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# Digital Logistics and Blockchain Utilization on Global Supply Chain Management



**Abstract:** - Global supply chain management faces several challenges, such as lack of transparency, traceability, and efficiency, leading to fraudulent activities, lost revenues, and poor customer satisfaction. This study addressed these challenges by investigating the potential effects of integrating blockchain technology and digital logistics in supply chain management. The research design is a mixed-method study involving a sample size of 230 respondents involved in the supply chain management industry. The respondents are selected using a random stratified random sampling technique, and the inclusion criteria will be that they must work in a company that utilizes digital logistics. The researcher gathered data through online surveys, and SPSS was used to analyze the data. The results show that the level of digitization of global supply chain management is high. Further, the utilization of digital logistics and blockchain technology in global supply chain management is highly evident. However, these companies always need help utilizing digital logistics and blockchain technology. Also, there is a significant effect on digital logistics, blockchain technology, and global supply chain management. All in all, companies can use this technology to gain a competitive advantage, reduce costs, and increase customer satisfaction.

**Keywords:** Digital Logistics, Blockchain, Supply Chain Management, Logistics, Industry 4.0

## I. BACKGROUND

The emergence of digital technologies, particularly blockchain, has had a significant impact on the global supply chain. Blockchain offers increased visibility, transparency, and security, addressing the challenges posed by traditional data collection and sharing methods. It enables real-time visibility and traceability, leading to better decision-making and risk management. The decentralized nature of blockchain ensures data integrity and reduces the risk of fraud and cyber-attacks.

Moreover, smart contracts in blockchain facilitate automated and secure transactions, eliminating the need for intermediaries and reducing costs. This technology also supports sustainability and ethical practices by enabling verification of product origins, promoting responsible supply chain practices.

China has been at the forefront of adopting digital logistics and blockchain technology in supply chain management. The country has made significant investments in digital logistics since 2015 and has embraced blockchain technology since 2018. The Chinese government has promoted the integration of these technologies through initiatives like the Blockchain Service Network (BSN) and the "Internet Plus Logistics" plan. These efforts have resulted in improved transportation efficiency, reduced costs, enhanced transparency, and heightened security in the supply chain.

Hence, the utilization of digital logistics and blockchain in the global supply chain has the potential to increase efficiency, reduce costs, and improve sustainability. China's adoption of these technologies showcases their transformative impact and sets an example for other countries and multinational organizations. The continued growth of digital logistics and blockchain is expected to further revolutionize the global supply chain in the future.

## II. OBJECTIVE

This paper explored digital logistics and blockchain technology's use in supply chain management, its impact on company workflow, and why it should be implemented throughout global supply chain management.

## III. METHOD

### *Research Design*

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In this research, the researcher adopted a mixed **quantitative-qualitative research** method. Specifically, the researcher used *exploratory qualitative research and descriptive quantitative analysis* to address the primary research objective, determining the effects of digital logistics and blockchain technology on global supply chain management.

#### *Participants*

The population of supply chain management companies was heterogeneous, with companies of different sizes, locations, and industries. At the same time, the researcher focused on asking each company's supply chain managers, logistics, operations managers, IT professionals, and industry experts/consultants. Hence, these groups deeply understand supply chain management's operational, financial, and strategic aspects. Their knowledge and experience are invaluable in providing insights into the potential benefits and drawbacks of using blockchain technology in global supply chains.

#### *Instrumentation*

The researcher adapted and modified the questionnaire from the study of Zelbst et al. (2020) entitled "*The Impact of RFID, IIoT, and Blockchain Technologies on supply chain transparency*" and Berneis et al. (2021) entitled "*Application of the Blockchain in the global supply chain Logistics System of Jiu Lian Supply Co., Ltd: Basis for a Services Improvement Plan.*". Also, the researcher adapted the interview questions from the study of Berneis et al. (2021) entitled "*Application of the Blockchain in the global supply chain Logistics System of Jiu Lian Supply Co., Ltd: Basis for a Services Improvement Plan.*"

#### *Statistical Treatment*

In terms of data analysis, the researcher used descriptive statistics and regression. For this data, it was presented using the frequency and percentage distribution. In addition, mean and standard deviation was used in assessing the levels of the different variables included in this study.

