Hindawi
Mobile Information Systems
Volume 2023, Article ID 9758903, 1 page
https://doi.org/10.1155/2023/9758903

Retraction

Retracted: Risk Prevention of E-Commerce Supply Chain Financial Market Based on High-Performance Computing

Mobile Information Systems

Received 8 August 2023; Accepted 8 August 2023; Published 9 August 2023

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] Y. Wang, Q. Yang, and P. Song, "Risk Prevention of E-Commerce Supply Chain Financial Market Based on High-Performance Computing," *Mobile Information Systems*, vol. 2022, Article ID 9301466, 12 pages, 2022.

Hindawi
Mobile Information Systems
Volume 2022, Article ID 9301466, 12 pages
https://doi.org/10.1155/2022/9301466

Research Article

Risk Prevention of E-Commerce Supply Chain Financial Market Based on High-Performance Computing

Yingying Wang, Qifeng Yang, and Ping Song

School of Economics, Wuhan University of Technology, Wuhan 430070, Hubei, China

Correspondence should be addressed to Yingying Wang; 244222@whut.edu.cn

Received 13 May 2022; Revised 24 June 2022; Accepted 7 July 2022; Published 19 August 2022

Academic Editor: Imran Shafique Ansari

As an emerging industry, e-commerce mainly relies on online platforms to provide products and services for enterprises and consumers, and it has its own risks in the development of supply chain finance. When developing an online business, it can rely on the support of developed logistics and physical stores, which has its special advantages in operating supply chain finance, but at the same time, it also brings special business risks. With the rapid development of economic level in recent years, the application of EC Supply Chain has become more and more extensive. The emergence of EC Supply Chain has injected strong vitality into the financial market, but at the same time, the EC Supply Chain financial business is also facing huge risks. For cross-border import e-commerce companies, the core of the supply chain is the source of goods and logistics. Enterprises have more resources, which means that they have more initiative in the fierce competition, and a stable and perfect supply chain will be the core competitiveness of the cross-border import e-commerce industry. The purpose of this paper is to study how to prevent risks in the EC Supply Chain financial market based on high-performance computing. This paper puts forward the importance of high-performance computing and the significance of EC Supply Chain development and proposes preventive measures against financial market risks in EC Supply Chain. From the data in the experimental part of this paper, it can be known that the development trend of the risk generated by the EC Supply Chain in 2010 accounted for 6.9%. By 2015, the percentage of the development trend of EC Supply Chain risk was 17.9%, an increase of 11%. It can be seen that the development of EC Supply Chain risk is very rapid, so how to prevent the financial market risk of EC Supply Chain is very urgent. From the data, it can be seen that the exogenous risk in the e-commerce supply chain has a score of 7.4–8.4 for market risk, a score of 7.7–9.1 for economic risk, and the highest score for economic risk. Risk is the biggest risk factor. The characteristics of supply chain risk are not only complex, diverse, and uncertain but also transitive and virtual.

1. Introduction

With the increasingly rational development trend of the cross-border import e-commerce industry, it is foreseeable that the comprehensive cross-border import e-commerce supply chain services that can solve the pain points of the market, integrating supply, logistics, financing, payment, and so on will be promising. The whole-chain industry centered on cross-border import e-commerce will also become a new engine for economic development in the current era. The research on supply chain management of cross-border import e-commerce enterprises can help enterprises to build a suitable supply chain management model according to the needs of themselves and the development of the times, improve the operation and management level of enterprises, and promote cross-border import e-commerce and the entire cross-border business. The healthy and long-term development of the e-commerce industry is of great significance. In high-performance environments, mesh networking systems provide shorter latency between hosts, so overall network performance and transfer rates can be improved.

With the widespread use of EC Supply Chain platforms, the new online supply chain finance financing model is gradually replacing the traditional offline supply chain finance financing model. Therefore, it is necessary to seek a new risk measurement tool for judging the financial market

risk of EC Supply Chain to solve the phenomenon of "financing difficult and expensive" for small- and medium-sized enterprises. It has a certain research value for promoting cooperation between banks and enterprises and helping them achieve mutual benefit.

The innovation of this paper is as follows: (1) This paper introduces the theoretical knowledge of high-performance computing and supply chain financial market risk and uses high-performance computing to analyze how high-performance computing plays a role in the research on supply chain financial market risk prevention. (2) This paper makes a detailed analysis of the types and characteristics of financial market risks in EC Supply Chain. Through experiments, it is found that the risk prevention of supply chain financial market based on high-performance computing can make the EC Supply Chain develop scientifically and well. Computer network security problems affect the security of information, funds, and property of enterprises. Therefore, it is necessary to study the types of security problems that occur in e-commerce and analyze corresponding preventive measures so as to promote the improvement of computer network security performance, and high-performance computing can achieve this.

2. Related Work

With the vigorous development of EC Supply Chain, there are more and more financial risks. Kang found that traditional financial risk assessment not only has a low accuracy rate but also has low adaptability. In order to solve this problem, he proposed a big data-based financial risk assessment model, which uses regression analysis to conduct big data analysis and prediction of financial risk assessment. Although the scholar's point of view is very good, he did not use some practical examples to illustrate whether the model he established is feasible [1]. Zhu and Liu found that establishing a good financial risk early warning mechanism has become very meaningful in today's society. But the scholar did not explain in detail why financial risk early warning is an important way to identify risks and what its advantages are [2]. Baek and Kim found that being able to predict the price of financial assets is important because people can reduce the risk of investment decisions through accurate predictions. Recently, deep neural networks have been widely used in this research field. Although the scholar found that forecasting can reduce investment risk, he did not specify what the role of deep neural networks in this field is and did not verify whether his statement was correct through specific data [3]. Vatanasakdakul and D'Ambra found that EC Supply Chain has grown significantly across the country, but it still faces many challenges. This perspective is implemented through a task-technology matching model that may help to better understand how organizations in developing countries are adopting EC Supply Chain. However, the scholar did not further introduce the matching model, so the practicability of this model still needs to be studied [4]. Pappas et al.'s current research is based on customers' online shopping experience and online shopping motivation, using complexity theory to study purchasing behavior in personalized online shopping. To achieve his goals, he proposes a conceptual model and research proposition. His research advocates surveying 400 customers on their online shopping experience using data analysis tools. Although the scholar carried out specific experiments and described the experimental objects, he did not get the experimental results, which made the experiments less meaningful [5]. Nisar and Prabhakar's goal is to analyze customer satisfaction in the EC Supply Chain market, and the results of his experiments show that customer satisfaction affects sales. If customer satisfaction is high, sales will be high, and if customers are not very satisfied, sales will be low. Although the scholar's entire experiment is clear, there is a lack of subjects and some data to support the authenticity of the experiment [6]. The purpose of Palsson H is to analyze and explain the factors that determine the development of traditional trade and EC Supply Chain. Although the scholar's starting point is very correct, he did not clearly explain what factors affect and determine the development of EC Supply Chain [7]. Gregory et al.'s research is based on a resource-based perspective theory and develops and tests a framework to determine the relationship between EC Supply Chain capabilities and marketing effectiveness by examining the impact of EC Supply Chain on export performance. Next, he empirically tested the framework using a sample of 340 exporters. The scholar's experiment has specific experimental objects, but the introduction of the relationship between EC Supply Chain and marketing efficiency is still too simple [8].

