

Article

Research on Innovation Management of Enterprise Supply Chain Digital Platform Based on Blockchain Technology

Lu Xiang *  and Renyong Hou

School of Management, Wuhan University of Technology, Wuhan 430070, China; hourenyong@126.com

* Correspondence: xianglu514@sina.com

Abstract: Purpose: In response to the problems of high production costs, weak comprehensive competitiveness, and incomplete capital chain in the development of enterprises in the international market, this article proposes to apply blockchain technology to the digital platform of the supply chain. By scientifically managing the digital platform, enterprises can reduce production costs and improve their capital chain. Design/methodology/approach: In this long-term economic life, theoretical science and technology are still developing, gradually forming a blockchain-based enterprise supply chain development model. The continuous research on the blockchain theory can provide more convenient services for the supply chain digital platform innovation management. Findings: This article studies the entire supply chain management process through blockchain algorithms and innovative management methods, which can enable enterprises to further develop on the digital platform of supply chain, promote the digital construction of supply chain, and ensure the sustainable development of enterprises. Originality/value: This can reduce the supply chain digital platform innovation management risk of enterprises by more than 60%, as well as reduce the cost of enterprises, which has a more far-reaching impact on the sustainable development of enterprises.

Keywords: digital platform; blockchain algorithm; enterprise supply chain; supply chain innovation model



Citation: Xiang, L.; Hou, R. Research on Innovation Management of Enterprise Supply Chain Digital Platform Based on Blockchain Technology. *Sustainability* **2023**, *15*, 10198. <https://doi.org/10.3390/su151310198>

Academic Editor: Chia-Huei Wu

Received: 20 May 2023

Revised: 16 June 2023

Accepted: 19 June 2023

Published: 27 June 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Blockchain is a chain composed of one block after another. These blocks keep some information of themselves and are connected according to time. The so-called blockchain is reflected in these connection relationships. As long as one server in the whole relationship network runs normally, the security of the whole regional chain can be guaranteed. These servers not only serve as places to store information in the whole cyberspace, but also provide computing support for information. In most cases, servers are managed by different staff members; thus, it is difficult for individuals to destroy the information in the blockchain. With the support of blockchain technology, data storage will be more secure and centralized features will be greatly weakened. Combining the two characteristics of blockchain, people can make a more real and reliable judgment on the information recorded in blockchain, as well as make enterprises trust each other in the process of production and transaction to ensure the safety of enterprises. On the basis of blockchain, this paper puts forward the application of the blockchain algorithm in the enterprise supply chain digital platform, which has certain practical significance for improving the data security of enterprise supply chain digital platform and enhancing the data management ability of the platform.

However, due to the late formation of the blockchain theory, enterprises have not yet fully applied it to their own supply chain digital platform innovation management, which is not conducive to promoting the sustainable development of enterprises; hence, many scholars have supplemented and improved the blockchain algorithm and theoretical basis in this regard. Du built a new supply chain financial platform through research, and managed the process through the blockchain to protect users' privacy [1]. Zhang

studied the risk assessment model of supply chain finance and made contributions to the security of supply chain finance [2]. Vu evaluated the financing performance of the supply chain, and proposed solutions and some suggestions to improve the financing performance on the basis of innovation ability and market response ability [3]. Saberi made a critical assessment of blockchain technology and smart contracts, put forward opinions on the use of blockchain for supply chain management, and provided direction for future research and development [4]. These theories are the core of blockchain development; however, with the economic development, these theories still appear to be insufficient.

In order to better use the blockchain theory, Teh proposed to use the blockchain in the framework system to achieve the sustainable development of enterprises and achieve their organizational goals [5]. Bai proposed that blockchain technology is a technology that can effectively support the transparency of the supply chain, which has laid a good foundation for the study of blockchain evaluation in the supply chain environment [6]. Parmentola confirmed the advantages of using blockchain distributed ledger technology to innovate processes, products, and transactions by studying whether and how blockchain technology is considered to affect environmental sustainability [7]. Li evaluated the enterprise's production technology through the supply chain network, and used the blockchain to realize data storage and sharing to reduce its risk, thus providing sustainable production management [8].

Yu focused on the combination of supply chain management and digital technology, and the integration advantages of Internet of things and blockchain in supply chain management were also highlighted. At the same time, according to the changes brought by digitalization, the added value of the integration of Internet of things and blockchain was analyzed from the perspectives of different stakeholders [9]. Mudassar investigated the current and future development of intelligent manufacturing in project management, aiming at the creation of an intelligent network physical system, which can use artificial intelligence algorithms to collect, store, and process data on the basis of various standards to make decisions [10]. The research of these scholars has promoted the development of blockchain theory to some extent.

Although the research of these scholars has promoted the development of blockchain theory, their research on the application of blockchain in enterprises is not comprehensive, and the research on the management of the digital platform of the enterprise supply chain is also very scarce. In order to improve the research on innovative management of the enterprise supply chain digital platform, it is necessary to further explore the enterprise supply chain digital platform with blockchain technology in order to realize innovative management of enterprise digital platform.

2. Blockchain Computing and Supply Chain Digital Platform

2.1. Supply Chain Analysis

An effective way to travel is to first understand the concept and principle of the supply chain [11]. The supply chain can be described as a pyramid: the manufacturing enterprise acts as the top of the pyramid, i.e., the upstream of the supply chain; the exclusive agent is in the next part of the tower tip; distributors are the middle backbone of the pyramid; the final downstream is the end user, which forms the foundation of the whole pyramid; the connection areas of these parts are used as information management systems for information communication, and the process of finally delivering products from finished products to end users through the network chain structure is the supply chain, as shown in Figure 1.

