Research on Management Conflict Matrix of Cross-border E-commerce Logistics Based on TRIZ Model

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Abstract: Cross-border E-commerce and international logistics are national key projects. International logistics is more important as Cross-border E-commerce becomes the main form of international trade. Based on the features of Cross-border E-commerce logistics, this paper selects Guangdong, where developing factors of Cross-border E-commerce industry and international logistics industry are relatively complete, as the representative research site. Questionnaires are distributed to 503 researchers from Cross-border E-commerce companies and universities in Guangdong province. Researchers use SPSS to analyze the reliability and validity of the data, and adopt the TRIZ theory to construct a logistics conflict matrix. The positive factor is inversely proportional to the negative factor variable. On the one hand, the ideal state of logistics weakens as the negative factor of logistics increases; on the other hand, the ideal state of logistics strengthens as the positive factor of logistics increases.

1 Introduction

As a new form of international trade, Cross-border E-commerce highly depends on logistics. The research of how international logistics facilitate Cross-border E-commerce is critical for understanding the operating process of cross-border logistics in China. As the pioneers of Cross-border E-commerce, logistics companies and the manufacturing industry in the Pearl River Delta region have played very important roles in transforming the foreign trade companies into Cross-border E-commerce. The manufacturing and logistics industries have achieved tremendous development by providing a great deal of raw material to Cross-border E-commerce Companies. The coordinated development contributes to the virtuous circle in economy. Based on the theory of efficiency and cost optimization, Cross-border E-commerce companies hope to reduce shipment costs while improving logistics efficiency. According to the related documents issued by the government in 2019 and 2020, our country pays close attention to the development of the distribution industry in an all-round way and the prosperity of trade at home and abroad. The factors such as efficiency, coverage rate, and service, decide whether we can develop Cross-border E-commerce with high quality. However, the backward technological innovation in distribution industry and the low logistics output constraints Cross-border E-commerce in our country. The priority is to increase the coverage and output rate of logistics, as well as to improve the customer service and reduce the shipment costs.

2 Literature review

In recent decade, there is a great deal of research on the application of TRIZ theory in management with some valuable outcomes. The research mainly focuses on three domains. Firstly, it explores the technology innovation in production. Xu Feng (2010) stated in the empirical analysis of the Samsung Group’s application of innovative methods. Samsung introduced the TRIZ theory in 1998 and applied TRIZ to all areas of the product manufacturing process, bringing technological innovation and enabling Samsung to become the industrial leader. The brand value of Samsung surpassed that of Sony in 2006, and was assessed as the fastest growth for the five consecutive years in 2007. Samsung promoted the TRIZ theory and has gone through three stages of preparation, dissemination and acceleration. It has successively established a TRIZ promotion department, formulated a training plan for employees, practiced TRIZ theory in production. It has also established a core patent protection system and incentive mechanism. It successfully introduced innovative methods such as TRIZ, which brought continuous technological innovation to Samsung, reduced research and development costs, and obtained huge economic benefits. Secondly, it investigates the method innovation in management. Zhang Dongsheng (2015) discussed in the book TRIZ-based management innovation methods that corporate management adopts the TRIZ method to discover conflicts in the enterprise, determine conflict elements, create conflict matrix, and help companies solve the dilemma by analyzing conflict factor matrix data.
From the literature review, we know that there is a few research in the application of TRIZ theory in social science. Firstly, many scholars think that TRIZ theory could only be applied in natural science. Product development factors have nothing to do with social science research factors. Secondly, that TRIZ theory is adopted in management innovation is in a macro way. It is seldom adopted in cross-industry business, let alone Cross-border E-commerce. Cross-border E-commerce emerged 7 years ago and has been developing quickly. It has become the main form of foreign trade and an important source of foreign exchange in our country. However, Cross-border logistics is a hindrance to Cross-border E-commerce development. The research of adopting TRIZ theory in building a foreign logistics conflict management matrix will have practical significance.