3. Basic Concepts of High-Performance Computing and Risks Facing the EC Supply Chain Supply Chain

3.1. EC Supply Chain and Basic Concepts of High Performance. E-commerce usually refers to a wide range of commercial and trade activities around the world; in the open network environment of the Internet, based on server-side application methods, buyers and sellers conduct various commercial and trade activities without seeing each other and realize online shopping for consumers. As society enters the digital age, the Internet has spread to various industries. The development of EC Supply Chain makes information spread farther and faster through the network, accelerates the information flow between nodes, and optimizes the allocation of resources. Based on this feature, EC Supply Chain can also be applied to the operation of the supply chain [9]. In recent years, the combination of supply chain finance and EC Supply Chain platform has become a hot research topic. The development of EC Supply Chain is shown in Figure 1.

As shown in Figure 1, the development of e-commerce supply chain finance has risen from about 10% at the beginning to the last 45%, indicating that the development of e-commerce is very rapid. EC Supply Chain finance is the integration of supply chain activities such as procurement, sales, and logistics by an EC Supply Chain platform. Then, these electronic data are analyzed and transmitted to form a corresponding credit management system and then combined with financial institutions to provide comprehensive financial services for buyers and sellers engaged in transactions on the procurement platform [10].

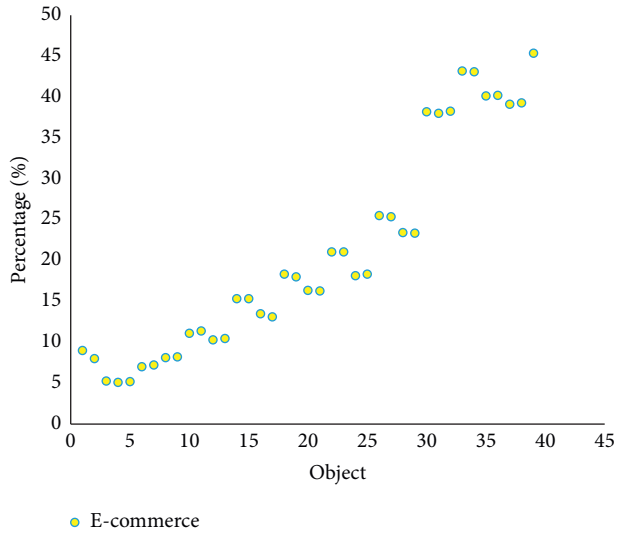

Figure 1: Development of EC Supply Chain.

This paper investigates the development of EC Supply Chain from 2011 to 2015, as shown in Table 1.

As shown in Table 1, the level of traditional supply chain financial service providers is relatively low, and there are few service providers that can effectively integrate logistics, information flow, and capital flow and provide systematic supply chain financial products. The design of traditional supply chain financial products ignores the credit value. The traditional supply chain finance only solves the financing needs of some small- and medium-sized enterprises, and financial institutions do not provide more support for the financing needs of a wide range of small- and medium-sized enterprises [11]. In the new environment of the complete popularization of the Internet, the rapid development of EC Supply Chain, and the ever-increasing demand for personalized financing, this strict financing model has been unable to meet the personalized financing needs [12].

On the other hand, the EC Supply Chain platform makes the information interaction between enterprises more sufficient and solves the problem of the asymmetry of traditional supply chain financing information [13]. Due to its huge numerical computing and data processing capabilities, high-performance computing can be widely used in major issues with far-reaching effects on the national economy, national defense construction, and scientific and technological development.

EC Supply Chain can also meet the individual financing needs of SMEs, and the financing efficiency of supply chain financing has also been greatly improved. This paper analyzes the advantages of high-performance computing, as shown in Table 2.

As shown in Table 2, the advantages of the high-speed development of high-performance computing are higher security. Its security is above 79%, the accuracy is also high, above 67%, and the efficiency of real-time processing reaches more than 82%. The high-speed development of high-performance computing has now become the core competitiveness of the financial industry. The parallel computing function of high-performance computing systems effectively improves the efficiency of detailed analysis of high-frequency cache traffic and realizes rapid analysis and real-time processing of large amounts of data [14].

Table 1: Development of EC Supply Chain from 2011 to 2015.

Years	Quantity	Percentage (%)	Growth rate (%)
2011	6533	20	0
2012	7892	25	5
2013	9852	29	4
2014	12541	34	
2015	16780	46	12

Large-scale parallel computing with high-performance computing as a platform enjoys a high reputation, and great achievements have been made in the application of scientific research, engineering technology, and military technology [15]. The structure of high-performance computing is shown in Figure 2.

As shown in Figure 2, high-performance computing can improve the user's ability to manage computing hardware resources and software resources autonomously. The infrastructure services provided by high-performance computing provide users with management rights to infrastructure and important computing resources, such as coprocessor GPUs. Users can configure the computing environment according to their needs without affecting other users and the overall system management [16, 17].

In addition, with the development of high-performance computing technology, in addition to traditional high-performance computing applications, emerging high-performance computing applications (such as finance, enterprise, and government) have also increased the demand for high performance [18]. High-performance computing operates with the concept of cloud computing. The high-performance computing center has many advantages and has received widespread attention in academia and business circles.

3.2. The Main Risks Faced by the E-Commerce Supply Chain Financing Model. E-commerce supply chain financing provides a new financing channel for e-commerce, and at the same time, it also faces the following main risks:

(1) Supply chain risk: most of the e-commerce enterprises are small- and medium-sized enterprises, and their strength is relatively weak. However, from the perspective of effective resource allocation, banks will choose strong enterprises as financing objects. Therefore, even if there are many enterprises in the supply chain, it is difficult to gain the trust of the bank and obtain bank loans. At the same time, e-commerce enterprises may go bankrupt due to their weak strength and difficulty in resisting operational risks. As part of the entire supply chain, these enterprises will cause serious damage to the entire supply chain and even paralyze the supply chain.

(2) Operational risk: due to the complexity of the Internet and the frequency of online operations, the work of online transactions is essentially different from traditional transactions. Administrators are likely to

Table 2: Benefits of HPC.

