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The Role of IT in Supply Chain Management: A Case Study of ERP Implementation with Blockchain

Ifeanyi Amuche Ilochonwu
[1]*Student, Campbellsville University, Louisville, Kentucky*

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ABSTRACT: This study aims to explore the complexities of integrating blockchain technology with Enterprise Resource Planning (ERP) systems in supply chain management, focusing on the decision-making processes and technical challenges organizations encounter during this Integration. Utilising a case study approach centered on Walmart, the research employs semi-structured interviews and document analysis to gather insights from key stakeholders involved in the blockchain-ERP integration process. Thematic analysis is applied to identify recurring themes related to decision-making frameworks and technical obstacles. The findings reveal significant technical challenges, including interoperability issues, data security concerns, and scalability problems. Additionally, the study highlights the importance of strategic decision-making processes that consider technological, organizational, and environmental contexts. Resistance to change within organizations is noted as a critical barrier to successful Integration.This research contributes to the existing literature by providing a framework for understanding the decision-making processes associated with blockchain-ERP Integration. The insights gained from Walmart's experience offer valuable lessons for other organizations facing similar challenges, enhancing both academic knowledge and practical applications in supply chain management.

Keywords: Blockchain; Supply chain; ERP system; Walmart

I. Introduction

The concept of Supply chain management (SCM) refers to a coordinated series of activities that seamlessly connect suppliers, manufacturers, transporters, and customers to ensure the efficient delivery of the right product or service (Maqbool et al., 2014). Supply chain management (SCM) is a crucial aspect of all business organizations, and its definition varies across literature, as there is no generally accepted definition. For instance, the definition of the Council of Supply Chain Management Professionals (CSCMP) focuses on the planning and management of all activities in the supply chain, emphasizing coordination and collaboration with partners and highlighting the Integration of supply and demand management. Also, Stock and Boyer's definition emphasizes managing relationships within and between organizations, including the flow of materials, services, finances, and information, which aim to add value, maximize profitability, and achieve customer satisfaction (Stock & Boyer, 2009). Developing an integrated and flexible supply chain management is essential to compete effectively in today's global market, as a sustainable competitive advantage is crucial for organizational success. Enterprise Resource Planning (ERP) systems enable organizations to adapt to these dynamic business environments by integrating core business processes such as accounting, procurement, material and inventory management, project management, manufacturing operations, and finance (Reitsma & Hilletofth, 2018). However, despite the benefits of ERP, supply chain operations often need help with data transparency, security, and interoperability, especially when involving multiple partners (Menon et al., 2019).

Blockchain technology (BCT), although developed initially as a technology for the financial sector, has been widely adopted in various sectors, including supply chain management, and integrated with different information systems, including ERP systems (Abeyratne & Monfared, 2016). It is a distributed ledger maintained by a network of computers known as nodes, secured using cryptography to process and verify transactions, improving transparency and trust in information sharing (Misra & Bova, 2018).

Despite the growing interest in the Integration of blockchain technology with ERP systems, the process remains complex and relatively unexplored in academic and practical settings. Current literature largely focuses on the theoretical benefits of this Integration, with limited attention

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given to the real-world challenges organizations face during the implementation process. Issues such as system interoperability, data security, scalability, and the complexities of managing decentralized systems in a traditionally centralized ERP environment should be considered. Additionally, the decision-making frameworks that guide organizations through the blockchain-ERP integration process need to be well-documented, leaving a gap in understanding how businesses approach these critical technological decisions.

This study aims to explore the complexities involved in integrating blockchain technology with ERP systems in supply chain management and investigate the decision-making processes organizations employ during and after the Integration. Specifically, this research seeks to answer the following question: How do organizations navigate decision-making processes and address technical challenges during the Integration of blockchain technology with ERP systems in supply chain management? By conducting an in-depth case study of a blockchain-ERP implementation, this research contributes to addressing the gap in the current literature by offering insights into the technical, organizational, and managerial challenges faced during Integration. Additionally, this study will provide a framework for understanding the decision-making processes that guide organizations through these challenges, contributing to both academic knowledge and practical applications in the field of supply chain management.

The remainder of this paper is structured as follows. Section 2 reviews the existing literature on IT in supply chain management, ERP systems, and blockchain technology, with a particular focus on their Integration. Section 3 presents the research methodology, outlining the case study approach and data collection methods. Section 4 discusses the findings, highlighting the key technical and organizational challenges of blockchain-ERP Integration. Section 5 offers a discussion of the decision-making processes identified in the case study, and Section 6 concludes the paper with theoretical and practical implications, limitations, and recommendations for future research.

