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THE INFLUENCING FACTORS OF REGIONAL FOREIGN TRADE BASED ON ISM

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Abstract

Foreign trade is an important part in economic development. Since there are great disparities in the development of China's foreign trade, it is necessary to study the influencing factors of regional foreign trade. On the basis of the current studies and guided by the principle of "region-enterprise- product- national market for exports", the authors chose 21 influencing factors in the development of regional foreign trade, and applied ISM to these factors to study their integrated role. The study result shows that the direct influencing factor of regional trade is geographical location, that the in-depth influencing factors count 9, including competitive industries, superior intelligent property right of exports, security guarantee of countries of direction countries for exports and so on, that 8 factors such as overseas reserves of enterprises, conspicuous edge of exports, market capability for direction countries for exports, belong to indirect influencing factors, and that superficial causes are degree of information disclosure, logistic equipment and operation level of destination countries of regional foreign trade. Explicit relations among influences of regional foreign trade provide a theoretical reference for practice of regional foreign trade.

Keywords: regional foreign trade; influencing factors; ISM

Introduction

Foreign trade is one of the main resources of national income. Since revolution and opening up, China has taken greater effort on developing foreign trade and currently puts forward to an aim of "pursuing open economy in high level [1]. At present, China's foreign trade faces unprecedentedly severe challenges [3] as China is still a developing country and confronts with the increasingly furious protectionism [2]. As an important part of China's economic development, China's foreign trade, for a long time, is unbalanced in development and discrepant in different regions [4]. In order to correctly recognize, objectively analyze and scientifically judge the latest changes, features of foreign trade development in China and to promote balanced development of foreign trade, it is necessary to study influencing factors of regional foreign trade.

Currently, a great number of references about the influences of foreign trade toward regional trade and regional specialization have been published. Researchers have provided tremendous

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valuable opinions form various angles and approaches [5]. For example, Feng Delian and other scholars researched the competitiveness, quality and transformation of foreign trade in the Yangtze River Delta, central China and coastal areas [6-9]. Scholars including Zhu Haoqi studied the problems existing in foreign trade enterprise and industries in Jiangsu, Guangdong, Fujian and Shenyang [7-15]. Li Hongling and other researchers emphasize on the development of foreign trade in ethnic areas [16-19]. These researches reach consensus over a lot of problems while they have numerous controversy and divergence. Also, there are a lot of influences of regional foreign trade worth to be further studied.

Against the context, by drawing lessons from the references and by integrating Interpretation Structural National (ISM), the author analyzed the influences of development of foreign trade which offer critical methods for the development of foreign trade and abundant research results.

1. The chooses of influencing factors of regional foreign trade

Twenty one influencing factors of regional foreign trade have been sorted out from the references. In order to ensure the selected factors more scientific and reasonable, the authors abide by the principles of completeness, systematization, controllability and importance. The influencing factors of regional foreign trade have been designed through combing the relevant experts' opinions and the guidance of the principle of "region- enterprise- product- national market for exports", as shown in the figure 1 below.

