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Blockchain Implementation in E-Commerce to Improve The Security Online Transactions

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ABSTRACT

The implementation of blockchain technology in E-commerce has become an increasingly important topic in recent years. Blockchain can bring big changes in the E-commerce industry, especially in increasing customer security and trust in online transactions. In this article, it is explained how blockchain technology can be used in E-commerce, such as in increasing the security of online transactions, product tracking, use of smart contracts, and digital identities. Nonetheless, the implementation of blockchain technology also has challenges and obstacles that need to be overcome, such as the considerable cost and time involved in system development and integration, as well as regulatory and legal issues related to the use of cryptocurrencies and digital identities. Therefore, the implementation of blockchain technology in E-commerce requires careful strategy and planning to maximize the benefits that this technology can provide.

Keywords: *Blockchain, Online Transaction, E-commerce, Cryptocurrencies*

INTRODUCTION

E-commerce has become an important part of today's digital business and economy (Taher, 2021). In online transactions, security is an important factor that needs attention (Alrubei et al., 2022). Fraud and cyber-attacks can easily occur in online transactions. Therefore, implementing blockchain technology in online transactions can help improve transaction security and protect user information (Niranjanamurthy et al., 2019).

Blockchain is a decentralized technology that is used to store data in an encrypted manner (Atzori, 2015). This technology allows users to store data safely and transparently without going through third parties. In the context of e-commerce, blockchain can be used to increase transaction security and protect user information.

First of all, blockchain can be used to verify user identity. In online transactions, the user's identity needs to be verified to prevent fraud. Blockchain can be used to create encrypted and secure digital identities (Takemiya & Vanieiev, 2018). Thus, only users who have valid digital identities can make transactions.

Second, blockchain can be used to track transactions (Efanov & Roschin, 2018). Every transaction made on the blockchain is visible and trackable to all users. In the context of e-commerce, this can help increase transaction transparency and prevent fraud. For example, if there is a suspicious transaction, it can be easily tracked to find the culprit and prevent similar transactions in the future.

Third, blockchain can be used to secure user information (Stephen & Alex, 2018). User information such as addresses, phone numbers, and credit card information can be stored securely on the blockchain. In an e-commerce context, this can help prevent fraud and cyberattacks on user information. If user information is stored on the blockchain, only users who have encryption keys can access that information.

Fourth, blockchain can be used to secure transaction logistics (Humayun et al., 2020). Blockchain can be used to create a decentralized tracking system, so that users can easily track the items they buy. In an e-commerce context, this can help prevent fraud and encourage safer transactions.

The implementation of blockchain technology in e-commerce can help improve the security of online transactions. This technology can be used to verify user identity, track transactions, secure user information, and secure transaction logistics. Thus, e-commerce users can make transactions more safely and comfortably. Therefore, implementing blockchain can be the right solution to ensure transaction security in e-commerce.

METHOD

Research methods on blockchain topics can be carried out using qualitative, quantitative approaches, or a combination of both (mixed-methods). Following are some examples of research methods that can be used in research on blockchain topics:

1. Case study: The case study method is used to gain an in-depth understanding of the phenomena or issues associated with the use of blockchain in an industry or sector (Xu et al., 2022). Researchers can collect data through interviews, observation, and document analysis, as well as analyze the collected data to understand blockchain implementation and its impact on a particular industry or sector.
2. Survey (survey): The survey method is used to collect data from respondents using a questionnaire (Roopa & Rani, 2012). Surveys can be conducted online or by filling out a questionnaire on the spot. Researchers can gather data regarding perceptions, attitudes, and use of blockchain within a particular industry or sector.
3. Focus group: The focus group method is used to gain perspective from a small group of respondents who have knowledge or experience in using blockchain in a particular industry or sector (Rosenthal, 2016). In focus groups, participants are invited to openly discuss certain topics, with the assistance of a moderator.
4. Documentary analysis (document analysis): Documentary analysis methods are used to collect data from written documents relating to the use of blockchain in a particular industry or sector (Kim et al., 2020). Documents analyzed can be in the form of scientific

journals, news articles, financial reports, and other documents relevant to the research topic.

