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Research Article

Analysis of Revenue Incentive Dynamic Mechanism of Financial Supply Chain from the Perspective of the Internet of Things

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With the rapid development of society, all walks of life need the support of the Internet of Things, and the financial industry is no exception. This article integrates blockchain technology with supply chain finance and builds a supply chain financial alliance architecture based on blockchain technology and an underlying model of the Ethereum blockchain system suitable for supply chain finance. We innovated new supply chain finance models and operating mechanisms and proposed business scenarios for supply chain finance from the perspective of blockchain. Taking into account the actual operation of the blockchain supply chain financial platform, the principal-agent model and the incentive theory are applied, and the supply chain financial accounts receivable model is taken as an example in the case of complete information and incomplete information. The incentive mechanism between the service provider of the chain supply chain financial platform and the core enterprise promotes the better implementation of blockchain technology and supply chain finance. Based on the existing theoretical research, this paper identifies the key influencing factors of the supply chain's cross-enterprise incentive mechanism. These influencing factors system includes two dimensions: transaction factors and relationship factors. Transaction factors include resource dependence, uncertainty, and cooperation experience; relationship factors include corporate reputation, trust level, and relationship commitment. Based on the nature of the incentive mechanism, information sharing and revenue sharing are extracted as the measurement dimensions of the supply chain's cross-enterprise incentive mechanism. On this basis, this article draws on the existing enterprise life cycle division method and constructs a hypothetical model of the influencing factors of the incentive mechanism in the incubation period, the growth period, and the maturity period. Relevant data was collected through questionnaires, and SPSS and AMOS software were used to perform statistical analysis, reliability analysis, exploratory factor analysis, confirmatory factor analysis, and structural equation hypothesis testing on the data. The performance of each influencing factor in different stages of the enterprise's life cycle and the importance of each influencing factor in the same life cycle stage are obtained.

1. Introduction

In the industrial field, the supply chain has realized the optimal allocation of physical resources, while supply chain finance is the optimization of the supply chain's capital flow in the financial field [1, 2]. Supply chain finance is a single credit financing business combining short-term finance and closed accounts based on the real trading background and the credit level of the leading supply chain enterprises, using the future trade cash flow determined by the enterprise as the repayment source. Supply chain finance is an effective way to realize the effective allocation of capital to enhance the liquidity of capital and lubricate the supply chain [3–5]. It is also an effective way to alleviate the financing problems of SMEs. In the context of overcapacity and the need to destock, prepaid account financing has its unique advantages. Prepaid account financing is mostly used for distributor financing, which is beneficial to alleviating the inventory backlog of manufacturers. At present, the research on account receivable financing and inventory financing is relatively mature, and there is little research on prepaid account financing. And it is only limited to the qualitative analysis of supply chain financial business model and operation process and their respective income risks [6, 7].

Researchers believe that supply chain finance should analyze the internal transaction structure of the supply chain, combine risk diversification measures such as core enterprises, logistics supervision companies, and capital flow guidance tools, and apply the credit model of self-compensation trade financing to provide supply chain node enterprises with credit and financial services such as settlement and wealth management [8, 9]. Related scholars have put forward the development concept that supply chain financing should be led by commercial banks; that is, financial institutions use wealth management, investment banking, and other advantages to give full play to the role of stability and maintenance in the operation of the supply chain, so that it can operate healthily and create profit margins [10]. Researchers believe that order financing is a financing business in which financing companies apply for loans from financial institutions based on valid sales orders and issue closed loans after the financial institutions review [11, 12]. Financing pricing must be based on accurate cost measurement. The initial loan pricing of Chinese banks is based on the cost of capital plus the target rate of return. Relevant scholars believe that SMEs have a longer cooperative relationship with banks [13, 14]. Although they increase the chances of obtaining loans, they also bear higher debt costs. The companies that maintain relationships with the two banks get the cheapest debt. Theoretically, limits are set on the degree of concentration of relations with banks. Prepaid account financing often involves warehouse receipts and inventory pledges [15]. The pledge rate is the core risk control indicator of an enterprise. The pledge rate represents the degree of guarantee of the pledge. In practice, banks often rely on experience to evaluate collateral. For example, the mortgage rate of real estate is generally 70%, the mortgage rate of production equipment is about 50%, the mortgage rate of movable property is about 20%–30%, and the mortgage rate of special equipment is only around 10% [16]. The most important customer relationship in supply chain finance is the bank-enterprise relationship. Due to the low internal information transparency of SMEs, serious information asymmetry problems often occur between banks and enterprises [17]. Therefore, banks and enterprises need to maintain long-term close contact to form a relationship. The impact of this relationship on loan interest rates is controversial. Some studies believe that the close relationship between banks and enterprises will have a negative effect on corporate loan interest rates [18, 19]. However, from a bank's point of view, when the relationship between banking companies is tense, the bank is more likely to raise interest rates to recover the prior dedicated investment. Relevant scholars found that when the bank-enterprise relationshi is close by studying the SME loan data of a commercial bank, the bank tends to charge higher loan interest rates to borrowing companies that maintain long-term business relationships, and the lending companies are also willing to increase the loanability of funds [20].

Due to the asymmetry of information, it is often necessary to consider the existence of adverse selection problems and moral hazard problems. Therefore, this chapter studies the blockchain technology service platform's incentive contracts for core supply chain finance companies. We design problems under information and incomplete information and design and solve the corresponding incentive contract model. This article analyzes and processes the survey data of the gestation period, growth period, and maturity period. First, we use SPSS19.0 to perform descriptive statistical analysis, reliability analysis, and exploratory factor analysis on the data; then, we use AMOS17.0 to perform confirmatory factor analysis, model correction, and hypothesis testing on the data. During the gestation period, the hypotheses H4b, H5a, H5b, H6a, and H6b did not pass the test, and the remaining hypotheses all passed the test; in the growth period, the hypotheses H2b, H3b, and H4a did not pass the test, and the other hypotheses passed the test; at the maturity stage, hypotheses H1a, H2a, H3a, H3b, and H4a have not passed the test, and the remaining hypotheses all passed the test.

The rest of this article is organized as follows. Section 2 discusses related supporting theories. Section 3 designs the revenue incentive mechanism of core information service enterprises under blockchain technology. Section 4 carries out a numerical analysis. Section 5 summarizes the full text.

2. Related Supporting Theories

2.1. The Hierarchical Structure of the Internet of Things. The Internet of Things consists of a three-tier architecture, as shown in Figure 1. It can process tens of millions or even billions of information in a few seconds, which provides a shortcut for processing the massive amounts of information collected in the Internet of Things system. Cloud computing emphasizes the aggregation, optimization, and dynamic processing of information, which greatly improves operating efficiency while reducing information processing costs.

