a start-up company in California. And they are working on how to solve the problem of high payment costs and long trade settlement time through blockchain-based smart contracts. The implementation of this project will herald the emergence of blockchain commercial application milestones. Therefore we propose the following hypothesis:

H1: Blockchain has a positive impact on cross-border e-commerce payment system.

3.2. Blockchain and Cross-border E-commerce Circulation System

Conventional data management is usually under the surveillance of a centralized entity. At present, all transactions on the Internet are based on a central transaction, and e-commerce is the most widely used Internet service in China. But centralized data is the most vulnerable to attack. The more data, the slower the processing.

Blockchain-based data management breaks the centralization and distributes data and permissions. All permissions and records are stored in separate blockchain ledgers. Data manipulation is transparent to users who have full data access[4]. The openness and transparency of blockchain technology makes data more secure, thus creating a complete and streamlined flow of information throughout the supply chain. Based on the blockchain-based peer-to-peer e-commerce transaction model, the e-commerce “customized service + zero intermediary + zero cost + high transparency + high efficiency” operation mode is realized through technologies such as consensus trust mechanism, encryption algorithm and distributed database. In addition, the asymmetric encryption technology and digital signature of the blockchain solve the problems of customer privacy and safe distribution of logistics, store the transportation instructions of goods in distributed blocks through intelligent contracts and continuously optimize the goods transportation route. Therefore we propose that:

H2: Blockchain has a positive impact on cross-border e-commerce circulation system.

3.3. Blockchain and Cross-border E-commerce Credit System

While the B2C mode transaction volume is growing rapidly, its development still faces many problems, including information asymmetry, difficulty in defining disputes arising in the transaction process, ineffective service, inevitable elimination of counterfeit products, and leakage of consumer information. Traditional product information disclosure and anti-counterfeiting technology methods are difficult to achieve the interconnection of information in all aspects of production and sales, resulting in a large number of product information loopholes. For example, the product security code can query the existence of the code, and once it is copied or damaged, it cannot play its anti-counterfeiting role. Another example is the fact that unscrupulous merchants on e-commerce platforms use real commodity logistics information to sell counterfeit products. Counterfeit goods and brush orders are almost an eternal pain point in the e-commerce industry. A large number of counterfeit brand-name products are sold online. These problems have led to the introduction of traceability anti-counterfeiting technology.

Blockchain adopts a distributed storage structure, using cryptography, consensus algorithms, smart contracts and other technologies to achieve information tamper resistance, anti-counterfeiting and traceability in the process of information collection, circulation, and sharing[15]. The first area in which blockchain technology has landed is traceability anti-counterfeiting technology. Through the decentralized mechanism, the distributed accounting system of the blockchain is time stamped so that all information on the chain is transparent and unmodifiable. Moreover, all transactions can be traceable[23]. Products traceability can be improved significantly, allowing customers to check the entire journey of a particular product and upgrading the level of logistics service[24]. In terms of product traceability, the anonymity and irreversible modification of the blockchain itself can guarantee the authenticity in the process of transmission after the chain is attached. There is still no way to guarantee the authenticity before the chain, and the stage of the chain still needs to be Three-party centralized institutions to guarantee.

Taking the consumer electronics industry as an example, the blockchain caters to the demand for information transparency and multi-subject participation in the supply chain management of the consumer electronics industry. It can verify and trace the entire process value of the

industry value chain with the participation of global producers and consumers. And the authenticity of information makes the development of the electronics industry more transparent and secure[25]. The blockchain can enhance customers' trust, which will allow them to check the entire journey of goods across the supply chain in full confidence. In this regard, the traceability mechanisms of the blockchain support products fraud prevention and fake across the supply chains. As result, supply chains will gain a lot in terms of costs reductions and efficiency[23].

Time-stamp proof and traceability can effectively support the anti-counterfeiting and traceability of online and offline retail products. For example, Jingdong Blockchain anti-counterfeiting retrospective open platform uses the Internet of Things technology and blockchain technology to collect information on the whole process of purchase, production, processing, marketing and circulation of commodity raw materials. Each piece of information has its own blockchain ID, and each piece of information is accompanied by the number of each information subject. Then we propose the following hypothesis:

H3:Blockchain has a positive impact on cross-border e-commerce credit system.

Figure 1 presents the research model.

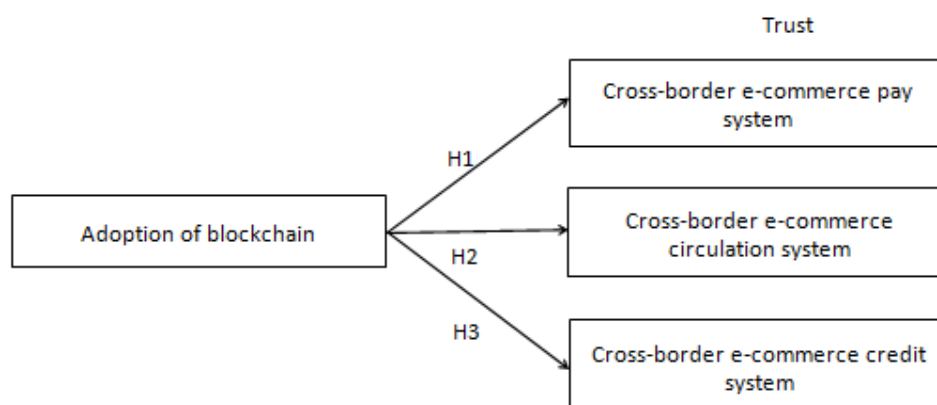


Figure 1. Research Model

4. Conclusion

Blockchain concepts and technologies provide new ideas for the development of cross-border e-commerce platforms. This study analyzes the impacts of blockchain technology on trust in cross-border e-commerce from the perspective of three core modules: payment system, circulation system and credit system, comparing with existing cross-border e-commerce technologies. The decentralized technical features enable the buyers and sellers to be closely integrated, eliminating the maintenance costs and transaction costs of third parties, and the cost savings can be used to improve the service quality of the platform and meet the diverse needs of users. Despite the promising application of blockchain technology, it is still in its early stages. The underlying technology of the blockchain needs a certain amount of time to improve, and the development of industrial demand will continue to promote the improvement of technology. The talent and cognitive level also needs time to improve, and it can be correctly recognized before it can better formulate policies.

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