3 Data description and empirical analysis

Zhang Dongsheng(2015) says that TRIZ theory can predict the law of development while making inventions and technological innovations. It plays a role in solving technical problem and developing innovative technology. When there are contradictions between technology and theory, contradictions can be eliminated to ensure the sustainable development of technology by using TRIZ. This study uses TRIZ theory to determine relevant research factors about Cross-border logistics. Questionnaires are distributed to 503 researchers from Cross-border E-commerce companies and universities in Guangdong province, of which 366 are valid. The research process includes distribution, recycling, screening, statistical analysis of questionnaires.

Table 1. Analysis of research data

| Factors                | Sample size | SD  | Mean |
|------------------------|-------------|-----|------|
| Local policy           | 366         | 0.91| 1.74 |
| Logistics system       | 366         | 1.09| 3.21 |
| Cost                   | 366         | 1.08| 1.88 |
| Link                   | 366         | 1.79| 2.81 |
| Efficiency             | 366         | 1.05| 3.16 |
| Coverage               | 366         | 1.07| 3.15 |
| Traceability           | 366         | 1.07| 3.10 |
| Information sharing    | 366         | 1.08| 3.15 |
| Personalization        | 366         | 1.07| 3.17 |
| Goods procurement      | 366         | 1.28| 3.27 |
| Customs clearance      | 366         | 1.79| 3.16 |

The intermediate value of the mean is 3. The smaller the mean, the higher the satisfaction. The smaller the standard deviation, the higher the polymerization degree of the selected results. The larger the standard deviation, the higher the dispersion of the selected results. From Table 1, we know that companies are relatively satisfied with local policies and international logistics links, and international shipment costs are acceptable. However, they are not satisfied with the overall logistics services, such as logistics efficiency, international logistics coverage, cargo tracking capabilities, logistics information sharing, personalized services, etc. The most dissatisfied is goods procurement.

Reliability, the same as credibility, refers to the degree of consistency of the results obtained when the same method is used to repeatedly measure the same object (Mikhalkina & Cabantous, 2015).

Table 2. Research reliability analysis

| Name                        | Corrected item-total correlation (CIT) | Item Deleted Cronbach's Alpha | Total Cronbach's Alpha |
|-----------------------------|----------------------------------------|-------------------------------|------------------------|
| Local policy                | 0.281                                  | 0.898                         | 0.892                  |
| Logistic system             | 0.731                                  | 0.875                         |                        |
| Goods procurement           | 0.713                                  | 0.877                         |                        |
| Link                        | 0.128                                  | 0.917                         |                        |
| Customs clearance           | 0.678                                  | 0.879                         |                        |
| Information sharing         | 0.790                                  | 0.871                         |                        |
| Logistics efficiency        | 0.724                                  | 0.875                         |                        |
| International logistics     | 0.821                                  | 0.871                         |                        |
| Traceability                | 0.830                                  | 0.869                         |                        |
| Logistics personalization   | 0.871                                  | 0.866                         |                        |

Table 3. Inspection of KMO and Bartlett

| KMO                         | 0.934           |
|-----------------------------|-----------------|
| Bartlett's sphericity test  | 3038.291        |
| df                          | 55              |
| $p$                         | 0.000           |

Table 4 Research validity analysis

Result of validity analysis

| Name                        | Factor loading coefficient | Communalities |
|-----------------------------|----------------------------|---------------|
| Local policy                | 0.484                     | 0.140         |
| Logistics system            | 0.817                     | 0.218         |
| Goods procurement           | 0.802                     | 0.218         |
| Link                        | 0.037                     | 0.042         |
| Customs clearance           | 0.844                     | 0.124         |
| Information sharing         | 0.891                     | 0.079         |
| Logistics efficiency        | 0.859                     | 0.080         |
| International logistics     | 0.897                     | 0.062         |
| Traceability                | 0.878                     | 0.112         |
| Personalization             | 0.894                     | 0.069         |
Characteristic root (before rotation): 6.390, 1.057
Explanation rate of variance (% before rotation): 58.089%, 9.609%
Accumulated explanation rate of variance (% before rotation): 58.089%
Characteristic root (after rotation): 6.191, 1.256
Explanation rate of variance (% after rotation): 56.280%, 11.418%
Accumulated explanation rate of variance (% after rotation): 56.280%
KMO: 0.934
Bartlett’s sphericity test: 3038.291

Illustration:
If the numbers in the table are colored, blue means the absolute factor loading coefficient is greater than 0.4, red means the degree of commonality is less than 0.4.

