Analysis and Decision-making of Regional Economic Vitality and Its Influencing Factors

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Abstract

This paper selects a total of 10 main factors, such as GDP, disposable income of residents, imports, exports, deposit balances, loan balances, etc. And uses the factor analysis method to establish a relationship model of the factors affecting the economic vitality. Investigate actions to enhance regional economic vitality. In response to the second question, Tangshan Province was selected as the selected city, and the time series was used to analyze and predict each factor before the policy change, and compare it with the factor value after the policy change. Analyze the changes in fiscal vitality before and after policy changes. An analysis of the short-term and long-term effects of economic policy transition on the region's economic vitality. For the third question, establish a mathematical model to examine and measure regional economic vitality, in order to measure regional economic vitality and rank the economic vitality of some cities. ECO is selected as an indicator to measure the vitality of the regional economy, and comprehensive indicators are collected from the number of newly established companies, the number of companies surviving , and the number of companies cancelled to obtain a comprehensive index ranking. Top three indicators are Shanghai, Shenzhen, Beijing. Finally, in order to improve the economic vitality development of the region and enhance the regional competitiveness of the region, this article gives suggestions for the development of the region in question based on the obtained economic vitality factors and the score corresponding to each factor.

Keywords

Factor analysis; Economic policy transition; Time series prediction; Bartlett's test.

1. Introduction

1.1 Background

The economic vitality of a region (or a city or a province) is affected by various factors. It is the unification of a region's comprehensive strength and competitiveness, including the ability to optimize the allocation of regional resources, the ability to sustain development, and the multi-level competitiveness of industries and enterprises. Among them, economic vitality is an important component of regional comprehensive competitiveness. Economic policy transformation is a process that is happening in all countries in the world. At present, China is in an important period of economic transformation, and the economy has entered a "new normal." Increasing economic vitality can enhance the comprehensive competitiveness of the regional economy at a deeper level.

1.2 Restatement of the Problem

The regional (or urban or provincial) economic vitality is an important part of regional comprehensive competitiveness. In order to improve the economic vitality, some regions have launched many preferential policies for stimulating the economy vitality, such as reducing the investment attraction approval steps, providing the capital support to startups and lowering the settlement threshold to attract the talented. In order to study how to improve the regional economic vitality, we should obtained some data and Analyze the various factors that affect the economic vitality of the region, and establish a suitable relationship model that affects the economic vitality. It also analyzes the impact on regional economic vitality changes from the perspective of population and corporate vitality trends.

Question two needs to analyze and discuss the changes in economic vitality of a region under the influence of economic policy transition based on known data and collected information. Measuring regional economic vitality is a complex issue. Question three needs to select a suitable index system, establish a model to analyze and measure the economic vitality of the region (or city or province), and apply the model to rank the economic vitality of the cities in the annex.

Finally, based on the above analysis, suggestions for the development of the region in question are given in order to improve the economic vitality of the region and increase its regional competitiveness.

1.3 Overview of Our Work

This paper selects 10 main factors, such as GDP, disposable income of residents, imports, exports, deposit balances, loan balances, etc., and uses factor analysis to explain the correlation between the original variables while reducing the dimensionality to further build the economy Relational model of influencing factors. The obtained model is used to further study the action plan to improve regional economic vitality.

The impact of changes in regional economic vitality is analyzed from two perspectives: the trend of population and corporate vitality.

Analysis. This paper selects the number of population and the number of new enterprises as the main influencing factors to analyze changes in economic vitality. Changes in policy will affect the number of people and specific values of new businesses. This paper uses time series to analyze and predict the factors before the policy change, and compares them with the factor values after the policy change. Analysis of policy changes.

Changes in economic vitality before and after the transition. Further analyzes the effects on the regional economic vitality change from the perspective of changing trend of population and enterprise vitality.

In response to the second question, this article selects Tangshan Province as the selected city, and analyzes the economic policy transition in this region.