Enterprise	Accuracy (%)	PrEC Supply Chainision	Real-time processing efficiency (%)
A	87	67	82
B	85	75	83
C	79	78	88
D	82	81	86

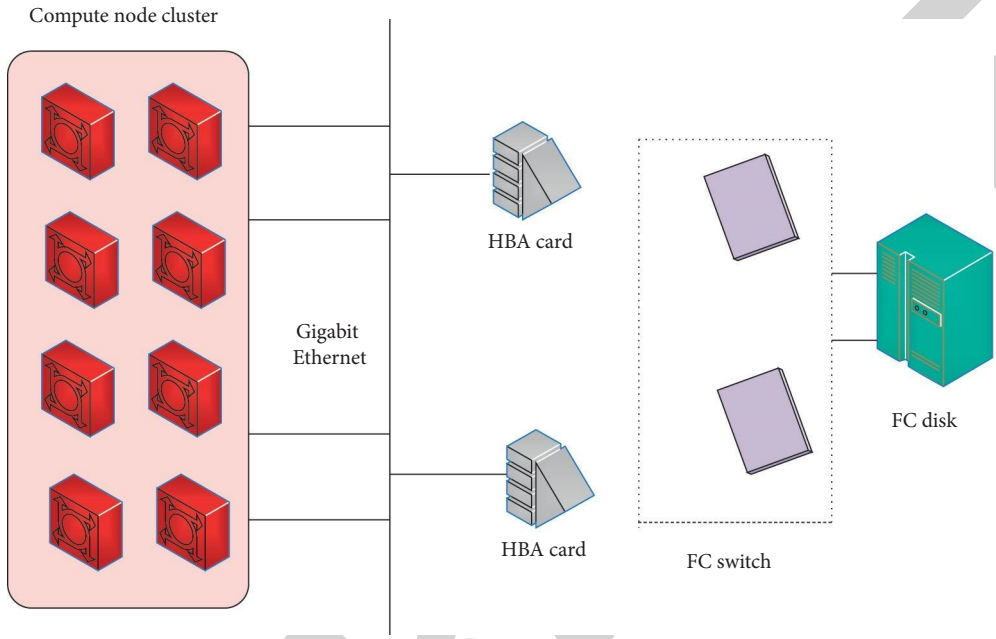

Figure 2: Architecture of HPC.

make mistakes when inputting data, and data loss caused by system failures will bring huge losses to the enterprise. The losses caused by network dagger operation errors are often much higher than manual operations, which further increases the operational risk. Communication between ~11hCb'lk2_ is often conducted online, further increasing the possibility of information leakage. At the same time, the logistics enterprise designated by the bank may be located in different places with the financing enterprise, which increases the operational risk of cargo transportation.

(3) Market risk: in the online warehouse receipt financing, the financing enterprise obtains the loan by pledging the goods. Fluctuations in market prices and exchange rates will cause changes in the price of collateral, which in turn will cause changes in the value of the collateral, which will have an impact on the solvency of an enterprise.

4. Load Balancing Model and Ant Colony Algorithm Based on High-Performance Computing

Common load balancing models include global load balancing and intracluster load balancing. From the perspective of product form, they can be divided into hardware load balancing and software load balancing. Global load balancing is generally implemented through DNS. It can be seen from the global high-performance computer rankings that the architectures adopted by the high-performance computers on the rankings are mainly based on cluster technology and large-scale parallel processing technology [19]. The high-performance computing cluster job processing architecture is shown in Figure 3.

As shown in Figure 4, after the job is submitted, it is queued, and the management node assigns it to the computing node for processing. At present, high-performance computing usually adopts blade servers, and blade servers refer to server platforms with high density and low cost [20, 21]. Pheromones, also known as pheromones, refer to substances that are secreted by an individual into the body and detected by other individuals of the same species through the olfactory organs, causing the latter to exhibit certain behavioral, emotional, psychological, or physiological changes. It has a communication function.

4.1. Load Balancing Model Based on High-Performance Computing. Let x represent an effective task scheduling strategy; then $T(X)$ represents the time for the task set T to execute all tasks on the server node S. The goal of task scheduling is to find the optimal span, where $T(X)$ is as small as possible.

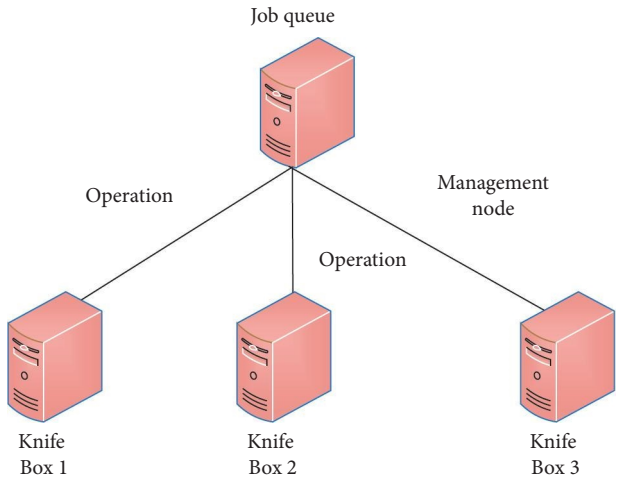

Figure 3: HPC cluster job processing architecture.

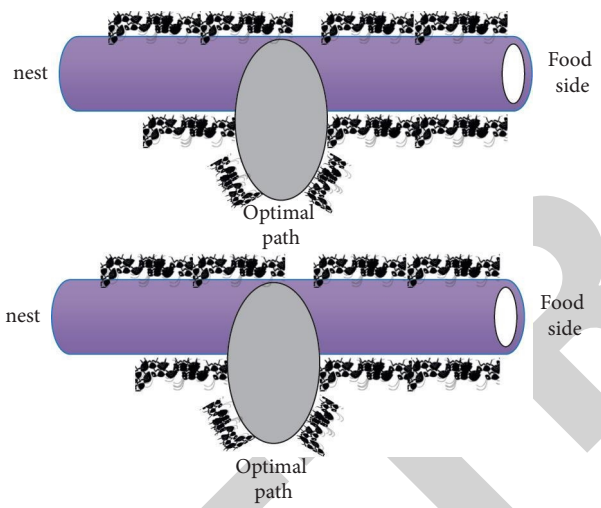

Figure 4: Double bridge structure diagram of ant colony to find the optimal path.

Let L represent the set of load balancing indicators $L = \{L_1, L_2, \ldots, L_N\}$; then $L_j(X)$ represents the load indicator of the server node j under the scheduling policy X. Then $L_j(X)$ is defined as formula (1):

$$L_j(X) = \frac{1}{T(X)} \sum_{i=1}^{m} M_{ij} * W_{ij}. \quad (1)$$

In formula (1), $j \in \{1, 2, \ldots, m\}$, $M_{ij} \neq -1$, and $0 \leq L_j(X) \leq 1$ can be obtained. Let $\sigma(X)$ represent the standard deviation of the load index, and then define $\sigma(X)$ as formula (2):

$$\sigma(X) = \sum_{n}^{1} \left(L_i(X) - \frac{1}{n} \sum_{j=1}^{n} L_i(X) \right)^2. \quad (2)$$

In formula (2), according to $0 \leq L_j(X) \leq 1$, we can get $0 \leq \sigma(X) \leq 0.5$; let $\mu(X)$ represent the standard deviation of the load index, and then define $\mu(X)$ as formula (3):

$$\mu(X) = 1 - 2 * \sigma(X). \quad (3)$$

In formula (3), $0 \leq \mu(X) \leq 1$ can be obtained from $0 \leq \sigma(X) \leq 0.5$. Then according to the mathematical model, the task scheduling algorithm can be described as finding a task scheduling strategy, making $T(X)$ as small as possible and $\mu(X)$ as large as possible, is the optimal solution.

