

Assistance of Internet of Things to Intelligent Business Management Model of Supply Chain Finance and Modern Logistics Enterprises

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ABSTRACT

Since its birth, supply chain finance (SCF) has made contributions to the development of small and medium-sized enterprises, but it also faces many challenges in the development process. With the development and continuous progress of the internet and information technology, it has also opened up new ways for urban development and innovation. This article introduced the background of intelligent business model, conducted academic research and summary on the keywords of SCF and the internet of things (IOT), and then summarized urban analysis by combining AI and big data. Then it put forward the business model factor analysis of SCF and modern logistics enterprises. At the end of the article, the simulation experiment was carried out, and the experiment was summarized and discussed. The experimental results showed that the average transaction cost of the new business model was 3.5 lower than that of the traditional business model. With the continuous development of artificial intelligence technology and big data technology, urban planning is also facing new opportunities and challenges.

KEYWORDS

Artificial Intelligence, Big Data, Business Models, Internet of Things, Urban Analysis

INTRODUCTION

With the development trend of smart logistics in the future, the transportation cost of global economic integration may be higher and higher. How to reasonably allocate and use resources to effectively reduce production costs is a problem that major companies must address. To achieve this goal, a highly developed, reliable, and fast logistics system should be established. With the global economic integration and the booming Internet economy, the role of logistics has changed from a single cost control to improving the service quality of customers and the overall competitiveness of enterprises.

Many scholars have studied the business model intelligence of supply chain finance (SCF) and modern logistics enterprises. Liu et al. (2019) reviewed the current SCF and analyzed the business model based on the city's background, internal and external advantages and disadvantages, and development trend. Ping et al. (2018) analyzed the existing problems from the perspective of reverse

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logistics and proposed corresponding countermeasures on how to deal with reverse logistics. Liashenko et al. (2021) proposed a structural solution for the interaction between transportation and logistics cluster and innovation ecosystem through research, so as to achieve the strategic goal of regional innovation development based on intelligent skills.

Rostami et al. (2019) made a theoretical analysis on the ways of SCF to improve the competitiveness of logistics enterprises and established a comprehensive evaluation index system. Kurpjuweit et al. (2021) sustained that the account manager platform based on blockchain technology can improve the visibility of the supply chain, promote the digitalization of the supply chain, and support the SCF. A group of commercial and financial procedures supported by technology that offers flexible payment options to a buyer and one of their suppliers at lower financing rates. This technology allows buyers to consent to financial institutions financing of suppliers' bills and the provision of working capital through a short-term credit facility improved liquidity for both parties. It will also expose the potential risks and enable executable and optimized plans.

SCF "can bring stability and flexibility to these supply chains by bringing the lowest cost of capital to where it is needed most in the supply chain to shift focus from survival to improving efficiency, innovation, and investment in new products" (Kartskhiya et al., 2020). Besides, it will help to reduce risks and advance the birth of the shared factory system. Kartskhiya et al. (2020) found that, in traditional business operations, the supply chain management and logistics system using digital technology has strong advantages. Doktoralina & Apollo (2019) found that there is a significant positive correlation between enterprise strategic management accounting practices and supply chain performance, and there is a positive correlation between supply chain performance and enterprise profits. Li and Chen (2019) mainly studied the competitive advantage of the third-party logistics enterprises based on strategic orientation in marketing practice (Majeed & Rupasinghe, 2017). The above scholars achieved good results, but the continuous updating of technology poses some problems.

Many scholars have analyzed, at different levels, how to use the IoT to help SCF and modern logistics enterprises. Majeed and Rupasinghe (2017) showed that, with the rapid development of new technologies such as big data, IoT, and cloud computing, almost every element of modern life is impacted by technology, including productivity, socializing, food and healthcare access, and transportation efficiency and safety. The power of the Internet has facilitated the emergence of international communities and made it easier to exchange information and resources. The best ways to power every strategy sharing information effectively in a different enterprise management model are as follows:

- Defining a personal communication style.
- Being open-minded.
- Using effective communication techniques for the team.
- Creating a circle, not a line, in communication.
- Keeping everything accessible.
- Requesting feedback and being aware of when to use different channels.

The development of SCF has attracted more and more attention. Birkel and Hartmann (2020) sustained that the IoT technology should be applied to supply chain risk management, and discussed the internal and external paths and effects of social customer relationship management. Hassija et al. (2020) aimed to apply IoT technology to supply chain risk management and discussed the internal and external paths and effects of social customer relationship management. Dweekat et al. (2017) proposed a more practical evaluation method for supply chain performance and applied it to the supply chain performance evaluation system. He et al. (2020) focused on the challenges and opportunities that the IoT faced in theory and practice. Radanliev et al. (2020) used the branch classification method to evaluate the development of supply chain integration in the research of industrial IoT, especially

in reducing network risks (Tang et al., 2017). The studies above show that the application of the IoT has a positive effect, but there are still some problems.

With the rapid development of economy and society, modern logistics enterprises are gradually moving towards technicalization. At the same time, with the continuous progress of SCF and various IoT technologies, the combination of various logistics methods has formed a new network style. The main goals of a global supply chain design are to reduce costs associated with logistics, working capital, and inventory. Heuristic, simulation, and optimization models are a few common forms of logistics network models. The intellectualization of business model based on the IoT to help SCF and modern logistics enterprises is a new attempt.