II. Literature Review

IT in Supply Chain Management

The Role of Information technology (IT) in Supply Chain Management has been explored in numerous studies (Varma & Khan, 2014; Attaran, 2020; Kumar & Danish, 2024). It is seen to be crucial in enhancing various functions of Supply Chain Management (SCM) by facilitating efficient decision-making and improving operational processes (Varma & Khan, 2014). Information technology (IT) has enabled the transitions from paper-based communication to electronic communication, streamlining interactions within supply chains, reducing errors, and speeding up information flow, allowing for quicker decision-making and improved customer service. Information technology (IT) has become integral to supply chain management, changing how businesses operate in a globalized and increasingly competitive environment. Technologies such as cloud computing, the Internet of Things (IoT), and artificial intelligence (AI) have enhanced supply chain visibility, efficiency, and real-time decision-making (Kim & Shin, 2019).

ERP Systems in Supply Chain Management

Enterprise Resource Planning (ERP) systems are crucial in integrating and streamlining supply chain functions to enhance efficiency, reduce costs, and improve overall performance. ERP implementation facilitates process automation of activities such as record keeping and time management, significantly reducing manual errors and boosting supply chain performance by optimizing inventory and production management (Asif et al., 2024; Pontoh et al., 2024). It fosters internal and external supply chain integration, allowing for better communication and collaboration among departments and partners, which is crucial for agility and responsiveness to market demands (Harianto et al., 2024). Additionally, integrating ERP with technologies like RFID enhances the tracking and management of products, further streamlining operations (Pontoh et al., 2024). By centralizing data and eliminating redundancy, ERP systems empower organizations to make informed decisions quickly, thus improving operational efficiency and productivity (Tuli & Kaluvakuri, 2022). Overall, the strategic adoption of ERP systems is essential for achieving a competitive advantage in modern supply chain management (Asif et al., 2024) (Barber et al., 2024). However, traditional ERP systems are often centralized with a single database, meaning a single entity controls it and needs more flexibility to seamlessly integrate with external partners, leading to challenges in data exchange and transparency.

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Blockchain Technology in Supply Chain: Integration Challenges

Blockchain technology offers notable benefits, yet its implementation faces numerous obstacles. Duy et al. (2018) identified scalability as one of the challenges with ERP-Blockchain integration- existing blockchain systems function well for smaller operations but encountered substantial obstacles when attempting to scale up to accommodate the needs of major financial institutions. Privacy concerns also arise, stressing the need to balance data openness and secrecy (Raj et al., 2024). Infrastructure challenges involve integrating blockchain with sustainable practices and ensuring legitimacy (Raj et al., 2024). Transparency issues, particularly proper information sharing, are critical (Raj et al., 2024). Other significant challenges include developing trust within supply chain systems, complying with governance rules, and improving partner coordination. Technical hurdles such as performance, efficiency, sustainability, and scalability are also prominent. Additionally, organizations may face high adoption and maintenance costs, potential infrastructure upgrades, and standardization issues (Dasaklis et al., 2021). Overcoming these challenges requires addressing organizational and cultural aspects, training participants, and carefully considering the suitability of blockchain for specific supply chains (Ghode et al., 2020; Dasaklis et al., 2021).

Previous studies have identified several challenges associated with integrating blockchain technology into Enterprise Resource Planning (ERP) systems. One significant challenge is the technical complexity of implementing blockchain, which can lead to scalability issues and interoperability concerns between existing systems and new blockchain solutions (Bodemer, 2023) (Hashimzai & Ahmadzai, 2024). Additionally, organizations often need more support to change from within, as employees may hesitate to adopt new technologies that disrupt established workflows (Bodemer, 2023). The high costs associated with blockchain implementation also pose a barrier, as organizations must weigh the potential benefits against the financial investment required (Imane et al., 2023). Furthermore, ensuring data integrity and addressing the single point of failure inherent in traditional ERP systems are critical concerns that necessitate robust solutions (Blockchain-Based Enhanced ERP Transaction Integrity Architecture and PoET Consensus, 2022). These challenges highlight the need for thorough research and strategic planning before embarking on blockchain-ERP integration projects.