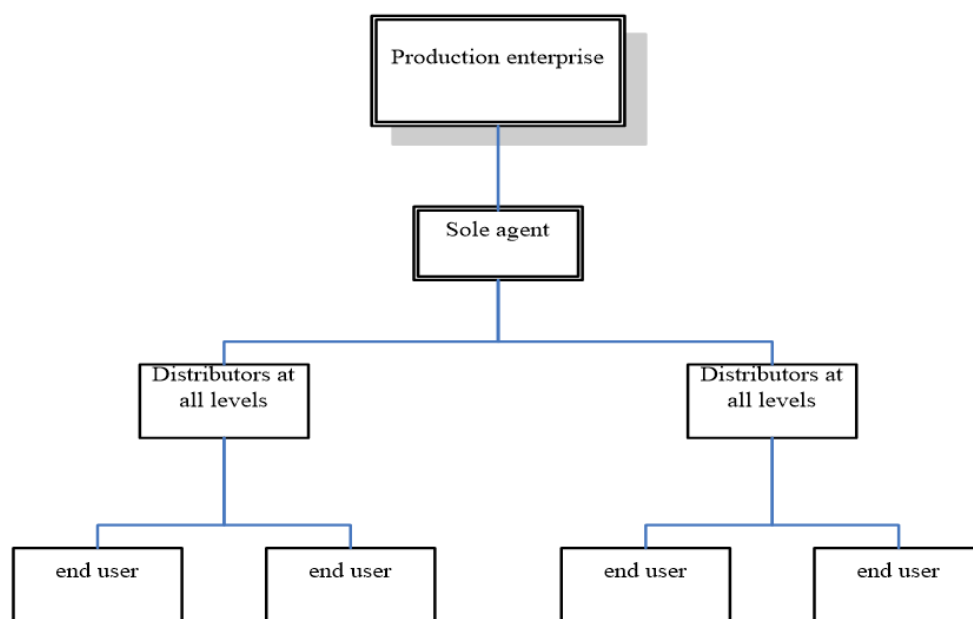


Figure 1. Supply chain context.

2.2. Digital Platform

In the process of establishing digital trust, the digital platform is an indispensable application system. With this application system, we can know the actual operation of the supply chain and grasp the corresponding enterprise financial data information. Through the application of digital platform, enterprise supply chain management has become more intelligent, enterprise financial activities have become more intelligent, and enterprise financial data and information can be shared. A digital platform can provide good technical support for the development of enterprise supply chain finance, especially in risk management and control, which can improve the management level of financial risks and provide effective security for enterprises to carry out financial activities. The digital platform can provide sufficient support for the orderly development of supply chain finance, especially for its risk management and control level, and it can also provide effective guarantee to improve the efficiency of financial activities.

2.3. Blockchain Technology and Its Algorithm Classification

Blockchain technology mainly focuses on the integrity, security, and invariance of data. Under blockchain technology, data information can be effectively analyzed to maintain data integrity [12,13]. This technology can also provide a smooth way to improve data integrity and design and track data. Blockchain can also improve the security of data. With the help of blockchain technology, it is difficult for individuals to modify network data, which prevents subjective and artificial data changes and ensures the security of network data. Invariance can be called the ability of blockchain ledger to remain unchanged, which means that the data stored in blockchain cannot be changed.

In order to further ensure the security of network data, smart contracts can also be introduced into the digital platform of supply chain. Smart contracts are digital contracts that rely on blockchain technology to make their terms and execution conditions unforgeable. Applying formal methods to the whole life cycle of smart contracts includes contract design, natural language description, formal description, model verification, automatic code generation, and conformance testing. This makes the generation and execution of contracts have normative constraints, ensures the credibility of contracts, and enables people to trust the production process and execution effectiveness of smart contracts. By using smart contracts, the security of enterprise supply chain digital platforms can be effectively guaranteed.

In this paper, research methods are mainly divided into two types. One is the sustainable development method relying on blockchain, and the other is the innovation management analysis method [14]. There are six core algorithms in the blockchain. One is the Byzantine protocol, which means that, in a network area, as long as more than half of the network nodes in the network body are operating normally, the blockchain can ensure data security and continue to operate under any circumstances. The other is asymmetric encryption technology, which means that, if a node in this network area wants to transmit information, in the process of information transmission, two network security keys, called public key and private key, are needed. If the message is encrypted with a public key, the private key corresponding to the public key is required to decrypt; similarly, if the message is encrypted with a private key, the public key corresponding to the private key is required for decryption. This practice greatly improves the security of network information. The third is fault tolerance. In each network structure, each network node exists independently, and nodes can join or exit the entire network system at will, which easily leads to information errors or information loss. Therefore, it is necessary to provide fault tolerance capability for the network structure through consensus algorithm, and the fault tolerance method that increases consensus for each node is safe, practical, and widely applicable to many places. The fourth is the Paxos algorithm, which can make each node in the system process certain information or protocol in a consistent way. The Paxos algorithm simply executes the “consistency algorithm” on the command instructions of each node, so that the whole system can reach a consensus. The fifth is the consensus mechanism algorithm, which obtains statistics of the workload of each node and uses a random algorithm to randomly allocate the accounting rights. The sixth is the distributed storage algorithm, which uses distributed storage resources to form a virtual storage device and stores data in various locations in a decentralized manner, so that the data can be stored safely. The composition of such a simple blockchain frame is shown in Figure 2.