## IV. RESULTS

### **Digitization of Supply Chain Management in China**

Supply chain companies in China are among the most important players in the global supply chain management industry, and they have been increasingly embracing digitization in recent years. Various factors, including the need for greater efficiency, transparency, and collaboration and the growing demand for real-time data and analytics drive this trend. It was supported by the supply chain manager at EzCarry that "*digital logistics can help improve the supply chain management process by providing real-time visibility of goods in transit, enabling better coordination between suppliers and customers, optimizing routes and reducing transportation costs, and providing better insights for demand forecasting and inventory management.*"

The mean of global supply chain management's digitization. With a mean of **3.25**, the respondents **strongly agree** that the digitization of supply chain management is rapidly evident in China, and they have a **moderate level of digitization**. Companies are adapting to the technology-driven era, integrating digital logistics trends within their company.

Specifically, the respondents believe *China has been at the forefront of digitizing global supply chain management, with many companies adopting advanced technologies like blockchain, IoT, and AI* (3.63). Further, *the digitization of supply chain management in China has improved visibility, transparency, and efficiency, reduced costs and increased speed and accuracy* (3.58). Moreover, *digitization has allowed Chinese firms to manage inventory, optimize logistics, and improve communication and collaboration with supply chain partners* (3.79). In addition, *the use of digital technologies has also increased the agility and responsiveness of supply chain management in China, enabling firms to adapt to changing market conditions and customer needs quickly* (3.63). Also, *e-commerce platforms have played a significant role in the digitization of supply chain management in China, enabling companies to connect with customers, manage orders, and track shipments* (3.73).

Consequently, *the Chinese government has actively supported the digitization of supply chain management, promoting innovation and investment in digital technologies and infrastructure* (3.68). The COVID-19 pandemic has accelerated the digitization of supply chain management in China, as companies have had to adapt quickly to new challenges and disruptions (3.69). More so, *the digitization of supply chain management in China has also led to new business models and opportunities, such as online marketplaces, cross-border e-commerce, and supply chain finance* (3.53). *Adopting digital technologies in supply chain management in China has also helped reduce the environmental impact of logistics and transportation, improving sustainability and reducing carbon emissions* (3.53). Hence, *the future of digitization in supply chain management in China will likely see continued investment in new technologies, greater integration across supply chain partners, and increased focus on data security and privacy* (3.37).

### Digital Logistics Technologies Utilization in Global Supply Chain Management

In recent years, companies in China have recognized the potential benefits of digital logistics in global supply chain management. With technological advancements, digital logistics have become an indispensable tool for companies seeking to optimize their supply chain operations, reduce costs, and improve customer satisfaction. As per participant number 2, a software developer at S.F. Holdings Co., Ltd., *“My expertise lies in developing software solutions that improve the efficiency and transparency of supply chain management processes. I have been working in this field for several years and have experience developing logistics, inventory management, and transportation management applications.”*

#### Perceived Usefulness

With a mean of **3.47**, the respondents **strongly agree** that they have a **moderate level of digital logistics utilization**, for they believe in the technology’s perceived usefulness.

Based on the data gathered by the researcher, the respondents strongly agree that *digital logistics has the potential to significantly improve supply chain management by providing real-time visibility, predictive analytics, and optimization capabilities* (3.47). Further, the respondents strongly agree that *by leveraging digital logistics, companies can optimize their supply chain operations, reduce costs, and increase efficiency, improving customer satisfaction* (3.42). Lastly, the respondents strongly agree that *using digital logistics in supply chain management can help companies stay competitive in today’s fast-paced business environment by enabling faster, more reliable, and more flexible operations* (3.52).

#### Perceived Ease of Use

Digital logistics have become increasingly popular in global supply chain management, and companies in China have strongly agreed that these tools offer perceived ease of use. Digital logistics platforms can simplify and streamline supply chain operations, making it easier for companies to manage their logistics processes, reduce costs, and improve customer satisfaction.

With a mean of **3.53**, the respondents **strongly agree** that they have an **extremely high level of digital logistics utilization**, for they believe in the technology’s perceived ease of use.

Based on the data gathered, the respondents strongly agree that *digital logistics can make supply chain management more user-friendly by automating complex processes, providing intuitive interfaces, and offering self-service options* (3.47). Moreover, they strongly agree that *by using digital logistics tools, companies can simplify their supply chain management operations, reducing the need for manual intervention and streamlining workflows* (3.58). Lastly, they strongly agree that *the ease of use brought by digital logistics can enable companies to onboard new partners and suppliers more easily, leading to faster and more effective collaborations* (3.53). Per participant number 3, an expert at Sinotrans Co Ltd., *“Digital logistics can provide greater visibility and transparency across the entire supply chain, allowing for better tracking and monitoring of goods. It can also help automate processes and reduce manual errors, improving efficiency and reducing costs.”*

#### Quality of System

In today's global supply chain management industry, companies in China strongly agree that digital logistics offer a quality system for their operations. With increasing complexity and competition in the supply chain industry, companies must ensure that they can deliver high-quality products to their customers promptly and efficiently. Digital logistics platforms have become an essential tool for achieving these objectives.

