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Research Article

Application and Development Prospect of Blockchain in Modern City Governance Information Management System

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The supply chain is an organization alliance formed by the aggregation of many enterprises and based on the information flow to realize the coordinated operation of all links between enterprises. Therefore, enhancing the information synergy between enterprises is a weapon to enhance the overall competitiveness of the supply chain. The introduction of information management technology is the technical support and fundamental guarantee to realize the supply chain information synergy capability. The introduction of blockchain solves the two main problems of traceability and irreversibility of transactions in the supply chain, which can effectively improve the transparency of the supply chain. Transparency, as an important point for all stakeholders in the supply chain, can ensure that product information can be viewed and obtained in a timely manner. The purpose of this article is to analyze the role of blockchain in the modern city governance information management system by observing and analyzing the methods of modern city governance information management system and to understand the application and development prospect of blockchain in the modern city governance information management system. The comparison of the blockchain before and after the implementation of the modern city governance information management system and the research on the application and development of the blockchain in the modern city governance information management system were analyzed. Using the method of this article, through the analysis of experimental data, I learned the role of blockchain in the modern city governance information management system and found that the blockchain plays an important role in the application and development of the modern city governance information management system, with a satisfaction of 60%. Through the combination of theoretical and experimental data, the application and development effect of the blockchain in the modern city governance information management system is analyzed to reach 55%. The research results show that the blockchain is in the application and development of the modern city governance information management system. It plays an important role. The strength of information flow transmission, processing, and analysis capabilities directly affects the smooth flow of transactions and interactions in all links of the supply chain.

1. Introduction

Blockchain originated from the virtual digital currency Bitcoin. As a basic technical support, Bitcoin is the technical guarantee for Bitcoin's decentralization, intelligence, and security operations. Since the concept of blockchain was proposed, the academic community has not yet given a unified definition. The formal definition of the blockchain is as follows: as a basic data protocol, the blockchain can be regarded as a distributed database, even for the operator of the database node; it is also a continuously growing and unchanging data system. This article believes that the blockchain is composed of blocks connected in chronological order. It does not need to rely on third-party agencies to provide trust. Using technologies such as cryptography and mathematical methods, a highly secure and memorable distributed shared database can be ensured. The emergence of decentralization effectively solves the above problems, not only eliminates intermediate costs and reduces the economic pressure of users but also greatly reduces the intermediary caused by delays, and realizes point-to-point information transmission and value transmission. The increase in time also increases the economic benefits of users [1]. For example, a poverty-stricken county has introduced the smart beekeeping technology of "Alibaba Cloud IoT + blockchain traceability" and deployed smart beehives, video surveillance, environmental monitoring poles, large data screens, and other equipment, as well as a blockchain traceability platform and a collaborative production and sales traceability platform. Poverty was lifted out of the honey industry.

Blockchain technology has the characteristics of high transparency, decentralization, trustlessness, collective maintenance, and anonymity. In this system, free and flexible value transfer activities can be realized without the credit provided by other credit institutions. Taking the online bank transfer process as an example, in addition to registering relevant information, you must also fill in the beneficiary's account name, the beneficiary's bank name, ID number, signature, and many other information. In addition, because banks need to process and verify related information and processes, relevant institutions and personnel need to invest a lot of time and energy, which restricts the realization of process effectiveness. Decentralization is different. Only limited information needs to be entered, such as the address of the counterparty and transaction amount, and the value transfer can be completed in an instant, which effectively improves the deficiency of the existing credit mechanism and maximizes time effectiveness. Smart contracts consist of a series of codes. According to the code setting, when the conditions are met, the conditions can be automatically identified, judged, and executed without any intermediary involvement [2].

Applegate and other scholars found that once the execution cannot be stopped, the essence of the agreement is an independent agreement, which is an effective technical means to achieve the exchange of target values and avoid interference from external factors. Smart contracts are similar to contract systems, but different from ordinary contracts as we know them. How to ensure that the blocks and timestamps in the blockchain are linked in chronological order is discussed [3]. The timestamp is the "timestamp" of each transaction, which effectively solves the problem of repeated payments, so that each transaction can be traced back to the source, and has the characteristics of nontampering and nonforgery [4].