2.2. Related Theories of Supply Chain Finance

2.2.1. Principal-Agent Theory. From an economic perspective, as long as there is a relationship between competition and cooperation, information asymmetry will appear. This relationship is called a principal-agent relationship. There is also a difference of interest between the principal and the agent due to the difference in the effect function [21]. The client's expectation is to maximize profits, while the agent only cares about whether his own interests can be met. This is also in line with the basic assumptions of the current mainstream economics and rational people. This assumption is the specific premise of the principal-agent theory [22].

2.2.2. Transaction Cost Theory. Asset exclusivity means that the funds invested in a certain business are not used for other purposes; that is, they cannot be transferred [23]. Once the business transaction is terminated, the cost of investing in the business is difficult to recover. This factor keeps transaction costs at a relatively high level. Transaction uncertainty refers to the occurrence of various risks that a certain business will face during the transaction process. The limitation of bounded rationality and the existence of

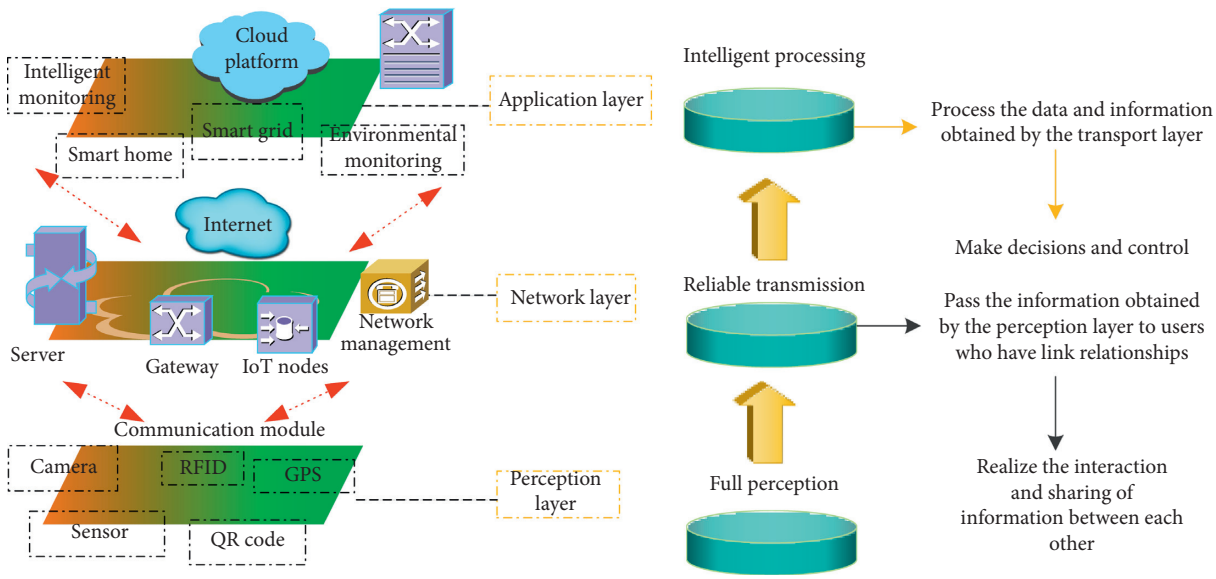

Figure 1: Architecture diagram of the Internet of Things.

information asymmetry in the transaction process make it impossible to accurately predict the future [24]. Both parties to the transaction can only prevent loss of interest by signing a contract. Therefore, the existence of transaction uncertainty will increase the cost of supervision and bargaining and cause an increase in transaction costs. Management and bargaining costs will increase with the increase in transaction frequency [25, 26].

2.2.3. Theory of Self-Compensation Trade Financing. The theory of self-compensation trade financing means that banks and other financial institutions can effectively control credit risk by controlling logistics or tying third-party responsible persons according to the capital flow of the enterprise under the premise of effectively mastering the business cooperation background of SMEs [27–29]. Under the premise of providing financing services for small- and medium-sized enterprises, the repayment generated by the business activities of the enterprise shall be used as the first source of loan repayment. The theory emphasizes the approval of single credits. The focus of the review is the authenticity of the trade background, the strength of the counterparty, credit, etc. The closed operation of the loan and the self-repayment of the repayment are the foundation for the realization of the self-repaying trade financing theory, which limits the risk to a controllable range.

2.3. Supply Chain Finance Model. In the supply chain "production-supply-sale" operation process, cash flow plays an important role in the normal operation of SMEs. Because it is in a relatively weak position in the supply chain, capital flows cannot return in a reasonable time. Without sufficient self-reserve funds, companies will be burdened with insufficient cash flow pressure and difficult-to-maintain normal production operations. This has created an urgent demand for loans from small- and medium-sized enterprises, but the limitations of their own credit strength make it difficult to obtain loans from banks or the interest on loans is high. The supply chain financial financing platform is shown in Figure 2.

2.3.1. Prepayment Financing Model. Prepayment financing is a financing model that occurs in the procurement stage of the supply chain and can be understood as "future inventory financing." The premise of the development of this model is that the core supplier enterprises in the upstream of the supply chain must commit to repurchase, and then the financing SMEs use the purchase documents generated between the core enterprises to apply for the corresponding loan line to the bank, and the right to take delivery is controlled by the bank.

2.3.2. Inventory Pledge Financing Model. Inventory pledge financing refers to financing small- and medium-sized enterprises that use temporarily immobile goods in their inventory as pledges to apply for loans from banks. The bank entrusts the supervision and transportation of the pledged goods to third-party logistics companies to provide liquidity support to the small- and medium-sized enterprises. This can effectively reduce the capital occupation cost of financing SMEs' inventory and the cost of warehouse use. Through inventory pledge financing, a balance between production and sales stability and liquidity can be achieved. The business process of inventory pledge financing is shown in Figure 3.

In the inventory pledge financing model, financing SMEs apply for loans from banks and other financial institutions with their own inventory of goods under the credit guarantee of the core enterprises with which they have a cooperative trade relationship. Banks first need to review the trade background of the supply chain where the financing SMEs are located, the credit strength of the core enterprises,