III. Research Method

Conceptual Framework

To explore the challenges of integrating blockchain technology with ERP systems in supply chain management and to look into the decision-making processes involved, this study uses a conceptual framework, the Technology-Organization-Environment (TOE) framework (Fig 1.). The TOE framework is an organisation-level theory that suggests that three different elements of a firm's setting affect adoption decisions (Jeff Baker, 2011). These three elements are the technological context, organizational context, and environmental context. It is suggested that all three have an impact on technological innovation (Tornatzky & Fleischer, 1990). TOE framework has been widely used to study technological innovations in organizations, especially in complex supply chain contexts (Awa et al., 2016). Its strength is in its three-dimensional approach, considering technological capabilities, organizational readiness, and external environmental factors that influence adoption, making the framework particularly suited to studying multi-stakeholder technologies like blockchain and ERP, where external forces like regulations and partner relationships are critical (Aprisca & Aligarh, 2024)

The Diffusion of Innovation (DOI) theory also offers valuable insights but differs in its focus and applicability. The DOI theory, for example, emphasizes attributes like compatibility, complexity, and relative advantage, which affect the adoption rate of new technologies (Amini & Javid, 2023; Awa et al., 2017). While DOI provides a granular view of technology characteristics that drive adoption, it focuses more on individual attitudes toward technology rather than the organizational factors emphasized in the TOE framework. As a result, DOI is more suited to assessing user-level adoption rather than inter-organizational dynamics, which are crucial for blockchain-ERP Integration in supply chains.

Institutional Theory, on the other hand, is valuable for examining how external pressures and norms drive technology adoption but may overlook internal organizational factors like resource allocation and decision-making structures (Malik et al., 2021). The TOE framework incorporates these organizational aspects, making it better suited in

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Walmart's case and for contexts requiring significant cross-functional coordination.

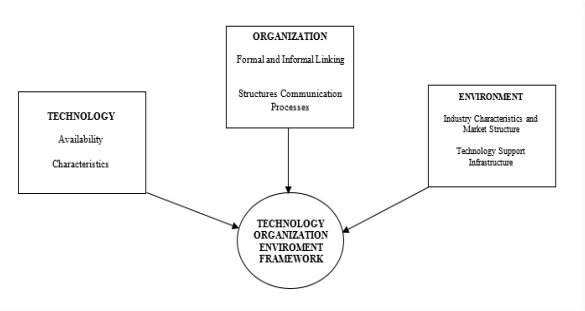

Figure 1; The Technology-Organization-Environment (TOE) framework

For this study, a single case study technique on Walmart—a company that has effectively integrated blockchain technology with ERP—was selected. This method enables a thorough analysis of the strategies, challenges, and decision-making procedures related to the Walmart blockchain-ERP integration process. The first step involved a thorough review of existing literature on blockchain-ERP Integration and its application in supply chain management. Key themes were then extracted and categorized using thematic analysis, a method that allows for identifying recurring patterns and insights across sources.

Research Design

This study employed a qualitative secondary research design, analyzing existing literature to explore the Integration of blockchain technology with Enterprise Resource Planning (ERP) systems in supply chain management. By synthesizing findings from peer-reviewed journal articles, academic research, and industry reports, this study provides a comprehensive examination of the technological and organizational factors that influence ERP blockchain integration.

Data Collection

Data for this study were sourced from reputable academic databases and publishers, including Elsevier, MDPI, Emerald Insight, and Taylor & Francis. Additional searches on Google Scholar were conducted to supplement findings with relevant academic studies and industry publications. The selection criteria prioritized sources focusing on ERP-blockchain implementation, supply chain management, and information technology applications within large-scale enterprises.

Source Types:

- Peer-Reviewed Articles: Empirical studies and theoretical analyses on ERP systems, blockchain technology, and their Integration in supply chains.
- Case Studies: Documented implementations of blockchain in ERP systems, particularly within large organizations with complex supply chains.
- Industry Reports: Publications providing insights into the latest trends, technological challenges, and best practices related to ERP blockchain integration.

By gathering data from multiple databases and sources, this study aimed to build a comprehensive, well-rounded understanding of the topic.