With a mean of **3.44**, the respondents **strongly agree** that they have a **moderate level of digital logistics utilization**, for they believe in the technology's quality systems.

Based on the data gathered, the respondents strongly agree that *digital logistics can improve the quality of supply chain management systems by providing real-time data, enabling better tracking and monitoring, and reducing the risk of errors* (3.42). Also, they strongly agree that *digital logistics companies can implement automated quality control measures, reducing the risk of defective products and ensuring consistency in their supply chain operations* (3.42). Henceforth, the respondents strongly agree that *digital logistics can enable companies to quickly identify and resolve quality issues, minimizing the impact on customers and suppliers and improving overall supply chain performance* (3.48).

#### *Attitude Towards Use*

In recent years, China has experienced a significant shift towards adopting digital logistics in global supply chain management. This trend has been observed across various industries, and companies operating in China have strongly agreed that the attitude toward digital logistics is positive.

With a mean of **3.53**, the respondents **strongly agree** that they have an **extremely high level of digital logistics utilization**, for they believe in their attitude towards use.

The respondents strongly agree that their *attitude towards using digital logistics in supply chain management is becoming increasingly positive as more companies recognize the benefits of automation, real-time visibility, and data analytics* (3.53). Further, the respondents strongly agree that *many companies invest in digital logistics solutions to improve their supply chain operations and gain a competitive edge* (3.53). Lastly, *while some may initially be hesitant to adopt digital logistics due to concerns around cost or complexity, the respondents strongly agree that those who embrace it can gain significant advantages in efficiency, agility, and customer satisfaction* (3.53).

#### *Intention to Use*

The integration of digital technologies has revolutionized global supply chain management, allowing companies to improve efficiency, visibility, and sustainability. China, one of the world's largest and fastest-growing markets, has attracted the attention of many companies looking to expand their operations in the region.

With a mean of **3.52**, the respondents **strongly agree** that they have an **extremely high level of digital logistics utilization**, for they believe in their intention to use.

The respondents strongly agree that *companies have expressed a strong intention to adopt digital logistics in their supply chain management operations, driven by a desire to improve efficiency and gain competitive advantage* (3.42). The respondents strongly agree that *the intention to use digital logistics is often driven by the need to streamline processes, reduce costs, and increase visibility and control over the supply chain* (3.58). *While there may be some barriers to adoption, such as the need for new technology infrastructure and training employees, the respondents strongly agree that digital logistics' potential benefits drive a strong intention to use it in supply chain management* (3.56).

### **Blockchain Technology Utilization in Global Supply Chain Management**

The global supply chain industry has always faced challenges such as inefficiencies, opacity, and a need for more transparency. This is especially true in China, where the supply chain ecosystem is complex, and multiple intermediaries are involved. However, the advent of blockchain technology has the potential to transform the way supply chains are managed, offering unprecedented levels of transparency and traceability.

With a mean of **3.70**, the respondents **strongly agree** that blockchain offers transparency in supply chain management. Hence, an **extremely high level of utilization** was expected from them.

The respondents strongly agree that *technology brings unparalleled transparency to supply chain management by creating an immutable, decentralized record of all transactions* (3.69). With *blockchain technology*, the respondents strongly agree that *every party involved in the supply chain can access a transparent and real-time view of the entire process, increasing trust and accountability* (3.73). Lastly, the respondents strongly agree that *using blockchain technology in supply chain management can significantly reduce the risk of fraud, counterfeiting, and other unethical practices by providing an auditable trail of all transactions* (3.68).

*Security*

Global supply chain management is an essential aspect of the world's economy, and its success is crucial to ensuring the timely and efficient delivery of goods and services. However, the conventional supply chain system often faces significant security challenges, such as fraud, counterfeiting, and hacking, which threaten the integrity of the supply chain network. In recent years, the application of blockchain technology in supply chain management has emerged as a promising solution to these security challenges. China, one of the world's largest trading economies, is at the forefront of implementing blockchain in supply chain management to enhance its security.

With a mean of **3.62**, the respondents **strongly agree** that blockchain offers security in supply chain management. Hence, an **extremely high level of utilization** was expected from them.

