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*Research Article*

# Supply Chain Financial Risk Management under the Background of Wireless Multimedia Communication and Artificial Intelligence

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The application of information technology and various electronic communication equipment has grown rapidly. At the same time, information technologies such as the Internet and communication networks have become increasingly mature and widely used, making e-commerce transactions simpler and the roles of enterprises in the supply chain increasingly diversified. At this stage, supply chain finance has become an important way for small- and medium-sized enterprises to finance, and it is a key step in commercial trade. However, the risk control of this model is difficult to be effectively contained. How to control its financial risk to the lowest level is the research goal of this paper. This paper analyzes and calculates the supply chain financial risks of different enterprises through a questionnaire method, a case analysis method, and a comparison method and obtains relevant data. The data results show that the entropy value of the net interest rate is 0.97, which indicates that it has a larger market share and less risk. Through wireless multimedia communication technology and artificial intelligence algorithms, the system calculation of supply chain financial risk management is much simpler. In this regard, the research proposes a scientific system for building supply chain financial risk management.

## 1. Introduction

As a new financing model, supply chain finance has achieved a high degree of integration of related resources such as production and operation. Compared with traditional bank loans, it reduces the business risk of enterprises, promotes the adjustment, upgrading and optimization of industrial structure, and enhances the level of core competitiveness as a whole. This is conducive to the construction of the supply chain financial service system and the improvement of information sharing between financial institutions and customers. However, there are higher requirements for the optimization and upgrading of Internet technology in terms of financial supply chain financing issues and risk management strategies.

There are many theories on supply chain financial risk management in the context of wireless multimedia communication and artificial intelligence. For example, Xu Bingyao said that under the influence of information technology, traditional financial management is undergoing changes that cannot be ignored [1]. Feng Juan believes that the combination of big data technology and information technology provides financial institutions with huge and diverse data collections and complex data analysis methods. And has many advantages. However, there is still a lot of room for improvement in terms of cost, data authenticity and user privacy [2]. Zhang Yu said that supply chain finance is a new type of business that integrates the real economy and financial operations. It has a unique operating model and risk management strategy. It not only overcomes the

shortcomings of the traditional financial credit model, but also solves the problem. Promote the rational allocation and revitalization of current assets of financial investment enterprises, and improve the operational efficiency of industrial chain enterprises [3]. Therefore, on the basis of scholars, in the context of artificial intelligence development, this paper uses modern technology to study supply chain financial risk management.

The goal of this study is to construct a management system that controls its financial risk to the lowest level. This paper first introduces the relevant theoretical knowledge of wireless multimedia communication, and then links it with supply chain financial risk management. After that, the principles of the management system construction are expounded, next, the questionnaire survey and calculation is carried out, and the corresponding data and conclusions are drawn. On the basis of the obtained data, this paper puts forward the construction strategy of the risk management system in combination with the actual needs, hopes to provide some reference for the development of related enterprises, especially small and medium-sized enterprises.

## 2. Supply Chain Financial Risk Management under the Background of Wireless Multimedia Communication and Artificial Intelligence

*2.1. Wireless Multimedia Communication.* Wireless multimedia communication technology is a new type of integration of image and sound. It is based on computer and uses various sensors to collect data and then transmit it. This new model has grown rapidly in recent years. The operation of wireless multimedia communication has higher requirements on the infrastructure. With the continuous improvement of people's living standards and the acceleration of wireless network construction, people have produced more and more demand for wired electronic communication systems and put forward more stringent requirements. In order to realize wireless multimedia communication, various broadband mobile system design concepts and technologies have appeared. In real life, these concepts will be updated in a short time, so only continuous exploration, research and improvement can ensure continuous progress [4, 5].

At this stage, the transmission system of wireless multimedia communication is composed of a transmitting station, a receiving end and a display. Among them, the transmitting station occupies an important basic position and is responsible for the transmission of signals. Its core component is the encoder. Due to the high coding efficiency and strong anti-interference ability, the code division multiplexing system is directly applied to realize the function of wireless data transmission and reception. There are other factors that can also affect the transfer rate. Such as the quality of the collection device, the bandwidth of the optical cable and so on. Optical cables are mainly used for data exchange. It has strong stability in terms of strength and width. It can also be used as a data channel or a storage medium to be stored and processed; it is also necessary to set up devices specially used for receiving or sending, such as digital certificate keyboards and various CD-ROMs, in a specific location to facilitate the transmission of communication functions and the operator's information. Comprehension and memory [6, 7].