BUSINESS MODEL FACTORS OF SUPPLY CHAIN FINANCE AND MODERN LOGISTICS ENTERPRISES

Development History

SCF is a new concept, with rich theoretical and practical experience, to some extent. However, from the current SCF practice, its development is not mature, and it is not widely used in financial institutions. SCF originates from commercial banks; its predecessor is trade finance. Letters of credit, bank guarantees, and documentary collections are well-known trade finance tools that are more frequently employed when trading partners do not know one another. SCF is a new financing method that gradually breaks away from the traditional supply chain and combines financial services.

At present, SCF has gradually separated from the traditional financial system. With the continuous innovation of modern financial technology, it has replaced offline and its technical level has been further improved. SCF is a financing business conducted by multiple financial institutions or enterprises on a unified electronic information platform. Network SCF is the general trend, and networking is inevitable. With the development of global e-commerce, all industries would gradually integrate into the Internet. The understanding of interconnection is the operation mode of the network. Networks, communication subnets, and communication subsystems are other names for interconnection networks. Internetworking is the process of connecting several networks. Transferring information from one type of network to another, such as the Internet, depends on communication standards. It makes certain that data always travel along the best routes. This is essentially the integration of modern information technology, communication technology, and other technologies, especially to the solution of information asymmetry. SCF is essentially a financial service. The Internet has changed the business process of enterprises, thus reducing transaction costs and efficiency.

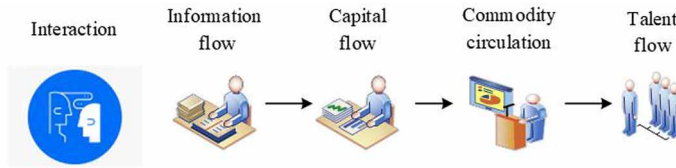
Development Prospect

From the perspective of aggregation, due to the demand of logistics, the innovation of the SCF system and financial products is an important means of enterprise development. In the large commercial circulation enterprises with abundant funds, numerous technical talents, and rich trading materials, logistics provides a broad space for their survival and development. On the one hand, enterprises are connected to form a huge logistics network, which has an interactive relationship of information flow, capital flow, business flow, and talent flow, laying a solid foundation for its development. On the other hand, due to the closer cooperation between enterprises, the closer ties between enterprises, the lower transaction costs, and the higher efficiency. Figure 1 shows the interaction between SCF system and financial products.

Connection Between Supply Chain and Logistics

SCF and logistics are twin brothers that should promote each other. The term SCF is used to describe more recently created financing and risk reduction strategies. It is far more likely to be applied to

Figure 1. The interactive relationship between the SCF system and the financial products



open account commerce, where the buyer and seller previously conducted business together, with the acceleration of the financial disintermediation process. Disintermediation refers to removing middlemen from the distribution chain in order to sell to clients directly. Disintermediation would occur, for instance, if brokers were abolished as a middleman so that a company could interact with and market its shares directly to its possible buyers. Disintermediation lowers costs enable manufacturers to improve profits and also establish a direct line of communication with the final consumer. As a result, more and more enterprises enter the financial field, leading to changes in the original financial ecology. Supply chain management requires SCF. In order to decrease risks, increase cash flow efficiency, and lower financing costs, SCF links buyers and suppliers with a finance institution. In brief, it is flexible, effective, and helpful for supply chain management. Indeed, logistics focuses on the internal transportation of products, while supply chain management manages interactions between various entities. Logistics service can enable enterprises and customers to enter their own logistics system more and provide convenient financial services for enterprises to enhance their competitiveness. Financial supply chain management is a discipline that emphasizes taking financial processes as a whole, rather than as discrete operations. The procure-to-pay cycle, working capital management, and the order-to-cash cycle are all components of the full business process. With the rapid development of network technology, modern computer technology represented by big data has developed rapidly, which has greatly changed people's lives and ideas. Data are a new resource. Mastering these data means mastering the most basic market information. The method used to connect or combine a master data record with an unmastered data source record is known as data mastering, and is the most valuable resource in the network era. Strengthening the qualification of logistics management personnel and the development of the entire trade and distribution industry requires not only financial experts, but also Internet technology technicians and various composite talents. Only in this way can logistics, finance, and trade be integrated. Trade finance products and main types of trade finance include term loans and working capital limits, such as overdraft and cash credit, letters of credit, invoice discounting or factoring, export credit (packing credit), and insurance. Relevant legislation should be formulated to create favorable conditions for development. The conditions that a developing economy must meet in order to achieve economic development include the presence of natural resources, rates of capital formation and saving, foreign investment advances in technology, and population growth. The current laws and regulations often lag behind the market. It is important to regulate the way individuals behave in conformity with social norms, including contract laws, regulatory laws, proscription laws, and personal laws to weigh the harm caused by the victim in relation to the individual and society at large. The comprehensive formulation of industry standards, information utilization standards, and credit management standards can promote the healthy and sustainable development of the commercial circulation industry. The formulation of an industry standard is the process of developing and document a standard in accordance with the Policy on Open Standards. "Information utilization standard" means that, if the output from an information system is integrated into a decision-human maker's information processing system, the information system is being used. As to the credit management standard, reviewing, assessing, and establishing the term of loan requests for a firm is the specialty of credit management.

HELP OF THE INTERNET OF THINGS TO SUPPLY CHAIN FINANCE AND MODERN LOGISTICS ENTERPRISES TO INTELLIGENTIZE BUSINESS MODELS

Development Trend of the Internet of Things Modern Logistics Supply Chain Management

The five development trends of IoT modern logistics supply chain management are summarized, as shown in Figure 2.

