Research on Cross-border E-commerce Platform Supplier Credit Evaluation Based on Big Data Interconnection

ZHANG YI-WEN
Guangdong University of science and technology, Xihu Road 99, Nancheng district, Dongguan, Guangong, 523000
Yvonnecc07@163.com

Abstract. This paper first analyzes credit assessment of cross-border E-commerce platform suppliers based on big data from two aspects: credit evaluation index system and credit evaluation model. On this basis, this paper summarizes the recommendations of supplier credit assessment for cross-border E-commerce platform based on big data, in order to provide reference for the work of supplier credit assessment for cross-border E-commerce platform from the perspective of big data, hoping that this study can help promote the cross-border E-commerce platform construction and cross-border E-commerce industry development.

1. Introduction
In recent years, E-commerce industry has shown a rising trend of development, which has gradually become China's new trade growth point. Cross-border E-commerce platform is a cross-border trade intermediary, can be directly involved in trade as a trading party, or only provide a communication platform for both sides of trade. At present, most of the cross-border E-commerce platforms in China do not participate in the trade platform, which leads to the credit loss of suppliers, so we need to assess their credit.

2. Credit evaluation index system

2.1. Selection of alternative indicators
We select ten alternative indicators for credit assessment of suppliers of cross-border E-commerce platforms, namely, size of suppliers, time of suppliers engaged in cross-border E-commerce industry, perfect degree of supplier information, product type and quality of suppliers, financial status of suppliers, after-sales level of suppliers, professional level of suppliers' staff, prices of suppliers' products, suppliers' awareness of intellectual property rights, brand awareness of suppliers, etc. The above indicators were selected for the following reasons.

First, considering the characteristics of suppliers of cross-border E-commerce platforms, and taking into account the concerns of users and suppliers, as well as the development goals of cross-border E-commerce platforms, the paper generally selects credit evaluation indicators, so the main consideration is the five aspects of the supplier, namely product, technology, personnel, capital, and management[1].

Secondly, we need to analyze the data sources of credit evaluation indicators, specifically to ensure the universality and comprehensiveness of the data sources and to avoid limiting the degree of perfection of the indicators. In this way, we can give full play to the cross-border E-commerce platform supplier credit assessment in the era of big data.
Third, we are supposed to apply the method of stepwise regression to select the candidate indicators. The specific way is to determine whether to retain the index according to the impact variable of the index on the evaluation result, and finally to form a reasonable supplier credit evaluation index of cross-border E-commerce platform.

2.2. Index construction
The steps of index construction of credit assessment of cross-border E-commerce platform suppliers are as follows.

First, data acquisition. In the era of big data, there are numerous tools to get data, among which the most effective way is the web crawler program, which can realize grasp the target data effectively.

Considering the unstructured nature of big data, which results in a relatively rapid change in data, we have developed a set of indicators to better capture the data, there is also a necessary to obtain more comprehensive data from cross-border E-commerce platforms, supplier websites and third-party information systems, with breadth-first and automation at all along to ensure the effectiveness of data collection. At the same time, it is also necessary to avoid manual intervention and influence on data collection. Only by automating processing to the maximum extent can we ensure the wide range of data collection, which can not only improve the objectivity and comprehensiveness of the acquisition of indicators, but is also helpful to grasp the overall change of the Evaluation Index. The specific data acquisition process is as follows: Take the supplier website as the crawler entrance, carry on the stack processing to all the web pages that need to obtain information; remove unwanted data and optimize data structure; calculate evaluation metrics in optimized data; store indicator data in a well-established database[3].

Second, target data processing. After getting the data, we need to standardize the original data, so that the composition of the index data can be converged by selecting the z-score standardized method.

Third, the construction of indicators. Different candidate indicators have different construction mode, and the specific mode needs to be determined by the actual candidate indicators.

3. Credit rating model

3.1. Model algorithms
The network system can map any n-dimension input to m-dimension output through input layer, hidden layer and output layer. Based on the model Algorithm. The detailed structure is shown in figure 1.

![Fig. 1 Schematic diagram of network system structure](image)

The graph above is a simplified N-dimensional input model and an M-dimensional output model, based on which we can divide the model algorithm into forward propagation stage algorithm and error back propagation stage algorithm, and the gradient error feedback training method is chosen in the calculation. The detailed calculation is as follows.