5. Simulation (simulation): Simulation methods are used to model the use of blockchain in a particular industry or sector (Smetanin et al., 2020). Simulations can be performed using software or hardware that mimics the process of blockchain transactions in a particular industry or sector. Researchers can collect data regarding the effectiveness, efficiency, and safety of using blockchain in the simulation.

The selection of the right research method depends on the research objectives, available data sources, and the research questions asked. Researchers can use one or a combination of several research methods to obtain more comprehensive and accurate research results.

FINDING AND DISCUSSION

There are several ways to implement blockchain in e-commerce online transactions, including:

1. Payments using cryptocurrencies: E-commerce may allow users to make payments using cryptocurrencies such as Bitcoin or Ethereum. This cryptocurrency is stored on the blockchain and does not require a third party to facilitate transactions. Thus, transactions are faster and safer.
2. Digital identity: E-commerce can create a digital identity for each user which is stored on the blockchain. This digital identity can be used to verify user identity and prevent fraud.
3. Item tracking: E-commerce can use blockchain to track goods sold. Each product can be assigned a unique code that is stored on the blockchain, so that users can track purchased products easily.
4. Smart contracts: Smart contracts are computer programs that run on the blockchain. E-commerce can use smart contracts to create automatic agreements between buyers and sellers. For example, payment will only be given after the goods are received by the buyer.
5. Application development: E-commerce can develop applications that use the blockchain to increase transaction security. For example, an application can provide notifications to users when changes occur to their transactions.

In conclusion, the implementation of blockchain in online e-commerce transactions can be done in various ways such as payments using cryptocurrency, digital identities, tracking goods, smart contracts, and application development. By implementing blockchain technology, e-commerce can improve transaction security and protect user information.

A. Payments Using Cryptocurrencies

Payment implementation using cryptocurrency in e-commerce can be done in various ways, one of which is by integrating a crypto payment gateway on the e-commerce platform (Mendoza-Tello et al., 2018). The following is an example of implementing payments using cryptocurrency in e-commerce:

1. Coinbase Commerce: Coinbase Commerce is a crypto payment gateway that allows e-commerce to accept payments in Bitcoin, Bitcoin Cash, Ethereum, and Litecoin. E-commerce can integrate Coinbase Commerce on their platform, so users can choose to make payments using cryptocurrency when making purchases.
2. BitPay: BitPay is a crypto payment gateway that allows e-commerce to accept payments in Bitcoin, Bitcoin Cash, and Ethereum. BitPay also provides integration with various e-commerce platforms such as Shopify, WooCommerce, and Magento.
3. GoCoin: GoCoin is a crypto payment gateway that allows e-commerce to accept payments in Bitcoin, Litecoin, and Ethereum. GoCoin provides integration with e-commerce platforms such as Magento, Shopify, and OpenCart.
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By integrating a crypto payment gateway such as Coinbase Commerce, BitPay, GoCoin, or CoinPayments on an e-commerce platform, users can choose to make payments using cryptocurrency when making purchases. After payment is confirmed on the blockchain, e-commerce can deliver goods or services that have been purchased by users. Thus, the implementation of payments using cryptocurrency can increase the speed and security of transactions in e-commerce.