Also, the respondents strongly agree that *blockchain technology provides enhanced security in supply chain management by leveraging advanced cryptographic algorithms and decentralization* (3.63). Further, they strongly agree that *using blockchain technology, supply chain data can be securely stored and accessed only by authorized parties, reducing the risk of data breaches and cyber-attacks* (3.53). Lastly, they strongly agree that *using blockchain technology in supply chain management enables the creation of tamper-proof records, ensuring the authenticity and integrity of the data throughout the supply chain* (3.68).

*Decentralization*

The traditional supply chain management system relies on centralized intermediaries to facilitate transactions and coordinate activities between parties. However, this system often results in inefficiencies, delays, and security risks. In recent years, the emergence of blockchain technology has provided a solution to these challenges by enabling decentralized coordination and transparency. China, one of the world's largest trading economies, has been at the forefront of implementing blockchain technology in supply chain management to enhance its decentralization.

With a mean of **3.62**, the respondents **strongly agree** that blockchain offers decentralization in supply chain management. Hence, an **extremely high level of utilization** was expected from them.

The respondents strongly agree that *decentralization is a key feature of blockchain technology that can bring greater efficiency and transparency to supply chain management* (1.74). Also, they strongly agree that *blockchain technology in supply chain management enables a decentralized network where all parties have equal access to information, reducing the need for intermediaries and increasing efficiency* (1.63). With *decentralized blockchain-based supply chain management*, the respondents strongly agree that *decision-making can be more collaborative and democratic, as all parties can have a say in the process* (1.68).

**Effect Between Global Supply Chain Management and Digital Logistics**

**TABLE 1: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	
					R Square Change	F Change
	.575	.330	.314	.20857	.330	20.906

Based on the results, the different attributes of digital logistics strongly correlate with the digitization of the global supply chain based on the .575 R Score. Further, other attributes still predict the effect since the attributes included in this study may only predict 33% of digital logistics. This is based on the computed R Square, which is .330 (as shown in Table 1).

**TABLE 2: Significance Level**

	Mean Square	t	Sig.	Verbal Interpretation	Decision
<b>Digitization of Global Supply Chain Management and Digital Logistics</b>	.909	8.633	.000	Statistically significant	Reject the Null Hypothesis

*H<sub>1</sub>- Digital Logistics has no significant effect on Global Supply Chain Management.*

With a significance score of .000, Table 2 shows a good indicator for the hypothesis testing of the study at 99% confidence level. *The researcher rejects the null hypothesis and concludes that digital logistics significantly affects global supply chain management.*

The digitization of global supply chain management has become an increasingly important topic in recent years, with the adoption of digital technologies helping improve supply chain efficiency, visibility, and sustainability. Digital logistics, in particular, has significantly affected the digitization of global supply chain management, enabling companies to optimize their logistics operations and improve their supply chain management processes.

Digital logistics also drives the digitization of global supply chain management by enabling greater collaboration and communication between supply chain partners. Using cloud-based platforms, companies can share data and collaborate with suppliers, logistics providers, and customers in real time. This enables greater visibility and transparency across the entire supply chain, improving efficiency and reducing costs.

The adoption of digital logistics has its challenges, however. One of the biggest challenges is more standardization across different digital logistics platforms. This can make it difficult for companies to integrate different systems and technologies, resulting in increased complexity and reduced efficiency. Additionally, there is a risk of cybersecurity threats, such as hacking and data breaches, which can compromise the security of logistics operations.

**TABLE 3: Coefficients**

	Unstandardized B	Coefficients Error	Std. t	Sig.	Verbal Interpretation
Digital Logistics' Perceived Usefulness	.257	.053	4.809	.000	Statistically significant
Digital Logistics' Perceived Ease of Use	.203	.067	3.030	.003	Statistically significant
Digital Logistics' Quality System	-.254	.067	-3.794	.000	Statistically significant
Digital Logistics' Attitude	-.232	.063	-3.660	.000	Statistically significant

Towards Use					
Digital	.100	.063	1.592	.113	Statistically significant
Logistics'					
Intention to					
Use					

Table 3 shows that all digital logistics attributes have a significant effect on global supply chain management. The digital logistics' perceived usefulness, perceived ease of use, quality system, attitude towards use, and intention to use significantly affected digital logistics at 95% confidence level.