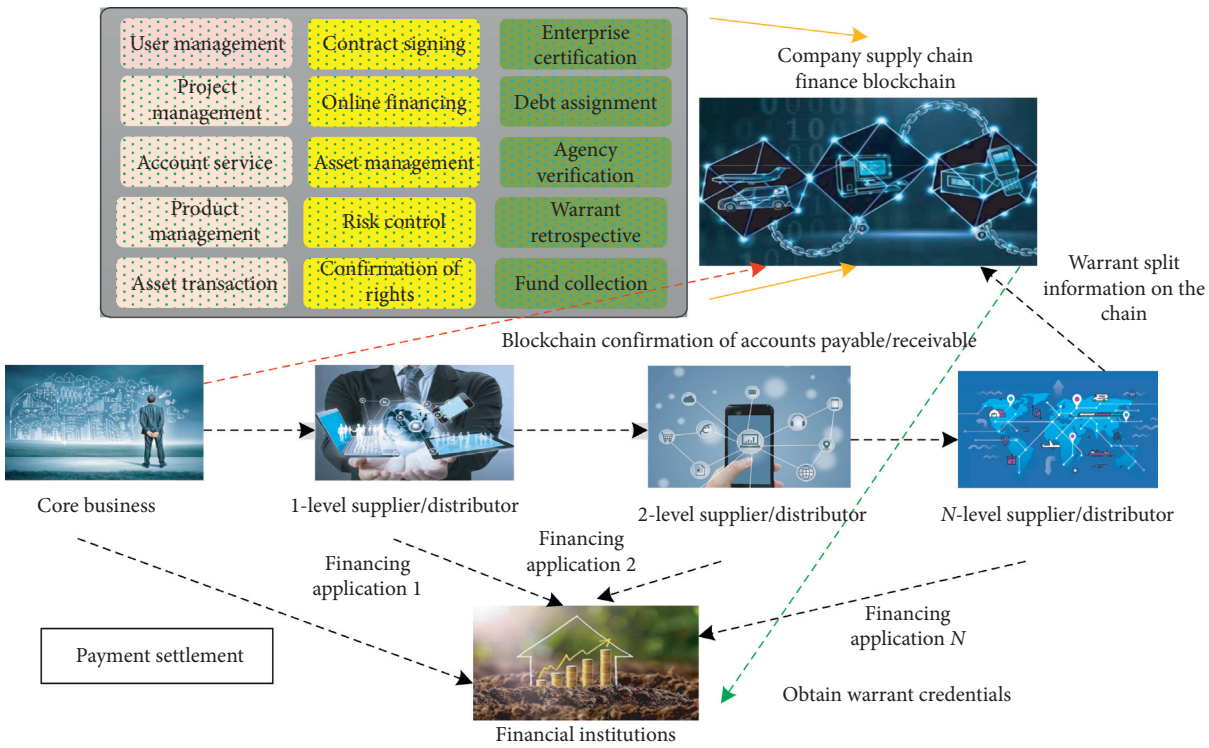

Figure 2: Supply chain finance financing platform architecture.

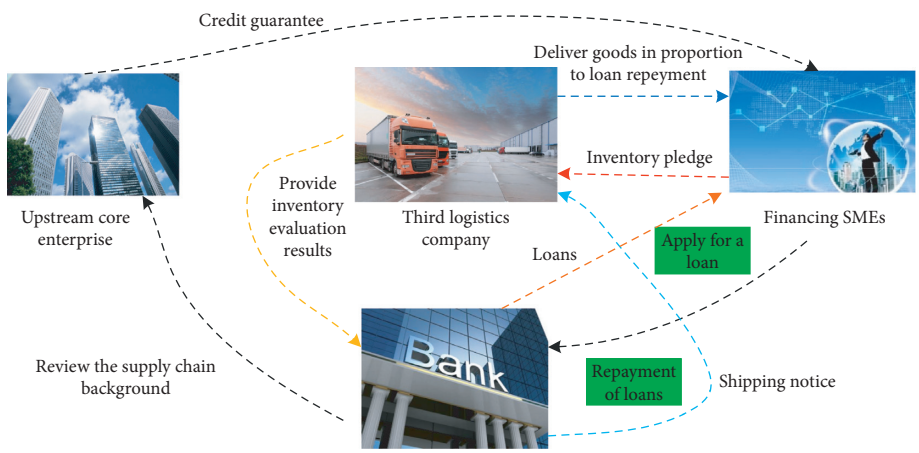

Figure 3: Inventory pledge financing business process.

and the strength of cooperation with the core enterprises. At the same time, it has entrusted third-party logistics companies with professional businesses that it does not possess, such as the evaluation of pledges, warehousing, and transportation, which greatly increases the operability of the inventory pledge financing model. After passing the professional evaluation of the third-party logistics company, the evaluation report is submitted to the bank. If the requirements are met, the bank will directly sign the pledge loan agreement with the financing SME after signing the responsibility guarantee letter with the core enterprise. After the pledged goods are delivered by the financing SME to the warehouse designated by the third-party logistics company, the logistics company issues a pledged warehouse receipt and transmits it to the bank. The bank sets a reasonable pledge rate based on various influencing factors and uses this as a benchmark for the financing company loans. After successful sales, SMEs get the money back and repay the bank loan with the money. According to the amount of repayment funds, the bank informs the logistics enterprise to issue a corresponding proportion of pledges, and this business will end until the loan is repaid.

2.3.3. Accounts Receivable Financing Model. Credit sales have become the trend of trade cooperation between enterprises. Noncore suppliers in the upstream of the supply chain cannot get the money back in time because of the gap

in strength or business needs. At the same time, they cannot successfully obtain the support from bank due to the lack of qualifications or collateral. Insufficient funds will affect the company's subsequent production and operations, causing the capital chain to break or even stop production. The act of selling on credit has brought great liquidity pressure to the cash flow of middle and upper reaches in the supply chain. The existence of the credit sale transaction has given birth to the emergence of the accounts receivable financing model.

The financing of the upstream of the supply chain between small- and medium-sized supplier enterprises and the downstream core manufacturer enterprises produces trade cooperation. After the small- and medium-sized enterprises sign the order contract with the core enterprise, the core enterprise issues accounts receivable documents to the small- and medium-sized enterprises to obtain the ownership of the goods. Subsequently, the financing SMEs can apply for loans from the bank with the accounts receivable documents as pledge. The bank needs to review the authenticity of the document, the creditworthiness of the core company, and the ability to collect funds. If the loan requirements are met, the bank will sign a transfer agreement with the financing SME and inform the core enterprise of the actual transfer. Under normal sales conditions, core enterprises receive continuous capital return and can repay the bank loans in batches or in full. When debt settlement is over, the bank will cancel the accounts receivable pledge contract with upstream financing SMEs. The development of the accounts receivable financing model has better solved the problem of rupture of the capital chain caused by the pressure of purchase and sale of upstream SMEs.

3. The Revenue Incentive Mechanism Design of the Core Information Service Enterprise under the Blockchain Technology

3.1. Business Scenario of "Blockchain + Supply Chain Finance". As shown in Figure 4, under the blockchain architecture, all different entities involved in the supply chain financial business can join the supply chain financial service platform in an equal manner and use blockchain technology to solve the problem of multiple parties in an uncertain environment. The issue of mutual trust reduces the high cost of credit enhancement through third-party credit intermediaries and reduces asset transaction costs. In the complete system, the information service platform centered on core enterprises, financial institutions, and the supply chain financial system uses blockchain technology to exchange data and complete transaction links. Financial nodes and transaction nodes form financial ledgers and transaction ledgers in the blockchain platform through specific transactions, share data, and reach cooperation, forming a complete supply chain financial ecology.