4.2. Ant Colony Optimization Algorithm Based on High-Performance Computing. Ant colony algorithm is a probabilistic algorithm used to find optimal paths, which is inspired by the behavior of ants to find paths in the process of finding food. This algorithm has the characteristics of distributed computing, positive feedback of information, and heuristic search and is essentially a heuristic global optimization in evolutionary algorithms. Ant colony algorithm simulates the predation process of ants. During the predation process of ants, the strength of the pheromone guides the action direction of ants, and ants always move in the direction of strong pheromone, gradually approaching the optimal path. The optimal path is the shortest distance between the food source and the nest [22]. The double bridge structure diagram of the ant colony to find the optimal path is shown in Figure 4.

As shown in Figure 4, they send signals to guide other ants toward the best route when they are moving [23].

Modify the amount of pheromone as in (4):

$$\tau_{i,s}(t+h) = (1-p)\tau_{i,s}(t) + p \times \tau_0(t+h). \quad (4)$$

Because they are visited by ants, it is indirectly beneficial to explore edges that have not yet been visited. Therefore, ants tend not to tend to common paths.

A certain amount of pheromone is proportional to the resulting solution as in (5):

$$\begin{cases} \tau_{i,s}(t+h) = (1-\xi)\tau_{i,s}(t) + \xi \times \Delta\tau_{i,s}(t+h), \\ \Delta\tau_{i,s}(t+h) = \text{best}C, \end{cases} \quad (5)$$

where $0 \prec \xi \leq 1$, ξ is the pheromone decay parameter, and Q is a constant. The global update pheromone is applied to all solutions, but only to the best solution found.

The path traversed by a single ant can be represented as a solution in a feasible solution, and then the path traversed by the ant can be represented as a subset of the problem solution. The positive feedback mechanism increases the randomness in the search process. On the contrary, when solving large-scale TSP problems, too few ant populations will accelerate the convergence, but the global optimization ability of the algorithm will be reduced, which will lead to the stagnation of the algorithm. Heuristic algorithms are proposed relative to optimization algorithms. An optimal algorithm for a problem finds the optimal solution for each instance of the problem. The relationship between the heuristic factor and the number of ants and the shortest path is shown in Figure 5.

As can be seen from Figure 5, when the number of ants is too small, the algorithm's ability to search for optimization is very low. With the increase in the number of ants and when

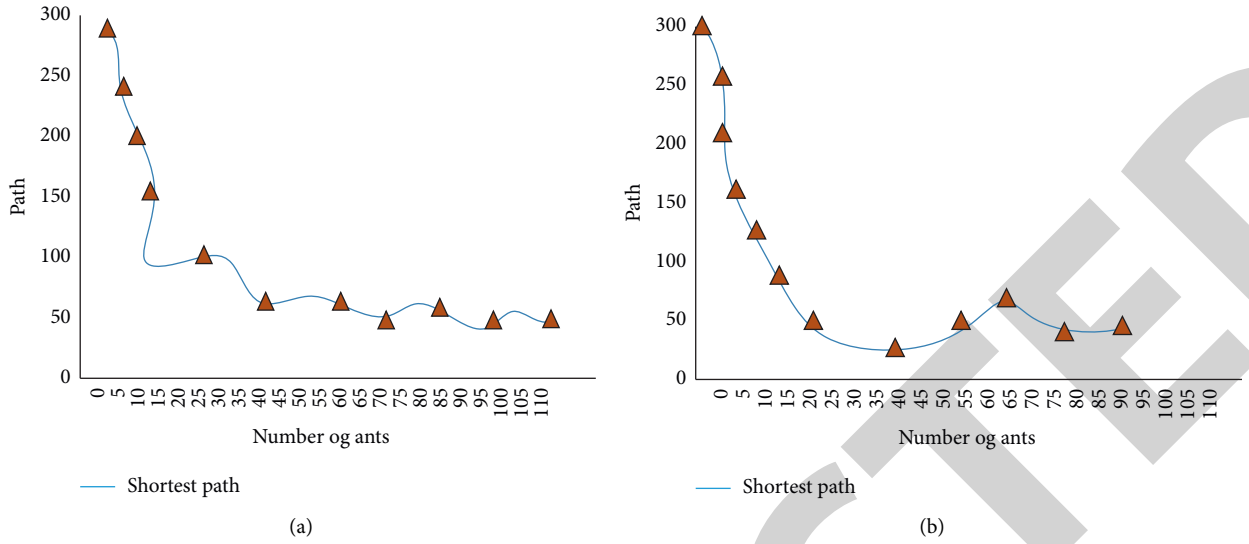

Figure 5: Heuristic factor and number of ants versus shortest path. (a) The relationship between the number of ants and the shortest path. (b) The relationship between the heuristic factor and the shortest path.

the number of ants is greater than 45, the search performance of the algorithm is improved. Although the performance of the algorithm has also been improved, the effect is not very obvious. This is because after the number of ants reaches a certain level, the amount of information on a large number of traversed paths tends to be average, and the positive feedback mechanism is less obvious. The random search of the algorithm is strengthened, and the global optimization ability of ants and the convergence speed of the algorithm are better. Convergence ability refers to whether it can finally converge to the optimal solution after a series of iterations starting from an initial condition; the global optimization ability actually refers to the "search" ability of the algorithm.

The number of indicators "should be less rather than more and should be simple rather than complex." For a large number of financial evaluation indicators of small- and medium-sized enterprises, some indicators should be eliminated through scientific methods to meet the requirements of the construction principles of evaluation indicators in this paper.

If the index is too high, it may not only affect the fairness and objectivity of the evaluation results but also cause the evaluation process to be time-consuming and labor-intensive. Therefore, it is necessary to carry out a correlation analysis on the evaluation indicators. The analysis of correlation mainly relies on calculating the correlation coefficient between the indicators, which is formula (6):

$$\rho = \sum_{i=1}^{n} (A_i - A)(B_i - B)^2. \tag{6}$$

In formula (6), A and B represent the two indicators to be compared, and A_i and B_i, respectively, represent the samples of the two indicators. For example, A_i can represent the current asset turnover rate of an enterprise in a certain year, and B_i can represent the fixed asset turnover rate of the enterprise in a certain year. A_i and B_i represent the sample mean of CC and DD, respectively. By collecting the relevant financial data of the enterprise, the correlation analysis between the relevant financial indicators can be carried out.