Individualization

In the fierce market competition, quickly realizing whether the customer's personalized needs can be met in a timely manner determines the company's comprehensive competitiveness, to some extent. In the supply chain, information sharing among enterprises is realized through information openness, efficiency, and transparency, and the competitiveness of the whole supply chain is improved with the goal of meeting customers' requirements quickly at low cost.

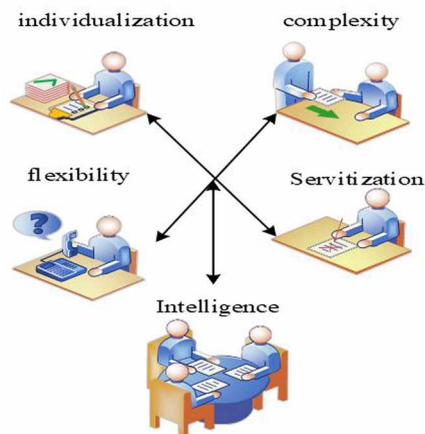
Complexity

One of the complexities of supply chain management is the number and diversity of its members, so how to optimize it and reduce the complexity has become a problem many enterprises face. An efficient and effective supply chain management enables enterprises to evaluate their partners more quickly, work with the best partners to establish continuous performance standards, manage each link, and supervise all aspects.

Flexibility

The information system based on the IoT can realize the integration of production activities between companies and enterprises. The procedure consists in integrating current systems to transfer and exchange information. Specifically, enterprise integration with the IoT necessitates extending connectivity from the enterprise and the cloud to devices at the edge of the network in applications where quick reaction time is anticipated for processing time-sensitive data to take action in real-time. Machineries as diverse as heavy machinery and light electronics can benefit from the machining, welding, inspection, and assembly processes that are often found in automated production line systems. The operation of the automatic production line allows to grasp the production status in real time, trains unskilled workers to complete particular activities, and lowers labor costs. Additionally,

Figure 2. The development trend of the IoT modern logistics supply chain management



the automatic production line contributes to faster return on investment, better worker safety, lower operating costs, and shorter lead times in the factory. In addition, the procurement information can be timely released according to the production progress, so as to achieve the balance of the production line and make the production more perfect and flexible.

Intelligence

Supply chain management is a complex and interrelated system. IoT technology is used in supply chain management. The information assists companies in increasing actual output, enhancing raw material quality, reducing energy use, and ensuring profitability. Manufacturers are adopting IoT solutions to continuously monitor production processes and equipment health. The IoT will improve fraud detection, insurance methods, and financial security, among other things, so that the company can track raw materials, parts, semifinished products, and finished products. By strengthening the intelligent management of each process and monitoring and tracking the product quality, companies can provide customers with high-quality products.

Servitization

In the servitization model, the technology provider retains ownership of the systems and is in charge of all operating expenses. As a result, it encourages the supplier to consider the long term when developing technology. Furthermore, preventing product switching is servitization. A manufacturer must deliver some kind of service alongside its manufactured items in order to participate in basic, intermediate, and advanced servitization. Many companies put more energy into upstream procurement, logistics, production, and other aspects, while ignoring downstream changes such as customer satisfaction and demand patterns. Making full use of IoT technology in the customer demand model can ensure the stability of upstream procurement, logistics, and manufacturing processes. Through effective monitoring of commodity circulation, customer needs can be grasped in time, thus improving the implementation value of services. Customers' satisfaction can certainly improve enterprises' market competitiveness. The enterprise's supply chain management based on the IoT can realize the intelligent integration of supply chain management and quality control. The combination of supply chain management and product service can make all members of the supply chain get the optimal mix, reduce the delivery volume, and speed up the response to meet more and more customer needs, so as to enhance the value of the entire supply chain. A logistics management system is a collection of software applications that optimizes corporate operations all the way through. The efficiency of processing orders, controlling inventories, transporting orders to customers, and, if necessary, returning orders will all be improved by a logistics management system.

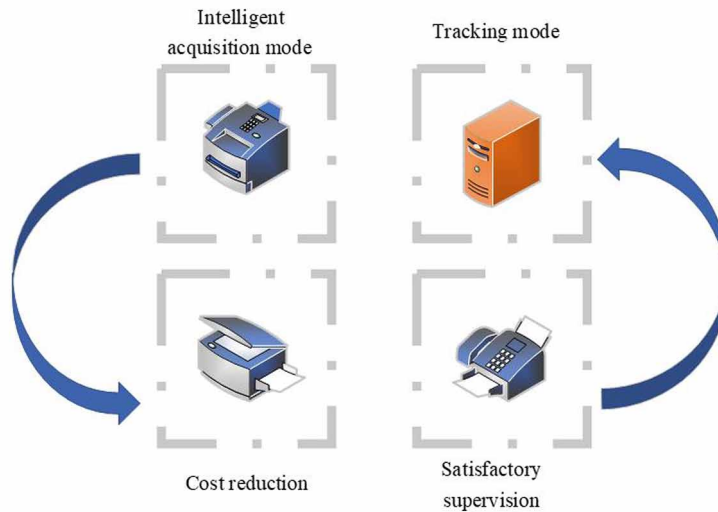
Intelligent Logistics and Supply Chain Management

Figure 3 illustrates four new tools for intelligent logistics and supply chain management; the subsections below provide relevant details.

