

E-Commerce Payment Model using Blockchain

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Abstract: Blockchain technology is considered as a significant development after the invention of the internet. Blockchain technology records the transactions on database which are encrypted and distributed over many computer networks like a digital ledger of online transactions. This technology can be utilized in the e-commerce industry to develop a decentralized online buying and selling platform. E-commerce industry presently facing many unique challenges like security measures of the e-commerce system, transparency, and trust, efficiency, etc. These challenges can be answered by the implementation of blockchain technology in the e-commerce industry. The article discussed opportunities for using blockchain technology in the e-commerce industry. Blockchain applications and opportunities are discussed for various aspects of e-commerce like Payment, Security, Supply chain, Work automation with Smart contract, Ethical practices for transparency in e-commerce transactions.

Keywords: Blockchain, Decentralization, Security, Payment, E-commerce

I. INTRODUCTION

At present, e-commerce, finance, energy and other fields are developing rapidly, and new technologies are changing with each passing day. In traditional e-commerce, user information leakage risk events occur from time to time. How to use blockchain technology to improve the security of e-commerce systems is an urgent need. As the scale of e-commerce cross-border trade continues to increase, the volume of cross-border payment is rising. In the current cross-border payment process, each transaction needs to be transmitted between multiple organizations. There are problems such as high intermediate costs, low payment efficiency, high membership threshold, and centralized security risks. Traditional e-commerce transactions have their records in a centralized organization, which is inefficient, costly and opaque. The blockchain distributed ledger guarantees the fairness and authenticity of the transaction, and avoids the possibility of transaction being tampered. The advantages of blockchain-based applications are optimizing business processes, reducing operating costs, and improving synergy efficiency. These advantages have been gradually reflected in financial services and supply chain management. Blockchain-based financial asset rights trading and circulation drive the development of financial markets, financial instruments, financial intermediation, and financial system. The payment clearing system is the basic support of economic and financial activities. And the payment clearing process is a typical multi-center scene, which is highly matched with the blockchain characteristics.

II. OVERVIEW OF BLOCKCHAIN TECHNOLOGY

Background

E-commerce, or electronic commerce, refers to the buying and selling of goods and services over the internet. With the widespread adoption of internet technologies, e-commerce has witnessed tremendous growth, transforming the way businesses operate and consumers shop. One critical aspect of e-commerce is the payment system, which enables secure and convenient financial transactions between buyers and sellers in the online marketplace.

Traditionally, e-commerce payments have relied on traditional payment methods such as credit cards, debit cards, bank transfers, and cash on delivery. While these methods have served as the foundation for online transactions, they come with various limitations, including security vulnerabilities, high transaction fees, slow settlement times, and geographical restrictions. These limitations have prompted the exploration of alternative payment systems, including those based on blockchain technology.

Significance:

The significance of e-commerce payment systems lies in their pivotal role in facilitating secure and efficient transactions in the digital marketplace. Here are some key points highlighting their significance:

- **Security:** E-commerce payment systems play a crucial role in ensuring secure online transactions. With the increasing prevalence of cyber threats and the potential for fraud, robust payment systems are necessary to protect sensitive customer information and financial data. Blockchain-based payment systems offer enhanced security through decentralized and cryptographic mechanisms, reducing the risk of fraud and unauthorized access.
- **Convenience and Accessibility:** E-commerce payment systems enable consumers to make purchases from anywhere at any time, eliminating geographical barriers. They offer convenience by providing a range of payment options, allowing customers to choose the method that suits them best. This accessibility and convenience contribute to the growth of online shopping and the expansion of global markets.
- **Efficiency and Cost Savings:** Efficient payment systems are crucial for seamless online transactions. Traditional payment methods often involve intermediaries, leading to longer settlement times and higher transaction fees. Blockchain-based payment systems can streamline transactions by eliminating intermediaries and automating processes, reducing costs and improving efficiency for both buyers and sellers.
- **Trust and Transparency:** Trust is a critical factor in e-commerce. Payment systems that offer transparency and accountability foster trust between buyers and sellers. Blockchain technology provides a transparent and immutable record of transactions, enhancing trust by enabling participants to verify and trace the flow of funds. This transparency can also help address disputes and prevent fraudulent activities