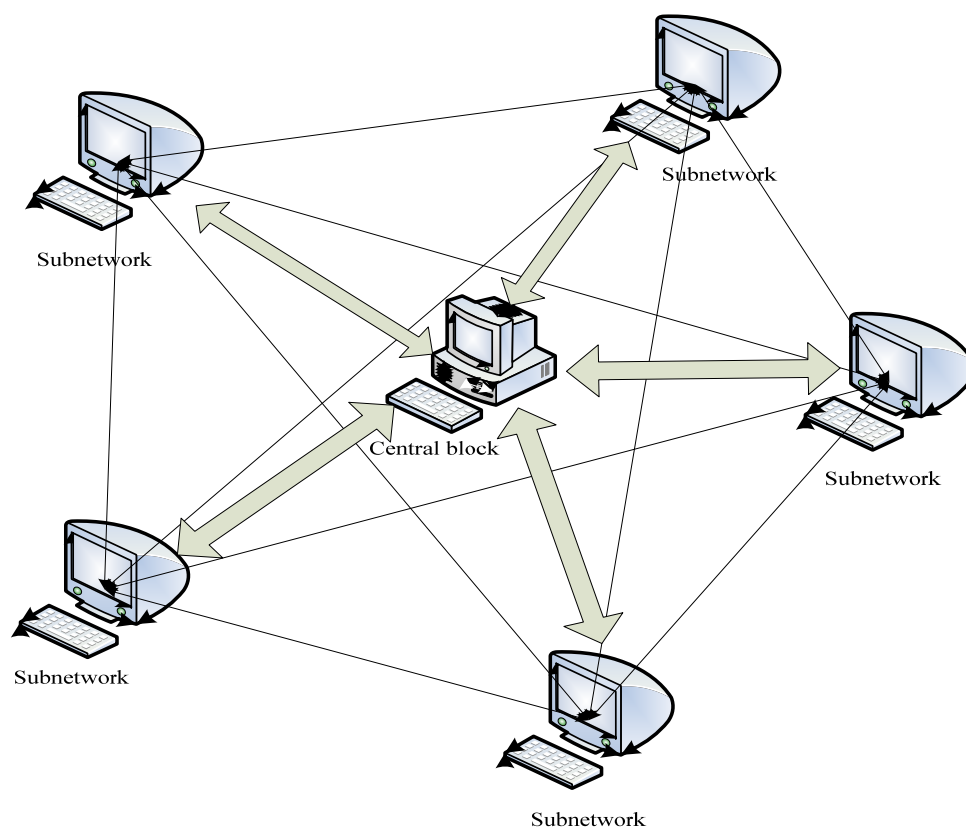


Figure 2. Simple architecture of blockchain.

Regarding the application of blockchain technology, some people have created a vision of review and research beyond the blockchain supply chain based on knowledge visualization technology [15]. Some people have proposed an extensible protocol based on public blockchain, which can be used to mark the interoperable ownership transfer of goods and is suitable for IoT devices with limited resources [16]. Some people have proposed to integrate blockchain with the Internet of things and use information and communication technology. A sustainable ecosystem was created in [17], while other researchers put forward an improved asymmetric alliance blockchain, as well as a univariate polynomial-based homomorphism computing privacy information retrieval scheme, to ensure the availability and transparency of the parking lot in the privacy protection intelligent parking system [18]. It can be seen that the application of blockchain technology is extensive. Combined with the above research, we suggest that, among the six blockchain algorithms, the Byzantine protocol algorithm can be emphatically strengthened in the application of an enterprise supply chain digital platform.

There are also many problems in the practical application of the digital platform management of the enterprise supply chain, especially in the analysis and processing of network data. In order to optimize the management of financial data by a digital platform and improve the security of enterprise data, it is necessary to combine the blockchain algorithm to optimize the performance of the digital platform of an enterprise supply chain. Therefore, on the basis of the relevant theories of blockchain algorithm, this paper puts forward a blockchain calculation method by using the consensus mechanism of the Byzantine algorithm [19].

Assuming that there are at least $3n + 1$ nodes in the blockchain, it constitutes a basic Byzantine unit P_a [20]. Here, m represents a normal network node and P_a represents a unit of the blockchain on the entire network node. In this network structure, the distribution view is numbered as C , and the primary node of node $3n + 1$ is set as T , while the other nodes are used as backups. If these nodes are numbered with integers, they would be $\{0, 1, \dots, 3n + 1\}$. This can be expressed as Equation (1).

$$T = c \bmod 3n + 1. \quad (1)$$

In this blockchain, all nodes are defined as all_α as a whole, which is used to store the specific data information of nodes. It has a double-linked list structure, With the help of the double-linked list structure, the data stored in the supply chain digital platform will be more perfect and specific, and the enterprise financial data information can also be safely stored in the digital platform; x and y represent the blockchain header index and blockchain content, respectively. Equation (2) can, thus, be obtained.

$$all_\alpha = \{x, y\}. \quad (2)$$

Next, if gie represents blockchain information, while the stored data are recorded as j , and the name of this node is n , the secret key and update time of the data are represented by s and r . Thus, the blockchain information structure gie is expressed as Equation (3).

$$gie = (g_j, g_n, g_s, g_r). \quad (3)$$

On the basis of the above construction, if P_a^l is a collection of virtual nodes, the mapping of each network node is described in Equation (4).

$$all_\alpha : P_a \rightarrow P_a^l. \quad (4)$$

In the whole blockchain transmission process, a consensus is reached with virtual node P_a^l through the certificate. This is helpful to improve the data transmission efficiency of the supply chain digital platform and greatly improve the security of data transmission.