Intelligent Acquisition Mode

Advanced IoT technology can uniquely identify goods. The combination of these technologies has also broken some technical barriers. Internet or computer access, a lack of curriculum, budgetary restrictions, Wi-Fi restrictions, and parental participation are some of the technological barriers that can be overcome with the right training and familiarity with new applications. The barcode gives a quick and affordable way to encode text data that can be read by low-cost electronic readers, and it encodes product information into bars and alphanumeric characters. For example, barcode recognition needs to be limited by a certain distance, and a large amount of recognition can improve the conversion speed and work efficiency. Also, it is possible to improve the conversion speed and work efficiency by:

Figure 3. Intelligent Logistics and Supply Chain Management



- Setting objectives for the Web site, gather and examine visitor information.
- Analyzing the company's competition.
- Examining the company's current conversion funnel.
- Clearly stating and emphasizing the company's value offer.
- Improving the layout of the company's important pages.
- Employing best practices for sales copy.

The IoT provides a platform for intelligent data collection in the logistics industry. When citizens connect with digital platforms and government organizations, PSUs and the role of technology in government can collect data about their behavior. As a result, the data obtained can be examined using analytics and artificial intelligence (AI) methods. The IoT organically combines traditional logistics technology with intelligent data collection technology. In addition to offering fleet management services, the IoT in logistics makes it easier to store items and control stock levels. In a logistics ecosystem, the IoT allows a business to have unmistakable transparency in all of its operations, thus assisting in efficient inventory management, making it intelligent and automatic in data collection and management. The top best data collection methods are surveys and questionnaires, interviews, observations, focus groups, records, and documents. In the specific implementation, the accuracy, networking, and intelligent decision-making of logistics information are the key points. It improves customer satisfaction, lowers costs, and promotes business efficiency. Yet, it verifies data from all levels of the logistics system that can be utilized to control the supply chain and make logistical decisions. Individual commodity flows are the input used to define the best distribution models, supply chains, lot sizes, tours, and routes in logistics decisions. Previously, information systems were established to manage their own processes and resources. Today, the network has become an open network, which can obtain information from social and external sources. At the same time, it can also open its information to the public, including location and sensing. This is an important technical way to achieve intelligent data collection. Intelligent data collection allows to index and file documents automatically. The technological barriers in an intelligent acquisition mode include rendering, virtual reality, augmented reality, ultrasound, augmented reality system, haptic feedback, and surgical simulator.

Tracking Mode

In dynamic tracking, a location service is needed to quickly track the external environment. Dynamic tracking is the process of pinpointing an object's location and offering instruction on how to get there. It aids in determining the campaigns are abundant and are not. The location information includes time and space, which can be loaded through location information and other status information to increase temperature, air pressure, and humidity, among other elements. On this basis, a dynamic information public service, information sharing platform, information processing, and other information technologies for enterprise internal decision-making are established. Through the analysis of massive logistics data, intelligent simulation of customer demand, inventory, logistics, and other aspects can be realized. The system can effectively track and manage the logistics, making the logistics work more efficiently and faster. By increasing efficiency, reduced costs, higher production rates, improved inventory management, wiser use of warehouse space, higher levels of customer and supplier satisfaction, and better customer experiences are all results of successful logistics. Some of the few key recommendations for successful logistics management are: Before implementing a new approach, the company should determine its transport logistics goals, benefit from contingency planning, taking advantage of technologies and tools for corporate automation, and promote frequent communication among its staff.

Reducing Costs

IoT technology makes cargo logistics simple and reduces the workload of logistics personnel. Supply chain management includes core businesses such as the following:

- **Distribution:** Order fulfillment across all distribution channels is the main goal of the distribution management system within logistics.
- **Packaging:** In order to maximize consumer value, sales, and profit, packaging is a coordinated system of preparing commodities for handling, transit, distribution, storage, retailing, consumption, recovery, reuse or disposal.
- **Transportation:** Moving products from one point to another is referred to as transportation, in a supply chain.
- **Warehousing:** It facilitates inventory distribution, sorting or cross-docking operations that aim to satisfy the market's expanding demand.
- **Unloading:** Moving the received products from the container to the dock floor for adequate inspection is referred to as unloading.

Automated transportation can improve logistics services, reduce or even cancel the requirements for cargo unloading and inventory management, thereby reducing costs, shortening processing time, and increasing social resources.

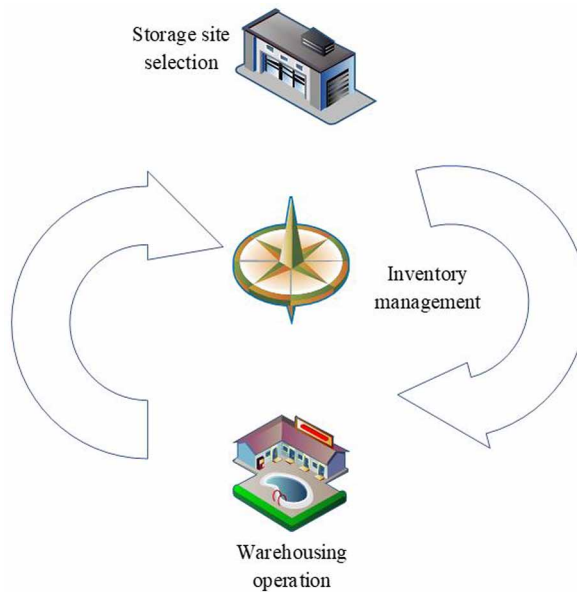
Satisfactory Supervision

The IoT not only has greater advantages and convenience in price, but also adopts intelligent transmission technology in logistics enterprises, which can also realize the data transmission of external logistics. Improving service quality can make it easier for customers to find the best shopping path and provide customers with the best shopping path. In addition, it can also optimize aftersales service to provide a free service, so that logistics and supply chain can be combined to make it a new monitoring method.