Discriminant analysis refers to the ability of the evaluation index to distinguish the differences between the evaluation objects. If for a certain evaluation object, all evaluation indicators in a certain range almost completely show high or low scores, it means that the evaluation indicators in this range have almost no discrimination, and it is difficult to explain the differences between the evaluated objects. The expression for the discriminant analysis is formula (7):

$$V_i = \frac{S_i}{A}. \tag{7}$$

Among them, $A = 1/n \sum_{i=1}^{n} A_i$, A is the mean value, S_i is the standard deviation, and V_i is the coefficient of variation. This paper introduces the EC Supply Chain platform qualification credit risk index. It not only conforms to the research on credit risk evaluation of online supply chain finance but also increases the proportion of "debt" evaluation indicators, which is more complete than the existing research index system.

4.3. Construction of EC Supply Chain Risk Evaluation Index System. Supply chain risk assessment is the core step of supply chain risk management. Risk assessment is to build an evaluation index system on the basis of risk identification and analysis of influencing factors, select a certain method to establish a model, and calculate the overall risk level of the supply chain and the risk factors of various risks. The evaluation of supply chain risk can not only provide a reference for the formulation of enterprise system but also provide certain help for enterprise's business process improvement and risk avoidance. When the data information

is transmitted, if the data required for the next normal work cannot be obtained within the corresponding time, the whole process cannot be carried out smoothly. The risk assessment process of the supply chain is shown in Figure 6.

As shown in Figure 6, in the process of analyzing the supply chain environment, the general environment of the EC Supply Chain platform cannot be ignored. When an enterprise adopts EC Supply Chain technology in supply chain management, it is necessary to consider its own operating conditions; only in this way can a correct judgment be made about the risks to be faced in the future. To sum up, in all the steps of supply chain risk assessment, the core one is environmental analysis.

4.3.1. Improve On-Time Delivery Rate. The on-time delivery rate is the ratio of the number of deliveries by time divided by the total number of deliveries within a specific time T. Assuming that the number of on-time deliveries in time T is M_1 and the total number of deliveries is M_2, the calculation of this indicator can be expressed as formula (8):

$$P = \frac{M_1}{M_2} \times 100\%. \tag{8}$$

4.3.2. Improve the Timely Rate of Information Transmission. Within a certain time T, the timely rate of information delivery is the ratio of the number of times of timely delivery of information to the total number of times. In information transmission, we not only need to pay attention to the rate of information transmission but also need to avoid the loss of information delay. The calculation formula is formula (9):

$$T_i = \frac{1}{m} \sum_{i=1}^{n} \times 100\%. \tag{9}$$

Among them, T_i is the ith transmission of information; n is the total number of information transmissions.

4.3.3. Increase the Frequency of Information Exchange. If the information exchange is not timely enough, there is a high probability of loss due to information asymmetry. If the information processing can ensure sufficient transparency, the transfer rate of logistics and capital flow can be greatly improved. Its calculation formula is as formula (10):

$$G = \frac{M}{T} \times 100\%. \tag{10}$$

Among them, n is recorded as the total number of information transmissions in the time T, and T is the specified period.

4.3.4. Reduce Customer Complaint Rate. If within a certain period of time T the number of customer complaints is recorded as U_1, the total number of transactions is recorded as U_2, and β is recorded as the service coefficient, then the customer complaint rate can be calculated as formula (11):

$$F = \frac{U_1}{U_2} \times \beta \times 100\%. \tag{11}$$

4.4. Empirical Analysis of EC Supply Chain Finance Based on High-Performance Computing VAR Model. The VAR model is the value-at-risk model, which is often used to measure risk. The predictions produced by a small and reasonably set VAR model are usually better than those produced by a larger system of structural simultaneous equations, especially for short-term forecasts, mainly because VAR models often the effect of constraints imposed to ensure that the identifiability of the structural model can be avoided. VAR model (Vector Autoregressive Model) is used to study the dynamic relationship between various variables. The advantage of this model is that there are few restrictions on the economic relationship between variables, and the error caused by the setting can be eliminated by this model.

Let the income of EC Supply Chain enterprises be R_a, and the total business volume of each EC Supply Chain platform is Q_a. Then the total revenue obtained by all EC Supply Chain platforms providing EC Supply Chain finance business is formula (12):

$$R_a = \sum R_a = \sum (T_2 - C_2) \times Q_a. \tag{12}$$

At the same time, financial institutions have sufficient funds to provide support for SMEs, and their interest is the income of financial institutions. The interest here refers to the interest spread obtained by the financial institution. If the income of a single financial institution is R_{2b}, then the income of the bank is $(Q_a - B_a)^2$, and the total income of all financial institutions is formula (13):

$$R_2 = \sum R_{2b} = \sum (T_1 + T_2) \times (Q_a - B_a)^2. \tag{13}$$

In order to obtain the dynamic relationship between the endogenous variables, it is necessary to carry out the corresponding regression analysis on the hysteresis of these endogenous variables. The basic expression of the VAR model is formula (14):

$$h_t = A_1 h_{t-1} + A_2 h_{t-2} + \cdots + A_2 h_{t-p} + \eta_t. \tag{14}$$

In formula (14), h_t is the vector representation of m-dimensional endogenous variables, $A_1 h_{t-1}$ is a dimensional square matrix, and η_t is an m-dimensional disturbance vector, which is expressed as formula (15) after the matrix is expanded:

$$\begin{bmatrix} t_{1t} \\ t_{2t} \\ t_{1mt} \end{bmatrix} = A_1 \begin{bmatrix} t_{1t-1} \\ t_{2t-1} \\ t_{1mt-1} \end{bmatrix} + A_2 \begin{bmatrix} t_{1t-2} \\ t_{2t-2} \\ t_{1mt-2} \end{bmatrix} + \cdots + A_P \begin{bmatrix} t_{1t-p} \\ t_{2t-P} \\ t_{1mt-P} \end{bmatrix}. \tag{15}$$

$A(T)$ is the parametric square matrix of $m \times m$ of lag operator 1 if the reciprocals of all the root moduli of the square matrix $(T)\eta_t$ are less than 1. That is, it is located in the unit circle, and then the corresponding stationary condition is satisfied, which can be written as an infinite-order vector moving average in the form of formula (16):