Justification for the Case Study Method: Walmart's Blockchain-ERP Integration

The Integration of blockchain technology with Enterprise Resource Planning (ERP) systems presents a complex landscape, particularly within the realm of supply chain management (SCM) (Dasaklis et al., 2021). As organizations strive for efficiency and transparency, understanding the nuances of this Integration becomes imperative. This essay argues that the case study method is an appropriate choice for investigating the intricacies of blockchain-ERP Integration, using Walmart as a focal point. Walmart's extensive operations, early adoption of blockchain technology, and commitment to supply chain optimization provide a rich context for exploring the challenges and benefits associated with this Integration (Sharma & Kumar, 2021).

Walmart's case can inform other industries that rely on multi-stakeholder supply chains or face similar technical and organizational challenges. For instance, Walmart's technical hurdles—such as interoperability, data security, and scalability—are common issues in blockchain and ERP integration, regardless of industry. Additionally, the organizational barriers encountered, including resistance to change and the importance of cross-functional teams, are relevant to most companies seeking to implement new technologies (Delaney & D'Agostino, 2015).

Walmart blockchain-ERP integration process

Walmart, one of the largest retail corporations globally, faced several specific supply chain challenges, particularly in the context of food safety and traceability (Percherla, 2022). One of the primary challenges Walmart faced was the ability to trace the origin of food products quickly and accurately (Sharma & Kumar, 2021). Traditional methods could take days or even weeks to trace a

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product back to its source, which needs to be improved to ensure food safety (Kitsantas, 2022). The case study organization was selected based on its effort to integrate blockchain technology with its existing ERP system in supply chain operations (Weber et al., 2016). The company operates within a complex, multi-stakeholder supply chain environment, making it an ideal case for studying the practical challenges of blockchain-ERP Integration.

Data Analysis

Thematic analysis was conducted to categorize data into key themes. This approach involved identifying and coding recurring themes related to blockchain-ERP Integration, such as technical complexities, decision-making frameworks, and organizational challenges. A systematic coding process was employed to ensure that the themes were consistent across multiple data sources. Themes were grouped into categories, including "decision-making processes," "technical challenges," and "integration benefits," which formed the basis for the analysis presented in the findings section.

To ensure the reliability of findings, data triangulation was applied by cross-referencing insights from peer-reviewed articles, industry case studies, and reports (Fig. 2). This approach allowed the study to validate key conclusions, reducing bias and reinforcing data reliability by comparing similar findings across independent sources.

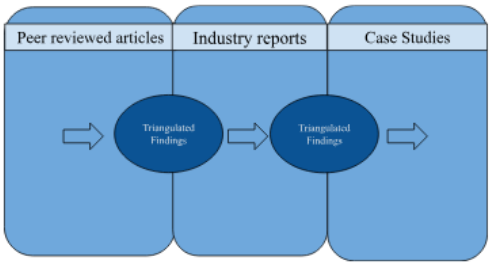

Fig 2. Triangulation findings

IV. Result of Findings

This case study provides insightful information about the intricacies and decision-making procedures of blockchain-ERP Integration. The focus on a single organization may limit its applicability to other supply chains or industries, and its reliance on secondary data also limits it. As a result, real-time insights or organization-specific nuances may need to be fully captured. Future research could expand the scope by examining multiple case studies across different industries to provide a broader perspective on the challenges of blockchain-ERP Integration. Moreover, the rapid evolution of blockchain technology presents another challenge to generalizing the findings, as new advancements may influence future integration processes.

The Technological Context in Supply Chain Management

All pertinent technologies used by a company, both those that are now in use and those that are available but have yet to be embraced by the market, are included in the technical context. Saberi et al. (2019) pointed out that a firm's current technologies have a big impact on the adoption process because they place limits on the amount and speed of technological change. Walmart has a long history of investing in IT to improve the efficiency of its supply chain operations (Percherla, 2022). The framework for incorporating innovations like blockchain is provided by the current technology, such as sophisticated inventory management systems and data analytics tools.

The Significance of ERP Systems

Key business operations are managed and integrated with the use of enterprise resource planning (ERP) technologies. Walmart has experienced enhanced operational efficiency and better decision-making due to the real-time data exchange that has been enabled by the ERP system's deployment across many departments (Saberi et al., 2019). Walmart is able to respond quickly to market demands and enhance its supply chain operations because of the ERP system, which acts as a single platform that connects data from sales, inventory management, procurement, and logistics.