Validity analysis is used to study the plausibility of quantitative data (especially attitude scale questions). On the one hand, KMO is analyzed. If the value is higher than 0.8, it indicates that the validity is high. On the other hand, the corresponding relationship between the item and the factor is analyzed. If the corresponding relationship is basically consistent with the research psychological expectation, it shows that the validity is good. If the KMO community is less than 0.4, and the corresponding relationship between the item and the factor is seriously deviated, the research team believes that there may be social environmental factors.

4 Theoretical model construction

4.1 TRIZ conflict matrix

TRIZ theory is a method that discovers and solves problems based on the principle of knowledge system. It is a method that can effectively describe the development of new technologies and new systems, and can elaborate a series of evolution processes of technologies and systems. TRIZ was originally used to solve innovative problems. It provides an effective model for innovative and complex contradictions.

This article uses TRIZ theory combined with SPSS data analysis to conduct empirical research on the factor weights of Cross-border E-commerce logistics, and build a general linear model. The model is as follows:

Conflict matrix is constructed based on factors as local policy, logistics system, cost, links, efficiency, coverage, traceability, information sharing, personalization, goods procurement, customs clearance.

Table 5 Conflict matrix of logistics key factors

5 Analysis of theoretical model

There will be many solutions to problems according to the conflict matrix. Managers need to select the factors that need to be improved under specific situation. Suppose Y is a general solution set, Y_i is No. i original understanding, then the general solution set Y can be expressed as

\[ Y = \{Y_1, Y_2, \ldots, Y_n\} (i = 1, 2, \ldots, n) \] (1)

An original understanding can also correspond to more than one lower or higher level solution, or it can also be understood that each original understanding is composed of at least one more refined original understanding. So it is a set composed of multiple solutions, which can be written as

\[ Y_i = \{Y_{i1}, Y_{i2}, \ldots, Y_{i(n-1)}, Y_{in}\} \] (2)

The formula can be a combination of one or several solutions.

The conflicts in management are more complicated, and the management conflicts are more intangible and abstract. The management innovation method based on conflict resolution is to describe the problems as pairs of conflicts, which form a conflict matrix, and then find out the technical parameters and give the management parameters according to the matrix. Assuming that the management parameters are \(j=1,2,3,\ldots,m\), and \(m\) is the number of management parameters. In the conflict matrix, negative parameters are in the vertical direction and positive parameters are in the horizontal direction. The negative parameters are expressed as a matrix of \(m\) rows and 1 column, which is expressed as
6 Conclusion

This article uses TRIZ theory combined with SPSS data analysis to conduct empirical research on the factor weights of cross-border e-commerce logistics, and build a factors conflict matrix. From the research, we know that logistics costs and efficiency restrain the development of Cross-border E-commerce, while coverage, information sharing and personalization facilitate the growth of logistics. Local policy, customs clearance and traceability have little effect. It is worth noting that when the logistics efficiency changes in both directions, the logistics cost also changes in both directions. That is, Cross-border E-commerce companies are using high shipment costs to strive for efficiency, so as to seize overseas markets and improve customer experience satisfaction. Compared to local policy, economic variables are more important in promoting Cross-border E-commerce logistics. Therefore, when developing international logistics, it should not confine to one factor. What the market needs are policies which could enhance the overall economic development of the city, such as the rationalization of the industrial structure, the upgrading of manufacturing industry, and the balanced development of the service industry.

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