The format of the certificate is shown in Equation (5), where type represents the message type, different blocks are set as q , and n represents the node number.

$$\text{news} = (\text{type}, q, v, n). \quad (5)$$

In addition, the formula of the consensus mechanism for supply chain digital platform innovation management is shown in Equation (6), where $m + 1$ represents the generation of new nodes, λ represents the migration function, α represents the blockchain status at a certain time, β represents the quantity, and Z_{m+1} indicates the block status after adding new blocks.

$$Z_{m+1} = \sum_0^m K(\lambda(\alpha, \beta)). \quad (6)$$

Lastly, people can provide calculation methods for the sustainable development of digital platform management of an enterprise supply chain based on these blockchain algorithms [21].

Therefore, this paper studies the risk of innovative management of a supply chain digital platform, reduces the management risk of a supply chain digital platform with the help of digital technology, improves the anti-risk capability of a supply chain digital platform, and better applies the blockchain methodology and theory to the digital platform innovation management of an enterprise supply chain [22]. As the procurement, inventory, production, and distribution matters involved are complex and require coordination among various departments in the enterprise, the internal structure of the enterprise needs to be optimized. Innovative talents need to be recruited, and the overall environment of financial development needs to be complied with, so as to improve the operating income. Therefore, there is an urgent need for a set of sustainable digital platform innovation management innovation ideas.

This paper uses the described method to analyze the existing problems and their impacts, and finally gets a more complete result. Using blockchain, this paper analyzes the financial innovation and development of the enterprise supply chain, analyzes its sustainable development, improves all the existing problems, and then studies and analyzes the entire network architecture to get an overall sustainable development strategy [23]. It also analyzes its sustainable development, improves the existing problems, and then studies and analyzes the entire network architecture to obtain an overall sustainable development strategy. In the end, a more comprehensive structure is used for analysis, and the digital platform innovation management of the supply chain can be optimized and upgraded to get a more convenient and effective method to enable enterprises to move forward on the road of sustainable development.

3. Enterprise Supply Chain Innovation Mode Based on Blockchain

Under the background of globalization, the international financial market is constantly changing. In order to better adapt to the changing financial market, the enterprise supply chain model needs to keep pace with the times. Therefore, it is necessary to innovate the enterprise supply chain model. This paper combines blockchain technology to conduct innovative research on enterprise supply chain model.

With the continuous development of blockchain technology, the application of blockchain has received more and more attention. Blockchain technology has been widely used in many fields, and has good applications in digital finance, Internet of things, supply chain management, etc. It can be seen that blockchain application has become a trend. This paper obtains the percentage data of blockchain applications in some fields from China's official statistics data, as shown in Figure 3. Blockchain plays a role in various fields [24].

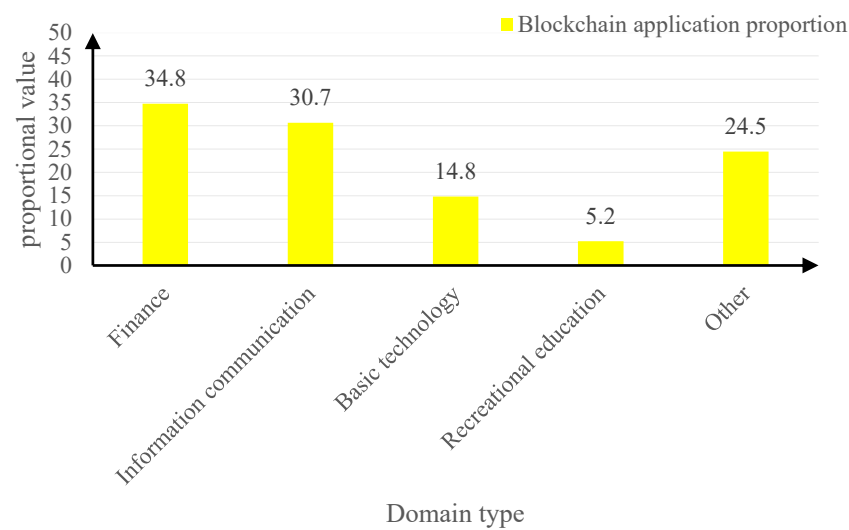


Figure 3. Proportion of blockchain applications.

It can be clearly seen from the figure that the application of blockchain in finance accounts for 34.8% of the total, indicating that the application in this area has been widely recognized. In addition, it also accounts for a large proportion of the basic technology of information exchange, which indicates that enterprises can use blockchain to optimize their internal structure and master first-hand information.

From the above database, it can be seen that the application of blockchain in finance, information exchange, and basic technology accounts for a large proportion. It can be seen that the application trend of blockchain in these fields can improve strong technical support for the development of an enterprise supply chain. With the help of blockchain technology, it can help enterprises master the latest financial information, so as to adjust the strategic direction of enterprise finance in time and effectively optimize the structure of enterprise supply chain.

In addition, by comparing the traditional model and the blockchain driven model, this paper concludes that blockchain has advantages that the traditional model does not have in all aspects of the enterprise development process [25]. The specific comparison is shown in Table 1.