Most SMEs use indirect financing as the main financing method, but in fact, direct financing (issuing stocks and bonds) is the key problem that solves the current difficulty of financing for SMEs. As a major direct financing method, ABS (asset securitization) can play a major role in solving the financing problems of SMEs, reduce the financing costs of SMEs, improve their financing convenience, and introduce a large amount of private capital in a legal manner.

3.2. Model Description and Assumptions. In the supply chain finance accounts receivable financing link, the relationship between the blockchain supply chain financial information service platform and the core enterprise is that the blockchain supply chain financial information service platform is the principal and the core enterprise is the agent. Based on the asymmetric information in the initial stage of the establishment of the blockchain-based supply chain financial platform, an incentive mechanism contract model based on the constraints of the blockchain supply chain financial information service platform is established. Companies improve their product quality and service quality, apply the principal-agent model to solve analysis, explore the behavioral characteristics of core companies in the financing process, help the blockchain supply chain financial information service platform to identify the sales capabilities of core companies, and promote core companies to improve their own comprehensive strength.

Assume that the sales volume of the core company on the supply chain financial financing platform based on blockchain technology is

$$Q = \delta - ae + d. \tag{1}$$

Among them, a represents the sales ability of core enterprise sellers, which is generally related to the core enterprise's product quality, advertising and promotion methods, customer demand and service levels, product prices, etc. The stronger the core enterprise's sales ability, the greater its sales. Since the blockchain supply chain financial service platform cannot use decentralized technology to accurately assess the actual sales capabilities of the core enterprise before the core enterprise uses the blockchain technology and the early stage of using the blockchain technology, the probability density function of the private information of an enterprise is $f(a)$.

In real life, core companies tend to exaggerate a to financial institutions to increase more credits and obtain more loans for upstream and downstream companies in the supply chain. e represents the level of effort of the core enterprise. Among them, a and e are continuous variables, core company sales capability a is the core company's private information under adverse selection, and effort level e is the core company's hidden information under moral hazard. d represents the maturity of the blockchain technology faced by the blockchain supply chain financial information service platform, and the value of d has a positive correlation with the maturity. δ represents the exogenous uncertainty factor when the seller conducts sales and satisfies a normal distribution with a mean of 0 and a variance of σ^2.

g represents the sum of the benefits obtained by the blockchain supply chain financial information service platform through the core enterprises on the platform. The utility of the blockchain supply chain financial information service platform is

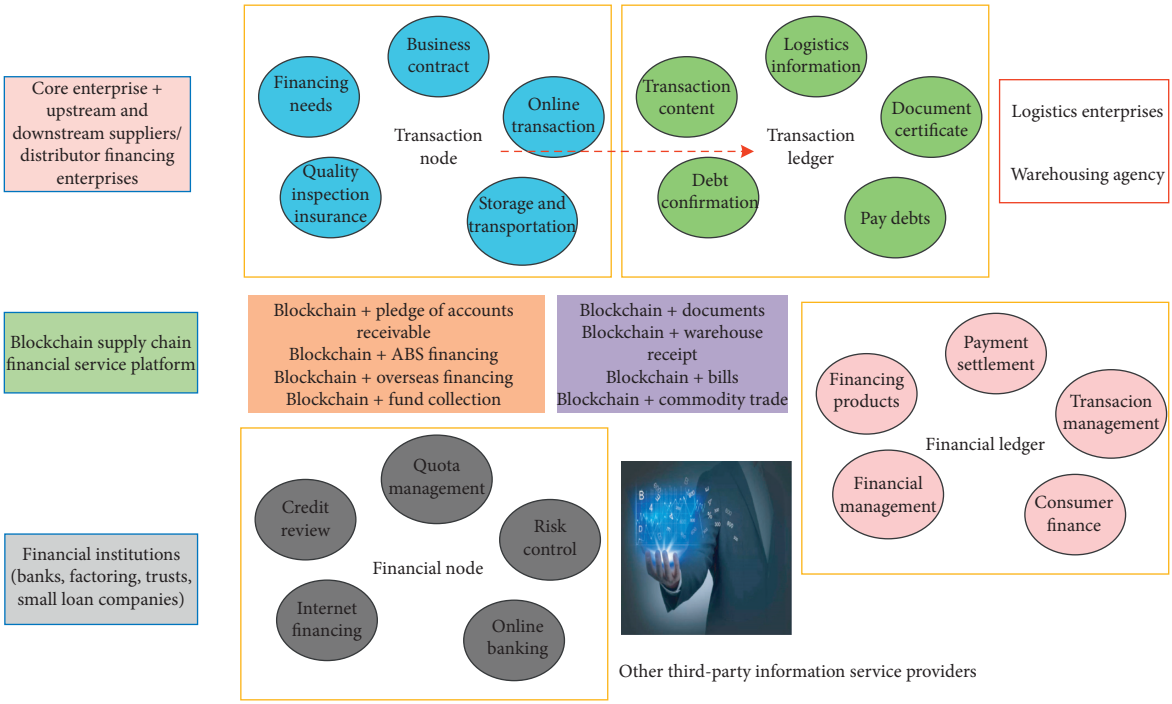

Figure 4: Schematic diagram of the application system of the supply chain financial platform under the blockchain architecture.

$$\pi_B = Q[k(a) + g] - a. \tag{2}$$

Assuming that the core enterprise is a risk aversion type, its utility function has an invariable absolute risk aversion feature, so its expected return function satisfies

$$E\pi_R = 1 - e^{-p\pi_R}. \tag{3}$$

π_R represents the total income of the core company, and p represents the absolute risk aversion of the core company. Assuming that the retained income of the core enterprise is 0, then the above can be summed up:

$$\pi_R = 0.5fe^2 + nQ - aQk(a). \tag{4}$$

Using the deterministic equivalent quantity method, the expected benefits of the core enterprise can be obtained as follows:

$$E\pi_R = 0.5fe^2 - (ae + d)(n - ak(a)) + 0.5p\sigma^2 ak(a). \tag{5}$$

3.3. Design of Incentive Mechanism under Complete Information. Under the condition of complete information, core enterprises package and upload their business capabilities, sales contracts, production and operation, and other information to the blockchain supply chain financial service platform; the blockchain system automatically accounts for the entire network. There is no private company in the core enterprise. Information, the blockchain supply chain financial service platform, and the core enterprise are completely information transparent, and the service platform can intuitively observe the core enterprise's sales ability a and sales effort level e. At this time, when the information is completely symmetrical, the blockchain supply chain financial service platform and core enterprises will seek to maximize their own interests and achieve the best overall configuration.