Revolutionizing the Supply Chain Management

With its improved transparency, traceability, and security, blockchain technology has become a disruptive force in supply chain management. Walmart can track products from suppliers to customers and guarantee the authenticity and quality of commodities by integrating blockchain technology with its ERP system. The boundaries of supply chain activities are drawn by this Integration, which also demonstrates how technology can help businesses grow and adjust to shifting market conditions (Saberi et al., 2019).

For example, during the E. coli incident associated with romaine lettuce, Walmart and IBM worked together to create a blockchain-based food traceability system. Walmart was able to discover tainted sources much faster because of this program,

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which allowed them to track the origin of food products in a matter of seconds (Kumar & Sharma, 2021). These features show how blockchain might improve customer trust and supply chain resilience.
Walmart's innovation strategy has been greatly influenced by its current technological capabilities. The company has been able to fully utilize blockchain technology thanks to its strong IT infrastructure, which includes cloud computing and sophisticated data analytics (Tiwari, 2016). Walmart can save costs and increase operational efficiency by smoothly incorporating blockchain technology into its supply chain processes by utilizing these current technologies. Furthermore, Walmart's strategic orientation is influenced by developments that the company still needs to implement. The company keeps an eye on new trends and technology in the industry, which helps it spot chances to improve its supply chain operations even more.

The Organisational Context in Supply Chain Management

Walmart stands as one of the biggest retail companies globally, with its enormous footprint and wide-ranging network of suppliers and employees. To successfully incorporate novel technology, Walmart's organizational structure is built to encourage collaboration and communication amongst different divisions. The existence of cross-functional teams and informal linking agents like product champions and boundary spanners improves effective technology adoption within the company (Kamath, 2018).

Linking Structures and Innovation Promotion

In order to foster creativity, internal organizational subunit linkages are essential. According to Tseng et al. (2011), these linking structures make it easier for resources and information to move between departments, allowing for a more coordinated approach to the adoption of new technology. Strong interdepartmental collaboration and communication are key components of Walmart's ERP system integration with blockchain technology (Pawan, 2019).

For instance, cooperation between procurement, logistics, and IT departments was necessary for the blockchain's application to food tracking. Walmart was able to take advantage of the knowledge and skills of many teams by using a cross-functional approach, which made sure the blockchain solution was customized to match the unique requirements of the supply chain. The presence of informal linking agents, such as employees who champion the use of new technologies, further enhances this collaborative environment.

The Role of Cross-Functional Teams

In order to facilitate the adoption of innovative technologies, cross-functional teams are crucial. By bringing together staff members from other departments, these teams enable the Integration of a range of viewpoints and specialties into the decision-making process. Cross-functional teams have played a key role in Walmart's ERP and blockchain technology adoption success (Tribis et al., 2018).

For instance, Walmart established a cross-functional team of personnel from supply chain management, IT, and compliance during the blockchain initiative's trial phase. In the end, this team's cooperative efforts to resolve issues and find areas for development resulted in a more successful application of the technology. A company's potential to innovate is increased when it can leverage the expertise of many divisions (Sunmola & Lawrence, 2024).

Slack Resources and Their Impact

The organizational context and how it affects technology adoption are also influenced by the availability of leave resources that can be dedicated to new projects. Walmart is able to invest in cutting-edge technology like blockchain and ERP systems because of its huge personnel and financial resources. Walmart's financial strength enables it to test novel ideas, carry out trial programs, and expand initiatives that prove effective without jeopardizing the company's general operations (Kumar et al.; M., 2021).

The Environmental Context of Walmart's Adoption of Blockchain Technology

The environmental context is made up of all the outside elements that affect a company's capacity to accept and use new technology. The retail industry's structure influences Walmart's supply chain management strategy for blockchain technology, the availability of technological service providers, and the regulatory landscape.

Industry Structure

The retail industry's organizational structure largely shapes Walmart's innovation strategy. Because of the fierce competition in the retail industry, new ideas are encouraged to be adopted. It is common for businesses in very competitive markets to need to innovate in order to stay in business. Leading the retail industry in terms of

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innovation, Walmart also encourages the adoption of new technology by its partners and suppliers (Pawan, 2019).

To satisfy Walmart's standards, suppliers have improved their systems and procedures in response to the retailer's pledge to use blockchain technology for food traceability. As Kumar and Sharma (2021) pointed out, this ripple effect shows how dominant businesses can use their position to promote innovation among value chain participants.