This article uses the method of experimental research to understand the role of blockchain in the modern city governance information management system, as well as the comparative exploration before and after its use. Through theoretical analysis and experimental exploration, find out the function and process data through data recording, sorting, calculation, mapping, analysis, and simulation through the blockchain in the modern city governance information management system correlation data statistical data set, combined with data and empirical analysis of blockchain in modernization. The role of urban governance information management system, combined with effective data, summarizes and analyzes the role of blockchain in modern city governance information management system. The results show that with the method of this paper, the recognition rate reaches 34%, which is faster and 20% faster than others.

2. Specific Methods Are Suggested

2.1. Blockchain. A blockchain is a database with a function of "hashing verification" of data. Blocks are data blocks, which combine data blocks into a chain structure in chronological order and use cryptographic algorithms to collectively maintain the reliability of the database in the form of distributed accounting. All data blocks are connected in chronological order to form a blockchain.

In the following aspects, the timestamp is superior to the general time recording function: first, the timestamp ensures the automatic and orderly connection of chronological blocks, rather than the idle arrangement in the database. Secondly, timestamp is an auxiliary tool for information query, which can save a lot of time. It is very convenient to query all information before and after, saving a lot of manpower and material resources. Finally, the timestamp guarantees the authenticity of the data. With the help of timestamps, the continuity of data generation can be well reflected. Once the information is maliciously deleted and tampered with, the node can be found in time, thereby further improving the authenticity, accuracy, and security of the data on the chain. The operating mechanism of the blockchain enables it to effectively resist malicious attacks [5]. Selective encryption and other specific data transmission volume are nodes on the open-source chain, and nodes can query the development and use of real-time data chains and related applications [6, 7].

The blockchain is composed of blocks connected to each other in time, and each block is also composed of fixed components. A block generally consists of data information, a timestamp, a hash value, a random number, and information about the previous block. Piece and blocks, as the basic unit of the blockchain, are both the structural elements of the system and the information carrier of the shared database [8, 9]. If the blockchain is likened to a large ledger, then the block is every page of this large ledger. It not only records the time, address, and content of the current transaction but also stores all data before the point in time in a fixed location in an inherent form, which is the basis for supporting queries, traceability, and other functions. In a broad sense, timestamp is to provide time proof for each transaction to verify the authenticity of transaction data; narrowly speaking, timestamp is an important part of block metadata and naturally has time characteristics. In a sense, blockchain can be understood as building a never-ending, indestructible timestamp system [10, 11].

Blockchain technology serves customers by facilitating the tracking and tracing of all stages of order production through delivery and quick adjustments. The applications brought about by blockchain technology can only be implemented at specific touch points in the network if accepted by the relevant parties, thus controlling the data security of all supply chain transactions.

Its main operation mechanism is as follows: first, obtain a piece of data information in the system; then, operate it automatically through a hash algorithm; and finally, convert it into a fixed-length irreversible output hash [12]. Because the process is irreversible, the original data cannot be calculated from the output information, and the security of the data information is protected to the greatest extent. In addition, any change in the bytes results in a huge difference in the output hash, which provides a simple and fast way for nodes to verify the authenticity of the data. Random numbers are one of the most critical data items in a block [13, 14]. It requires accountants to continue their efforts. Although there are many valid numbers, the answer is hard to come by. There are no fixed algorithms or shortcuts. The only way is to keep trying. Therefore, people call this process "mining." The process of "mining" is also irreversible, but its verification process is simple and provides another technical guarantee for data security [15]. In the previous piece of information, in the blockchain, each block not only contains all the transaction information in the current time period but also cleverly compresses the previous transaction information and saves it in each block to ensure that each transaction can be traced back quickly to the source. In addition, the previous transaction records are also compressed and stored in the hash value, which saves a lot of storage space for the database [16]. In the computer system, first, the system does not rely on a central server for operation, and the interests of members come from the participation of other members; second, the rights and obligations of system members are equal, taking into account the client and the server; make up real or virtual groups, and know each other's existence. First is decentralization. The resources and services in the system are scattered on each node, and each node has the right to use and consume equally. Through the cooperation between the nodes, the content transmission and service sharing between the nodes can be realized directly, which avoids the possible centralized management bottleneck; second is scalability [17, 18]. With the development of hardware technology and the rapid growth of computer storage capacity and network bandwidth, P2P can effectively use a large number of node resources scattered in the network and allocate value exchange, information exchange, or data storage to all nodes. On the whole, the blockchain is actually a decentralized data storage structure constructed by a P2P network.