From the model assumptions, the client's blockchain supply chain financial service platform is a risk-neutral type, which encourages core companies to strive to improve sales. Therefore, the expected benefits of the blockchain supply chain financial service platform are

$$E\pi_B = a(d + ae)[k(a) + g]. \tag{6}$$

According to Stackelberg's theory, the optimal planning problems and constraints of the blockchain supply chain financial service platform can be obtained. The optimal unit sales subsidy incentive $k^*(a)$ increases with the maturity of the blockchain technology d. As the absolute risk aversion degree p, the core company's effort cost coefficient f, and the uncertainty factor variance $\sigma 2$ increase, it decreases; therefore, for core companies with relatively low effort costs, the blockchain supply chain financial service platform is willing to provide higher sales incentive subsidies to ensure that core companies can reach the highest possible operating level and ensure the ability to repay later. At the same time, when the blockchain supply chain financial service platform develops more mature and stable profitability, the information service platform will also be more capable of giving incentive subsidies.

The optimal expected benefits of the blockchain supply chain financial information service platform will increase with the sum of the benefits brought to the information service platform by the core enterprise using the blockchain supply chain financial platform, the core enterprise's sales

revenue function, and the maturity of blockchain technology. At this time, the expected income of the core enterprise is zero. Therefore, the better operating conditions and business capabilities of core enterprises can bring better benefits to the blockchain supply chain financial information service platform.

3.4. Construction of Incentive Mechanism Contract Design. In an incomplete information environment, before the blockchain supply chain financial information service platform signs an incentive mechanism contract with the core enterprise, the blockchain supply chain financial information service platform as the client can only know the general situation of the agent's core enterprise information. The true capability level of the core enterprise is hidden, and blockchain supply chain finance cannot directly observe this information. Therefore, at this time, the two parties cooperating on the alliance chain have the problem of adverse selection before signing the incentive mechanism contract. When the incentive contract is signed, the core enterprise of the agent usually chooses the level of effort based on its own rationality, while the principal's blockchain supply chain financial service platform generally has no way to know the true level of effort of the agent's choice, so there is a certain amount of effort at this time.

Under the asymmetric information variable, its effort level e is the hidden information variable under moral hazard. The core enterprise chooses its own optimal effort level according to the incentive contract $k(a)$ designed by the blockchain supply chain financial service platform. The service platform uses this to identify the sales capabilities of the core companies on the blockchain alliance chain and to provide efficient incentives for them.

According to the assumption of the above model, the blockchain supply chain financial service platform is known to be risk-neutral, so the expected benefits of the blockchain supply chain financial service platform are

$$E\pi_B = f(a)a(d + ae) - [g + k(a)]. \tag{7}$$

Assuming that the retained earnings of the core enterprise is zero, the individual participation constraint (IR) is

$$(ae + d)[ak(a) - n] \geq 0.5fe^2 + 0.5pnk(a)\sigma^2. \tag{8}$$

The incentive contract of the blockchain supply chain financial information service platform can promote core enterprises to improve their sales efforts on the blockchain platform. The core company's incentive strength is analyzed, and the incentive contract is analyzed to obtain

$$E\pi_R = dnk(a) + 0.5p\sigma^2 ak(a)^2 + a^2. \tag{9}$$

In order to maximize its own benefits, the blockchain supply chain financial service platform provides incentive contracts for core companies as follows:

$$\max E_{\pi_B} = f(a)a(d + ae)[k(a) + g]. \tag{10}$$

4. Numerical Analysis

4.1. Reliability Analysis. In this study, SPSS19.0 was used for reliability analysis, and for the three inverse questions in the uncertainty variable, the question data was replaced before the reliability analysis. Reliability is an indicator of the consistency or stability of the results measured through repeated tests, or the estimated error of the measurement, to reflect the actual degree of the actual quantity. The greater the reliability of the scale, the smaller the standard error of measurement. Commonly used reliability testing methods in Likert scales are Cronbach's α coefficient and split-half reliability. Since split-half reliability only uses half-sample reliability, it usually reduces the length of the original test questions. Therefore, this study uses Cronbach's α coefficient to test the reliability of the sample. Reliability analysis of the scales of gestation period, growth period, and maturity period was carried out, and the specific results are shown in Figure 5.

From Figure 5, it can be found that the Cronbach α coefficients of each subscale are all above 0.7, and the Cronbach α coefficients of the total scale are all above 0.8, which shows that the scale has good consistency and internal structure and good reliability.

4.2. Confirmatory Factor Analysis. Confirmatory factor analysis is to further test the relationship between latent variables and observed variables on the basis of exploratory factor analysis and test the authenticity and rationality of the hypothetical model by testing the degree of fit between the data and the hypothetical model. Generally speaking, confirmatory factor analysis is a prestep or basic framework for integrated structural equation analysis. This study uses AMOS17.0 software to perform confirmatory factor analysis to prepare for the subsequent construction of structural equation models.

The basic fitness is used to test whether the model has identification problems, data file input errors or sequence errors, etc. The measurement indicators are generally the error variance in the estimated parameters, the significance of the error variation, and the factor loading. It is generally believed that there can be no negative error variables in the estimated parameters, and all error variations must reach a significant level. The factor loading degree is between 0.5 and 0.95. The larger the factor loading, the more the index variable can be explained by the construct. The index variable can effectively reflect the characteristics of the variable to be measured.

The internal structural fit of the model is mainly used to evaluate the significance of the estimated parameters in the model, the validity and reliability of each indicator variable, etc. Generally speaking, the evaluation indicators of the model's inherent structural fit are the scale's t value, P value, combination reliability, and average variance extraction value (AVE). The t value is the t-test value. If the absolute value of this value is greater than 1.96, the parameter estimate reaches the 0.05 significance level. If the absolute value

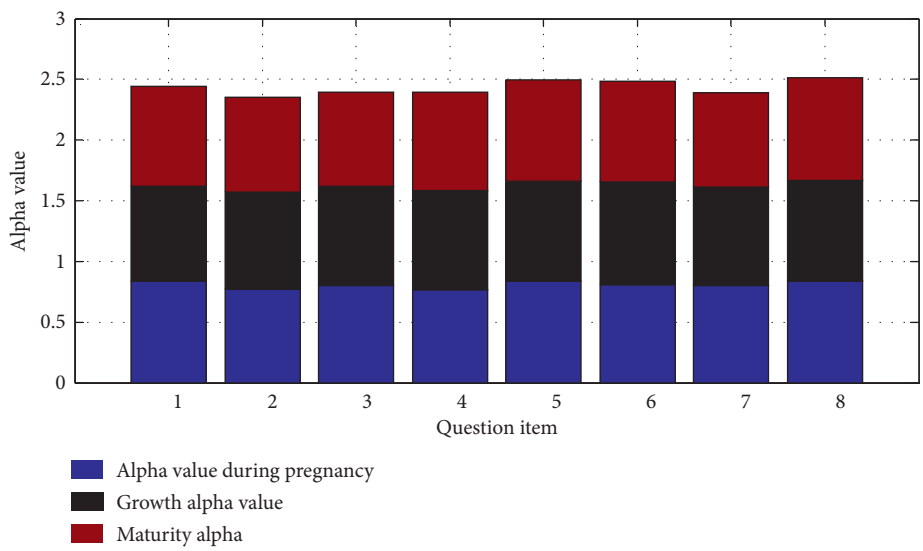

Figure 5: Reliability analysis results of the scale.