Blockchain

Blockchains are tamper evident and tamper resistant digital ledgers implemented in a distributed fashion (i.e., without a central repository) and usually without a central authority (i.e., a bank, company, or government). At their basic level, they enable a community of users to record transactions in a shared ledger within that community, such that under normal operation of the blockchain network no transaction can be changed once published. In 2008, the blockchain idea was combined with several other technologies and computing concepts to create modern cryptocurrencies: electronic cash protected through cryptographic mechanisms instead of a central repository or authority. The first such blockchain based cryptocurrency was Bitcoin. Within the Bitcoin blockchain, information representing electronic cash is attached to a digital address. Bitcoin users can digitally sign and transfer rights to that information to another user and the Bitcoin blockchain records this transfer publicly, allowing all participants of the network to independently verify the validity of the transactions. The Bitcoin blockchain is stored, maintained, and collaboratively managed by a distributed group of participants. This, along with certain cryptographic mechanisms, makes the blockchain resilient to attempts to alter the ledger later (modifying blocks or forging transactions).

Blockchain Advantages for E-commerce.

Blockchain technology offers several ways to enhance the safety and security of e-commerce payments. Here are some key ways in which blockchain can contribute to making e-commerce payments safe and secure:

- **Immutable Transaction Records:** Blockchain creates a decentralized and tamper-resistant ledger that records all transactions. Once a transaction is added to the blockchain, it cannot be altered or deleted. This immutability ensures the integrity of payment records and prevents fraudulent activities.
- **Enhanced Data Security:** Blockchain incorporates cryptographic techniques to secure transaction data. Each transaction is encrypted, and the data is distributed across multiple nodes in the network. This decentralized storage reduces the risk of a single point of failure and makes it difficult for hackers to compromise the data.
- **Smart Contracts:** Smart contracts are self-executing contracts that automatically enforce predefined rules and conditions. In e-commerce payments, smart contracts can be used to facilitate secure and automated transactions. They eliminate the need for intermediaries, reducing the risk of fraud and ensuring that payments are only released when specific conditions are met.

- **Identity Verification:** Blockchain can enable secure identity verification in e-commerce payments. By linking user identities to their blockchain addresses, it becomes difficult for malicious actors to impersonate users or engage in fraudulent activities. This helps in preventing identity theft and unauthorized access to payment systems.
- **Fraud Detection and Prevention:** Blockchain can facilitate real-time monitoring of transactions, enabling the detection of suspicious activities and fraudulent patterns. By analyzing the transaction history and identifying anomalies, blockchain-based systems can proactively identify and prevent fraud, enhancing the overall security of e-commerce payments.
- **Transparency and Traceability:** Blockchain provides transparency by making transaction details visible to all participants in the network. This transparency helps in building trust between buyers and sellers, as they can verify the authenticity and integrity of transactions. Additionally, the traceability feature of blockchain allows users to track the entire payment process, reducing disputes and providing a clear audit trail.
- **Disintermediation and Cost Reduction:** Traditional payment systems often involve intermediaries, such as banks or payment processors, which add costs and introduce vulnerabilities. Blockchain-based e-commerce payments eliminate the need for intermediaries, reducing costs and minimizing the risk of third-party involvement in sensitive payment information.
- **Cross-Border Payments:** Blockchain technology can streamline and secure cross-border e-commerce payments. By removing the need for multiple intermediaries, blockchain reduces the complexity and costs associated with cross-border transactions. Additionally, the use of cryptocurrency or stablecoins can provide faster and more cost-effective cross-border payment options.

