The Evaluation of Supply Chain Risks in Cross-border E-commerce Based on the Analytic Hierarchy Process

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Abstract: With the development and popularization of the Internet, e-commerce becomes more and more common. Cross-border e-commerce (CBEC) as an important part of e-commerce also develops rapidly. The most important part of Cross-border e-commerce is the supply chain. There are some problems like long-chain, cross-border payment problems, logistics, and overseas warehouses, bonded warehouses that happen in business. Nowadays, only enterprises solve these problems can they develop strong and healthy. To help enterprises evaluate their supply chain risk, the Analytic Hierarchy Process (AHP) has been used to analyze the magnitude of supply chain risk in this paper.

1. Introduction

As we all know, e-commerce is a transaction process that connects sellers and customers with the internet. The key that turns virtual into reality is the supply chain. There are so many uncertain elements in the supply chain, especially in Cross-border e-commerce [1]. Thus, recognizing the elements that lead to risk in the supply chain is the highest priority for a cross-border enterprise. In this paper, a study based on the AHP has been carried out to analyze the magnitude of supply chain risk.

2. The basic fundamental of the AHP

AHP is a method that combines qualitative and quantitative analysis. The feature of the AHP is to solve some problems that can't be totally quantitatively analyzed in a complex system. Every time when we make some choices, we need to consider in different ways and think about many things, this makes the problems complicated. We also may face a situation that we don't know anything about the choice we made [2]. At that time, we can use AHP to analyze the problems. There are three main hierarchies in the AHP: goal, criterion, and alternative [3]. The structure of the AHP is shown in Figure 1[4].

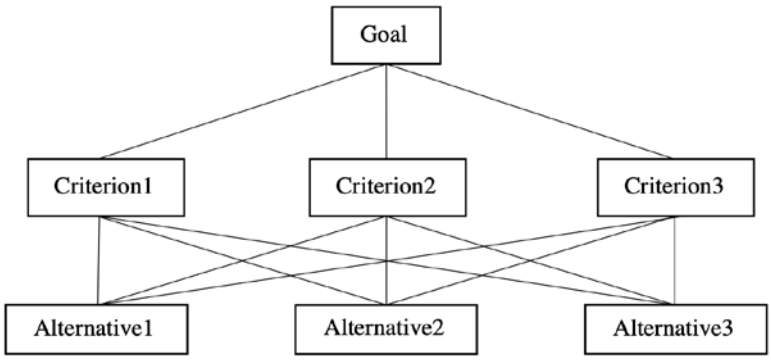

Figure 1. AHP structure

The general model of AHP consists of four basic steps, which are:
(1) Set up a hierarchy structure Model.
(2) Construct a judgment (paired comparison) matrix.
(3) Single- hierarchy sorting and consistency check.
(4) Total- hierarchy sorting and consistency check.
The process of AHP is shown in Figure 2.