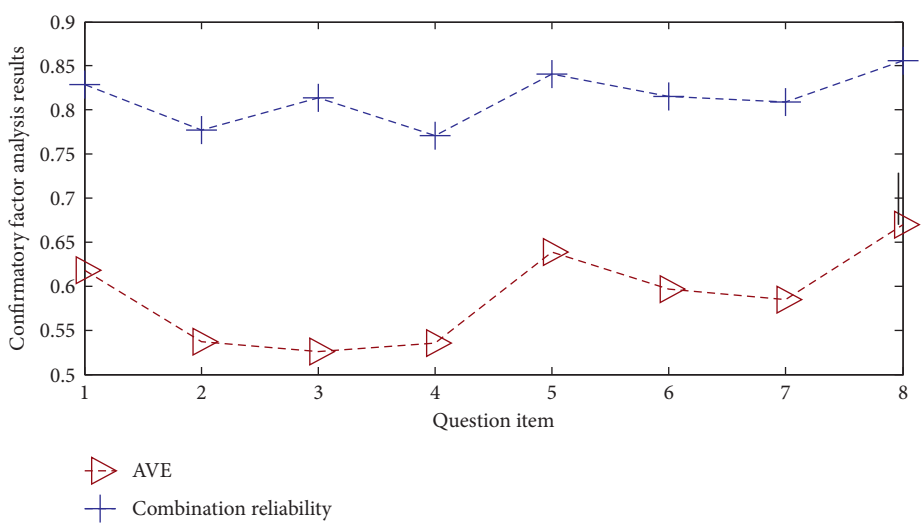

Figure 6: Confirmation factor analysis results of the gestation period scale.

of the t value is greater than 2.58, the parameter estimate reaches the 0.01 significance level.

4.2.1. Confirmatory Factor Analysis of the Gestation Period Scale. The confirmatory factor analysis results of each variable of the gestational period scale and the overall model fit analysis results are shown in Figure 6.

According to the confirmatory factor analysis result of the gestation period scale, it can be seen that the combined reliability and AVE value of each observation variable are both greater than 0.5, which indicates that the model has a good inherent quality. According to the analysis results of the model fit, it can be seen that except for the GFI which is slightly less than 0.90, the other fit indexes meet the requirements, which indicates that the model has a good fit.

4.2.2. Confirmatory Factor Analysis of the Growth Stage Scale. The confirmatory factor analysis results of each variable of the growth stage scale and the overall model fit analysis results are shown in Figure 7. According to the confirmatory factor analysis results of the growth stage scale, it can be seen that the combined reliability and AVE value of each observation variable are greater than 0.5, which indicates that the model has good inherent quality and good fit.

4.2.3. Confirmatory Factor Analysis of the Maturity Scale. The confirmatory factor analysis results of each variable of the maturity scale and the overall model fit analysis results are shown in Figure 8. According to the confirmatory factor analysis results during the maturity period, it can be seen that the load of each factor is greater than 0.85, and the

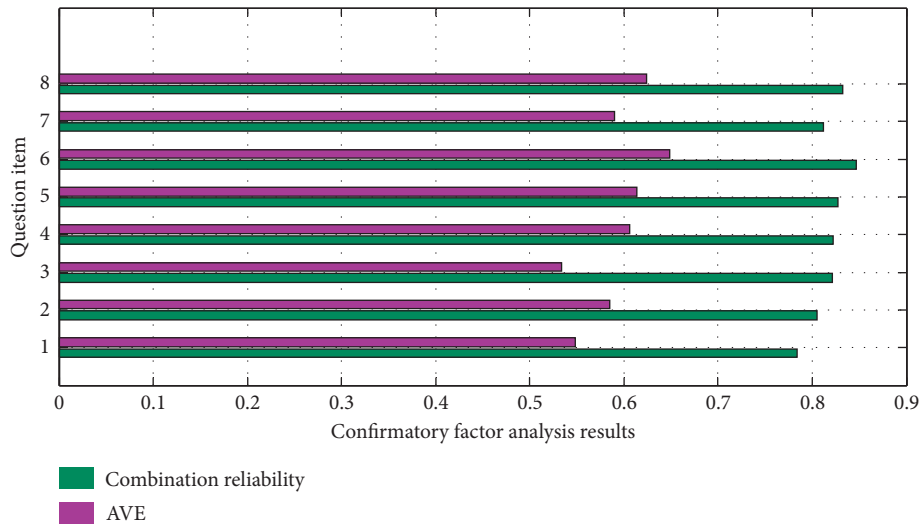

Figure 7: Confirmatory factor analysis results of the growth stage scale.

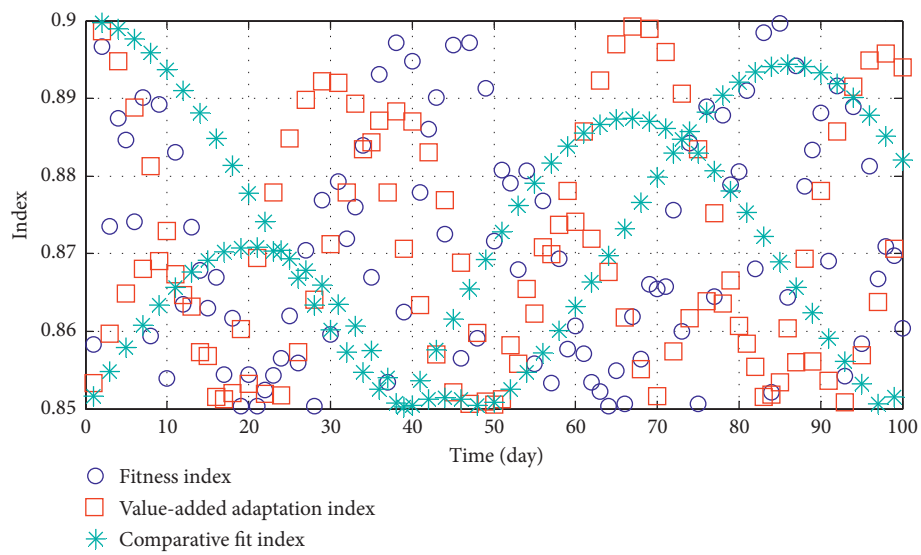

Figure 8: The analysis results of the overall model fit of the maturity scale.