*2.2. Supply Chain Finance.* The enhancement of market cooperation enables enterprises to concentrate their limited resources on enhancing their own strong factors, while some secondary factors can be completed in the form of inter-enterprise alliances. This context has led to significant changes in the traditional form of supply chains. Structurally, the supply chain has a networked form, which is multi-directional and changing. Under the cooperative supply and demand relationship, the supply chain has a dual structure [8, 9].

The first is the multiplicity of identities. In the supply chain, the roles played by upstream and downstream enterprises are different. For upstream companies, it is a buyer; for downstream companies, it is a supplier. This is the "dual structure" of the supply chain. Second is complexity: a supply chain is a complex networked system with members and organizations with different and conflicting goals. It usually consists of several types of companies. The relationship between them is complex and there are many exchanges and transactions associated with them. Dynamic: with the development of enterprises and changes in the market, members of the supply chain are also in an unstable state. Risk: due to the unequal access to information, participating in supply chain finance will have certain risks [10, 11].

Supply chain finance provides new ideas for small and medium-sized enterprises to seek financing. Supply chain finance is not a one-size-fits-all business or product [12–14]. It is associated with other upstream and downstream enterprises through divergent business links, thus greatly expanding financing channels. Through the division of labor and the cooperation of affiliated companies, the continuous value creation of the entire supply chain can be achieved [15, 16].

The supply chain finance business can provide reference for the bank loan of the enterprise. Because banks have limited access to information on SMEs, they cannot make scientific assessments on their credit rating and repayment ability. Therefore, it is possible to trace the performance of enterprises in supply chain finance. That is, the connection between supply chain finance and bank loans should be realized as soon as possible [17, 18].

*2.3. Supply Chain Financial Risk Management*

*2.3.1. Operational Risk in Supply Chain Finance.* Companies in a supply chain often vary widely in management, business systems, and the quality of their employees. The supply chain and the composition of many enterprises in the supply chain also determine the technical differences between enterprises. These problems make it difficult for enterprises to connect in the process of supply chain financing. The new supply chain financial financing system is different from the business access level of loan approval and management

of traditional enterprises, so it puts forward higher requirements for the professionalism of practitioners.

*2.3.2. Market Risk of Supply Chain Finance.* In many cases, due to wrong market forecasts or the impact of other new products, the company does not sell products as originally planned, resulting in interruption of the company's capital chain and bringing repayment risks to commercial banks [19, 20].

## 3. Construction of Credit Risk Indicator System

*3.1. Principles for the Construction of the Index System.* This article takes the study of the supply chain financial risk management system of online companies as an example. Online supplier supply chain financing is a kind of credit model formed by online suppliers in the financing process. The financing process is similar to the principle of offline commercial financing. The construction of indicators must be based on scientific and reasonable principles. The specific principles are as follows:

(1) The specific principles are as follows:

Combine qualitative and quantitative. In order to establish an online business supply chain financial indicator system, qualitative analysis must be carried out first. Then adopt a quantitative method to optimize the indicators.

Typicality. The structure of the online business supply chain financing indicator system should be typical. The first, second or higher index of the index structure should fully reflect the characteristics of the index.

Integrity. The built-in display needs to be able to measure the company's risk from multiple angles and directions, and reflect the integrity of the indicators, so as to be able to map the real risk situation.

scientific. The indicators generated must have a scientific basis. From the pre-selection and selection of indicators to the creation of final indicators, the scientific principles of indicators must be followed.

(2) AHP determines subjective weight

Analytic Hierarchy Process (AHP) is currently widely used in subjective evaluation. It simplifies goals by dividing them into levels so that otherwise complex goals become more hierarchical. On the basis of in-depth analysis of the decision-making problem, the decision-making problem is subdivided into general goals, sub-goals and evaluation criteria.