Table 1. Comparison between blockchain driving mode and traditional mode.

Pattern	Digital Platform Innovation Management	Information Transfer	Financing Risk	Whether the Fund Is Controllable
Traditional mode	Easy supervision and management	Information sharing and timely transmission	Large financing risk	Closed and controllable capital ring
Blockchain driven mode	Difficulty in supervision and management	There are barriers to information transmission	Small financing risk	Uncontrolled funds

In Table 1, it is obvious that the development of supply chain based on blockchain has great advantages in digital platform innovation management information barriers and capital risk management and control. Therefore, the integration of the two concepts would inevitably promote the progress of enterprises and promote their sustainable development. In order to make the enterprise sustainable for a long time, the enterprise must maintain its vitality, and stable financing funds can inject vitality into it. When an enterprise conducts supply chain digital platform innovation management, due to the unreasonable allocation of funds and the existence of information barriers, there are often large risks. If the blockchain is used to manage all transactions in the supply chain, with efficient protection and convenient information assurance, it can not only reduce costs, but also improve

efficiency and reduce risks. Moreover, due to the decentralized and tamper-resistant characteristics of the blockchain, the authenticity of transaction data information on the supply chain is solved, which greatly improves the security of enterprises.

In addition, according to the blockchain consensus algorithm, it can be concluded that risks and opportunities exist all the time in the development of enterprises, and how to reduce the risk of enterprise supply chain digital platform innovation management becomes the next point that needs attention in this paper [26]. Similarly, by giving some data analysis to the security performance of the blockchain, and taking the fault tolerance rate generated by the supply chain digital platform innovation management as a variable, we can analyze how much financing risk can be reduced by integrating the blockchain [27]. This paper takes the supply chain digital platform innovation management capital risk analyzed by Enterprise A in the last 5 years as an example to compare the number of risk items generated by financial financing. The results are shown in Figure 4.

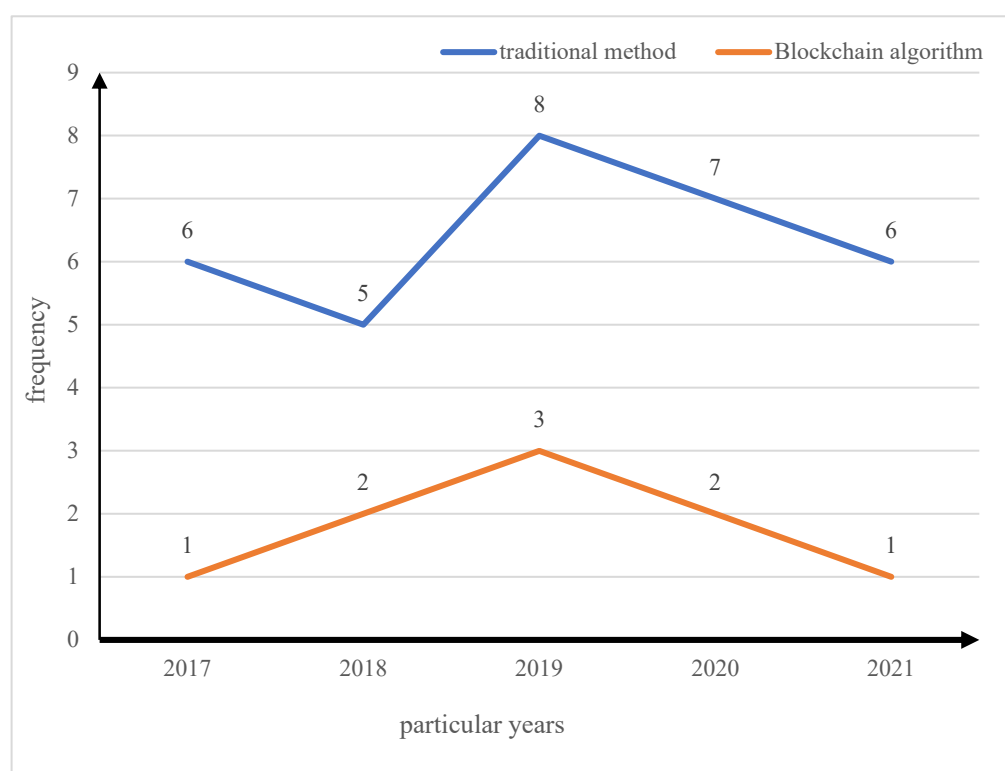


Figure 4. Enterprise A supply chain financial risk trend chart.

It can be seen from Figure 4 that, when using the blockchain for enterprise capital risk management calculation, the probability of enterprise risk occurrence was greatly reduced. At the same time, the number of risks predicted by the traditional method minus the number of predictions under the blockchain method was calculated in the traditional method to reduce the risk ratio. Taking 2018 as an example, which was the closest year to the forecast difference, it was concluded that the blockchain approach effectively reduced the risk of enterprises in the supply chain digital platform innovation management by more than 60%. This shows that, with the help of blockchain technology, the anti-risk ability of enterprise supply chain digital platform can be effectively improved, and the security of supply chain digital platform can be effectively improved ensuring the sustainability of enterprises.

Then, this paper used data to attack the digital platform innovation management of the blockchain centric enterprise supply chain to measure its security. This article observed whether the risk was found by using the method of attacking and tampering with data. Taking the distance of the blockchain as a variable, the probability of its success was

calculated. A computer science and technology Enterprise X and a cultural Enterprise Y were used as experimental samples, and the results are shown in Table 2.