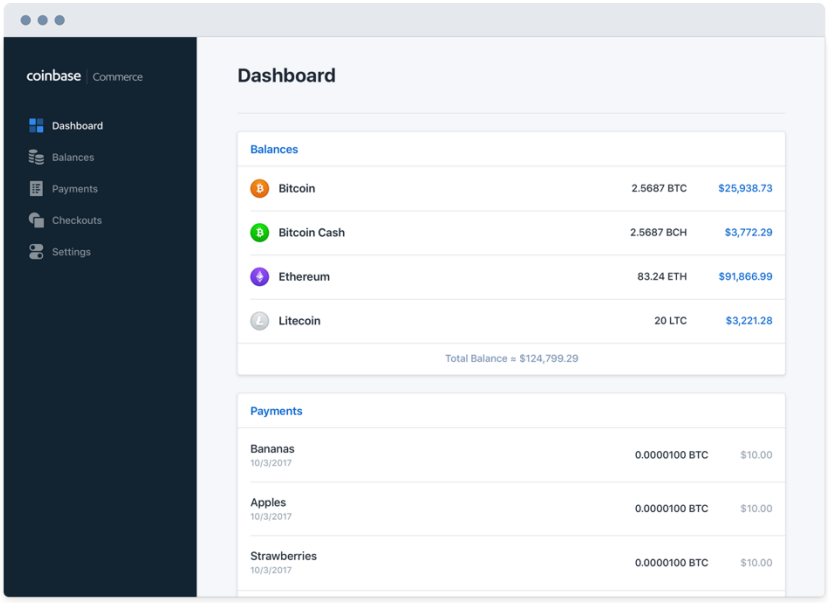

Figure 1: Coinbase Commerce Software

B. Digital Identity

Implementation of the use of digital identities for E-commerce users can be done by utilizing blockchain technology (Ismanto et al., 2019). The following is an example of implementing the use of digital identity for E-commerce users:

1. Self-sovereign identity (SSI): SSI is a digital identity concept that allows users to have complete control over their identity. In implementing SSI in E-commerce, users can create digital identities that are stored on the blockchain and can be used on different E-commerce platforms. This digital identity can be used to verify user identity and prevent fraud.
2. Blockchain-based identity verification: E-commerce can use blockchain technology to verify user identity. In this implementation, users can upload their identity documents such as ID cards or passports to the blockchain, so they can be verified automatically. Once verified, the user's identity is stored on the blockchain and can be used on different E-commerce platforms.
3. Decentralized identity (DID): DID is a digital identity concept that allows users to have a digital identity that is decentralized and not centralized in a single entity. In implementing DID in E-commerce, users can have digital identities that are stored on the blockchain and can be used on different E-commerce platforms. This digital identity can be used to verify user identity and prevent fraud.

By implementing blockchain technology for digital identity in E-commerce users, users can have digital identities that are decentralized, secure and can be used on different E-commerce platforms. This can improve transaction security and protect user information.

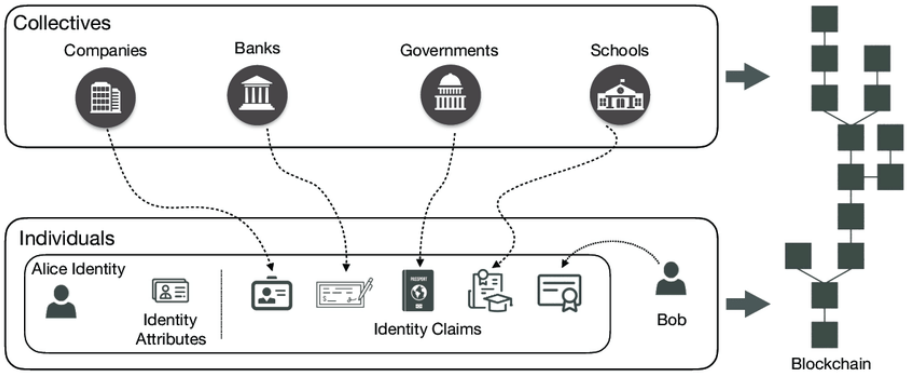

Figure 2: Overview of blockchain based identity management solutions (Zhu & Badr, 2018)

C. Item Tracking

Blockchain implementation to track goods sold on e-commerce can be done in the following ways:

1. Creating a product digital identity: Each product sold in e-commerce is assigned a unique digital identity, such as a serial number or QR code. This digital identity will be recorded on the blockchain along with other product information, such as make, model, and specifications (Dewi Widhy Asti et al., 2022).
2. Creating transaction records: Every time the product is produced, stored, or transported, a transaction record is created and stored on the blockchain. These transaction records include information such as the date, time, location, and parties involved in the transaction.
3. Transaction validation: Every time a transaction occurs, the blockchain will perform an automatic validation to ensure that the transaction is valid and has not been modified by an unauthorized party.
4. Creating a digital receipt: Every time a product is delivered to a buyer, a digital receipt is created and stored on the blockchain. This receipt includes information such as the order number, shipping receipt number, delivery date, and consignee information.
5. Product tracking: Everyone involved in the product supply chain, from producers to consumers, can use blockchain to track products. The available information includes product transaction history, from production to delivery to the end consumer.