Application of Artificial Intelligence and Big Data in Supply Chain Finance and Modern Logistics Enterprises

Figure 4 summarizes the application of three points of artificial intelligence and big data in SCF and modern logistics enterprises, and the subsections below provide relevant details.

Figure 4. Application of AI and Big Data in SCF and Modern Logistics Enterprises



Storage Site Selection

Data intensive analysis is a major challenge for smart cities because it deploys various sensors everywhere (Liu et al., 2019). Many individuals are suspicious about smart city projects because of the security issues that arise in such environments. In essence, IoT gadgets are security flaws. Concerns about the proliferation of IoT sensors and the tighter coupling of infrastructure silos in cities are well-founded. Traditional warehouse location is generally based on maps and geographic information and selected by using the geographic information system software. However, its disadvantage is that, in addition to environmental factors, it has not fully considered many factors such as traffic economy. Through AI technology, data can be extracted and analyzed from many factors (e.g., geographical location, warehouse construction and operating costs, competitors' current situation, and policies) to avoid the impact of human factors. At the same time, it can revise the analysis results based on the principle of long-term development and finally obtain a more objective and accurate site selection scheme, so as to reduce costs and improve benefits.

Inventory Management

The traditional inventory management mode relies on manpower to complete, which requires highly skilled personnel and cannot realize real-time and dynamic management of inventory, inventory type, goods storage time, and other information. Traditional logistics focuses mostly on procurement, production, sales, and distribution, occasionally including maintenance and inventory management. It also applies to the administration and delivery of supplies and goods. However, the transformation from traditional inventory management to intelligent inventory management through networking technology, visualization technology, and big data processing technology can not only quickly read the stored data, but also connect the data of each warehouse in real time, thereby effectively reducing inventory, saving costs, and improving the security of inventory management.

Warehousing Operation

The main characteristics of intelligent warehousing are containerization, automation, and intelligence. The integration of storage and transportation of goods means that most of the goods in the intelligent warehouse are transported and stored point-to-point in a standardized and unitized way, which can reduce the transportation connection and increase the turnover speed of materials. Intelligent operation refers to the fact that, under the action of intelligent algorithm, all automation equipment in the warehouse can run orderly and can make corresponding responses according to different environments to improve the operation efficiency of the warehouse.

ALGORITHMS RELATED TO SUPPLY CHAIN AND LOGISTICS INTELLIGENCE

Ant Colony Algorithm

In logistics distribution, a logistics distribution company needs to deliver orders from n customers according to the shortest path; then, how to choose the shortest path? In this paper, the author takes this problem as an example to verify the ant algorithm. It is supposed that m is the number of ants, d_{xy} is the city, and x and y are the distance. $\tau(t)$ is the remaining information on the path (x, y) connecting city x and y at time t , and the information on each path is equal at the initial time. H represents the expected degree of distance y that is expected to migrate to distance x , which can be specifically determined by some heuristic algorithms, usually by the following:

$$\eta_{ij} = l / d_{xy} \quad (1)$$

Ant $k(k=1,2,\dots,m)$ determines the direction of movement according to the amount of information of each path. The probability of ant k moving from city i to city j at time t is calculated as follows:

$$P_{xy}^k = \tau_{xy}^\alpha(t) \times \eta_{xy}^\beta(t) \quad (2)$$

$$P_{xy}^k = \sum \tau_{xs}^\alpha(t) \times \eta_{ys}^\beta \quad (3)$$

These cities are the cities ant k can choose next time. The difference between the artificial ant colony system and the natural ant colony system is that the artificial ant colony system has the memory ability to record the cities that the ants pass through and dynamically adjust them according to the evolution process. Artificial ants maintain the pheromone volatilization characteristics of the ant colony, and, in a certain period of time, the previously left information can gradually disappear. After each ant has visited a city, the pheromone of each path is adjusted according to the following formulas:

$$\tau_{xy}(t+n) = \rho \cdot \tau_{xy}(t) + (1-\rho) \Delta \tau_{xy} \quad (4)$$

$$\Delta \tau_{xy} = \sum_{k=1}^m \Delta \tau_{xy}^k \quad (5)$$

Among them, $\Delta\tau_{xy}^k$ represents the amount of pheromones that the k th ant stays on the path (x, y) in this cycle, while $\Delta\tau_{xy}$ represents the increment of pheromones on the path (x, y) in the cycle:

$$\Delta\tau_{xy}^k = \begin{cases} \frac{Q}{L_k} \\ 0 \end{cases} \quad (6)$$

Q is a constant, representing the pheromone left by the ant, and L_K represents the route taken by the k th ant in this cycle. At the start time:

$$\tau_{xy}(0) = C \quad (7)$$

$$\Delta\tau_{xy} = 0 \quad (8)$$

τ_{xy} represents the degree of expectation from city x to y , which can be determined by selecting different heuristic algorithms according to specific problems, as follows:

$$\Delta\tau_{xy} = \begin{cases} \frac{Q}{d_{xy}} \\ 0 \end{cases} \quad (9)$$

$$\Delta\tau_{xy} = \begin{cases} Q \\ 0 \end{cases} \quad (10)$$

Algorithm of Logistics Optimal Path

Assuming that, under given conditions, the delivery center sends goods to users, and the calculation formula of the maximum carrying quantity K , the maximum carrying distance $n(K)$, the customer's cargo carrying capacity, the distance from x to y to the distribution center to each distribution point, and the shortest distribution route of the k th executive line nk are as follows:

$$\min z = \sum_{k=1}^k \left[\sum_{i=1}^{nk} d_{r(i-1)ki} r_{ki} + d_r \text{sign}(n(k)) \right] \quad (11)$$

$$S.t \sum_{i=1}^{nk} \leq Q_k \quad (12)$$

$$\sum_{i=1}^{mk} d_{rk} + d_{r0} \text{sign}(n_k) \leq D_k \quad (13)$$

$$0 \leq n_k \leq L \quad (14)$$

$$\sum_{k=1}^k n_k = L \quad (15)$$

BUSINESS MODEL SIMULATION EXPERIMENT ASSISTED BY INTERNET OF THINGS

Experiment Description

The author used the experimental method of empirical analysis to analyze the business model intelligence of IoT-assisted SCF and modern logistics enterprises. The experimental samples were enterprise A, under the traditional business description, and enterprise B, under the new business model, and the data samples were 100 managers of four enterprises. The process of making adjustments to a supply chain's activities to guarantee maximum efficiency is known as supply chain optimization. Supply chain optimization allows to obtain current inventory tracking and data that are available to promise. For real-time intelligence, order management, reporting and analytics, and inventory tracking, the company should use AI services and composable data. The optimization of modern logistics from the perspective of SCF consists in reducing transaction costs and improving transaction efficiency, means, and service methods. It is crucial to coordinate company value (i.e., customer experience, profitable growth, compliance, and sustainability) with effective supply chain operational outcomes (i.e., demand fulfillment, product supply, and new products/business) in order to reduce supply chain costs. It is possible to lower the cost of transportation logistics by investigating shipping consolidation options, taking into account warehousing services, utilizing automatic container loading systems to cut labor costs, and performing preventive maintenance. The five most common criteria that affect project transaction costs and collaboration level are communication quality, project uncertainty, owner organizational efficiency, change orders, and trust. According to the author, the optimization of the logistics management mode of commercial circulation enterprises should start with improving the status of SCF, using IoT technology, strengthening the talent team, improving the law, and applying industrial standards. The advantages of the integration of the IoT in the business management information system are as follows: Real-time visibility of resources and assets, decreased costs, greater operational effectiveness, insights from data for speedy decision-making, remote monitoring and control of resources and assets from beginning to end, predictive and prescriptive insights in real time, and increase in end-user satisfaction.

Table 1 shows the statistics of the importance of the four enterprises on the above five aspects.

Transaction Cost

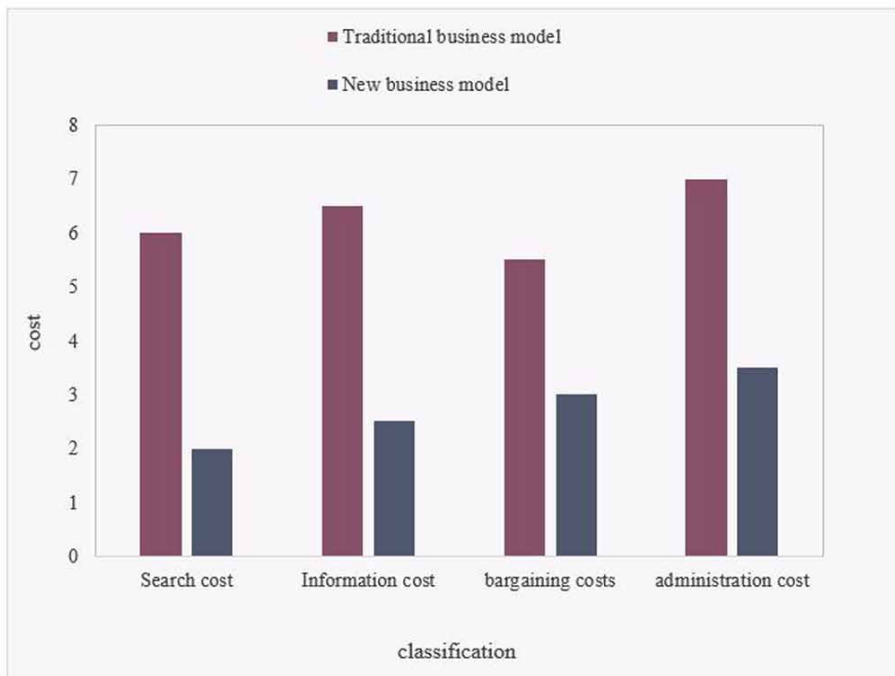
The author analyzed the transaction costs of SCF and modern logistics enterprises' business models and traditional business models under the support of the IoT. The range of cost values in the experiment was 1—10. The analysis objectives were search cost, information cost, bargaining cost, and management cost (Figure 5).