(3) Entropy method to determine objective weight

The entropy method is a systematic quantitative measurement that describes the process of order change under complex economic conditions. It represents the distribution of data under objective conditions. The more divergent the data, the more uncertain the weight of the index. The entropy method eliminates subjective factors when calculating weights.

Classification and standardization formulas of indicators are as follows:

$$K_{\mathrm{m}n} = \frac{\lambda_{mn} - \lambda_n^{\min}}{\lambda_n^{\max} - \lambda_n^{\min}},$$
$$K_{\mathrm{m}n} = \frac{\lambda_n^{\max} - \lambda_{mn}}{\lambda_n^{\max} - \lambda_n^{\min}}. \quad (1)$$

Through the screening and evaluation of different loan schemes, the optimal scheme is obtained. The evaluation method is simple and operable.

*3.2. Questionnaire Design and Recovery.* In this article, in order to test whether the indicators in this article are useful, after pre-selecting the indicators of the online financing model, the risk assessment indicators are initially designed as a series of questionnaires. Then use the data analysis software SPSS17.0 to analyze the data obtained in this paper, and conduct a systematic analysis. The subjects of this questionnaire survey are companies, bank employees and financial educators participating in the online financing process. Because the survey objects are relatively scattered, the research adopts the form of online questionnaire to conduct research. In order to reduce the impact of invalid questionnaires on the research data, the research adopted a method of increasing the number of distributions. There are 100 questionnaires in this questionnaire, 86 valid questionnaires, and the recovery rate is 86%.

*3.3. Reliability Analysis of Indicators.* Reliability analysis is equivalent to checking whether there is consistency between different indicators. In general, Cronbach's $\alpha$-coefficient is used to test whether there is consistency between different subjects. The degree of internal consistency is divided into: a coefficient greater than 0.8 indicates an excellent conclusion, 0.6 to 0.8 is considered good, and less than 0.6 is considered unreliable. In order to reflect whether a single indicator has an impact on the evaluation object, it is also necessary to calculate the coefficient value after removing the indicator. If this indicator is removed, the reliability coefficient of the evaluation object will increase. After calculation, the reliability value of this questionnaire has reached 8.86, which is higher than the standard value, which proves that the development of this questionnaire is effective.

## 4. Analysis of the Results of the Questionnaire

*4.1. Basic Data Analysis of Questionnaire Survey Samples.* After preliminary statistics, Table 1 is obtained. The percentage of questionnaires from undergraduates or above can reach 55.81%, and those with more than 3 years of working experience can reach 45.35%, indicating that the target of the questionnaire is indeed at a certain level in the financial field.

As shown in Figure 1, we can see that there are more males than females in the questionnaire sample. There are more undergraduates than junior college students. The number of people who have worked for 3-5 years is larger than those who have just come to work for one or two years.

Table 1: Basic data analysis of questionnaire survey samples.

| | Sample size | Proportion |
|---|---|---|
| Male | 44 | 51.16% |
| Female | 43 | 50% |
| Junior college | 35 | 40.70% |
| Undergraduate | 48 | 55.81% |
| Working years (1-2) | 26 | 30.23% |
| Working years (3-5) | 39 | 45.35% |
| Working years above 5 | 21 | 24.42% |

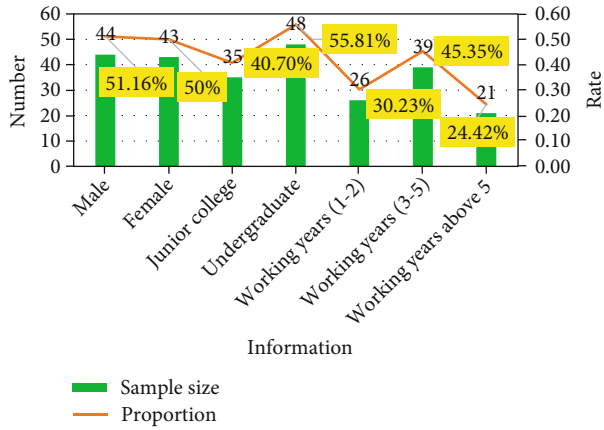


Figure 1: Basic data analysis of questionnaire survey samples.