Industry Life Cycle

Innovation processes are also impacted by the retail industry's life cycle stage. Thanks to shifting customer tastes and technological improvements, the retail industry is now growing at a rapid pace. Businesses in sectors that are expanding swiftly typically innovate faster in order to take advantage of new prospects. Conversely, businesses in established or stagnant sectors could demonstrate more circumspect approaches to innovation (Tornatzky & Fleischer, 1990).

Walmart wants to improve supply chain efficiency and transparency; thus, the company's use of blockchain technology fits with the retail industry's development trajectory. Still, some retail companies could decide to cut expenses rather than make large investments in innovation, especially if they think the market is stable or even shrinking. This contradiction draws attention to the disparate methods of innovation used in the same sector.

Support Infrastructure for Technology

The presence of a strong support system heavily influences technology innovation. The availability of technology service providers and trained workers facilitates the adoption of blockchain technology at Walmart. Businesses with high labor expenses are frequently compelled to look for labor-saving solutions (Kim & Shin, 2019). Walmart's move into blockchain technology is an attempt to improve operational efficiency and cost-effectiveness.

Additionally, Walmart's ability to successfully integrate blockchain technologies is improved by the availability of consultants and technology service providers like IBM. Working together with well-known IT companies enables Walmart to make use of knowledge and assets that might not be available internally, encouraging a more creative atmosphere (Ertemel, 2018).

Regulatory Environment

The regulatory environment is yet another important aspect that impacts innovation. Government rules can influence a company's capacity for innovation in both positive and bad ways. For example, laws requiring traceability and transparency in the food supply chain may incentivize companies such as Walmart to use blockchain technology in order to comply (Pawan, 2019). On the other hand, industries like construction and agriculture, where rigorous testing and licensing requirements can impede the introduction of new materials or processes, are examples of how severe regulations can create hurdles to innovation.

Regulations pertaining to consumer protection and data privacy are critical in determining how corporations such as Walmart may develop in the retail industry (Kamath, 2018). These rules are intended to protect customer data and guarantee that companies manage data appropriately. They may, however, also impose limitations on a business's capacity to use data to spur innovation. The following summarises the ways in which these rules affect Walmart's capacity for innovation (Pawan, 2019):

1. Limitations on Data Utilization

- **Privacy Requirement:** Strict standards govern how businesses can gather, retain, and utilize consumer data. Examples of these regulations include the General Data Protection Regulation (GDPR) in Europe and several state-level legislation in the United States. This implies that although Walmart can collect enormous quantities of data about the interests and behavior of its customers, it must do so in a manner compliant with these laws. This may restrict the range of data analysis and hinder the creation of customized services or focused advertising campaigns.
- **Consent and Transparency:** Before collecting a customer's data, businesses are frequently required by law to get that customer's express consent. Walmart may need to spend time and money making sure that its data processes are transparent and compliant, which might impede its ability to adopt data-driven innovations swiftly.

2. Technological Development Innovation

- **R&D Constraints:** Walmart must take data protection rules into account when creating new technologies, such as AI-driven analytics or tailored shopping experiences. This may result in a more conservative attitude to research and development, which might slow down the rate of innovation.
- **Data Sharing Limitations:** Legal restrictions may limit Walmart's capacity to exchange data with other companies or technology suppliers, which may impede efforts at cooperative innovation. For example, Walmart may need help to collaborate with a software company to improve its supply chain

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analytics if it is required to make sure that any data sent conforms with privacy laws.

3. Balancing Compliance and Innovation

- Resource Allocation: Compliance with data privacy regulations often requires significant investment in legal, IT, and compliance resources. This can divert funds and attention away from innovation initiatives, as Walmart must prioritize meeting regulatory requirements.
- Facilitating Innovation: On the flip side, regulations can also drive innovation by pushing companies to develop new solutions that enhance data security and consumer trust. For example, Walmart may invest in advanced encryption technologies or privacy-preserving data analytics to comply with regulations, which can lead to innovative practices that benefit the company and its customers.

4. Market perception and consumer trust

- Building trust: Customers are more inclined to interact with a store that shows a dedication to preserving their personal information. Therefore, Walmart may gain consumer confidence by adhering to data privacy standards. Because customers will be more inclined to give their data knowing it will be managed appropriately, this trust can spur innovation.
- Competitive edge: Businesses that successfully manage the regulatory environment and place a high priority on consumer protection may have an edge over their competitors. Walmart may use its compliance as a differentiator to set itself apart from rivals that could have trouble with data protection.