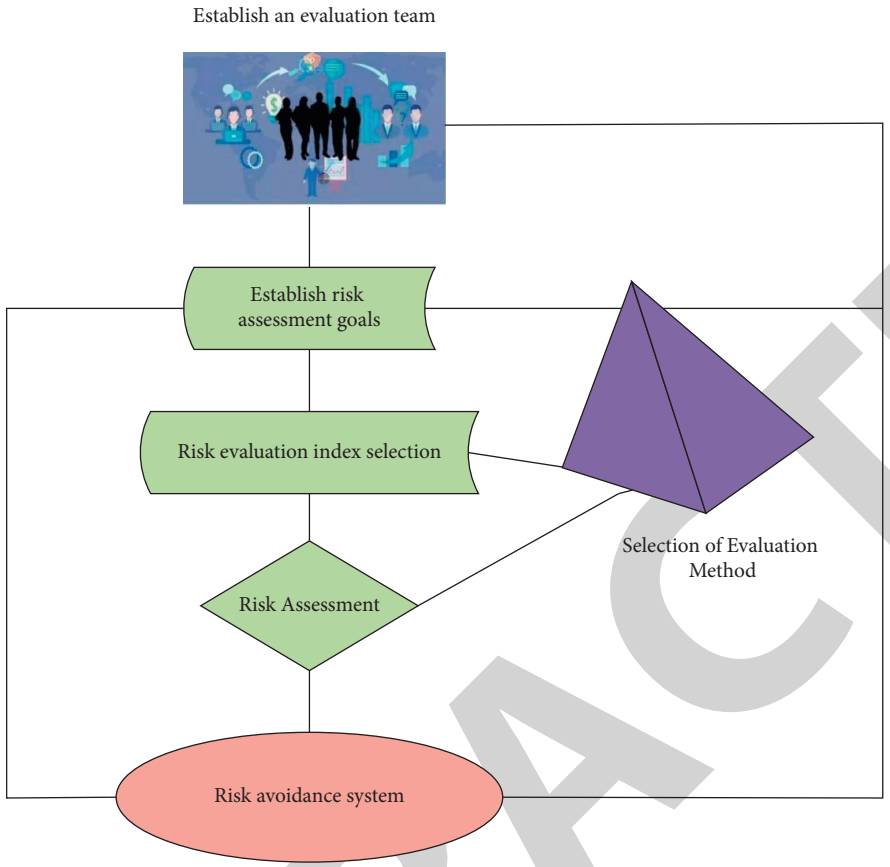

Figure 6: The risk assessment process of the supply chain.

$$x_t = C(T)\eta_t. \tag{16}$$

For the VAR model, this paper uses the least squares method to estimate. After the parameters of the VAR model are estimated, the corresponding VAR model parameter estimates can be obtained according to x_t.

Before establishing a VAR model, it is generally necessary to use the unit root test to determine whether the time series is stationary so as to determine whether there is a "false regression" situation. The ADF test method is used for unit root judgment, and its model is formula (17):

$$\Delta h_t = \omega_1 + \omega_2 + \delta h_{t-1} + \partial_i g \sum_{i=1}^{m} V h_{t-1} + \theta_t. \tag{17}$$

Among them, g is the constant term, t is the trend term, θ_t is the residual, and the ADF test is mainly by comparing the t value with the critical value of the ADF. If the t value is greater than the ADF critical value, it is considered that the time series may have autocorrelation and is not stationary. If the t value is less than the ADF critical value, the time series is considered to be stationary.

In VAR empirical research, the Granger causality test is also often used as a method for judging its causality. The model is as shown in formula (18):

$$h_t = \sum_{i=1}^{m} \alpha_i h_{t-1} + \sum_{j=1}^{m} \beta_j k_{t-j} + v_{1t}. \tag{18}$$

Among them, $\beta_j = 0$, $(j = 1, 2, \ldots, q)$; it means that if all the lag parameters are not significant, it can be considered that the null hypothesis cannot be rejected. That is to say, as long as there is a significant lag parameter, then it can be considered that there is Granger causality. It can be tested by the F statistic as in formula (19):

$$F = \frac{(\mathrm{RSS}_2 - \mathrm{RSS}_1)/n}{\mathrm{RSS}_1/(T - 2n - 1)}. \tag{19}$$

Among them, RSS_2 represents the residual sum of squares after adding constraints under the premise that the null hypothesis holds, and RSS_2 is as in formula (20):

$$\mathrm{RSS}_2 = \frac{1}{n} \sum_{i=1}^{m} h_t. \tag{20}$$

If the F value of the sample is greater than the critical value h_t, it means that the null hypothesis does not hold.

5. Experiment and Analysis of Financial Market Risk in EC Supply Chain

5.1. Characteristics and Category Analysis of EC Supply Chain Financial Market Risks. Supply chain finance is currently in a golden period of development, but its booming development has also raised concerns about regulation and risks. Due to insufficient preventive measures, inadequate supervision, and single coping methods in financial

institutions such as commercial banks, offline supply chain finance often occurs in which SME bosses abscond with money, or SMEs operate poorly and become insolvent. Over time, small- and medium-sized enterprises are faced with financial difficulties, and financial institutions are reluctant to lend.

This paper investigates and analyzes the characteristics of supply chain risks, as shown in Figure 7.

As shown in Figure 7, among them, 4 experts scored the characteristics of supply chain risks. The score range for the transitivity of risk is 7–7.5, and the score for the complexity of risk is 6.5–7.1. The arrival of the EC Supply Chain platform brings new opportunities for supply chain finance. Compared with traditional supply chain financing, it not only saves a lot of human and material resources but also improves the security of funds and information. But it also brings a lot of risks, the characteristics of which include transitivity, complexity, diversity, dynamics and uncertainty, and virtuality.

This paper investigates and compares the development trends of EC Supply Chain financial market risks from 2010 to 2015 and 2016 to 2020, as shown in Figure 8.

As shown in Figure 8, from 2010 to 2015, the development trend of EC Supply Chain financial market risk increased from 6.9% in 2010 to 17.9% in 2015. From 2016 to 2020, the development trend of EC Supply Chain financial market risk increased from 24% to 43%. It can be seen that the development of EC Supply Chain financial market risks has been on the rise.

Risks in the EC Supply Chain are mainly divided into endogenous risks and exogenous risks. This paper investigates endogenous risk and exogenous risk and invites 5 financial risk control experts to score, as shown in Tables 3 and 4.

As shown in Table 3, the endogenous risks in the EC Supply Chain include information risk, logistics risk, cooperation risk, and moral hazard. Among them, the five experts scored 8.4–8.9 points for information risk; 8.1–8.5 points for logistics risk; 7.6–8.7 points for cooperation risk.

As shown in Table 4, the exogenous risk in the e-commerce supply chain is market risk, the scoring range is 7.4–8.4, and the economic risk scoring range is 7.7–9.1. The exogenous risks in the EC Supply Chain are as follows.

5.1.1. Market Risk. Under normal circumstances, the supply chain cannot respond in time to changing customer preferences and market trends. The reason for this is that the supply chain itself has many and complex links, and the accuracy of market information will gradually decline.

5.1.2. Economic Risks. In supply chain enterprises in the economic recession, the market demand gradually cools down, and the economic stimulus is reduced. However, at this time, the overall capital liquidity of the market is poor, the financing cost is increased, and the assets in the early stage still require a large amount of capital investment. This economic situation can easily lead to operational risks in the supply chain.

5.1.3. Policy and Legal Risks. Political and legal risks refer not only to risks caused by narrow political and legal factors but also to all risks that directly or indirectly damage the interests of enterprises through political changes that adjust the development goals of enterprises.

5.2. EC Supply Chain Risk Prevention

(1) Risk awareness is a prerequisite for risk management. In the ever-changing information age, both enterprises and employees must have a strong risk awareness.

(2) Risk identification: this requires risk management personnel to uniformly classify, analyze, and identify information and materials from reliable sources to provide data support for subsequent risk control. The process of risk identification includes perceiving and understanding the objective risks and analyzing the factors that cause the risks.