With blockchain implementation, e-commerce can ensure that the products being sold are genuine and come from a reliable source. In addition, product tracking carried out on the blockchain can help e-commerce to reduce fraud, theft, and counterfeit products.

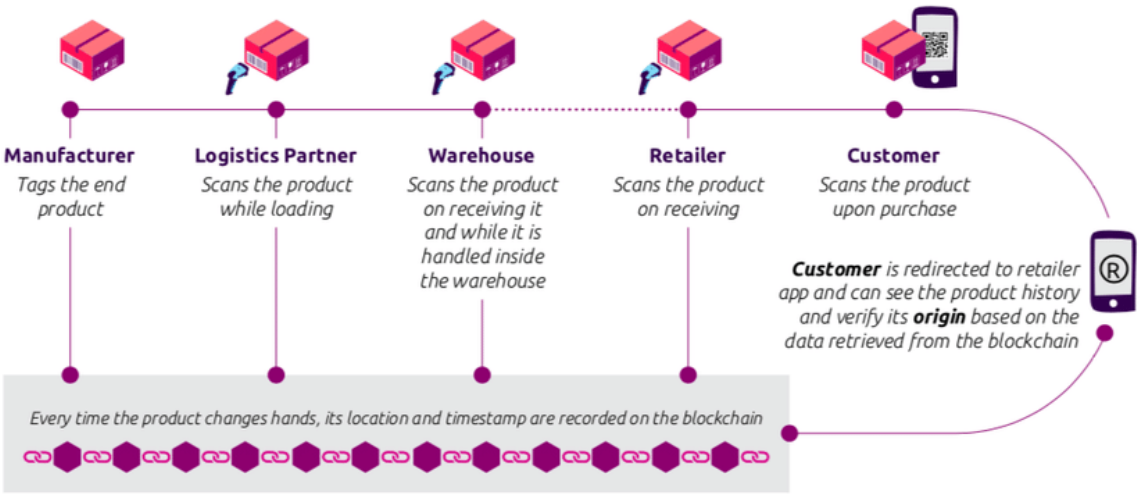

Figure 3: Simplified process for tracking products using blockchain adopted from (Acungil, 2019)

D. Smart Contracts

Smart contracts are computer programs written on blockchain platforms to perform specific tasks, such as executing transactions and validating data (Ryan, 2017). In the context of e-commerce, smart contracts can be used to automate transaction processes and ensure the security and reliability of these transactions.

The following are ways to implement smart contracts in e-commerce:

1. Defining the goals of the smart contract
   The first step in implementing a smart contract is determining the goals to be achieved. These goals must be specific and measurable so that they can be properly coded into the smart contract.
2. Writing smart contract code
   After determining the goal, the next step is to write the smart contract code using the appropriate programming language for the blockchain platform used. There are several programming languages that are generally used to create smart contracts, such as Solidity, Vyper, and JavaScript.
3. Running smart contracts
   After the smart contract code has been written, the smart contract will be uploaded to the blockchain and will run automatically according to the rules set in the code. Smart contracts can be accessed by all parties involved in the transaction and can be executed transparently without a middle party.
4. Monitoring and validating smart contracts
   After the smart contract is executed, all transactions that occur will be recorded on the blockchain and can be monitored by all parties involved. Smart contracts will also validate data automatically and will execute transactions according to the rules set in the code.

By implementing smart contracts in e-commerce, transaction processes can be carried out more quickly, safely and efficiently. In addition, smart contracts can also reduce the risk of human error, fraud, and data inaccuracies.