Short- and long-term effects of economic vitality. As a coastal city, Tangshan has been developing its foreign economy, and foreign trade has made considerable progress and become a major pillar of the economy. Therefore, two factors are selected as evaluation indicators to analyze the economic development status before and after the policy change, and the short-term impact of policy change on economic vitality is obtained. Then, based on the existing economic analysis and forecasting theory, the long-term impact of policy changes on economic vitality is given. In response to the third question, this paper establishes a mathematical model for analyzing and measuring regional economic vitality to measure regional.

Economic vitality and the city's economic vitality is ranked in Annex 3. Select ECO to measure regional economy.

The index of vitality is obtained by comprehensively collecting the number of newly established companies from 2009 to 2018, the number of companies surviving in 2019, and the number of companies canceling from 2009 to 2018 to obtain a comprehensive index ranking.

Finally, in order to improve the economic vitality development of the region and increase the regional competitiveness of the region, this article gives suggestions for the development of the region in question based on the ranking obtained and the scores corresponding to each factor.

2. The relational model of influencing factors of economic vitality

2.1 Establishment of the model

The factor analysis method was first proposed by Spearman in 1904 and it is the generalization of principal component analysis.

The basic idea is to group variables according to the correlation, so that the correlation of the same group of variables is higher, the correlation of different groups of variables is lower, and the linear

combination of a smaller number of common factors and the sum of specific factors are used to express Each variable originally observed in order to explain the correlation between the original variables and reduce the dimensionality. At the same time, weights reflecting the amount of information contained in the factors and indicators are formed to calculate the comprehensive evaluation value. In this way, the influence of subjective factors is overcome in the selection of index weights, which helps to objectively reflect the actual relationship between samples.

2.1.1 Selection of impact factors

In order to analyze the economic vitality reasonably, select variables that can comprehensively reflect the current economic situation and development trends. First select a region: GDP, disposable income of residents, imports, exports, deposit balance, loan balance, new registration The 10 main factors affecting economic vitality are enterprises, the actual use of foreign capital, internal expenditures on industrial RD funds, and the number of urban employees participating in basic endowment insurance at the end of the year.

2.1.2 Index correlation analysis

The prerequisite for factor analysis is that there is a high correlation between the explanatory variables, so that a few public factors can be extracted from the original variables to explain the information of the original variables, and the effects of dimensionality reduction and simplification can be achieved. In order to avoid the result error caused by different dimensions between different variables, the data was imported into sps5 software for standardization, and the correlation between the variables was tested using KMO statistics and Bartlett's sphericity. KMO = 0.795 and Bartlett's test p-value = 0.000, indicating that the selected explanatory variables are suitable for factor analysis.[1]

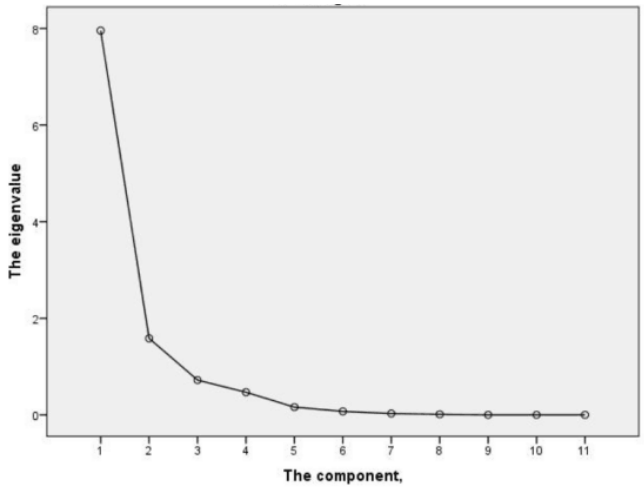

Figure 1 Gravel figure

It can also be seen from the gravel chart that the information contributed by the first two factors represents that the polyline is relatively steep, and the subsequent polyline is relatively flat, so it can be considered that it is reasonable to extract the two factors.

2.1.3 Establishment of factor model

The component score coefficient matrix is multiplied by the index to calculate the factor score, that is

$$F_i = \alpha_{i1}x_1 + \alpha_{i2}x_2 + \alpha_{ip}x_p (p = 1,2,..., m) \quad (1)$$

Among them, F_i Means the i-th factor score, $x_1, x_2,..., x_p$ represents the standardized value of the indicator; $\alpha_{i1}, \alpha_{i2},..., \alpha_{ip}$ indication ingredients.