2.2. Urban Governance. The application of information technology has given birth to the new urban concept of "smart city." In the governance of smart city, the collaborative governance model of multiparticipation is difficult to effectively coordinate the relationship between the participating subjects, resulting in the dilemma of urban governance. It is particularly necessary to introduce blockchain technology in urban governance. Blockchain technology helps to establish a trust mechanism between urban governance entities. On the one hand, it clarifies the rights and responsibilities of people and things in the city, reduces the cost of urban governance, and on the other hand promotes the efficiency of urban governance.

Each node of the blockchain has a copy of all the data of the system. Once the data is updated, the information will be quickly copied to each block to ensure the integrity and authenticity of the data information. Encryption technology is the core technology to ensure the security of data and information, and it is an active and effective means of security. Use mathematical algorithms to encrypt the information and convert the information into ciphertext. The ciphertext cannot be pushed back to prevent illegal users from stealing the user's original data and maintain the confidentiality and security of the data. According to different key algorithms, encryption technologies can be divided into two categories: symmetric encryption technology and asymmetric encryption technology. Among them, symmetric encryption uses only one key for encryption and decryption. Once the private key of any party is disclosed, the entire communication content will be decrypted. Asymmetric encryption uses key pairs, one for encryption and the other for decryption [19]. Unlike symmetric encryption, keys need to be synchronized first. In contrast, the security of symmetric encryption depends only on the key itself. The private key can explain the information carried by the public key and important privacy information of the node user. Once the private key is lost, its owner may lose all resources, resulting in huge losses. The content of synergy theory mainly includes the following three aspects: (1) synergy: synergy is the result of synergy. In an open and complex system, a large number of subsystems interact to produce an overall effect that cannot be achieved by the individual, thereby better coping with the complex external environment and improving the overall flexibility of the system. (2) Servo principle: in other words, fast variables are subject to slow variables—the cooperation speed and effectiveness of the entire system are constrained by the slowest variables in the entire system. Similar to the bucket principle, the "short board" in the system will ultimately determine the benefits of each component. (3) The principle of self-organization: self-organization is relative to other organizations. Other organizations refer to the external effects caused by organizational changes, while self-organization refers to the spontaneous changes between internal subsystems to form a synergistic effect. Therefore, it has a new structure and function to better respond to the new environment and maximize organizational development.

It has the following characteristics: common goals. There are two main reasons for the synergy of the system: first, changes in the external environment force the system to adjust for survival or development; on the other hand, in order to better survive or develop the system through the coordination between the various subsystems and the sufficient resources, reasonable configuration enhances the overall adaptability of the system and produces synergistic effects. But the premise is that the relevant subsystems are internally adjusted under the same goal. Consistent goals make each part have a clear direction and upgrade in a coordinated and unified manner. In the production process of the new structure, the weakest regulating variable plays a decisive role in system synergy, so the synergy process is a process of overall change. Significant component changes will not result in overall optimization and upgrades. Therefore, we cannot ignore the overall coordinated development, because we pay too much attention to the individual and the relationship between the parts is very close. Through mutual communication and joint adjustment, we can eliminate the "barrel" effect to the greatest extent and improve the overall advantage of the system. For spontaneity, regardless of the external factors or the coordination caused by internal factors, they are systemic spontaneous adjustments and cannot be forcibly interfered by the outside world. Only spontaneous adjustments can make their development more stable and durable, and the consistency of goals can be further consolidated. The new structure, new features, and new functions of the system produced by the cooperation of various subsystems cannot be achieved through the self-improvement of the subsystems, which is also one of the important reasons for the overall cooperation of the selection system. A business language is recognized by a computer [20]. It can be seen that it has three main characteristics: one is that the form of content transmission is recognized and standardized; the second is that electronic data exchange enables data transmission between electronic devices; and the third is that information is transmitted using computer-recognizable languages. At present, electronic data interchange has been widely used in various aspects of real life, such as data transfer between international trade, transfer of packing slips and bills of lading in international shipping, etc., to achieve "paperless trade" [21, 22].