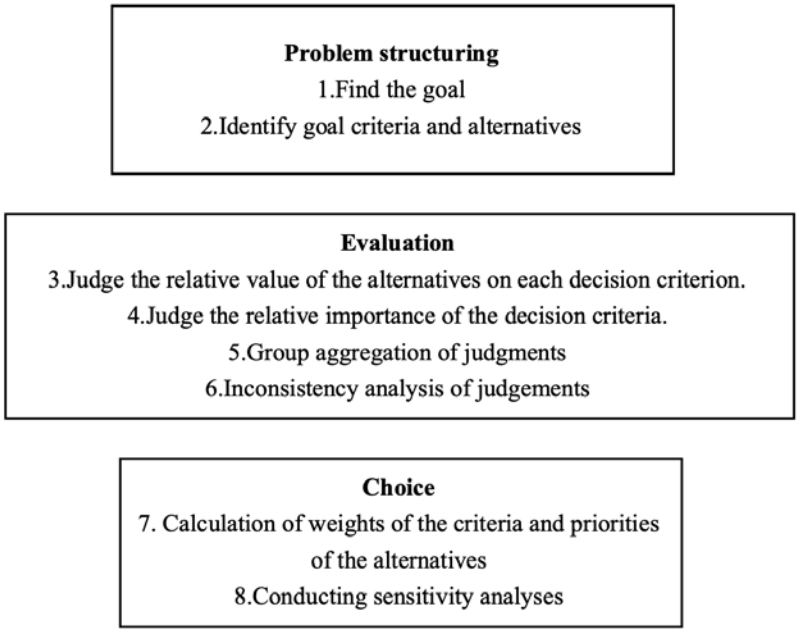

Figure 2. The process of AHP

In the AHP, the alternative is the beginning, and the goal is the end. In the process of evaluating cross-border e-commerce supply chain risk, we can set up an evaluation system by AHP.

3. The Evaluation based on AHP

3.1 The establishment of index system and determination of the criterion

In this paper, the goal is the cross-border e-commerce supply chain risk and the alternatives are enterprises, no doubt. How to choose the criteria is very important. It will influence the accuracy of the evaluation. As shown in Figure 3, the risk is divided into internal risk and external risk [5], and the internal and external risk are then subdivided into some other risks [6], such as the risk of production, risk of information, risk of transportation, risk of cooperation, risk of morality, risk of economy, risk of market, risk of law and risk of the policy.

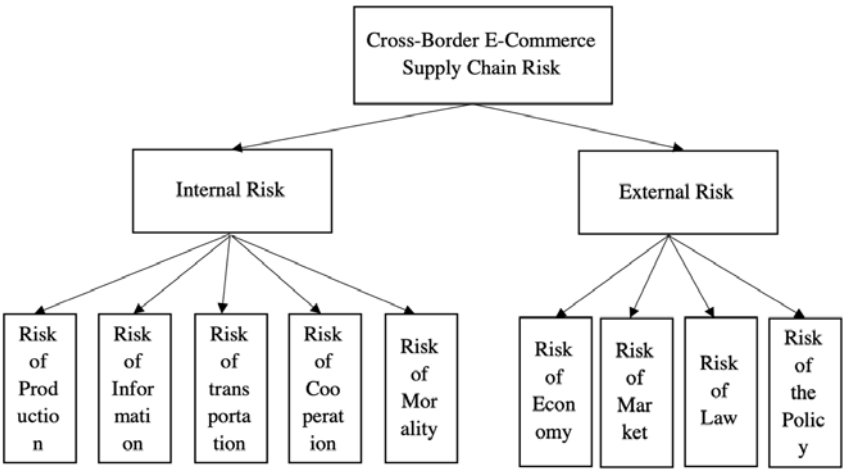

Figure 3. The cross-border e-commerce supply chain risk tree

For example, in this period of time, the enterprises which export to or import from the western countries have a high risk of economy, risk of market, and risk of the policy. If in January or February, these enterprises would have a high risk of production, risk of transportation, and risk of cooperation.

3.2 Make an evaluation by AHP

When we compare two or more cross-border e-commerce enterprises' supply chain risk, we can use this index system. In order to calculate the risk, we need to find some data that represent the specific risks. And then we can use some AHP software (like yaahp) or calculate it by hand. Another important part is to determine the relative importance of every two risks. In this research, the criterion has two layers, and we just need to determine the bottom layer. To determinate the relative importance, we need to refer to many experts' papers and take the median, mean, or mode. It's reasonable to do in this way. Or, we can also send questionnaires to some related people to get the parameters.

4. Conclusion

For the emerging cross-border e-commerce industry, supply chain risk management research is relatively complex and extensive. There are many uncertainties, and the types and parameters of risks need to be further improved. In this paper, the supply chain risks in cross-border e-commerce have been evaluated by using the AHP. First, the AHP method has been introduced. Next, the index system has been established and the criterion has been determined. Last, the AHP method has been used to evaluate the supply chain risks in cross-border e-commerce. It's shown that the AHP method is a very promising way to analyze the supply chain risk.

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