Figure 5 shows that, first of all, transaction costs in the traditional business model were significantly higher than those in the new business model. The standard of transaction costs in logistics enterprises is that the lower the transaction costs, the better the efficiency. Secondly, as

Table 1. Statistics of the Importance of Four Enterprises to the Five Aspects

Actions for the optimization of logistics management	Enterprise I	Enterprise II	Enterprise III	Enterprise IV
Improving the status of SCF	11	13	36	23
Using IoT technology	16	15	9	9
Strengthening the talent team	19	24	20	37
Improving the law	21	34	17	11
Applying industrial standards	33	14	18	20

Figure 5. Analysis of Transaction Costs of SCF in the Traditional and New Business Models With the IoT



to transaction cost data of the two models, the reference value of the traditional business model in search cost is 6, and the reference value of information cost is 6.5; the reference value of bargaining cost is 5.5, and the reference value of management cost is 7. The reference value of the new business model in search cost is 2, and the reference value of information cost is 2.5; the reference value of bargaining cost is 3, and the reference value of management cost is 3.5. These results show higher management costs in the traditional business model, which is also due to its lack of better technical support. In the new business model, the search cost is very low, because the IoT offers rich data, and the cost of supporting enterprises is low. Finally, the researcher carried out an average calculation for

the sum of the four costs in the two business models. The average value of the traditional business model in the four costs was 6.25, while the average value of the new business model in the four costs was 2.75. Thus, the average transaction cost of the new business model is 3.5 lower than that of the traditional business model.

Transaction Efficiency

Many factors affect the transaction efficiency, including the material conditions that meet the transaction needs, transaction technology, and transaction system. Figure 6 shows the analysis results of transaction efficiency between the new business model and the traditional business model; the value range of efficiency in the experiment was 1-100%.

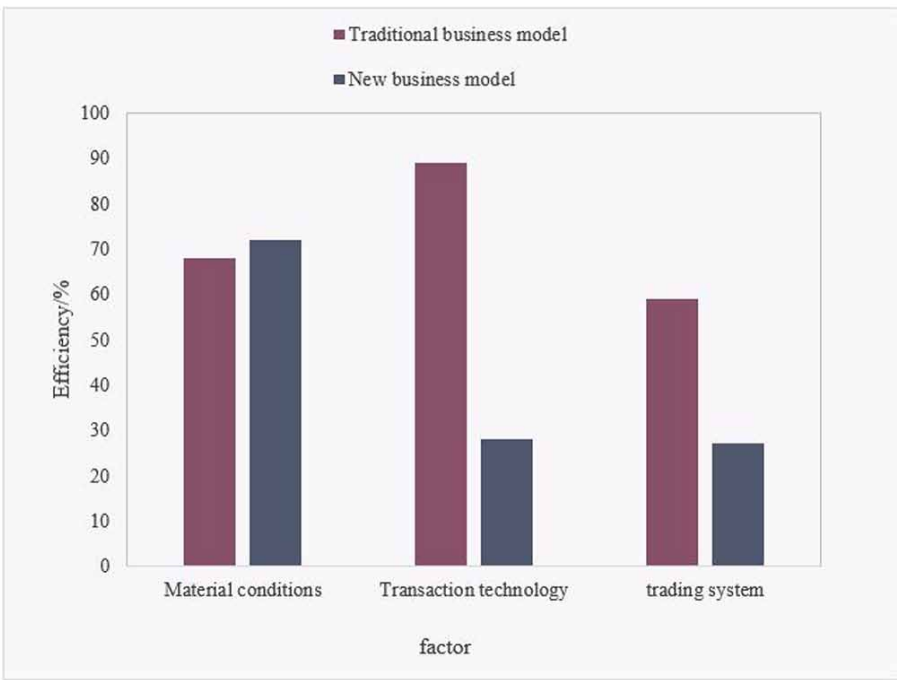
As Figure 6 shows, in the traditional business model, the reference value of material conditions, transaction technology, and transaction system affecting transaction efficiency are 68% 89%, and 59%, respectively. In the new business model, the reference value of material conditions, transaction technology, and transaction system affecting transaction efficiency are 72%, 28%, and 27%, respectively.

The reference value shows that the traditional business model is affected by technical factors, and that the transaction technology has a greater impact on the transaction efficiency, while the material conditions in the new business model have a greater impact on the transaction efficiency. Thus, the average reference value of the three factors in the traditional business model is 72%, while in the new business model it is about 42.3%.

Transaction Transparency

Much practice has proved that the combination of the IoT and SCF can effectively improve the transaction transparency of SCF participants and further strengthen risk control. The author's

Figure 6. Analysis of Transaction Efficiency of the Two Models



investigation in this regard included Enterprise A and Enterprise B as samples. Two modern logistics enterprises use two different business models: Enterprise A uses the traditional business model, while Enterprise B uses the new business model. Figure 7 shows the transparency analysis of four transactions under the two business models based on the data publicly available online. The value range is 1—10.

Figure 7 shows that the transparency of Enterprise A in the four transactions is significantly lower than that of Enterprise B. Therefore, the traditional business model is inferior to the new business model in terms of transaction transparency. The data are as follows: Transaction transparency of enterprise A is 7 in transaction 1, 8 in transaction 2, 6 in transaction 3, and 6 in transaction 4. Transaction transparency of Enterprise B is 8 in transaction 1, 10 in transaction 2, 9 in transaction 3, and 8 in transaction 4. These data show that the transparency of the four transactions of Enterprise B is more than 8. The average transparency of the four transactions of Enterprise A is 6.75, while the average transparency of the four transactions of Enterprise B is 8.75. Thus, the average transparency of Enterprise B is 2% higher than that of Enterprise A.

Satisfaction

Based on the experimental analysis above, the author investigated the number of satisfied managers in two logistics enterprises (25 in each company, 50 in total) using two business models (Figure 8).