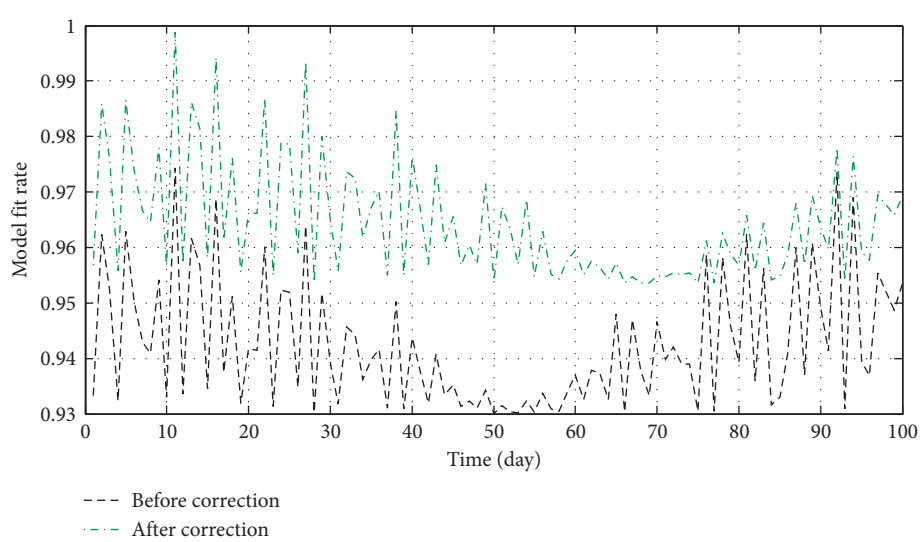

Figure 9: Comparison of the fitness of the premodified hypothetical model and the postmodified hypothetical model in the mature period.

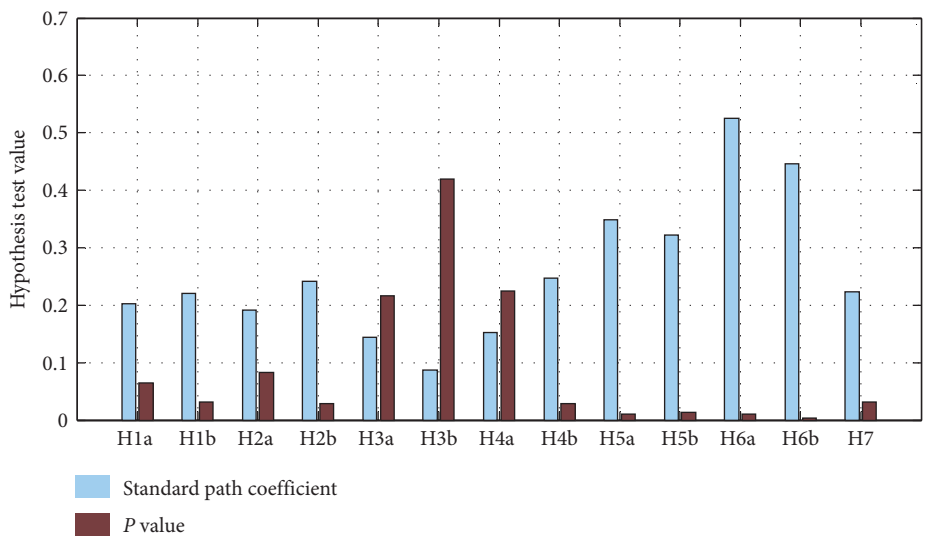

Figure 10: Hypothesis test results of the maturity scale.

fitness index is good, which shows that each variable has a good validity structure.

5. Model Modification and Fitness Evaluation

The adaptability of the sample data of the three stages of the enterprise life cycle and the hypothesis model of this study is tested separately. According to the adaptability summary table of the AMOS output report, it can be found that all the adaptability indicators in the initial hypothesis model have not reached the ideal status. However, from the revised index table, we can find that the residual correction index among the latent variables resource dependence, uncertainty, cooperation experience, corporate reputation, trust level, and relationship commitment is relatively high. Therefore, establishing the correlation between them will significantly reduce the chi-square value and increase the significance. The comparison of the fitness of the hypothetical model before and after the correction is shown in Figure 9. It can be seen that after the correction of the hypothetical model, the fitness indicators have reached the ideal level (>0.9). Figure 10 shows the results of the hypothesis test of the maturity scale. We give the path coefficient and *P* value of the research hypothesis.

6. Conclusion

This article considers a series of influencing factors such as core enterprise sales ability, blockchain technology maturity, sales effort level, etc.; through principal-agent and incentive mechanism theory, we design the incentive contract in the blockchain supply chain financial alliance chain under the accounts receivable model. Taking into account the possibility of failure to repay on time or bad debts due to poor management of core enterprises, a good incentive contract can effectively help the blockchain supply chain financial service platform to screen the true operating conditions of core enterprises. It can appropriately stimulate the sales level and sales effort of the core enterprise and avoid the risk of repayment. With the help of enterprise life cycle theory, this research discusses the measurement dimensions and influencing factors of the supply chain's cross-enterprise incentive mechanism, constructs research hypothesis models for different life cycle stages, and conducts empirical analysis and hypothesis testing based on survey data. It reveals the mechanism of the supply chain's cross-enterprise incentive mechanism based on time and vertical sequence. Based on the perspective of the enterprise life cycle, this study explores the mechanism of the incentive mechanism of different life cycle stages related influencing factors from the perspective of time and vertical sequence. This is a new attempt to study the supply chain cross-enterprise cooperation relationship. Therefore, in the choice of research methods, research approaches, and research ideas in this article, it is inevitable that they will appear imperfect due to the immature theory. This research is an exploratory empirical research. It analyzes and discusses the mechanism of the incentive mechanism of the relevant influencing factors in different stages of the enterprise life cycle and identifies the important influencing factors of the incentive mechanism in different life cycle stages and the changes in the role of influencing factors at different stages trend. Based on this, it is imperative to construct a set of incentive mechanisms suitable for different life cycles of enterprises, and future research will focus on this. Based on the theory of self-compensated trade financing, supply chain finance has played down the financial analysis and access standards for financing small- and medium-sized enterprises, shifted the focus to the control of operations, and directly infiltrated the management of risks by controlling the flow of funds and logistics. This is conducive to realizing dynamic control of risks, and at the same time realizing the risk isolation of credit subjects. Banks and other financial institutions use the credit guarantees of core enterprises in the supply chain to further reduce their own credit risks, match the flow of funds in the supply chain with the trade cycle, shorten the

financing cycle, and make up for the weak operating stability of SMEs. At the same time, the trade cooperation relationship of the supply chain can be used to carry out upgraded business development from point to chain to network.

Data Availability

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Consent

Informed consent was obtained from all individual participants included in the study references.

Conflicts of Interest

The author declares that there are no conflicts of interest regarding the publication of this paper.