Table 2. Successful attack in blockchain.

Distance	The Probability of Successful Attack under This Algorithm	Probability of Attack Success under Traditional Algorithm
0	1.000	1.000
1	0.256	0.426
2	0.052	0.385
3	0.014	0.249
4	0.006	0.193
5	0.002	0.157
6	0.001	0.084
7	0.001	0.052

It can be concluded from Table 2 that the farther the attack distance was from the block, the more difficult the attack was, and the probability of a successful attack was low. When the distance was seven nodes. The probability of successful attack of enterprises under the algorithm in this paper was reduced to 0.001, which shows that blockchain technology can effectively reduce the risk of malicious attacks and tampering of enterprise data and greatly improve the security of enterprise data. so enterprises can use blockchain to avoid risks. It can be inferred that in-depth research on blockchain technology was conducive to reducing enterprise risk. This process can be clearly described with a line chart, as shown in Figure 5.

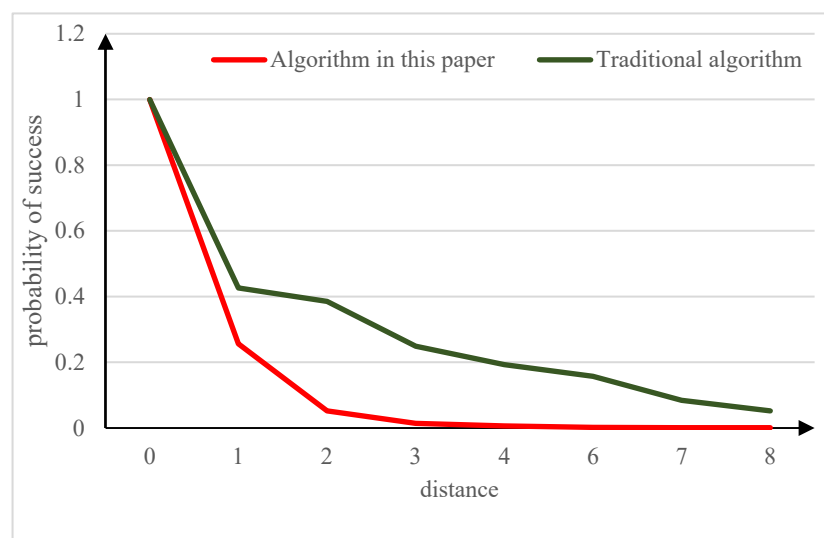


Figure 5. Blockchain experimental attack success chart.

It is clearly shown in the broken line diagram 5 that the farther away from the blockchain node, the lower the probability of success of the destruction and the infinitely closer to zero. Therefore, using the blockchain algorithm can reduce the probability of information error and control it at a lower value. However, under the traditional algorithm, the probability of successful destruction was obviously higher than that of this algorithm, which shows that this algorithm can effectively reduce the probability of enterprise destruction. From the perspective of sustainability, it is extremely appropriate to provide innovative development methods for enterprise supply chain digital platform innovation management.

To sum up, this paper gave the direction of supply chain enterprise management innovation under the blockchain, as well as highlighted that there are many enterprises in

various industries that use blockchain technology. The application of blockchain technology can ensure that the core interests of enterprises are not affected, and it can also ensure that the funds needed are managed in a safe way. For such upstream enterprises, the most fundamental need is for enterprises to take good care of their own funds. The purchasing company is primarily responsible for the delivery of products. Therefore, a series of work activities such as procurement should be managed scientifically and carefully. However, due to the huge burden of upstream enterprises, many connected operations would become more difficult, especially in supply chain logistics management. Therefore, relevant management leaders should fairly assign these difficult tasks to their employees and mobilize the enthusiasm of various functional departments. For the entire blockchain financial service platform, data encryption protects the basic information of the entire service platform. If an enterprise needs innovation and reform, it must have complete information to guide its reform direction. Therefore, people must rely on the blockchain to achieve information sharing, so as to break the information barrier, seek new opportunities and development in the digital platform innovation management of the supply chain of information sharing, promote enterprise sustainable development, and ensure enterprise vitality.

However, in the whole digital platform innovation management service of the supply chain, because the information of each core enterprise is not easy to release, there is no absolute information sharing. More often, small groups are formed, such that each core upstream enterprise forms its own small circle, which is not easy to develop as a whole. Therefore, it is still necessary to form an effective channel for information transmission between cores, and develop related supporting applications to further develop the blockchain theory and reach the situation of the Hundred Flowers Campaign. If this large sharing platform needs to be established, capital participation is also essential. Therefore, this paper believes that the supply chain financial assets should also be securitized, and the blockchain information should be used to integrate into the market, providing a new way for financing. In addition, people would continue to increase investment in science and technology and technical talents. It is believed that the progress of science and technology can continuously promote the intelligent development of enterprise supply chain finance, and constantly innovate in the supply chain.

Using the blockchain algorithm, this paper optimized the performance of the digital platform of enterprise supply chain, so as to improve the ability of digital platform in data transmission, reduce the problem of data loss in the transmission of network data information, and effectively improve the security of network data transmission. Innovative management of the digital platform of supply chain can help to promote the financial development of enterprises. With the help of blockchain technology, it can guarantee the financial security and information security of enterprises, and the supply chain of enterprises can become more reliable. Through the innovative management of the digital platform, the process industry of the enterprise supply chain can become more intelligent and scientific, thus reducing losses and finally realizing the economic growth of enterprises.