Perceived usefulness is the extent to which a person believes using a particular system will enhance their job performance. Digital logistics has been perceived as useful in the supply chain management process. Integrating technology in logistics has resulted in efficient and effective supply chain management, which has significantly impacted global supply chain management. Digital logistics has improved inventory management, faster delivery times, and real-time tracking of goods, among other benefits. Businesses that have embraced digital logistics have improved their supply chain management process, resulting in increased customer satisfaction, reduced costs, and improved efficiency.

Perceived ease of use is another attribute that significantly affects global supply chain management. This attribute refers to the degree to which a person believes using a particular system will be effortless. Digital logistics has been designed to be user-friendly, making it easy for businesses to integrate technology into their logistics processes. The user-friendly nature of digital logistics has made it easy for businesses to adopt and implement this technology, resulting in efficient and effective supply chain management.

Intention to use is also an essential attribute significantly affecting global supply chain management. This attribute refers to the individual's willingness to use a particular system. The benefits of this technology have influenced the intention to use digital logistics. The benefits of digital logistics have made businesses willing to adopt and implement this technology in their supply chain management process. The intention to use digital logistics has resulted in increased adoption and implementation of this technology, resulting in improved supply chain management.

Attitude towards use is another attribute that significantly affects global supply chain management. This attribute refers to the individual's feelings about using a particular system. The positive attitude toward using digital logistics has increased the adoption and implementation of this technology. The positive attitude towards digital logistics has been influenced by the benefits associated with this technology, such as improved efficiency, reduced costs, and increased customer satisfaction.

The quality system is another essential attribute significantly affecting global supply chain management. This attribute refers to the quality of the technology used in the supply chain management process. The quality of digital logistics has been a significant factor in its adoption and implementation in the supply chain management process. The quality of digital logistics has ensured that it meets the needs of businesses and has resulted in efficient and effective supply chain management.

**Effect Between Global Supply Chain Management and Blockchain Technology**

**TABLE 4: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	
					R Square Change	F Change
	.340	.115	.104	.24054	.115	9.836

Based on the results shown in Table 4, the different attributes of blockchain strongly correlate with the digitization of the global supply chain based on the .858 R Score. Further, other attributes still predict the effect since the

attributes included in this study may only predict 11.5% of blockchain technology. This is based on the computed R Square, which is .115.

**TABLE 5: Significance Level**

	Mean Square	t	Sig.	Verbal Interpretation	Decision
Digitization of Global Supply Chain Management and Blockchain Technology	.569	15.224	.000	Statistically significant	Reject the Null Hypothesis

*H<sub>2</sub>- Blockchain Technology has no significant effect on Global Supply Chain Management.*

With the significance score of .000, Table 5 shows a good indicator for the hypothesis testing of the study at 99% confidence level. *The researcher rejects the null hypothesis and concludes that blockchain technology has a significant effect on global supply chain management.*

Blockchain technology has the potential to revolutionize global supply chain management, making it more efficient, transparent, and secure. Supply chain management involves multiple parties, including suppliers, manufacturers, distributors, and retailers, all of whom must work together to ensure that goods are delivered to customers in a timely and cost-effective manner. The digitization of global supply chain management has been ongoing for many years, but the introduction of blockchain technology has accelerated this process and made it more effective.

One significant effect of blockchain on the digitization of global supply chain management is increased transparency. Blockchain technology provides a tamper-proof and immutable record of all transactions, making it possible for all parties involved in the supply chain to access the same information. This transparency enables businesses to track products and services in real-time, reducing the risk of delays and ensuring that goods are delivered to the right place at the right time.

Another effect of blockchain on the digitization of global supply chain management is increased security. Blockchain technology uses cryptography to secure transactions, making it virtually impossible for hackers to manipulate or steal data. This security is critical in the supply chain, where fraud and counterfeiting can lead to significant financial losses for businesses. With blockchain technology, each transaction is verified by multiple parties, ensuring that it is genuine and not subject to tampering.

Blockchain technology also has the potential to increase efficiency in the supply chain. Traditionally, supply chain management involves multiple intermediaries, including banks, customs officials, and shipping companies. The use of blockchain technology can eliminate the need for these intermediaries, reducing costs and speeding up the delivery of goods and services. Blockchain technology enables businesses to automate many of the processes involved in the supply chain, reducing the need for manual intervention, and minimizing the risk of errors.

Also, one significant challenge to the digitization of global supply chain management is the lack of standardization. Different businesses use different systems to manage their supply chains, making it difficult for them to work together effectively. However, blockchain technology has the potential to address this challenge by providing a common platform for businesses to share information and collaborate.