V. Discussion

The findings on Walmart's blockchain-ERP Integration offer important new perspectives on the challenges of implementing cutting-edge technology in a big business. For technology adoption to be effective, the study emphasizes the significance of organizational and technological environments. Walmart's substantial investment in IT infrastructure, which includes cutting-edge data analytics tools and inventory management systems, offers a strong platform for incorporating blockchain technology. In line with the Technological-Organizational-Environmental (TOE) framework, this highlights how various environments interact to influence the adoption of new technologies.

A thorough contextual study that skillfully looks at the organizational, technological, and environmental elements impacting Walmart's adoption of blockchain is one of the finding's strengths. For businesses wishing to adopt comparable technology, this multifaceted approach offers a comprehensive grasp of the variables at work. Another noteworthy aspect is the focus on the function of cross-functional teams as a catalyst for effective technology adoption. These teams improve problem-solving skills and encourage creativity by combining a variety of viewpoints and areas of expertise, which is crucial in a complicated implementation like blockchain. Additionally, the results are based on an actual case study, offering useful advice that other businesses thinking about integrating blockchain technology may find useful. Similar projects in other industries can benefit from the lessons acquired from Walmart's experience.

The Diffusion of Innovation (DOI) hypothesis, which emphasizes characteristics including relative advantage, complexity, and compatibility, provides insightful information on the uptake of technology. Although the Technology-Organization-Environment (TOE) paradigm highlights organizational variables, DOI focuses mostly on individual attitudes toward technology, even if it offers a complete perspective of the technical attributes that drive adoption.

The DOI theory is enhanced by the TOE framework's focus on organizational context, which covers elements like structure and culture. This helps to address the larger context in which technology adoption takes place. A key factor in Walmart's successful blockchain deployment, for example, is its organizational structure, which encourages cooperation through cross-functional teams; DOI could ignore these organizational dynamics.

Organizations may also evaluate the viability of implementing new technologies with the aid of DOI's emphasis on technological factors like relative advantage and complexity. Nonetheless, the TOE framework offers a more thorough perspective by taking into account the effects of organizational preparedness and current technology on the adoption process. One element that DOI might need to account for completely is the ease with which blockchain integration was made possible by Walmart's well-established IT infrastructure.

The TOE paradigm also stresses the significance of external environmental elements, such as regulatory environments and the availability of technological service providers. In contrast, DOI emphasizes individual attitudes and perceptions that impact the adoption rate. A factor that may be less

stressed in DOI is how external collaborations may improve technology adoption, as seen by Walmart's engagement with IBM.

Limitations: Limited generalizability is one of the findings' drawbacks; the findings' applicability to other supply chains or industries may be limited by their focus on a single organization; various organizations may encounter particular difficulties and environments that could have varying effects on the adoption process. Furthermore, the study's dependence on secondary data can restrict the breadth of insights into subtleties unique to the business since first-hand reports and real-time insights from implementation stakeholders could offer a deeper comprehension of the difficulties encountered. Additionally, because blockchain technology is developing so quickly, it is not easy to generalize the results because breakthroughs might alter integration procedures and best practices, requiring constant study to stay up to date.

In conclusion, Walmart's supply chain management illustrates how blockchain technology may be integrated with Enterprise Resource Planning (ERP) systems, highlighting the important role that IT plays in improving operational efficiency, transparency, and traceability. Even while there are many advantages to this kind of Integration, such as increased data accuracy and quicker decision-making, there are also many difficulties involved. The study offers important insights that guide future research and practice by looking at the technological, organizational, and environmental context. Although technological adoption can be better understood via the lens of the DOI theory, the TOE framework's focus on organizational variables enhances the conversation. It draws attention to the challenges of integrating cutting-edge technologies like blockchain. Future studies should broaden their focus and use real-time data to better understand these processes in different organizational settings.

Recommendation

When implementing this innovative technology, the study emphasizes how crucial it is to take organizational and technological factors into account. Due to Walmart's distinct operations and unique position in the retail sector, the case study offers insightful information, but the conclusions may need to be more generalizable. Future studies might look at a variety of businesses to gain a deeper grasp of the difficulties associated with blockchain-ERP Integration. For other businesses looking to improve their supply chain capabilities through cutting-edge IT solutions, Walmart's example, however, shows how technology can completely transform supply chain management.

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