(3) Risk measurement and assessment: in order to measure the probability of occurrence and the scope of influence of risks and provide a basis for final risk control, qualitative or quantitative analysis methods are used to calculate and analyze factors that may cause supply chain risks.

6. Discussion

This paper analyzes how to prevent the financial market risk of EC Supply Chain based on high-performance computing, expounds the related concepts of high-performance computing and EC Supply Chain, and studies the relevant theories of financial market risk. This paper explores methods to prevent risks in the EC Supply Chain financial market. And this paper discusses the importance of financial market risk prevention through the method of investigation and finally takes the integration of high-performance computing into financial market risk prevention as an example to explore the correlation between the two.

This paper also makes a reasonable use of the VAR model for research. As the VAR model has become more widely used and its importance has gradually become prominent, many scholars have begun to combine the VAR model theory with financial empirical analysis and finally learned that the construction of the risk evaluation index system of EC Supply Chain is inseparable from the VAR model.

Through the experimental analysis, this paper shows that, with the rapid development of EC Supply Chain, the use of supply chain is becoming more and more extensive. However, EC Supply Chain is easy to face various risks, so in order to propose effective measures, this paper firstly analyzes the types and characteristics of risks.

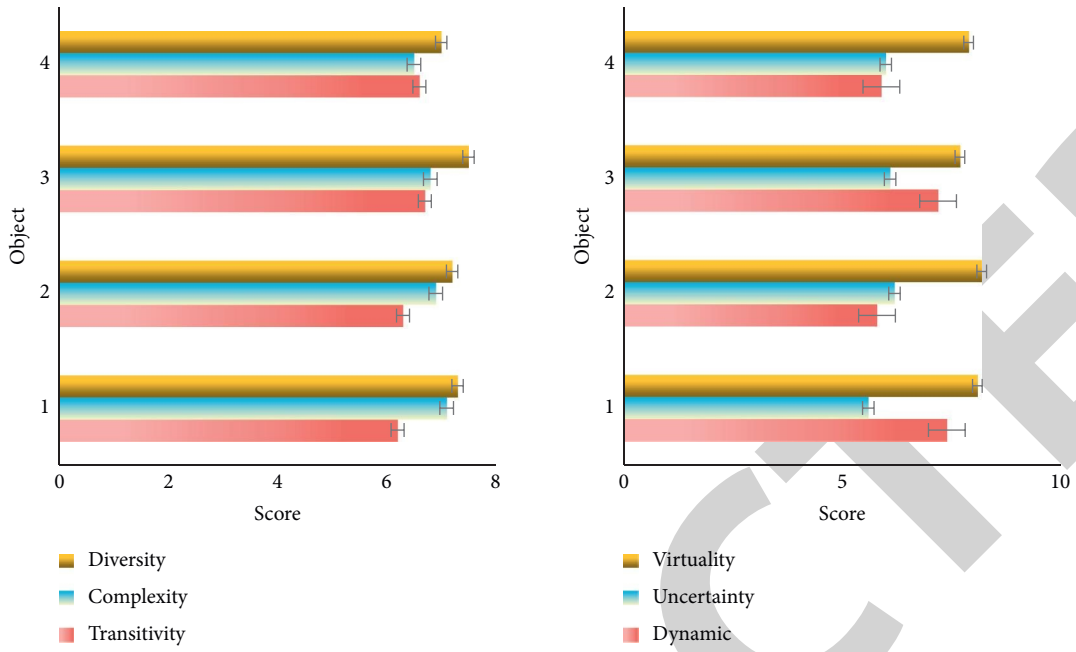

Figure 7: Characteristics of supply chain risk.

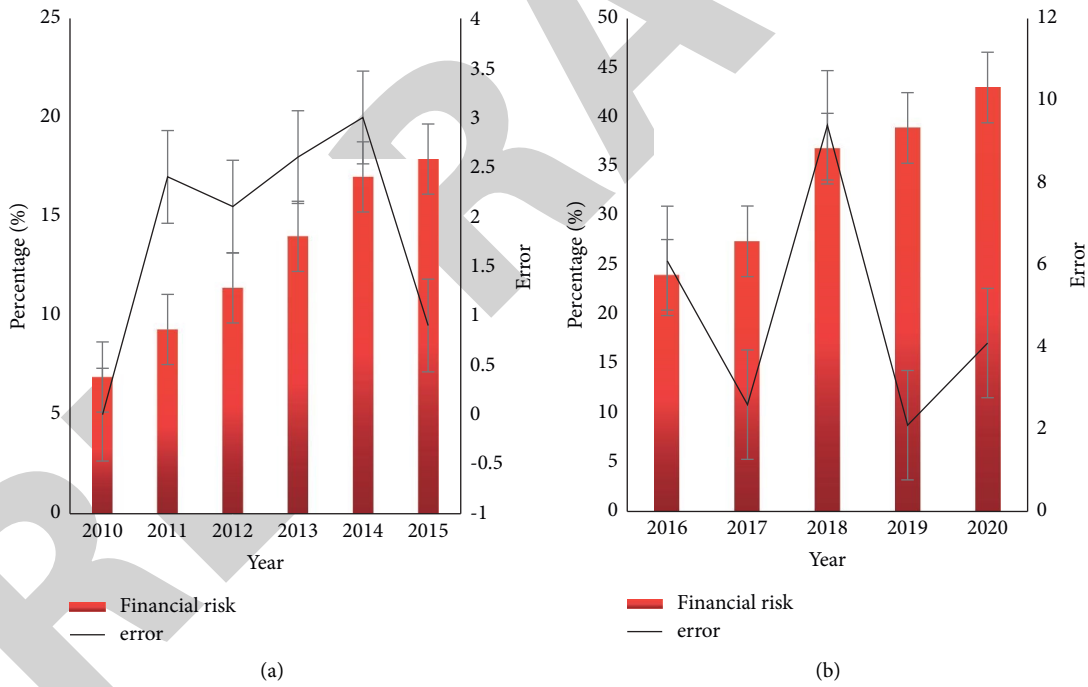

Figure 8: Development trend of EC supply chain financial market risk in 2010–2015 and 2016–2020. (a) Development trend of financial market risk from 2010 to 2015. (b) Development trend of financial market risk from 2016 to 2020.

Table 3: Endogenous risks in the EC Supply Chain.

	1	2	3	4	5
Information risk	8.9	8.5	8.4	8.8	8.9
Logistics risk	8.5	8.3	8.2	8.1	8.5
Cooperation risk	8.7	7.6	7.9	7.8	7.6
Moral hazard	8.2	7.8	8.0	8.2	8.1
Production risk	6.7	6.9	6.8	7.4	7.2
Corporate culture risk	6.8	5.9	6.2	6.1	6.6

Table 4: Exogenous risks in the EC Supply Chain.