**TABLE 6: Coefficients**

	Unstandardized B	Coefficients Std. Error	t	Sig.	Verbal Interpretation
Blockchain Technology's Transparency	-.124	.059	15.224	.037	Statistically significant



Blockchain Technology's Security	.156	.052	-2.103	0.003	Statistically significant
Blockchain Technology's Decentralization	-.271	.059	3.026	0.000	Statistically significant

Table 6 shows that all blockchain attributes have a significant effect on global supply chain management. The blockchain's transparency, security, and decentralization significantly affected digital logistics at 95% confidence level.

Blockchain technology is a decentralized and secure ledger that records transactions between parties without intermediaries. The use of blockchain technology in global supply chain management has significant effects, including increased security, transparency, and decentralization. Among these attributes, security has the greatest effect, followed by transparency and decentralization.

The security of the supply chain is critical in ensuring that goods and services are delivered to customers without the risk of fraud or counterfeiting. Blockchain technology provides a tamper-proof and immutable record of all transactions, making it virtually impossible for hackers to manipulate or steal data. This security is critical in the supply chain, where even a single instance of fraud or counterfeiting can lead to significant business financial losses. With blockchain technology, each transaction is verified by multiple parties, ensuring that it is genuine and not subject to tampering.

Transparency is another critical attribute of blockchain technology that significantly affects global supply chain management. The transparency provided by blockchain technology enables businesses to track products and services in real time, reducing the risk of delays and ensuring that goods are delivered to the right place at the right time. This transparency also enables businesses to identify and address any issues or delays in the supply chain, reducing the risk of disruption and increasing customer satisfaction.

Decentralization is another attribute of blockchain technology that significantly affects global supply chain management. With decentralization, no central authority controls the supply chain, making it more efficient and cost-effective. Blockchain technology can eliminate the need for intermediaries, reducing costs and speeding up the delivery of goods and services. Blockchain technology enables businesses to automate many of the processes involved in the supply chain, reducing the need for manual intervention and minimizing the risk of errors.

## V. CONCLUSION

Supply chain companies in China are embracing digitization to streamline operations, reduce costs, and improve efficiency. Cloud computing, blockchain, and artificial intelligence automate processes, saving time and costs while improving accuracy and reducing errors. Digitization enhances transparency and collaboration through real-time data and analytics, enabling companies to track shipments, monitor inventory, and proactively address potential issues. The need for efficiency, transparency, real-time data, improved customer service, and ethical sourcing drives this trend. Digitization also helps meet sustainability demands by tracking and verifying raw materials' origin and quality. This transformation creates new growth opportunities and shapes the future of supply chain management in China.

The adoption of digital logistics technologies in China's global supply chain management is driven by enhanced visibility, optimized network performance through big data analytics, and end-to-end traceability. Digital logistics facilitates collaboration and communication, offers environmentally friendly options, integrates with existing systems, provides real-time data and analytics, and allows remote access. It is viewed as a quality system providing control, flexibility, and risk management. The positive attitude towards digital logistics is supported by e-commerce growth, government support, and benefits like efficiency, transparency, collaboration, and risk management. Companies strongly agree that digital logistics optimize supply chain operations and improve customer satisfaction in China.

Blockchain technology benefits global supply chain management in China through transparency, security, and decentralization. The decentralized ledger provides end-to-end visibility, traceability of products, and collaboration among partners. It enhances security and privacy, reducing cyber-attack risks. Blockchain can potentially transform supply chain management by improving transparency, security, and efficiency. China has implemented blockchain in food safety and logistics to enhance supply chain management systems, decentralization, transparency, and collaboration.

Implementing digital logistics in China faces challenges such as inefficiencies and errors in data transfer, high costs for small and medium-sized enterprises (SMEs), cultural differences, language barriers, cybersecurity concerns, and talent shortage. Overcoming these challenges requires robust infrastructure, cost-effective solutions, financial incentives, cultural sensitivity, effective communication, and cybersecurity measures. Investment in training programs and collaboration between industry and academia can develop the necessary expertise, unlocking digital logistics' potential in China.

The adoption of blockchain technology in China's global supply chain management faces challenges like limited adoption, lack of standardization, scalability issues, data privacy and security concerns, and regulatory challenges. More successful case studies, industry-wide standards, scalable solutions, data privacy and transparency balance, robust security measures, clear regulatory frameworks, and collaboration are needed. Educating, promoting research and development, encouraging standardization, and establishing regulatory frameworks will drive wider adoption, revolutionize sectors, enhance efficiency, and foster trust in digital transactions.