It is not difficult to see that electronic data exchange has played an important role in reducing the error rate, shortening order processing and delivery time, and reducing enterprise inventory [23]. However, in view of the huge changes in the current market environment, electronic data exchange technology still has certain shortcomings in the following aspects: first, electronic data security. With the rapid development of network information technology, malicious information technologies and software such as hackers and viruses are also increasing. On the basis of paperless transactions, data security is becoming increasingly important. However, there are no relevant defense measures in the electronic data exchange technology, which poses a great threat to the data security in the system and also brings many uncertain factors to the effective operation of the information collaboration system. Second, it does not completely require manual processing [24]. Although this technology does not rely on paper documents to a certain extent, the goal of collaborative information management is to achieve completely electronic document processing [25]. Only fully electronic document data can ensure that the transaction process is not disturbed by human factors, minimize the probability of errors, and maximize transaction efficiency [26]. Third, the cost is high. Because electronic data exchange requires the use of recognized data transmission standards, the data exchange system must be used uniformly, otherwise real-time data transmission cannot be achieved. However, for the supply chain of SMEs, due to weak capital strength, weak technical capabilities, and other reasons, the establishment of the system will lead to a reduction in their working capital, reduce their ability to respond to emergencies, and increase their ability to operate risk impacts. For the information on synergies in the supply chain, from data collection, processing, and analysis to data use, the initiative is in the hands of core companies, and the use rights of other supply chain companies are greatly restricted. Therefore, this model cannot meet the needs of modern supply chains, and there are many problems to be solved. First, centralized management will cause a large number of data resources to be idle. The supply chain includes not only supply and manufacturing but also various companies such as logistics and sales. Therefore, the information resources in the supply chain database are complex and diverse. The supply chain database is a data network that can meet the decision-making needs of various enterprises, but centralized control agencies make it impossible for noncore enterprises to effectively assist the operation and information resources of the enterprise, resulting in the second highest utilization of information and centralized management to reduce the degree of visualization [11, 27].

2.3. Information Management. The realization of supply chain information coordination is based on fast and reliable information flow. The degree of visualization directly affects the quality of the information flow. However, restrictions on access rights, nondisclosure of data, and deliberate concealment will seriously hinder the transparency of the operation process and affect the scientificity and accuracy of supply chain companies' decisions. Finally, nondisclosure of information will further cause the problem of uneven distribution of benefits, threaten the trust foundation of supply chain companies, seriously dampen the enthusiasm of supply chain companies for cooperation, and then affect the effectiveness of supply chain coordination. The cooperation of production information mainly refers to the process guidance and improvement of the production process and the supply chain that improves production efficiency, reduces the friction coefficient in the production process, accelerates the seamless connection speed of each link, reduces production delays, and improves product quality. Production collaboration is an important part of supply chain collaborative management. The quality of the product or service directly affects the quality characteristics of the enterprise and customer loyalty to the entire supply chain. This is also a key link that determines the long-term development of the supply chain. From different dimensions, blockchain classification can get different blockchain classifications. This article divides the blockchain into permission chains and nonpermission chains based on whether the connection of the nodes requires permission from other members. The license chain consists of a public license chain and a private license chain, sometimes called the alliance chain. Member nodes in the alliance chain need to get permission from other members in the alliance to join. Members in the alliance chain understand each other's identities, and their consensus is participated by the alliance members. Data read and write permissions are established in accordance with alliance rules. Sometimes, the private permission chain is also called the private chain, which is applicable to the internal system of the unit or organization. The read and write permissions of data are controlled by the organization, so it cannot completely solve the problem of appointment letters. The unlicensed chain is also known as the public chain. Any organization or individual is free to join or withdraw from the blockchain system, and system members can participate in negotiations and have read and write permissions to the data.