	1	2	3	4	5
Market risk	7.5	7.4	8.2	8.3	8.4
Economic risk	7.7	8.2	9.1	8.8	8.3
Policy and legal risks	6.4	6.8	6.7	6.6	7.2

7. Conclusions

The cross-border import e-commerce supply chain has the characteristics of cross-region, multilink, and multisubject, so it will face more and more complex risks than the supply chain management of traditional enterprises. This paper starts with how to solve the problems encountered in the development of the current EC Supply Chain. This paper focuses on the role of high-performance computing in the risk prevention of EC Supply Chain financial market and introduces the basic theoretical knowledge of high-performance computing and EC Supply Chain. In the method part, an ant colony algorithm based on high-performance computing is proposed. Ant colony algorithm can be applied to financial market risk prevention through the shortest path optimal solution, which can effectively and quickly capture risks and solve problems in time. This paper also conducts an empirical analysis of EC Supply Chain finance through the VAR model. In the experimental part, this paper investigates and analyzes the development trend of EC Supply Chain financial market risk. Through the analysis of e-commerce supply chain risk, a more comprehensive supply chain risk avoidance strategy and measures are given. In short, preventing supply chain financial market risks is conducive to the sustainable and healthy development of the European Community. The use of high-performance computing can comprehensively and effectively analyze the risks in the e-commerce supply chain financial market. The principle of the ant colony algorithm to find the optimal path can also be applied to the reduction of risks. Choose the program with the lowest risk to achieve the enterprise benefit. The research in this paper is still very meaningful, but in the experiment, there is not a lot of data to support the scientific nature of the experiment, so in future work, the experiment still needs to be improved.

Data Availability

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

Conflicts of Interest

The authors declare that there are no conflicts of interest with any financial organizations regarding the material reported in this manuscript.

Acknowledgments

This study was supported by Research on Collaborative Innovation and Risk Control of Online Supply Chain Finance in China's Economic Transition Period (71233006) and Three-Dimensional Trust Mechanism of Internet Finance and Participants' Trust Perception and Transaction Decision (71473186).

References

[1] Q. Kang, "Financial risk assessment model based on big data," *International Journal of Modeling Simulation & Scientific Computing*, vol. 10, no. 4, pp. 106–113, 2019.

[2] Z. Zhu and N. Liu, "Early warning of financial risk based on K-means clustering algorithm," *Complexity*, vol. 2021, no. 24, pp. 1–12, 2021.

[3] Y. Baek and H. Y. Kim, "ModAugNet: a new forEC Supply Chainasting framework for stock market index value with an overfitting prevention LSTM module and a prediction LSTM module," *Expert Systems with Applications*, vol. 113, pp. 457–480, 2018.

[4] S. Vatanasakdakul and J. D'Ambra, "A conceptual model for EC Supply Chain adoption in developing countries: a task-tEC Supply Chainhnology fit perspEC Supply Chaintive," *International Journal of Information TEC Supply Chainhnology & Management*, vol. 6, no. 2-4, pp. 343–361, 2017.

[5] I. O. Pappas, P. E. Kourouthanassis, M. N. Giannakos, and G. Lekakos, "The interplay of online shopping motivations and experiential factors on personalized e-commerce: a complexity theory approach," *Telematics and Informatics*, vol. 34, no. 5, pp. 730–742, 2017.

[6] T. M. Nisar and G. P. Prabhakar, "What factors determine e-satisfaction and consumer spending in EC Supply Chain retailing?" *Journal of Retailing and Consumer Services*, vol. 39, pp. 135–144, 2017.

[7] H. Palsson, F. Pettersson, and L. Winslott Hiselius, "Energy consumption in e-commerce versus conventional trade channels - i," *Journal of Cleaner Production*, vol. 164, no. 15, pp. 765–778, 2017.

[8] G. D. Gregory, L. V. Ngo, and M. Karavdic, "Developing e-commerce marketing capabilities and efficiencies for enhanced performance in business-to-business export ventures," *Industrial Marketing Management*, vol. 78, pp. 146–157, 2019.

[9] S. Salimi, M. Mawlana, and A. Hammad, "Performance analysis of simulation-based optimization of construction projects using High Performance Computing," *Automation in Construction*, vol. 87, pp. 158–172, 2018.

[10] I. Noda, N. Ito, K. Izumi, H. Mizuta, T. Kamada, and H. Hattori, "Roadmap and research issues of multiagent social simulation using high-performance computing," *Journal of Computational Social Science*, vol. 1, no. 1, pp. 155–166, 2018.

[11] C. Celant and I. V. Pustokhina, "Future trends and Italian SMEs," *American Journal of Business and Operations Research*, vol. 1, no. 1, pp. 52–59, 2020.

[12] P. Thoman, K. Dichev, T. Heller et al., "A taxonomy of task-based parallel programming technologies for high-performance computing," *The Journal of Supercomputing*, vol. 74, no. 4, pp. 1422–1434, 2018.

[13] W. Turek, "Erlang-based desynchronized urban traffic simulation for high-performance computing systems," *Future Generation Computer Systems*, vol. 79, no. 2, pp. 645–652, 2018.

[14] N. Jagiella, D. Rickert, F. J. Theis, and J. Hasenauer, "Parallelization and high-performance computing enables automated statistical inference of multi-scale models," *Cell Systems*, vol. 4, no. 2, pp. 194–206, 2017.

[15] S. Ziesche and R. V. Yampolskiy, "High performance computing of possible minds," *International Journal of Grid and High Performance Computing*, vol. 9, no. 1, pp. 37–47, 2017.
[16] R. P. Mundani, J. Frisch, V. Varduhn, and E. Rank, "A sliding window technique for interactive high-performance computing scenarios," *Advances in Engineering Software*, vol. 84, no. C, pp. 21–30, 2015.
[17] M. Saracevic, N. Wang, E. E. Zukorlic, and S. Becirovic, "New model of sustainable supply chain finance based on blockchain technology," *American Journal of Business and Operations Research*, vol. 3, no. 2, pp. 61–76, 2021.
[18] J. Bauer and D. Jannach, "Optimal pricing in EC supply chain based on sparse and noisy data," *DEC Supply Chainision Support Systems*, vol. 106, pp. 53–63, 2017.
[19] H. Hallikainen and T. Laukkanen, "National culture and consumer trust in e-commerce," *International Journal of Information Management*, vol. 38, no. 1, pp. 97–106, 2018.
[20] J. K. Min, "How to promote EC supply chain exports to China: an empirical analysis," *KDI Journal of EC Supply Chainonomic Policy*, vol. 39, no. 2, pp. 53–74, 2017.
[21] R. S. Bhadoria and N. S. Chaudhari, "Pragmatic sensory data semantics with service-oriented computing," *Journal of Organizational and End User Computing*, vol. 31, no. 2, pp. 22–36, 2019.
[22] C. Robinson, "Disclosure of personal data in ecommerce: a cross-national comparison of Estonia and the United States," *Telematics and Informatics*, vol. 34, no. 2, pp. 569–582, 2017.
[23] Y. Zeng, F. Jia, L. Wan, and H. Guo, "E-commerce in agrifood sector: a systematic literature review," *The International Food and Agribusiness Management Review*, vol. 20, no. 4, pp. 439–460, 2017.