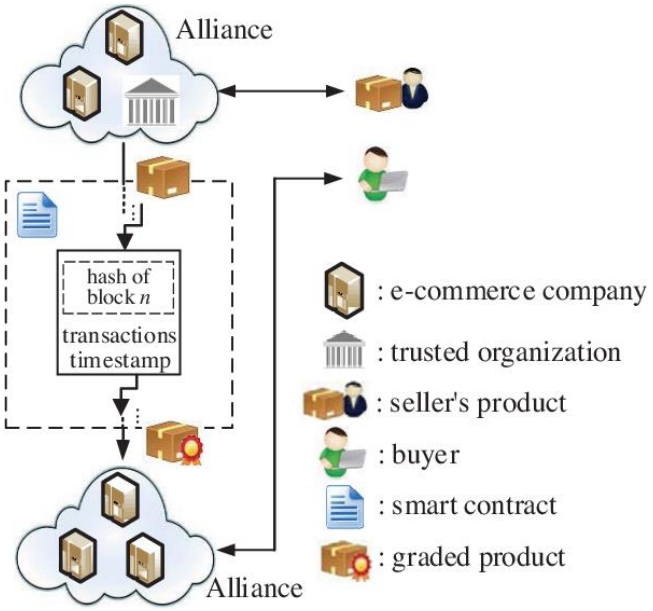

Figure 4: Block diagram of BPGS in e-commerce business model (Yang et al., 2019)

E. Application Development

The following is an example of how to implement blockchain in developing e-commerce applications:

1. Product digital identity
   In e-commerce applications implemented with blockchain technology, each product is assigned a unique digital identity, such as a serial number or QR code. This digital identity will be recorded on the blockchain along with other product information, such as make, model, and specifications.
2. Transaction records
   Every time the product is produced, stored, or moved, a transaction record is created and stored on the blockchain. These transaction records include information such as the date, time, location, and parties involved in the transaction.
3. Transaction validation
   Every time a transaction occurs, the blockchain will perform an automatic validation to ensure that the transaction is valid and has not been modified by an unauthorized party.
4. Creating a digital receipt
   Every time a product is delivered to a buyer, a digital receipt is generated and stored on the blockchain. This receipt includes information such as the order number, shipping receipt number, delivery date, and consignee information.
5. Product tracking

Everyone involved in the product supply chain, from producers to consumers, can use blockchain to track products. The available information includes product transaction history, from production to delivery to the end consumer.

6. Payments using cryptocurrencies
   Blockchain can also be used for payments using cryptocurrencies such as Bitcoin or Ethereum. In this case, the e-commerce application will allow payment using cryptocurrency and will handle the transaction using a smart contract.
7. Data security
   By using blockchain technology, data stored in e-commerce applications will be safer and cannot be changed by unauthorized parties. Every transaction made on the e-commerce application will also be recorded on the blockchain, so that the transaction can be verified and recorded transparently.

Blockchain implementation in e-commerce applications can provide many benefits, such as higher data security, faster and more efficient transactions, and more accurate product tracking. However, implementing blockchain in e-commerce applications also requires considerable costs and time, so it needs to be considered carefully before being implemented.

CONCLUSION

In conclusion, the implementation of blockchain technology in e-commerce applications can provide many benefits, especially in increasing the security of online transactions. By using blockchain technology, information and transactions can be stored in a decentralized and encrypted manner, making it more difficult for unauthorized parties to infiltrate or modify it.

In addition, blockchain technology can also make it easier to track products and validate transactions automatically, thereby increasing efficiency and speed in transactions. The use of smart contracts can also increase security and trust in online transactions, by ensuring that all parties involved fulfill the terms of the contract.

However, the implementation of blockchain technology in e-commerce applications also has challenges and constraints, such as considerable costs and time in system development and integration. In addition, there are still many regulatory and legal issues that need to be addressed, especially related to the use of cryptocurrencies and digital identities.

Nonetheless, the use of blockchain technology in e-commerce can bring significant changes in this industry, especially in increasing consumer security and trust in online transactions.

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