Several key data structures and cryptographic algorithms are used in the data layer to ensure that the recorded data cannot be tampered with. The network layer defines the network structure, message protocol, and verification mechanism of the blockchain system. The consensus layer defines how distributed nodes agree on the content of block data. The incentive layer rewards the nodes that contribute to the blockchain system, so that most nodes maintain integrity in the system for the purpose of maximizing their own interests. The contract layer provides developers with a variety of scripts for their use. Some blockchain systems also provide Turing's complete development language and running language virtual machines. On these virtual machines, a variety of smart contract applications can be implemented. The application layer is based on the layers below it and leverages the advantages of the blockchain to provide a variety of decentralized application services. Blockchain technology is a series of mature or emerging technologies. Under the effective and reasonable use of various technologies, it provides a secure and stable operating environment for the blockchain network. The blockchain technology model is divided into six layers: application layer, contract layer, incentive layer, consensus layer, network layer, and data layer. Among them, the consensus layer, network layer, and data layer are the three core layers necessary for a blockchain network and are the basis for ensuring the normal operation of the blockchain network. The related technologies used in these three layers also provide new solutions for the development of information security technology for the Internet of Things. These consensus algorithms for public chains have problems such as large resource consumption and low efficiency. Although they have high fault tolerance and strong antiattack capabilities, they sacrifice certain availability and are not suitable for IoT environments with high real-time requirements.

Blockchain is a low-level technology for solving credit problems. From a technical perspective, the blockchain is a decentralized, distributed database. Each node in the distributed environment maintains an independent state, and the destruction of a few nodes will not affect the operation of the entire system. For enlightenment from theoretical thinking, in order to obtain decentralization and equal information status in the Internet era, technical experts and scholars have made great achievements in information equality theory. The development of this theory greatly encouraged later scientists and computer experts to explore a decentralized currency, which provided theoretical guidance for the struggle for equal power. The development and maturity of technology are also a necessary condition for the creation of blockchain. The emergence of cryptography, the gradual improvement of algorithms, and the introduction of computer computing capabilities and distributed concepts have made great contributions to the development of blockchain. Interaction in a broad sense refers to the communication and interaction between all things. It can be the interaction between people, people and things, and things and things, but it is not limited to the use of language, senses, expressions, touch, etc. to generate a certain relationship.

3. Some Related Experiments

It can be seen that the governance of smart cities is inseparable from two key elements; one is wisdom, and the other is governance. The "wisdom" of a city mainly comes from data collection, processing, analysis, and application supported by technology. The "governance" of a city emphasizes multiparty participation and win-win cooperation, and the ultimate goal of governance is to serve the overall interests of urban residents. Therefore, the governance of a smart city means that different actors in the city use data, experience, and knowledge to make logical inferences and rational thinking and use these inferences and thinking in the practice process of urban decision-making and behavioral norms.

3.1. Experimental Object. According to the conclusion of the requirements analysis, the functions of each module are designed and implemented in detail, and the experimental components can be compared for low, medium, and high groups. The interaction between web vocabulary mainly refers to the creation of a platform or functional state. Users can not only obtain relevant information, information, or services but also communicate and interact between users or between users and the platform to collide more. Ideas, thoughts, and needs define the content and structure of communication between two or more interacting individuals, enabling them to cooperate with each other to achieve certain goals. Information design refers to people's skills and practice in image processing of information content. It simplifies some information knowledge into complex and rich content and makes it easy for the audience to understand. Improve people's application information and efficiency through information design. At present, more and more countries and enterprises have realized the importance of information design, and at the same time, they have also spawned professional companies that provide information design services, and universities have begun to pay attention to this new profession. Scholar Song Jidong believes that interactive information visualization can not only make complex information easier to understand but also make it easier for users to acquire knowledge. Interaction design is mainly to improve the user's understanding ability, increase the interest in information acquisition, and reduce the user's learning cost. Information visualization is mainly to help users understand the information, make the information more intuitive and easy to obtain, and attract users' attention. The combination of the two design methods makes design information easier to understand and more interesting. Thereby, the information display effect is better exerted. Information visualization is different from scientific visualization and data visualization. The research objects of information visualization are mainly nonspatial, abstract, and unstructured information collections. Scientific visualization and data visualization mainly study spatial data with geometric properties. Information visualization mainly represents abstract information through graphics to help people understand and dig deeper information content.