III. IMPLEMENTATION DETAILS

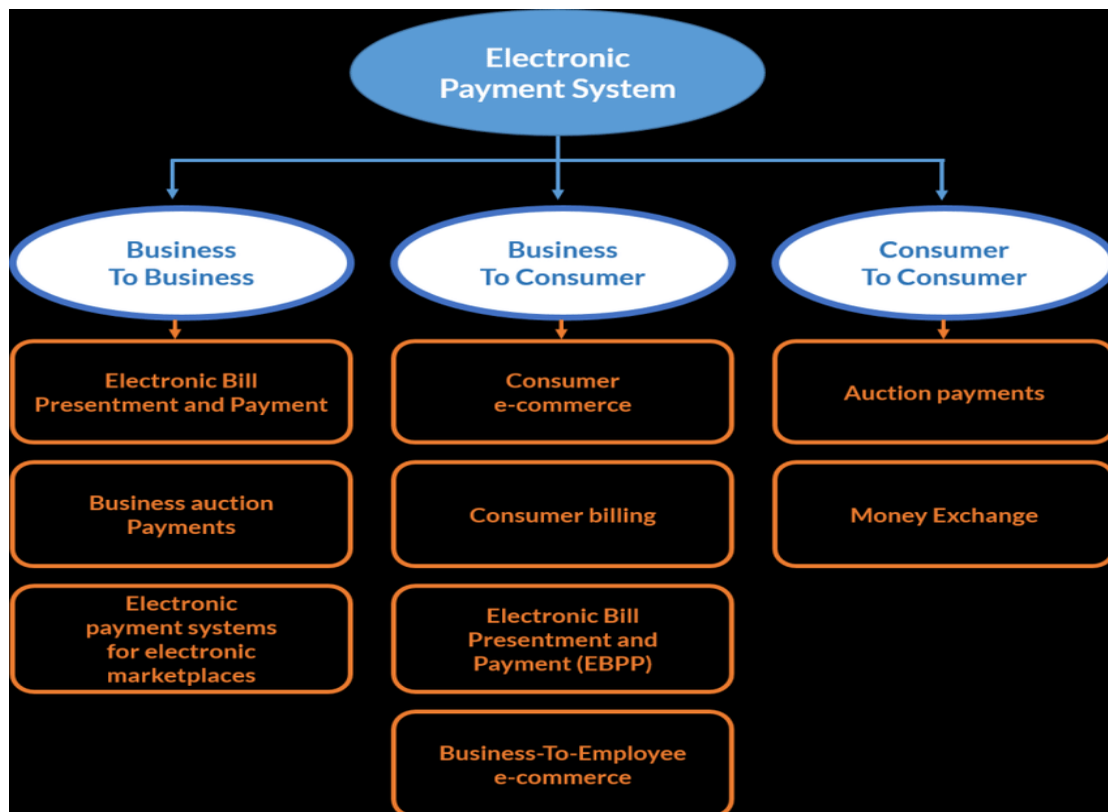


Figure 1

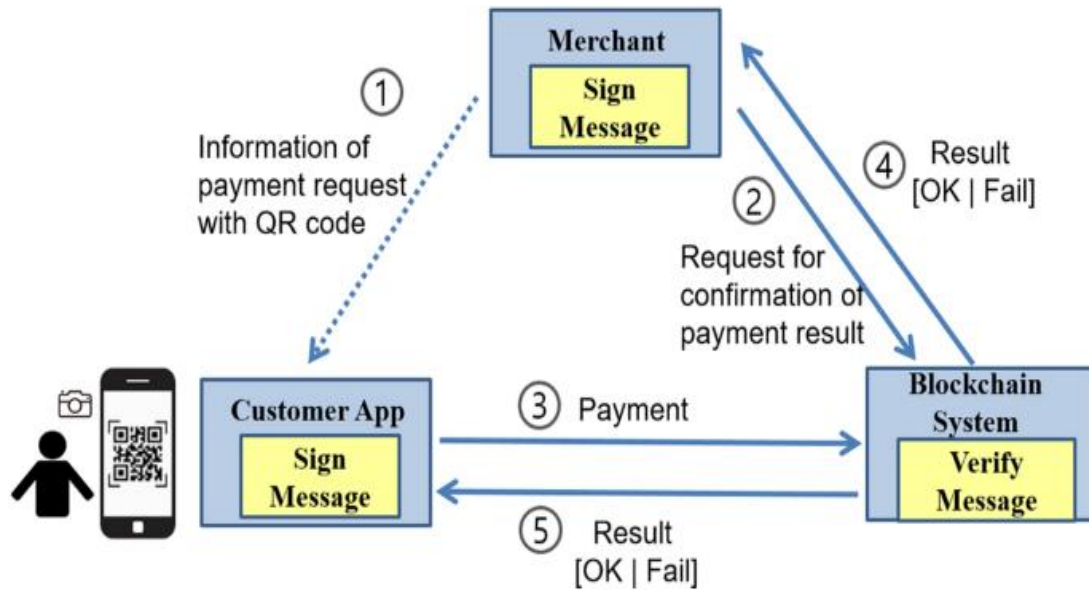


Figure 2

IV. LITERATURE SURVEY

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V. RESEARCH METHODOLOGY

This study uses Descriptive research to gather preliminary information, observe the growth and development of the e-commerce payment and blockchain technologies, record the coming together of the two and describe the advantages from such an implementation.

VI. FINDINGS

- 1. Improved Security:** Blockchain technology enhances security in e-commerce payment systems by utilizing cryptographic techniques to protect transactions and sensitive data. This improves trust and reduces the risk of fraud or unauthorized access.
- 2. Transparency and Accountability:** The transparency of blockchain enables all participants to view transaction history, promoting trust and accountability in e-commerce transactions. This transparency can help prevent disputes and resolve issues more efficiently.
- 3. Reduced Intermediaries and Costs:** Blockchain-based e-commerce payment models have the potential to eliminate intermediaries, such as banks or payment processors, thereby reducing transaction costs and processing fees. This can result in cost savings for both merchants and consumers.
- 4. Smart Contract Automation:** Smart contracts, enabled by blockchain technology, allow for automated and self-executing agreements. In e-commerce payments, smart contracts can automate payment processes, trigger actions upon specific conditions, and streamline transaction flows.

VII. SCOPE FOR FUTUTRE STUDY

- 1. Country-specific regulatory aspects** as well as comparison studies on e-commerce can be done.