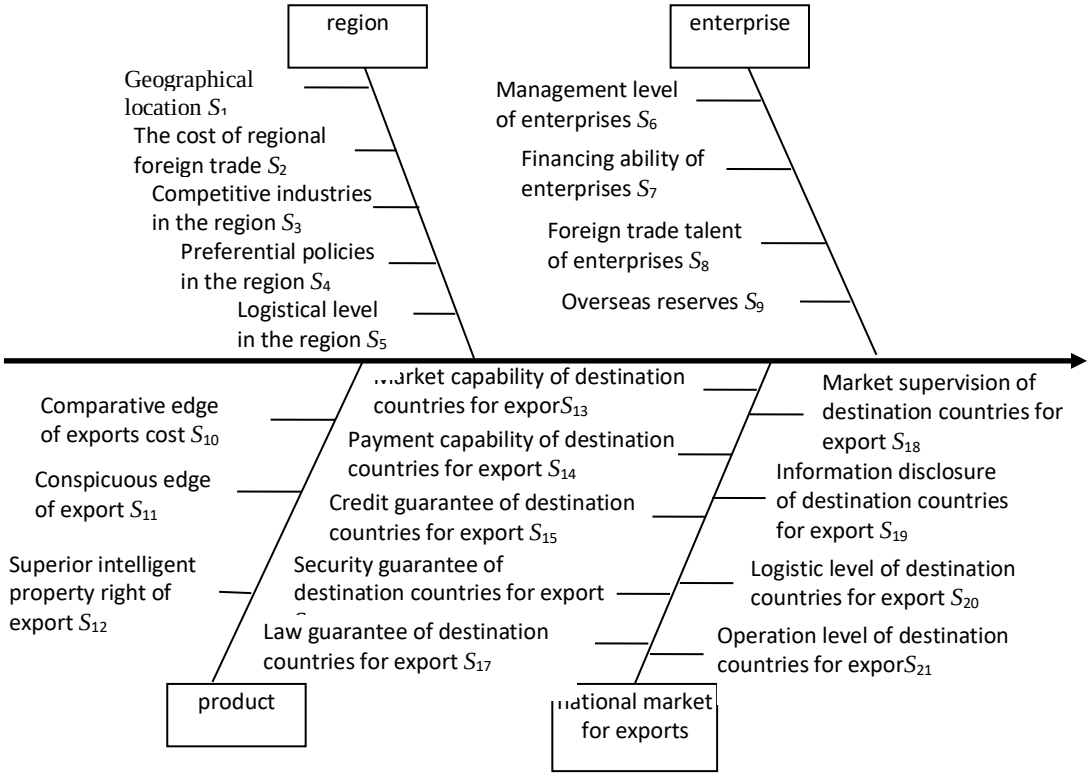

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Figure1 Influencing factors of regional foreign trade

Taking the influencing factors as S_i (i= 1, 2, …, 21)

S_1: Geographical location;

S_2: The cost of regional foreign trade;

S_3: Competitive industries in the region;

S_4: Preferential policies in the region;

S_5: Logistical level in the region;

S_6: Management level of enterprises;

S_7: Financing ability of enterprises;

S_8: Foreign trade talent of enterprises;

S_9: Overseas reserves;

S_{10}: Comparative edge of exports cost;

S_{11}: Conspicuous edge of export;

S_{12}: Superior intelligent property right of export;

S_{13}: Market capability of destination countries for export;

S_{14}: Payment capability of destination countries for export;

S_{15}: Credit guarantee of destination countries for export;

S_{16}: Security guarantee of destination countries for export;

S_{17}: Law guarantee of destination countries for export;

S_{18}: Market supervision of destination countries for export;

S_{19}: Information disclosure of destination countries for export;

S_{20}: Logistic level of destination countries for export;

S_{21}: Operation level of destination countries for export.

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The influencing factors are not explicit in their relations from perceptional intuition. Some are mutually overlapped, some mutually connected and some of them form a complex hierarchical factor chain, which is in need of structural analysis [20].

2. Structure and result of ISM for influences of regional foreign trade

2.1 The basic steps of ISM theory and structure

Interpretative Structural Modeling, or ISM, one of the structural modeling technologies, is a widely applied methodology for dealing with complex issues in modern System Engineering. First proposed by J. Warfield in 1973, ISM is explored as a way of analyzing systematical and structural issues about society and economy.

ISM is an application of graphical matrix to illustrate simple logical operation and describe logical relations among composition of complex system. By representing logical operation of adjacent matrix in digraph, accessible matrix can be concluded. By decomposing accessible matrix, complex system would be resolved into unambiguous hierarchical structure.

The fundamental steps of ISM structure as follow:

1. Forming a panel of experts;
2. Setting key point of the system;
3. Finding out the pivotal influencing factors of study objects and concluding their relations through interviewing;
4. Constructing adjacent matrix *A* according to the relations of various key factors;
5. Forming accessible matrix;
6. Ensuring hierarchy of factors;
7. Constructing a graph if hierarchical structure[21].

2.2 ISM of regional foreign trade

ISM with various advantages of scientificity, integrity, and operability improves people's recognition of influencing factors, analyzes incidence relation among influencing factors, clears out interactional and development logic of influencing factors. Therefore, the thesis applies ISM to form a hierarchical structure of influencing factors of regional factors.

1. Constructing adjacent matrix

Above-mentioned study indicates there are 21 influencing factors regional foreign trade, taking S_i (i=1, 2, …, 21) and constructing binary relations among the factors. Then forming adjacent matrix A (A refers to a 21 row* 21 column matrix) about influencing factors of regional foreign trade according to following rules.

(1) If S_i has direct impact on S_j, a_{ij} is set as 1.
(2) If S_i hasn't direct impact in S_j, a_{ij} is set as 0.
We obtain the adjacent matrix A as follow:

$A=$

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	S_{14}	S_{15}	S_{16}	S_{17}	S_{18}	S_{19}	S_{20}	S_{21}
S_1	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1
S_2	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
S_3	0	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0
S_4	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
S_5	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S_6	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
S_7	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
S_8	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1
S_9	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0
S_{10}	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
S_{11}	0	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0	1	1	1
S_{12}	1	1	1	1	0	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1
S_{13}	0	0	0	0	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1
S_{14}	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1
S_{15}	0	0	0	0	1	0	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1
S_{16}	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1
S_{17}	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1
S_{18}	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1
S_{19}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
S_{20}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
S_{21}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0

Figure1 Adjacent matrix A of influencing factors of regional foreign trade

2. Obtaining accessible matrix

Following the stop of constructing adjacent matrix *A* is to obtain accessible matrix *R* by calculating the matrix *A* according to offset law.