*4.2. Calculation of AHP Weight.* The bank selected 4 employees to participate in the risk assessment. These experts will start the evaluation based on their in-depth understanding of online business and financial issues after the indicator is created. After the final discussion, review, revision and other processes, the scoring results of this article are obtained. The details are shown in Figure 2:

As shown in Figure 2, in the score, the highest score is the platform enterprise management risk in the financing enterprise qualification. According to the calculation method of eigenvalue and consistency, this matrix meets the consistency requirements.

*4.3. Calculation of Entropy Method.* First, through many discussions with company executives, quantitative indicators were obtained from the company's financial management, the original evaluation matrix was established, and qualitative indicator data were listed through questionnaires. The questionnaires are mainly distributed within the company. The questionnaire data is organized. The specific data is shown in Table 2:

As shown in Figure 3, in the initial value, the product market share, technical equipment level, inventory turnover rate, and return on net assets of different brands are different. Among them, the car's share, technical level, inventory turnover rate and net asset value are the highest.

According to the relevant calculation formulas of weights, this paper calculates the entropy value, difference coefficient, and entropy weight of its indicators, and they are derived in Table 3.

As shown in Figure 4, we can see that in the supply chains of various industries, the net interest rate entropy is the highest, and the difference coefficient and entropy weight of the market share are the smallest. It shows that its creditworthiness is relatively high, and the risk of bank loans is relatively small. The second is the inventory turnover rate, which ranks second in comparison with the market share. This shows that companies with higher credit ratings and a reasonable inventory turnover ratio are more likely to get the attention of bank loans.

*4.4. Implementation Suggestions for Supply Chain Financial Risk Management*

*4.4.1. Try to Avoid the Risk of Uncertainty.* Risks occur with uncertainty. In the supply chain finance business, there are many potential and uncontrollable factors, such as demanders of funds, suppliers, etc. These risks can cause losses or increase costs to varying degrees. On the other hand, it also includes huge economic losses due to the credit problems of supply chain financiers and loopholes in the information security system, which lead to the inability to use network equipment normally. This can even have a chain reaction, leading to systemic paralysis and market volatility, affecting the entire industry and even socio-economic disorder. In pursuit of the goal of maximizing the overall benefit, the process of risk management must work closely with other departments to ensure that each link in the entire supply chain operation can be effectively monitored within the system. Due to the existence of various uncertainties between different industries and enterprises, it is necessary to systematically and comprehensively understand the influencing factors in all aspects when conducting risk identification. At the same time, taking into account the possible results and other potential problems of the members in the entire supply chain, formulate preventive plans and emergency plans.

*4.4.2. Establish a Scientific Evaluation Index System.* Considering the combination of dynamics and complexity, a specific business activity may involve risk identification and assessment of multiple different departments or even multiple products. In supply chain finance business, banks estimate the probability of default by analyzing and calculating the credit lines of enterprises and individuals. At the same time, it is necessary to pay attention to whether the early warning mechanism and countermeasures before the occurrence of potential risk events are effective and whether the prevention cost can be minimized. Supply chain finance is based on a comprehensive analysis of the company's overall operating conditions, financial conditions and market prospects, so as to formulate corresponding emergency plans, and put forward targeted and feasible management measures based on these plans. Construction of evaluation index system. According to the above principles, a set of systems including financial and non-financial factors and closely related to the interests of other stakeholders is established to evaluate the credit issues, operations and management involved in the supply chain financial business, and to

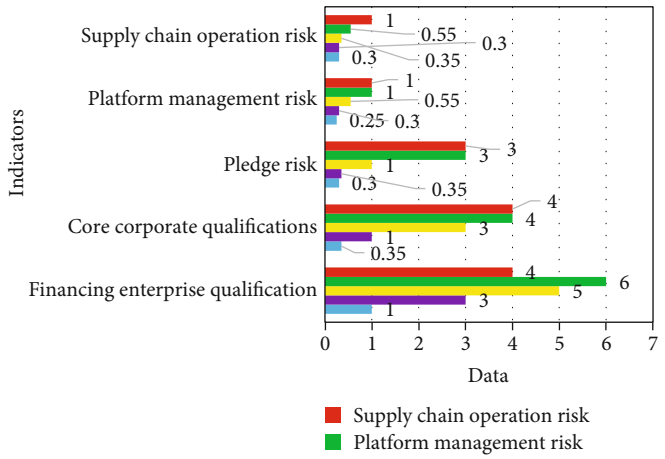


Figure 2: First-level index risk weight expert judgment and analysis.