3.1.1. Forward propagation phase algorithm
The net input value can be calculated by using the input vector and the weight vector of all connection weights of the hidden layer neurons. Then, the net input value is brought into the activation function of the cell, and the linear function is obtained by inputting the value into the output layer.
3.1.2. Phase algorithm for error back propagation
In order to make the difference between the predicted value and the target value clear, we need to calculate the respective mean square error. And it is necessary to apply the gradient descent method to calculate the adjustment weights to reduce the difference.

3.2. Improved algorithm
In practical application, the gradient error feedback training method has some limitations, that is, because of the saddle surface in the high-dimensional space, the value of gradient is infinitesimal when approaching to these positions, this makes the difference between the predicted value and the target value increase. There are many local minima of this method, so we consider improving the gradient error feedback training method. Here's how it works.

3.2.1. Adding momentum terms
When the gradient error feedback training method is used, the adjustment weights are only in the gradient descent direction, and the previous gradient direction is not taken into account. Therefore, the gradient will be relatively small and the calculation speed will be slow or even zero when calculating the saddle surface and other parameter spatial data. To speed up the calculation, we can add momentum terms.

3.2.2. adaptive adjustment of learning efficiency
As one of the important parameters in network system, learning efficiency often needs to be adjusted in practical application. Specifically, in the surface, the learning efficiency in the flat area will increase the number of calculations, so it is necessary to adjust the learning efficiency properly. If the error changes greatly, the learning efficiency will change the calculation process, and then increase the number of iterations. In this case, the learning efficiency should be appropriately reduced. Therefore, it is necessary to adjust the learning efficiency adaptively.

At the same time, in order to improve the speed of the convergence process, the learning efficiency needs adaptive adjustment. The adjustment process is as follows: If the difference between the predicted value and the target value is increased after the update of the network system's weight value, the adjustment is ineffective; Otherwise, if the difference between the predicted value and the target value decreases, the adjustment is effective.

4. Recommendations for credit assessment of cross-border E-commerce platform suppliers based on big data

4.1. Advice to technology

4.1.1. Improvement of financial indicators for suppliers
In the establishment of cross-border E-commerce platform supplier credit assessment system, we need to further refine and improve the supplier's financial indicators. However, it should be noted that the data of supplier's Fund is classified as trade secret, and it also has a great influence on the result of supplier's credit evaluation. Therefore, in addition to listed companies, small suppliers of capital data access more difficult (5). According to the above, in the practical application, the cross-border E-commerce platform not only needs to expand the access of data on suppliers' funds, but also needs to analyze the way of data on suppliers' transactions to summarize the company's assets and liabilities.

4.1.2. More emphasis on samples
The network model is sensitive to the samples, which means that the samples will directly affect the evaluation results. If the sample data is too small, it may lead to the over-fitting of the model, which reduces the generalization ability of the computational model. Therefore, we need to enlarge the sample data as much as possible to ensure the accuracy of the credit evaluation results.
4.1.3. Application of random search parameter search method
Considering that there are many types of parameters and data involved in the supplier credit evaluation system of cross-border E-commerce platform, we need to choose the method of random search to achieve better calculation results.

4.2. policy recommendations

4.2.1. Improvement of supplier credit assessment system for cross-border E-commerce platform
In order to fully assess the credit of suppliers of cross-border E-commerce platforms, we need to establish a credit assessment system and increase the involvement of cross-border E-commerce platforms in commodity exports, which requires cross-border E-commerce platforms to increase their professionalism and improve their management systems. At the same time, if the credit evaluation system is used, the information of each supplier can be balanced and the problem of Information asymmetry can be avoided, which is beneficial to the cooperation among suppliers and promotes the construction and development of cross-border E-commerce platform.

4.2.2. application classification of "supplier credit evaluation system for cross-border E-commerce platform"
For different types of cross-border E-commerce platform suppliers, the establishment of the corresponding credit assessment system can better meet their credit assessment requirements. For example, as for the platform quality assurance section, we can develop the corresponding supplier products and after-sales quality credit evaluation system; According to the customer demand, we can make the corresponding credit evaluation system of supplier's service level. Of course, to realize special evaluation models for different credit evaluation systems, the establishment of "CROSS-BORDER E-COMMERCE platform supplier credit assessment system" will be more difficult if every special evaluation model needs its credit evaluation systems

5. Conclusion
In short, there are still some problems in the current credit assessment of cross-border E-commerce platform suppliers based on big data, which have reduced the accuracy and comprehensiveness of the assessment results. In view of this, the related department needs to take the corresponding solution consummation way from the technical level. In addition, the government and relevant organizations need to improve their policies on the management of cross-border E-commerce platforms to regulate cross-border E-commerce trade, so as to promote the development of cross-border E-commerce industry.

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