4. The Shortcomings of Blockchain and the Improvement Countermeasures

4.1. Shortcomings of Blockchain

As far as practical progress is concerned, the application of blockchain technology in enterprise supply chain digital platform innovation management technology has been initially established, but there are still deficiencies, and there is a lack of communication bridges between core enterprises. Policies and internal companies still have certain risks. There is still a long way to go before the application of blockchain technology in life and production. There are many defects in the ongoing development; below, we highlight three problems.

Firstly, due to the impact of national policies and the adverse environment of economic globalization, all companies meet international standards, and trade with other regions of

the world has become more intense. The characteristics of blockchain decentralization do not conform to people's daily production and lifestyle.

Because the blockchain theory is still in the early stage of development, there are many shortcomings in the formulation of rules and regulations on blockchain in enterprises. In the daily management of enterprises, the supervision and management of blockchain are not in place, and there are many problems in practical application, which restrict the development of enterprise supply chain and are not conducive to the management of enterprise supply chain digital platform.

Secondly, from a comprehensive perspective, blockchain still has many problems that cannot be solved temporarily. For example, under blockchain technology, there are certain difficulties in information verification, and the freedom of enterprises to use blockchain for supply chain innovation management is affected. In addition, the blockchain theory is in the early stage of development, and there is no corresponding tool that can be directly used to integrate the blockchain. There is also the technical problem of overloading the block capacity. Because the feature of the blockchain is that each node shares information, this results in excessive node information, which easily leads to the nodes in the blockchain becoming full. Such technical problems also restrict the development of the blockchain.

Lastly, due to the strong technical competitiveness of blockchain, if enterprises first study effective technical methods, they would ensure their own capital operation in the enterprise confrontation; therefore, there would be some malicious competition problems in technology, which is difficult to study, easily leading to enterprise stagnation.

4.2. Countermeasures for Improvement

In order to improve the application advantages of blockchain in enterprise supply chain management, government departments need to improve relevant laws and regulations as soon as possible, guide enterprises to reduce the adverse effects caused by the application of blockchain technology, and provide adequate supervision to enable enterprises to adapt to blockchain theory, continuously optimize and innovate the internal structure of enterprises, and escort their development.

Related enterprises also need to spend more energy to study blockchain technology, as well as combine some emerging technologies to effectively optimize the blockchain to solve some problems existing in the blockchain, so as to continuously inject vitality into the innovative management of enterprise digital platforms and promote the scientific development of enterprises.

Enterprises should strengthen cooperation, break down information barriers, realize the sharing, co-creation, and win-win scenario of digital resources, and strengthen the transmission of information, thus ensuring the security of enterprise supply chain finance.

5. Conclusions

This paper analyzed the innovative methods of enterprise supply chain digital platform management based on blockchain through a series of studies. Firstly, it used the characteristics of blockchain to ensure the security of supply chain digital platform. Secondly, it used blockchain algorithms to evaluate and analyze the digital platform innovation management of the entire supply chain. Lastly, it used supply chain financial innovation to stimulate enterprise. With the help of digital technology, it is proposed to realize the innovative management of the supply chain in the form of a digital platform of the supply chain. With the help of a digital platform, the capital security of enterprises can be effectively guaranteed and the sustainable development of enterprises can be promoted. In future research, it will be necessary to continuously innovate the management mode of the enterprise supply chain digital platform. While the blockchain technology is developing, it is also necessary to continuously apply the new technology of blockchain development to the enterprise supply chain digital platform in order to realize its sustainable development.

Author Contributions: L.X. and R.H. designed and performed the experiment and prepared this manuscript. All authors contributed to manuscript editing. All authors have read and agreed to the published version of the manuscript.