3.2. Experimental Methods

(1) Literature analysis. This is one of the main methods used in this article. Through consulting, collating, and analyzing a large amount of document information and the cooperation between the blockchain and the supply chain, we have an in-depth understanding of the research background and significance of this research and a more comprehensive understanding of relevant theoretical and technical principles and laid the foundation for subsequent research. A solid foundation of influencing factors and issues in the process of information cooperation on a supply chain basis is laid

(2) Research methods combining qualitative research and quantitative analysis. In the research and writing process of this article, on the one hand, a systematic qualitative analysis of the problems and influencing factors in the traditional supply chain information collaboration process is conducted; on the other hand, from the perspective of quantitative analysis, using relevant game theory knowledge based on the research of the blockchain, the case analysis of the supply chain information collaboration process is conducted to further deepen the optimization of the supply chain information collaboration system

(3) Model analysis. Based on the specific analysis of the traditional supply chain information collaboration system, this article reveals the shortcomings of practical applications and, on this basis, introduces blockchain optimization. Through the construction of a model and comparative analysis, the applicability of the supply chain information collaboration system is proven. And superiority based on the blockchain achieves synergies throughout the supply chain

Scientific visualization and data visualization are mainly to allow researchers to better understand direct understanding of structure and data results. Therefore, interactive information visualization as a design method is more suitable as the first step in the design practice of popular science exhibition halls. The first step is to gather a large number of requirements. The second step is to remove the coarse and fine, to define the product functions more clearly, to lock the user's goals and needs, and to further subdivide the product. For scalability, the network can increase or decrease nodes arbitrarily, and the status of the newly added nodes is consistent with the status of other nodes. For fault tolerance, downtime and restart of any node in the network will not affect the propagation of the message; for decentralization, no central node is required, all nodes are equal, and no node needs to know the status of the entire network; as long as the network is connected, any node can propagate the message to the entire network; for consensus convergence: there is no guarantee that all nodes will receive the message at a certain time, but the message will propagate rapidly in the network at an exponential speed.

4. Detailed Description

4.1. Blockchain-Related Analysis

4.1.1. Gas Required for Digital Identity Management. According to the statistical analysis of the data, as shown in Figure 1, Gas is the "workload" required to measure an action or a group of actions and is a unit of measure for transaction costs. Gas exists inside the Ethereum Virtual Machine as a count of computational workload. On the one hand, it serves as a reward for miners to package blocks, and on the other hand, it raises the threshold for malicious transactions and maintains the normal operation of the Ethereum network. The costs of creating a smart contract or performing a function in a smart contract include contract execution costs and transaction costs. Under this framework, the registration of an autonomous identity is to create a digital identity agency contract DIPC, a digital identity storage contract CD, a digital identity verification contract IAC, a digital identity restoration contract IRC, and a digital information verification contract IVC in the digital identity management contract DIMC. Digital identity authentication (login) is called IAC contract; digital identity and related information authentication uses IVC protocol; digital identity authorization is called optical disc contract; digital identity retrieval is related to IRC contract. Taking digital identity registration as an example, users need to consume about 360 Gas to obtain an autonomous digital identity. The management cost of autonomous digital identity is low, making the application of this framework possible.

4.1.2. Analysis of Attack Nodes. According to the statistical analysis of the data, the probability of the attacking node successfully tampering with the block data, where the ordinate is the tamper probability and the abscissa is time, is shown in Figure 2 and Table 1. After a period of time, the probability of successful attack is close to 66%. Then, the rewards it receives as an honest node far outweigh the benefits of tampering with the data. In theory, all nodes will eventually receive the message, so this is a final consensus protocol. The negotiation layer is the core of the blockchain system, and the negotiation algorithm is the essence of the blockchain. The negotiation algorithm, also known as the consensus mechanism, is essentially a solution. When an inconsistency occurs in a distributed system, a unique and universally recognized result is determined through it to resolve the inconsistency. The consensus algorithm is to determine the distributed ledger accounting process among the nodes in the blockchain system according to the prenegotiated rules, so that different nodes agree on the transaction data, thereby ensuring the consistency and authenticity of the distributed ledger. The essence is that different nodes adopt a distributed consensus mechanism to reach an agreement on the structure of the blockchain, which is also the core of the blockchain system.

