

# The Impact of Blockchain Technology Implementation in Supply Chain Management: A Literature Review

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## ARTICLE INFO

## ABSTRACT

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Blockchain technology has become an innovation with the potential to transform supply chain management by enhancing transparency, efficiency, and security in business processes. Blockchain-based systems enable decentralized, immutable, and verifiable transaction recording by all parties involved, thereby reducing the risk of data manipulation and increasing trust among supply chain actors. This research aims to review the impact of blockchain technology implementation in supply chain management, focusing on key benefits such as increased operational efficiency, reduced transaction costs, and enhanced product tracking capabilities. In addition, this research also identifies the challenges faced in the implementation of this technology, including high adoption costs, integration with existing systems, and regulations that are not yet fully supportive. Through this literature review, it is hoped that a deeper understanding of the potential and challenges in the implementation of blockchain in supply chains can be obtained, as well as optimal strategies for its application in various industries.

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## Introduction

Blockchain technology has rapidly developed and become an innovative solution in various sectors, including supply chain management. With its decentralized, transparent, and secure characteristics, blockchain offers a new way to manage the flow of information and transactions in the global supply chain. In traditional systems, supply chains often face challenges such as lack of transparency, risk of fraud, and operational inefficiencies. Data that

is scattered among various parties is often difficult to verify, leading to information imbalances and potential manipulation. Blockchain presents itself as a solution by providing an immutable transaction record, allowing all parties involved to access the same information in real-time. In addition to increasing transparency, this technology also contributes to reducing operational costs, improving inventory efficiency, and enhancing data security. However, despite its many benefits, the implementation of blockchain in the supply chain still faces challenges such as high adoption costs, integration with existing systems, and regulations that are not yet fully supportive. This research aims to review the impact of blockchain technology implementation in supply chain management, identify the benefits and challenges faced, and explore optimal strategies for its application across various industries. In recent years, blockchain technology has become an innovation that is transforming various sectors, including supply chain management. In the digital era, the need for transparency, efficiency, and security in supply chain processes is becoming increasingly urgent.

The traditional paradigm in supply chain management often faces challenges such as complex coordination, information prone to distortion, and transaction errors. Uncertainty in this process can hinder operational efficiency and reduce trust among supply chain actors. Blockchain offers a solution with a decentralized approach and information distribution, enabling the recording of transactions that are immutable and verifiable by all parties involved. With the implementation of this technology, companies can enhance data security, operational transparency, and business process efficiency. However, despite its great potential, the implementation of blockchain in supply chains still faces various challenges, such as high adoption costs, integration with existing systems, and regulations that are not yet fully supportive. Therefore, this research aims to review the impact of blockchain technology implementation in supply chain management, identify the benefits and challenges faced, and explore optimal strategies for its application.

## **Method**

This research uses a systematic literature review approach to explore the impact of blockchain technology implementation in supply chain management. The methods used include:

### **1. Data Collection**

The primary sources come from academic journals, industry reports, and case studies related to the application of blockchain in supply chains. The selected articles come from reputable databases such as Scopus, IEEE Xplore, and Google Scholar.

### **2. Literature Selection Criteria**

Studies discussing the implementation of blockchain in supply chains across various industries. Articles that identify the benefits, challenges, and strategies for implementing this technology. Publications from the last 5 years to ensure relevance with the latest technological developments.

### 3. Data Analysis

The collected literature was analyzed using the content analysis method to identify key patterns and trends. Classification was carried out based on main benefits, implementation challenges, and proposed solutions in various studies.

### 4. Synthesis of Findings

The results of the analysis are compiled to provide a comprehensive overview of the impact of blockchain in the supply chain. The findings are compared with industry trends and applicable regulations to assess the feasibility of implementation. This approach allows the research to provide comprehensive insights into the potential and constraints in the implementation of blockchain in the supply chain.

## **Result and Discussion**

Based on the literature review, the implementation of blockchain technology in supply chain management shows several significant impacts:

### 1. Increased Transparency and Security

Blockchain allows for the recording of immutable transactions, thereby reducing the risk of data manipulation. This system enhances trust among supply chain actors, especially in industries with many stakeholders.

### 2. Operational Efficiency and Cost Reduction

With the automation of the verification process, blockchain reduces time and administrative costs in the supply chain. The implementation of smart contracts allows transactions to be conducted without intermediaries, thereby reducing operational costs.

### 3. Enhanced Product Tracking Capability

This technology enables real-time product tracking, thereby increasing the accuracy of information related to the origin and movement of goods. In the automotive industry, blockchain has been used to ensure the authenticity of components and reduce the risk of counterfeiting.

Although it has many benefits, the implementation of blockchain in the supply chain still faces several challenges:

### 1. High Implementation Costs

The adoption of this technology requires a significant investment in infrastructure and human resource training.

## 2. Integration with Existing Systems

Many companies still use traditional systems, so integrating with blockchain requires complex technical adjustments.

## 3. Regulation and Standardization

The lack of uniform regulations across various countries poses a barrier to the widespread adoption of blockchain.

## 4. Overall, blockchain technology has great potential in improving the efficiency and transparency of supply chains. However, the success of its implementation depends on the industry's readiness to address existing challenges. Blockchain technology offers innovative solutions in supply chain management, particularly in enhancing efficiency, transparency, and security.

However, its success greatly depends on the industry's readiness to face technical, economic, and regulatory challenges.

## The Potential of Blockchain in Supply Chains

### 1. Transparency and Trust

Blockchain allows all parties in the supply chain to access the same data in real-time, reducing the risk of information manipulation. Each transaction is recorded in an immutable block, increasing trust between suppliers, distributors, and consumers.

### 2. Operational Efficiency

Automation through smart contracts reduces the need for intermediaries, speeds up transactions, and lowers administrative costs. Digital product tracking enables quick identification of defective or counterfeit goods.

### 3. Data Security

The blockchain system uses advanced cryptography, making data more protected from unauthorized access or tampering. Product information, from raw materials to distribution, can be verified more accurately.

## Challenges of Blockchain Implementation

### 1. High Adoption Costs

Blockchain infrastructure requires significant investment in hardware, software, and human resource training. Small and medium-sized enterprises may struggle to allocate budgets for this technology.

### 2. Integration with Existing Systems

Many companies still use traditional systems, so migrating to blockchain requires complex technical adjustments. Difficulty in connecting blockchain with existing ERP and supply chain management systems.

### 3. Regulation and Standardization

The lack of uniform regulations across various countries poses an obstacle to the widespread adoption of blockchain. The standardization of blockchain protocols is still in the development stage, so cross-industry adoption is not yet optimal.

## Conclusion

Blockchain has great potential in improving the efficiency and transparency of supply chains, but its success depends on the industry's readiness to address existing challenges. Investment in infrastructure, system integration, and supportive regulations will be key factors in the widespread adoption of this technology. Blockchain technology has great potential in improving efficiency, transparency, and security in supply chain management. With a decentralized and immutable system, blockchain enables more accurate transaction recording, reduces the risk of data manipulation, and enhances trust among supply chain participants. From the literature review conducted, it was found that blockchain can provide benefits such as increased operational efficiency, reduced transaction costs, and better product tracking capabilities. However, the implementation of this technology still faces challenges, including high adoption costs, integration with existing systems, and regulations that are not yet fully supportive. The success of blockchain implementation in the supply chain depends on the industry's readiness to address these challenges. Investment in infrastructure, system integration, and the development of supportive regulations will be key factors in the widespread adoption of this technology. With the right strategy, blockchain has the potential to become an innovative solution in enhancing the effectiveness and transparency of supply chains across various sectors.

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