Funding: This work was supported by the Key Projects of Hubei Social Science Foundation (20182s0118): Research on Promoting the Deep Integration of Technology and Economy in Hubei.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Du, M. Supply chain finance innovation using blockchain. *IEEE Trans. Eng. Manag.* **2020**, *67*, 1045–1058. [CrossRef]
2. Zhang, L.; Hu, H.; Zhang, D. A credit risk assessment model based on SVM for small and medium enterprises in supply chain finance. *Financ. Innov.* **2015**, *1*, 14. [CrossRef]
3. Vu, T.L.; Nguyen, D.N.; Luong, T.A.; Nguyen, T.T.X.; Doan, T.D.U. The impact of supply chain financing on SMEs performance in Global supply chain. *Uncertain Supply Chain. Manag.* **2022**, *10*, 255–270. [CrossRef]
4. Saberi, S.; Kouhizadeh, M.; Sarkis, J.; Shen, L. Blockchain technology and its relationships to sustainable supply chain management. *Int. J. Prod. Res.* **2019**, *57*, 2117–2135. [CrossRef]
5. Teh, D.; Khan, T.; Corbitt, B.; Ong, C.E. Sustainability strategy and blockchain-enabled life cycle assessment: A focus on materials industry. *Environ. Syst. Decis.* **2020**, *40*, 605–622. [CrossRef]
6. Bai, C.; Sarkis, J. A supply chain transparency and sustainability technology appraisal model for blockchain technology. *Int. J. Prod. Res.* **2020**, *58*, 2142–2162. [CrossRef]
7. Parmentola, A.; Petrillo, A.; Tutore, I.; De Felice, F. Is blockchain able to enhance environmental sustainability? A systematic review and research agenda from the perspective of Sustainable Development Goals (SDGs). *Bus. Strat. Environ.* **2022**, *31*, 194–217. [CrossRef]
8. Li, Z.; Guo, H.; Barenji, A.V.; Wang, W.M.; Guan, Y.; Huang, G.Q. A sustainable production capability evaluation mechanism based on blockchain, LSTM, analytic hierarchy process for supply chain network. *Int. J. Prod. Res.* **2020**, *58*, 7399–7419. [CrossRef]
9. Yu, P. Integration of IoT and Blockchain for Smart and Secured Supply Chain Management: Case Studies of China. In *Integration of IoT and Blockchain for Smart and Secured Supply Chain Management: Case Studies of China*; IGI Global: Hershey, PA, USA, 2022; pp. 179–207.
10. Mudassar, R. Digital twin-based smart manufacturing system for project-based organizations: A conceptual framework. In *Proceedings of the International Conference on Computers and Industrial Engineering*, Beijing, China, 18–21 October 2019; CIE: Beijing, China, 2019.
11. Rehman Khan, S.A.; Yu, Z.; Sarwat, S.; Godil, D.I.; Amin, S.; Shujaat, S. The role of block chain technology in circular economy practices to improve organisational performance. *Int. J. Logist. Res. Appl.* **2022**, *25*, 605–622. [CrossRef]
12. Michael, J.; Cohn, A.L.A.N.; Butcher, J.R. Blockchain Technology. 2018, pp. 1–11. Available online: <https://www.steptoe.com/a/web/171269/LIT-FebMar18-Feature-Blockchain.pdf> (accessed on 19 May 2023).
13. Sarmah, S.S. Understanding blockchain technology. *Comput. Sci. Eng.* **2018**, *8*, 23–29.
14. Mukherjee, A.A. Application of blockchain technology for sustainability development in agricultural supply chain: Justification framework. *Oper. Manag. Res.* **2022**, *15*, 46–61. [CrossRef]
15. Shoaib, M.; Zhang, S.; Ali, H. A bibliometric study on blockchain-based supply chain: A theme analysis, adopted methodologies, and future research agenda. *Environ. Sci. Pollut. Res.* **2023**, *30*, 14029–14049. [CrossRef]
16. Khor, J.H.; Sidorov, M.; Zulqarnain, S.A.B. Scalable Lightweight Protocol for Interoperable Public Blockchain-Based Supply Chain Ownership Management. *Sensors* **2023**, *23*, 3433. [CrossRef]
17. Anitha, A.; Haritha, T. The Integration of Blockchain with IoT in Smart Appliances: A Systematic Review. In *Blockchain Technologies for Sustainable Development in Smart Cities*; IGI Global: Hershey, PA, USA, 2022.
18. Haritha, T.; Anitha, A. Asymmetric Consortium Blockchain and Homomorphically Polynomial-Based PIR for Secured Smart Parking Systems. *Comput. Mater. Contin.* **2023**, *75*, 3923–3939. [CrossRef]
19. Yontar, E. Challenges, threats and advantages of using blockchain technology in the framework of sustainability of the logistics sector. *Turk. J. Eng.* **2023**, *7*, 186–195. [CrossRef]
20. Xu, X.; Zhu, D.; Yang, X.; Wang, S.; Qi, L.; Dou, W. Concurrent Practical Byzantine Fault Tolerance for Integration of Blockchain and Supply Chain. *ACM Trans. Internet Technol.* **2021**, *21*, 1–17. [CrossRef]
21. Xu, M.; Chen, X.; Kou, G. A systematic review of blockchain. *Financ. Innov.* **2019**, *5*, 27. [CrossRef]

22. Mathivathanan, D.; Mathiyazhagan, K.; Rana, N.P.; Khorana, S.; Dwivedi, Y.K. Barriers to the adoption of blockchain technology in business supply chains: A total interpretive structural modelling (TISM) approach. *Int. J. Prod. Res.* **2021**, *59*, 3338–3359. [[CrossRef](#)]
23. Manupati, V.K.; Schoenherr, T.; Ramkumar, M.; Wagner, S.M.; Pabba, S.K.; Singh, R.I.R. A blockchain-based approach for a multi-echelon sustainable supply chain. *Int. J. Prod. Res.* **2020**, *58*, 2222–2241. [[CrossRef](#)]
24. Koh, L.; Dolgui, A.; Sarkis, J. Blockchain in transport and logistics—Paradigms and transitions. *Int. J. Prod. Res.* **2020**, *58*, 2054–2062. [[CrossRef](#)]
25. Liu, P.; Hendalianpour, A.; Hamzehlou, M.; Feylizadeh, M.R.; Razmi, J. Identify and rank the challenges of implementing sustainable supply chain blockchain technology using the bayesian best worst method. *Technol. Econ. Dev. Econ.* **2021**, *27*, 656–680. [[CrossRef](#)]
26. Mubarik, M.; Rasi, R.Z.R.M.; Mubarak, M.F.; Ashraf, R. Impact of blockchain technology on green supply chain practices: Evidence from emerging economy. *Manag. Environ. Qual. Int. J.* **2021**, *32*, 1023–1039. [[CrossRef](#)]
27. Vu, T.T.; Trinh, H.H.H. Blockchain technology for sustainable supply chains of agri-food in Vietnam: A SWOT analysis. *Sci. Technol. Dev. J. Econ. Law Manag.* **2020**, *5*, 1278–1289. [[CrossRef](#)]

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.