If $(A+I) \neq (A+I)^2 \neq \ldots \neq (A+I)^k = (A+I)^{k+1}$ $(k<n-1)$

Accessible matrix *R* can be $R = (A+I)^{k+1}$

A is adjacent matrix and *I* is unit matrix. Multiplication of above-mentioned matrix fits into Boolean algebra. The process of the algorithm is as follow: the sum of *A* and *I* squares in line with Boolean algebra until all the products are identical. The accessible matrix *R* is the equal products. The accessible matrix *R* presented as figure 2 was obtained with the help of ISM software. (process omitting)

$R =$

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	S_{14}	S_{15}	S_{16}	S_{17}	S_{18}	S_{19}	S_{20}	S_{21}
S_1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S_2	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S_3	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S_4	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S_5	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S_6	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S_7	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S_8	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S_9	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	1	1	1	1	1
S_{10}	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	1	1	1	1	1
S_{11}	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	1	1	1	1	1
S_{12}	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S_{13}	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	1	1	1	1	1
S_{14}	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	1	1	1	1	1
S_{15}	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	1	1	1	1	1
S_{16}	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S_{17}	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	1	1	1	1	1
S_{18}	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	1	1	1	1	1
S_{19}	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
S_{20}	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
S_{21}	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1

Figure 2 Accessible matrix R of influencing factors of regional foreign trade

3. Constructing structural model

Since the hierarchical relations were not explicit even if the accessible matrix was obtained, we arranged matrix R in accordance with different gradation. If there are completely same row and relevant column, the identical ones would be deleted. From the figure 2, we conclude that there are identical S_2 to S_8, identical S_9 to S_{11}, S_{13} to S_{18} and S_{17} to S_{18}, identical S_{12} to S_{16}, so the row and column of 3th to 8th, 10th to 11th, 13th to 15th, 16th, 17th to 18th and 20th to 21th the column are deleted. The bowdlerized matrix was rearranged as the mainstay matrix M. As shown in the following figure.

$M =$

	S_1	S_{2-8}	$S_{12,16}$	$S_{9-11,13-15,17-18}$	S_{19-21}
S_1	1	1	1	1	1
S_{2-8}	0	1	1	1	1
$S_{12,16}$	0	0	1	1	1
$S_{9-11,13-15,17-18}$	0	0	0	1	1
S_{19-21}	0	0	0	0	1

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Figure 3 Matrix M of influencing factors of regional foreign trade

The systematic structural model was formed after deleting from matrix *M*, the influencing factors of regional foreign trade can be divided into four levels.

The first level: Geographical location S_1

The second level: The cost of regional foreign trade S_2, Competitive industries in the region S_3, Preferential policies in the region S_4, Logistical level in the region S_5, Management level of enterprises S_6, Financing ability of enterprises S_7, Foreign trade talent of enterprises S_8, Superior intelligent property right of export S_{12}, Security guarantee of destination countries for export S_{16}.

The third level: Overseas reserves S9, Comparative edge of exports cost S_{10}, Conspicuous edge of export S_{11}, Market capability of destination countries for export S_{13}, Payment capability of destination countries for export S_{14}, Credit guarantee of destination countries for export S_{15}, Law guarantee of destination countries for export S_{17}, Market supervision of destination countries for export S_{18}.

The fourth level: Information disclosure of destination countries for export S_{19}, Logistic level of destination countries for export S_{20}, Operation level of destination countries for export S_{21}.

The structural model is shown as Figure 4:

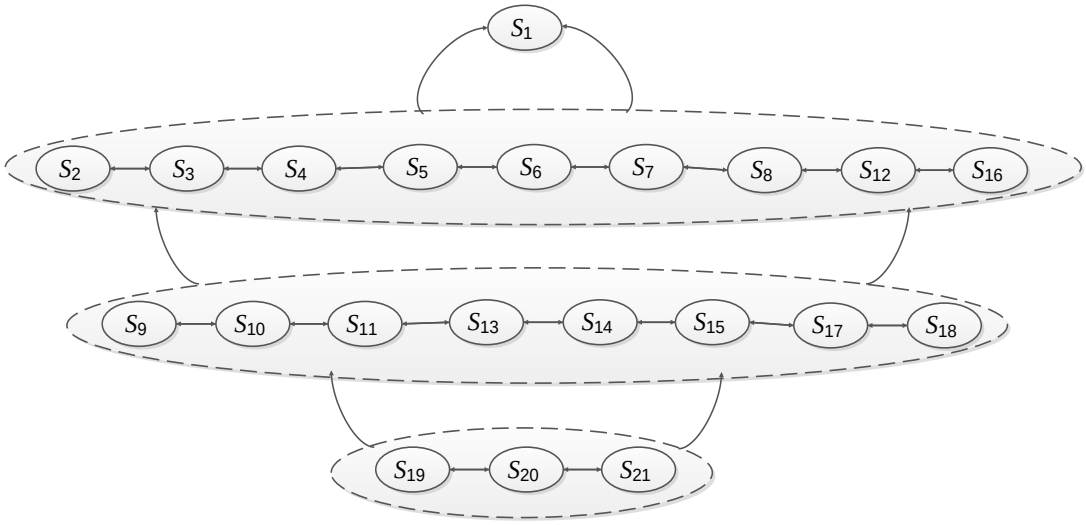

Figure 4 structural model of influencing factors of regional foreign trade

2.3 Brief analysis on ISM of influencing factors of regional foreign trade

From the Figure 4, we conclude

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The first level is the direct influencing factor. The geographical location has direct impact on the regional foreign trade.

The second level is the in-depth influencing factors, which are the cost of regional foreign trade, competitive industries in the region, preferential policies in the region, logistical level in the region, management level of enterprises, financing ability of enterprises, foreign trade talent of enterprises, superior intelligent property right of export, security guarantee of destination countries for export.

The third level is the mid-leveled factors, which are overseas reserves, comparative edge of exports cost, conspicuous edge of export, market capability of destination countries for export, payment capability of destination countries for export, credit guarantee of destination countries for export, law guarantee of destination countries for export, market supervision of destination countries for export. The factors are the results of the first level and the second level.

The fourth level is the superficial factors which are information disclosure of destination countries for export, logistic level of destination countries for export, operation level of destination countries for export. These factors are not direct factors, but they would have negative impact on the regional foreign trade if the factors were in bad condition.

The four levels reflect the logic relations among the influencing factors. Distinguishing mutual relations among the influencing factors and determining the surface influencing factors, indirect influencing factors and in-depth influencing factors are good to grasping development principles of regional foreign trade and offering theories for formulating development strategies for regional foreign trade.

3. Development strategies for regional foreign trade on the basis of ISM

1. Laying emphasis on geographical location

Geographical location is the direct factors so the region with sound geographical location should take advantage of the chance to positively expand foreign trade paths and promote export-oriented economy.

2. Strengthen competitiveness of local industries

Competitive industries, one of the in-depth influencing factors, would improve the development of foreign trade by virtue of the direct factor. To enhance competitiveness of local industries by right of superior geographical location and complementary role between market and government is the one of profound way to raise the regional foreign trade. Therefore, it is necessary to realize transformation and upgrading of competitive local industries.

3. Improve awareness of intelligent property right of exports

Compared with traditional trade, IPR export can improve factors allocation and innovation spillover and enhance economic growth. IPR export is good to enlarging effective supply and middle and high-end supply, raising total factor productivity. It is a mean to deepen foreign trade supply side structural reform and a significant underpinning of transformation of China's

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manufacturing, China's quality, China's brand in *China Manufacturing 2025*. Therefore, it is necessary to enlarge the investment in scientific and technological research, improve add value of products and make much profit.

4. Enhance comprehensive strength of enterprises

Besides the in-depth factors, management level, financing ability, foreign trade talent of enterprises reflex the comprehensive strength of enterprise which is worth to be emphasized. The export process involves in knowledge of various fields like customs, interest rate, accountant, finance, law, marketing and so on. A great number of problems can not be efficiently solved in time without adequate knowledge in these fields. Therefore, enterprises should improve management level, comprehensive strength and self-quality, positively cooperate with science and technology agendas and institutions of higher learning, bring in high-qualified talents and foster talents.

5. Nonnegligible destination countries of exports

Destination countries of exports is the surface factor whose role can not be neglect. Without adequate recognition of market condition of destination countries of exports, the enterprises would wrongly select and distribute national market and formulate improper development strategies. Without adequate acquaintance of trade policies of destination countries of exports, it is inferior position to avoid trade barriers. Therefore, we should attach great importance to condition of destination countries of exports so as to adjust the operating strategies in line with economic and politic condition of destination countries of exports.

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