- 2. Scalability Solutions:** Future work could focus on developing scalable blockchain solutions that can handle a higher volume of transactions without sacrificing performance. This may involve advancements in consensus algorithms, sharding techniques, or layer-two solutions like state channels or sidechains.

3. Privacy and Confidentiality: Enhancing privacy and confidentiality in blockchain-based e-commerce payments is an important area for future research. Exploring techniques such as zero-knowledge proofs, secure multiparty computation, or privacy-enhancing frameworks can enable confidential transactions without compromising the transparency and auditability aspects of blockchain.

VIII. CONCLUSION

The current paper proposed a convenient payment model without a transaction intermediary, such as public key certificate or PG, and implemented a design to confirm its application potential. An experiment was conducted to verify that the internal blockchain features, such as public key, private key, and digital signature, can be used to construct a functioning electronic payment system without having to implement additional modules. In conclusion, it was confirmed that a system in which the merchant, customer, and blockchain subsystems, each executing authentication, can guarantee integrity and nonrepudiation of payment transactions. The authentication performance was reasonable, at 100 TPS. The proposal set forth in the current study makes data transmission between merchants and customers easier and more convenient by using the QR code, and as such, may serve as an alternative for resolving issues surrounding payment fees for processing e-commerce transactions.

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BIOGRAPHY

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