4.2. Analysis of Information Management System

4.2.1. Delay Algorithm. According to the statistical analysis of the data, as shown in Figure 3, when using the consensus delay algorithm, that is, the algorithm consensus nodes before 200 years, in idle time, in general, all nodes elect the

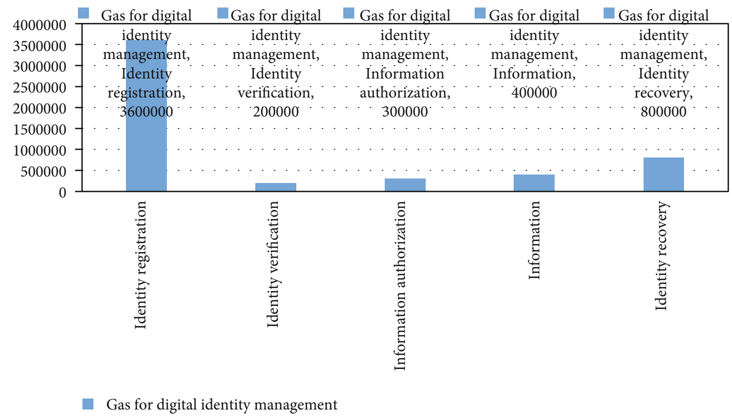

Figure 1: Gas for digital identity management.

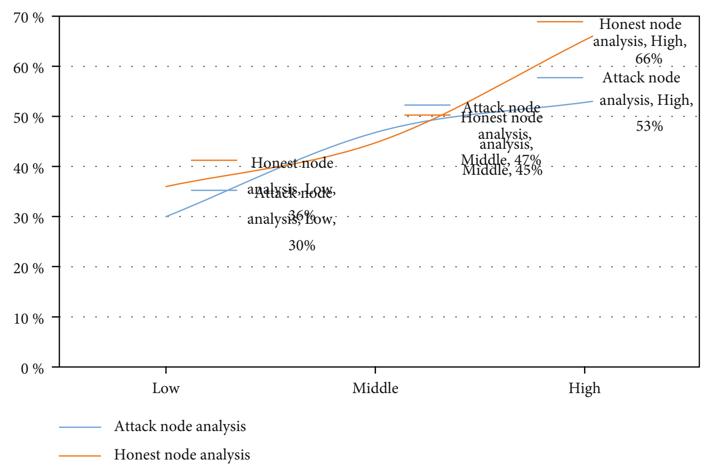

Figure 2: Attack node analysis.

Table 1: Attack node analysis.

	Low	Middle	High
Attack node analysis	30%	47%	53%
Honest node analysis	36%	45%	66%

master node to lead a consensus: proposal: select the master node responsible for the new block; validation: other nodes are responsible for validating the proposed block. If most nodes pass the verification, the proposed block can be updated to the main chain; uplink: all nodes add new blocks to the main chain to complete a complete consensus process. The security foundation of the blockchain is guaranteed using digital encryption technology. Data encryption technology is the most basic security technology and is known as the core of information security. It was originally mainly used to ensure the confidentiality of data during storage and transmission. Once the digital encryption technology is destroyed, the data security in the blockchain will be challenged, and its antitampering functions will no longer exist. Digital encryption technology uses cryptographic algorithms to solve data security problems. It replaces the protected information into ciphertext through various methods such as transformation and replacement and then stores or transmits the information. Even if the encrypted information is obtained by unauthorized persons during the storage or transmission process, it can also ensure that the information is not cognition, so as to achieve the purpose of protecting information. The confidentiality of this method depends directly on the cryptographic algorithm and key length used. There are two encryption algorithms, one is symmetric encryption algorithm; the application is earlier, and the technology is mature. The characteristics of the symmetric encryption algorithm are that the algorithm is open, the calculation amount is small, the encryption speed is fast, and the encryption efficiency is high. The second is the asymmetric encryption algorithm. The asymmetric encryption algorithm is used. Before the communication between the sender and the receiver, the receiver must send the public key that has been randomly generated to the sender and keep the private key. Since asymmetric algorithms have two keys, they are particularly suitable for data encryption in distributed systems. With the advent of the era of big data, data, as a valuable resource with huge potential, has attracted more and more attention. In addition, a large amount of data is closely related to user behavior, which makes users