Global supply chain management and digital logistics are interconnected concepts benefiting businesses. They reduce costs, improve efficiency, and enhance customer service. Challenges like lack of standardization and cybersecurity threats need to be addressed. Blockchain technology's impact on global supply chain management includes increased transparency, security, efficiency, real-time tracking, fraud prevention, and reduced need for intermediaries. Challenges such as interoperability and implementation costs must be overcome. Despite these challenges, blockchain is an attractive option for businesses modernizing their operations and digitizing global supply chain management. Its impact will continue to grow as the technology evolves.

## **Problems Encountered in Using Digital Logistics and Blockchain in Global Supply Chain Management**

### *Digital Logistics*

The problems encountered in using digital logistics in global supply chain management. With a mean of **3.70**, the respondents **always encountered problems** concerning the usage of digital logistics. Digital logistics allows faster and more efficient communication, data management, and delivery tracking. However, there are several challenges to implementing digital logistics in China, particularly due to inefficiencies and errors in data transfer and communication, high implementation costs, cultural differences and language barriers, cybersecurity and data privacy concerns, and the need for skilled talent and expertise.

The respondents always need to improve their efficiency and efficiency *in data transfer and communication* (3.68). One of the most significant problems encountered in digital logistics implementation in China is the inefficiencies and errors in data transfer and communication. The supply chain involves multiple parties, including manufacturers, distributors, retailers, and customers, each with different communication systems and protocols. This can lead to communication breakdowns and data errors, which can cause delays and disruptions in the supply chain. The need for standardized communication protocols is a significant barrier to implementing digital logistics in China.

Further, they always knew that *the high cost of implementing digital logistics systems could be a barrier for smaller companies and require significant technological and infrastructure investments* (3.62). Another challenge is the high cost of implementation. While digital logistics can potentially reduce costs in the long term, the initial investment required to establish the necessary infrastructure and train staff can be relatively inexpensive. This is especially true in China, where logistics infrastructure is still developing, and technology costs are often higher than in other countries. Therefore, many companies would prefer to invest in digital logistics, which hinders their ability to compete globally.

In addition, they always have the problem of *cultural differences and language barriers, which challenge effective communication and collaboration between international partners and suppliers in Chinese global supply chain management companies using digital logistics*. Cultural differences and language barriers are significant challenges in implementing digital logistics in China. China has a unique business culture emphasizes personal relationships and trust-building, which can take time for foreign companies to navigate. Furthermore, the Chinese language is complex and has several dialects, making communication challenging for foreign companies that need a deeper understanding of the language.

*Cybersecurity and data privacy concerns are a growing issue in using digital logistics in global supply chain management in China, as companies must ensure that sensitive data is protected and secure against potential cyber-attacks or breaches* (3.63). Cybersecurity and data privacy concerns are also significant challenges in digital logistics implementation in China. China has stringent regulations governing the collection and storage of personal data, which can take time for foreign companies to comply with.

Moreover, cyber-attacks on supply chains are becoming increasingly common, and companies must ensure their data is secure and protected. Lastly, *there is a need for skilled talent and expertise in digital logistics and supply chain management in Chinese global supply chain management companies, which can be a limiting factor for the successful implementation and adoption of digital logistics systems* (3.78). As per participant number 3, an operations manager at General Commerce Logistics Ltd., *“the potential risks and limitations of utilizing blockchain technology in the supply chain management process include the cost of implementation, standardization, and cooperation among different parties. Additionally, blockchain technology is not a solution for all supply chain problems and may not be suitable for all industries.”*

Finally, the need for skilled talent and expertise is a crucial factor in successfully implementing digital logistics in China. The logistics industry requires a broad range of skills, from data analysis and communication to project management and operations. Many companies in China need more talent and expertise to implement digital logistics effectively.

In conclusion, while digital logistics has the potential to revolutionize the supply chain management system in China, several challenges must be addressed. These challenges include inefficiencies and errors in data transfer and communication, high implementation costs, cultural differences and language barriers, cybersecurity and data privacy concerns, and the need for skilled talent and expertise. Companies must work to overcome these challenges to realize the full potential of digital logistics in China.

### *Blockchain*

The problems encountered in using digital logistics in global supply chain management. With a mean of **3.58**, the respondents **always encountered problems** using blockchain technology.

Blockchain technology has the potential to revolutionize global supply chain management by enabling secure and transparent tracking of products and transactions. However, the adoption of this technology in China faces several challenges, including limited adoption, lack of standardization, scalability, data privacy and security, and regulatory challenges.