Table 2: Initial value of credit risk evaluation index of financing model.

| | Car | Clothing | Plastic | Chemical |
|---|---|---|---|---|
| Product market share | 0.46 | 0.37 | 0.23 | 0.32 |
| Technical equipment level | 7.55 | 5.32 | 4.32 | 3.43 |
| Inventory turnover | 0.66 | 0.41 | 0.32 | 0.47 |
| Roe | 0.35 | 0.46 | 0.56 | 0.44 |

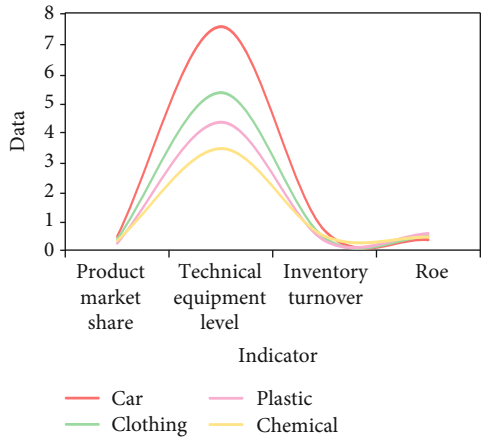


Figure 3: Initial value of credit risk evaluation index of financing model.

Table 3: Entropy calculation-related results.

| | Entropy | Coefficient of difference | Entropy weight |
|---|---|---|---|
| Product market share | 0.97 | 0.03 | 0.03 |
| Technical equipment level | 0.95 | 0.04 | 0.05 |
| Inventory turnover | 0.96 | 0.02 | 0.03 |
| Roe | 0.98 | 0.04 | 0.04 |

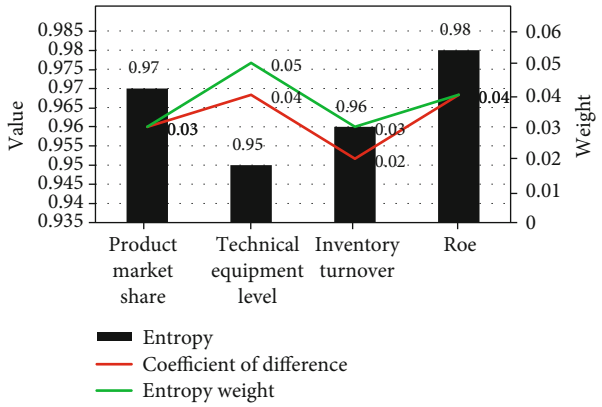


Figure 4: Entropy calculation-related results.

conduct quantitative analysis. A network of interrelated relationships is formed due to the existence of a large number of different degrees of connections between nodes in the supply chain. Therefore, it is necessary to establish a perfect early warning mechanism and coping strategy model in risk identification and assessment to control the loss caused by its possible occurrence or occurrence of problems.

## 5. Conclusion

Supply chain finance is a financing method commonly used by small and medium-sized enterprises at this stage. It greatly expands the financing channels of small and medium-sized enterprises and strengthens the connection between upstream and downstream enterprises in the supply chain. However, due to the lack of standardized management and supervision, it often faces great risks. The rapid development of wireless communication and artificial intelligence technology enables enterprises to enhance the grasp of the specific situation of financing partners and the prediction of financing behavior risks through more scientific data analysis models. Through the development of this research, it is confirmed that the weight of enterprises in the financial supply chain is not constant, but needs to be calculated in an all-round way according to the role of enterprises in

financial behavior. In the next step of research, I will select a representative small and medium-sized enterprise for tracking, specifically analyze its actual situation and existing problems in supply chain finance, and put forward more targeted improvement suggestions.

## Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Conflicts of Interest

It is declared by the authors that this article is free of conflict of interest.

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