Figure 3: Delay algorithm.

pay more and more attention to the privacy protection of their data. But at present, data is still in the hands of so-called industry giants, whether in traditional areas such as digital identity or healthcare.

4.2.2. Implementation Effect Analysis. According to the statistical analysis of the data, as shown in Figure 4, the willingness of the blockchain is to replace the current infrastructure (for example, like the back-end systems of many financial institutions in the world, it can process thousands of transactions per second), Because the blockchain integrates a number of basic technologies such as distributed accounting, nontampering, and smart contracts, it has built a mechanism for establishing trust at a lower cost, which can play a huge role in many business scenarios, especially in the financial field. Therefore, there is no doubt that blockchain has the potential to become a new generation of infrastructure. For transaction throughput, the higher the volume, the more interesting the blockchain technology is. As the number of nonlicensed chain nodes deployed for each virtual server increases, its throughput decreases due to hardware limitations. Since each account sends transaction blocks asynchronously to other unrelated accounts, it does not need to wait for merchants to pack like traditional blockchains do. Analyze, utilize, and even tamper with data without the user's knowledge. With the advent of blockchain technology, its inherent transparency, credibility, tamper resistance, traceability, and high reliability have opened up

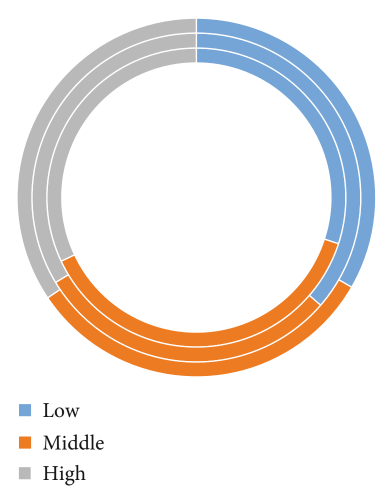

Figure 4: Implementation effect analysis.

new ideas for data confirmation and storage and protection of data privacy. In the use of blockchain technology to ensure the authenticity and reliability of the original data, the lack of market liquidity of data assets can be converted into certificates, which can be freely traded in the financial market through commoditized method data, which makes the value of user data resources tend. However, some scholars believe that the real realization of blockchain in supply chain applications is inseparable from the mutual trust between enterprises. Only in this way can an effective consensus foundation be formed and the ability to cooperate with each other and the operation efficiency of the supply chain can be improved.

5. Conclusions

(1) It greatly reduces the cost of input and maintenance and is conducive to achieving synergistic benefits. On the one hand, the nature of the blockchain is a series of program code, so its introduction cost is very low, so the supply chain enterprises do not need to make major changes to the original information processing system; on the other hand, the bottom layer of the blockchain technologies, such as asymmetric encryption, is very flexible to set up and deploy, which can be reset by manual intervention in emergency situations, greatly reducing later maintenance and operation costs, and it provides a new method to reduce costs and improve supply chain efficiency; this is a new model to realize the information supply chain

(2) This will be described in detail in later studies and will not be described here. Although product design centered on the user's goals is important, balancing business models and technical levels is also important. Considering users on the premise of business and technology balance, this requires communicating with the technical department and understanding the business goals before designing

(3) Intelligent process processing to reduce error rate. It can be seen from the optimized process that the operation department, sales department, and finance department rely on smart contracts to achieve seamless docking. Code review, verification, and other processes will be performed automatically according to the content of the contract, which can eliminate the interference of human factors, realize real-time data sharing, effectively reduce the probability of errors, improve the accuracy of the cooperation process, and maximize the synergy effect

Data Availability

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

Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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