References

[1] L. M. Gelsomino, R. Mangiaracina, A. Perego, and A. Tumino, "Supply chain finance: a literature review," *International Journal of Physical Distribution and Logistics Management*, vol. 46, no. 4, pp. 348–366, 2016.

[2] S. D. Lekkakos and A. Serrano, "Supply chain finance for small and medium sized enterprises: the case of reverse factoring," *International Journal of Physical Distribution and Logistics Management*, vol. 46, no. 4, pp. 367–392, 2016.

[3] D. A. Wuttke, C. Blome, H. Sebastian Heese, and M. Protopappa-Sieke, "Supply chain finance: optimal introduction and adoption decisions," *International Journal of Production Economics*, vol. 178, pp. 72–81, 2016.

[4] L. A. Chicaiza-Becerra and M. Garcia-Molina, "Prenatal testosterone predicts financial risk taking: evidence from Latin America," *Personality and Individual Differences*, vol. 116, no. 1, pp. 32–37, 2017.

[5] K. Fanning and D. P. Centers, "Blockchain and its coming impact on financial services," *Journal of Corporate Accounting and Finance*, vol. 27, no. 5, pp. 53–57, 2016.

[6] G.-X. Gao, Z.-P. Fan, X. Fang, and Y. F. Lim, "Optimal Stackelberg strategies for financing a supply chain through online peer-to-peer lending," *European Journal of Operational Research*, vol. 267, no. 2, pp. 585–597, 2018.

[7] Y. L. Zhao, H. Nan, and Z. H. Yu, "Improved particle swarm optimization algorithm based on twice search," *Journal of Computational and Applied Mathematics*, vol. 37, pp. 2541–2546, 2017.

[8] K. L. Seaman, J. K. Leong, C. C. Knutson, and G. R. Samanez-Larkin, "Individual differences in skewed financial risk-taking across the adult life span," *Cognitive, Affective, and Behavioral Neuroscience*, vol. 17, no. 6, pp. 1232–1241, 2017.

[9] B. Egelund-Müller, M. Elsman, F. Henglein, and O. Ross, "Automated execution of financial contracts on blockchains," *Business and Information Systems Engineering*, vol. 59, no. 6, pp. 457–467, 2017.

[10] Z. Li, H. Guo, W. M. Wang et al., "A blockchain and automl approach for open and automated customer service," *IEEE Transactions on Industrial Informatics*, vol. 15, no. 6, pp. 3642–3651, 2019.

[11] L. Luo, K. Chen, and F. P. Du, "Surface fitting and position-pose measurements based on an improved SA-PSO algorithm," *Journal of Tsinghua University (Science and Technology)*, vol. 55, no. 10, pp. 1061–1066, 2015.

[12] R. Offringa, L. C. Tsai, T. Aira, M. Riedel, and S. S. Witte, "Personal and financial risk typologies among women who engage in sex work in Mongolia: a latent class analysis," *Archives of Sexual Behavior*, vol. 46, no. 6, pp. 1857–1866, 2017.

[13] M. Ober, S. Katzenbeisser, and K. Hamacher, "Structure and anonymity of the bitcoin transaction graph," *Future Internet*, vol. 5, no. 2, pp. 237–250, 2013.

[14] C. Lu, W. Sheng, Y. Han, and X. Ma, "Phase-only pattern synthesis based on gradient-descent optimization," *Journal of Systems Engineering and Electronics*, vol. 27, no. 2, pp. 297–307, 2016.

[15] L. M. Abualigah and A. T. Khader, "Unsupervised text feature selection technique based on hybrid particle swarm optimization algorithm with genetic operators for the text clustering," *The Journal of Supercomputing*, vol. 73, no. 11, pp. 4773–4795, 2017.

[16] K. Christidis and M. Devetsikiotis, "Blockchains and smart contracts for the internet of things," *IEEE Access*, vol. 4, pp. 2292–2303, 2016.

[17] Y. Zhang and J. Wen, "The IoT electric business model: using blockchain technology for the internet of things," *Peer-to-Peer Networking and Applications*, vol. 10, no. 4, pp. 983–994, 2017.

[18] W. H. Han, J. Xu, and X. H. Shen, "Hybrid of self-learning particle swarm optimization and gradient descent based magnetic flux leakage lnversion," *Fire Control Command Control*, vol. 40, no. 1, pp. 88–91, 2015.

[19] L. M. Abualigah, A. T. Khader, and E. S. Hanandeh, "Hybrid clustering analysis using improved krill herd algorithm," *Applied Intelligence*, vol. 48, no. 11, pp. 4047–4071, 2018.

[20] Y. Zhang, S. Kasahara, Y. Shen, X. Jiang, and J. Wan, "Smart contract-based access control for the Internet of Things," *IEEE Internet of Things Journal*, vol. 6, no. 2, pp. 1594–1605, 2019.

[21] N. Zhang, Y. Wang, C. Kang, J. Cheng, and D. He, "Blockchain technique in the energy internet: preliminary research framework and typical applications," *Proceedings of the Chinese Society of Electrical and Electronics Engineers*, vol. 36, pp. 4011–4023, 2016.

[22] Y. J. Lei, X. D. Yu, and S. H. Yue, "Research on PSO-based intuitionistic fuzzy kernel clustering algorithm," *Journal of Communication*, vol. 5, no. 5, pp. 25–54, 2015.

[23] L. M. Abualigah, A. T. Khader, and E. S. Hanandeh, "A combination of objective functions and hybrid krill herd algorithm for text document clustering analysis," *Engineering Applications of Artificial Intelligence*, vol. 73, pp. 111–125, 2018.

[24] X. Ye, Q. Shao, and R. Xiao, "A supply chain prototype system based on blockchain smart contract and Internet of Things," *Science and Technology Review*, vol. 35, no. 23, pp. 62–69, 2017.

[25] X. Tai, H. Sun, and Q. Guo, "Electricity transactions and congestion management based on blockchain in energy internet," *Power System Technology*, vol. 40, pp. 3630–3638, 2016.

[26] G. Singal, V. Laxmi, M. S. Gaur et al., "Multi-constraints link stable multicast routing protocol in MANETs," *Ad Hoc Networks*, vol. 63, pp. 115–128, 2017.

[27] C. Xin, X. Chen, H. Chen, S. Chen, and M. Zhang, "Green product supply chain coordination under demand uncertainty," *IEEE Access*, vol. 8, pp. 25877–25891, 2020.

[28] I. Nielsen, S. Majumder, E. Szwarc, and S. Saha, "Impact of strategic cooperation under competition on green product manufacturing," *Sustainability*, vol. 12, no. 24, pp. 10248–10275, 2020.

[29] J. Huang, W. Yang, and Y. Tu, "Financing mode decision in a supply chain with financial constraint," *International Journal of Production Economics*, vol. 220, pp. 107441–107452, 2020.