Figure 8 shows that the trend of the traditional model curve is from dissatisfaction to general, then to satisfaction, and finally to other. The trend of the new model curve is from dissatisfaction to general, then to satisfaction and finally to others. The number of managers in the four satisfaction types in the traditional model is 5, 4, 13, and 3 respectively; the number of managers in the four satisfaction types in the new model is 1, 2, 21, and 1, respectively. Dissatisfaction and satisfaction are the criteria for evaluating the two business models. Thus, the number of dissatisfied managers in the traditional business model is 10% of the total number, while the number of dissatisfied managers in the new business model is 2% of the total number. The number of satisfied managers in the traditional

Figure 7. Transparency Analysis of Four Transactions Under the Two Business Models

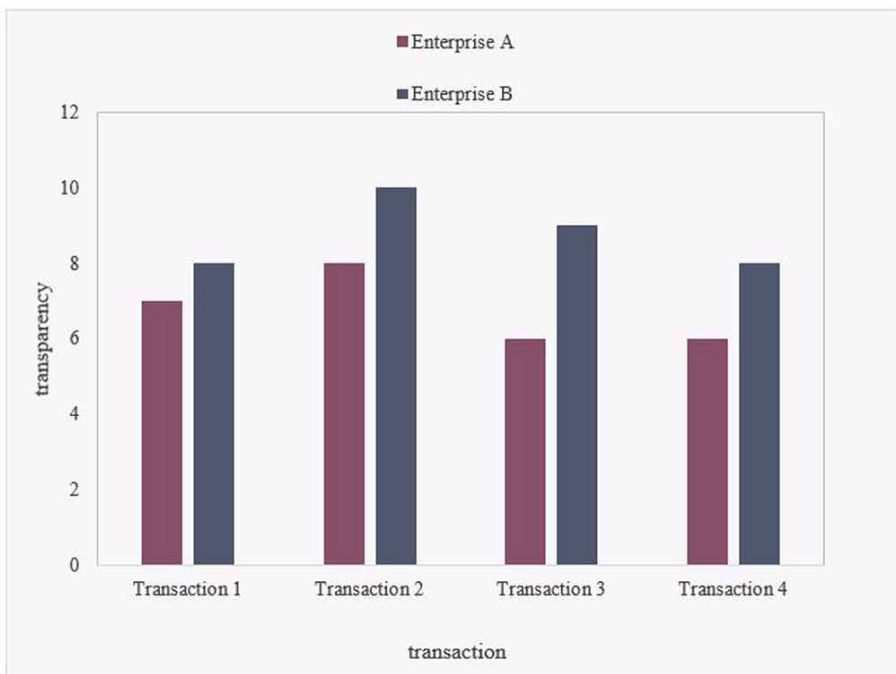
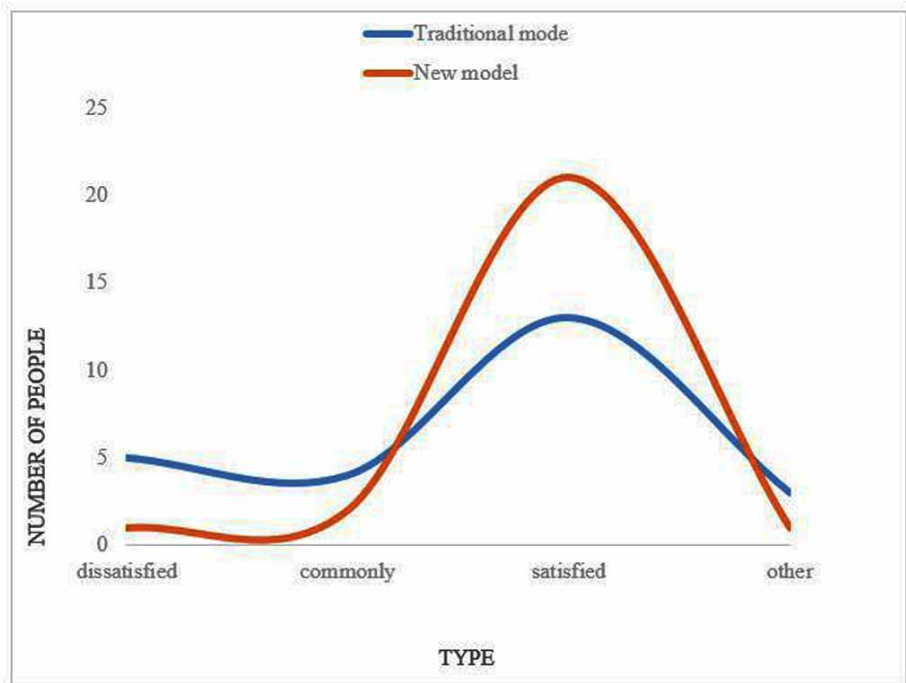


Figure 8. Satisfied Managers in the Two Models



business model is 26% of the total number, while the number of satisfied managers in the new business model is 42% of the total number. The author calculated that the managers' dissatisfaction rate of the traditional business model is 8% higher and the manager's satisfaction rate is 16% lower than that of the new business model.

To sum up, the analysis of transaction cost, transaction efficiency, transaction transparency, and satisfaction evidenced that the new business model is superior to the traditional business model, so this experiment is of certain research significance.

CONCLUSION

Any industry must go through several stages before it can truly embark on the road of sustainable development. This is a long process and a new stage of AI development. The establishment of an intelligent city is to collect and use the basic information of the city through IoT technology. In this paper, the author discussed the application of IoT technology in SCF and modern logistics enterprises from the aspects of methods, algorithms, and simulation experiments, and pointed out that the traditional business model has a high dissatisfaction rate.

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