*Many companies still need to be more willing to adopt blockchain technology due to the need for more understanding, trust, and regulatory clarity* (3.57). One of the significant problems with blockchain technology adoption in China is the limited adoption of this technology. While several companies have started implementing blockchain technology in their supply chain management systems, the technology's overall adoption rate still needs to be higher. This is primarily due to the need for more awareness and understanding of the technology and the high costs associated with implementation and maintenance. As per participant number 2, a software developer at S.F. Holdings Co., Ltd. *“Blockchain technology can be utilized in the supply chain management process to create a secure and transparent system for tracking goods throughout the supply chain. It can also help reduce the risk of fraud and errors, leading to greater efficiency and cost savings.”*

*Standardization is needed to implement blockchain technology in the global supply chain* (3.73). Another challenge is the need for more standardization of blockchain technology in China. There is no unified standard

for blockchain technology in China, which leads to compatibility issues between different blockchain systems (Berg et al. 2021). This lack of standardization hinders the adoption of blockchain technology by companies that require cross-platform interoperability.

*The technology is still in its early stages and cannot handle the volume of transactions in global supply chains* (3.42). Scalability is also a significant challenge in adopting blockchain technology in China. The blockchain's distributed ledger technology requires significant computational power to maintain, which can limit scalability. This scalability issue is particularly problematic in China, where the number of transactions per second can be massive, and the current blockchain technology may need help to handle the volume.

*The immutable nature of blockchain makes it difficult to alter or delete data, which can be problematic if sensitive information is compromised* (3.68). Data privacy and security concerns are another challenge in adopting blockchain technology in China. Blockchain technology relies on decentralization, meaning multiple nodes hold copies of the same data. This can lead to data breaches and hacking attempts, compromising sensitive data. Furthermore, the anonymity of blockchain transactions can make it difficult to trace fraudulent activities.

*The regulatory environment for blockchain technology is still evolving, and it is challenging to comply with various regulations across different jurisdictions. This can lead to legal and financial risks for organizations that adopt blockchain technology in their supply chain* (3.48). Regulatory challenges are also a significant obstacle to adopting blockchain technology in China. The Chinese government has implemented strict regulations on blockchain technology, including bans on cryptocurrency exchanges and ICOs. The government's involvement in the regulation of blockchain technology can lead to uncertainties in terms of legal compliance, which can deter companies from adopting the technology.

In conclusion, adopting blockchain technology in China's global supply chain management system faces several challenges, including limited adoption, lack of standardization, scalability, data privacy and security, and regulatory challenges. However, these challenges can be overcome through increased awareness, collaboration between different blockchain platforms, and the developing of new blockchain technologies that can handle high transaction volumes. Additionally, the Chinese government must work to create a regulatory environment that fosters innovation while ensuring data privacy and security.

## VI. CONTRIBUTION

The research contributes to the idea of these companies to continue investing in the digitization of supply chain management in China. The strong agreement among supply chain management companies regarding the high level of digitization suggests that this is a valuable investment for companies operating in China. Digitization can increase supply chain operations' efficiency, transparency, and cost savings. Further, consider increasing investment in digital logistics utilization in global supply chain management companies. The high level of agreement among supply chain management companies regarding digital logistics utilization suggests that this is an area where companies can continue to gain a competitive advantage.

Moreover, explore the use of blockchain technology in global supply chain management. The strong agreement among supply chain management companies regarding the high level of blockchain technology utilization suggests that this technology has the potential to improve supply chain operations significantly. However, companies should also be aware of the challenges associated with blockchain adoption. Also, address the challenges of using digital logistics in global supply chain management. Supply chain management companies should work to overcome challenges such as inefficiencies and errors in data transfer and communication, high cost of implementation, cultural differences and language barriers, cybersecurity and data privacy, and a need for skilled talent and experts. Addressing these challenges can help improve digital logistics' effectiveness in global supply chain management. The challenges associated with using blockchain in global supply chain management. Supply chain management companies should work to overcome challenges such as limited adoption, lack of standardization, scalability, data privacy and security, and regulatory challenges. Addressing these challenges can help to unlock the full potential of blockchain in global supply chain management. Lastly, consider the potential benefits of blockchain technology for global supply chain management. The significant effect of blockchain technology on global supply chain management suggests that companies should explore using it to improve the

security, transparency, and efficiency of their supply chain operations. However, companies should also be aware of the challenges associated with blockchain adoption.

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