The total factor score is equal to the weighted arithmetic mean of each sub-factor score, that is:

$$F = \sum b_i F_i (\sum b_i = 1) \quad (2)$$

Among them F is the total factor score F_i Represents the i-th factor score b_i Represents the contribution of the i-th factor. (Factor contribution = factor contribution rate after factor factor rotation / total variance explanation rate) 2.1.4 Solution of factor model and result analysis.

According to the principle of principal component analysis, the larger the common factor variance extracted between variables, the stronger the ability to be explained by the common factor.

According to the results obtained by SPSS, most of the variable factors proposed by the extracted common factor variance are explained to a degree higher than 70%. Therefore, less information is lost in the original data, and the extraction effect is better. Generally speaking, for a variance contribution rate of not less than 75%, the factor extraction component explanation information accounts for 75% of the total information. For factors with characteristic roots greater than 1, data analysis is performed based on SPSS software, and finally two factors are obtained.

The expression of the factor is as follows:

$$F_1 = 0.121 * k + ... + 0.12 * p \quad (3)$$

$$F_2 = 0.037 * k + ... + 0.104 * p \quad (4)$$

Among them,k is the total population,p is the deposit balance,the factor coefficient is the result calculated by SPSS. As shown in Table 1 Component score coefficient matrix.

Component score coefficient matrix

	composition	
	1	2
population	.121	.037
Gross domestic product	.125	-.110
Per capita disposable income	.100	.110
imports	.027	-.531
exports	.101	-.200
Loan balance	.123	.046
Newly registered enterprise	.003	.515
Actual utilization of foreign capital	.122	-.027
The internal expenditure of industry RD funds is regulated	.126	-.054
Urban worker year end attends primary endowment insurance number	.123	.032
Deposits	.120	.104

The rotated composition matrix[a]

	composition	
	1	2
population	.973	.089
Gross domestic product	.965	-.145
Per capita disposable income	.819	.200
imports	.087	-.839
exports	.755	-.294
Loan balance	.985	.104
Newly registered enterprise	.150	.822
Actual utilization of foreign capital	.965	-.012
The internal expenditure of industry RD funds is regulated	.984	-.056
Urban worker year end attends primary endowment insurance number	.985	.081
Deposits	.978	.196

The standardized sample data was imported into SPSS software, and the results in Table 1 were obtained.

It can be seen that the cumulative variance contribution rate reaches 86.722%, indicating that the first two factors contain 86.722% of all index information, and the amount of information extracted is

relatively large. Therefore, it can be explained that factor analysis is more effective in extracting the original variable information.

In order to explain its practical significance, the common factor is orthogonally rotated to maximize the variance, and the result of Table 2 The rotated composition matrix is obtained.

Further set the GDP, disposable income of residents, export value, deposit balance, loan balance, actual use of foreign capital, internal expenditure on industrial RD funds, and the number of urban employees participating in basic endowment insurance at the end of the year as factor 1, GDP, Per capita disposable income, export value, deposit balance, loan balance, actual use of foreign capital, and internal expenditures on industrial RD expenditures reflect economic production, while urban workers who do not participate in basic endowment insurance annually reflect social security levels. Therefore, the factor 1 is named the social production and social security factor, the newly registered enterprise is the factor 2, and the factor 2 is named the emerging enterprise factor.

Using the variance contribution rate of each factor as the weight, the weighted average of the economic vitality index scores is as follows:

$$ECO=0.72239*F_1+0.14493*F_2 \quad (5)$$

The final weights obtained by factor analysis and weighted calculations by factor score functions to obtain comprehensive scores. Used to measure regional economic vitality. Changes in policy will affect the number of people and specific values of new businesses. This paper uses time series to analyze and predict the factors before the policy change, and compares them with the factor values after the policy change. Analyze the changes in economic vitality before and after policy changes. Further analyzes the effects on the regional economic vitality change from the perspective of changing trend of population and enterprise vitality.

2.2 Analysis of the Impact of Changes in Regional Economic Vitality

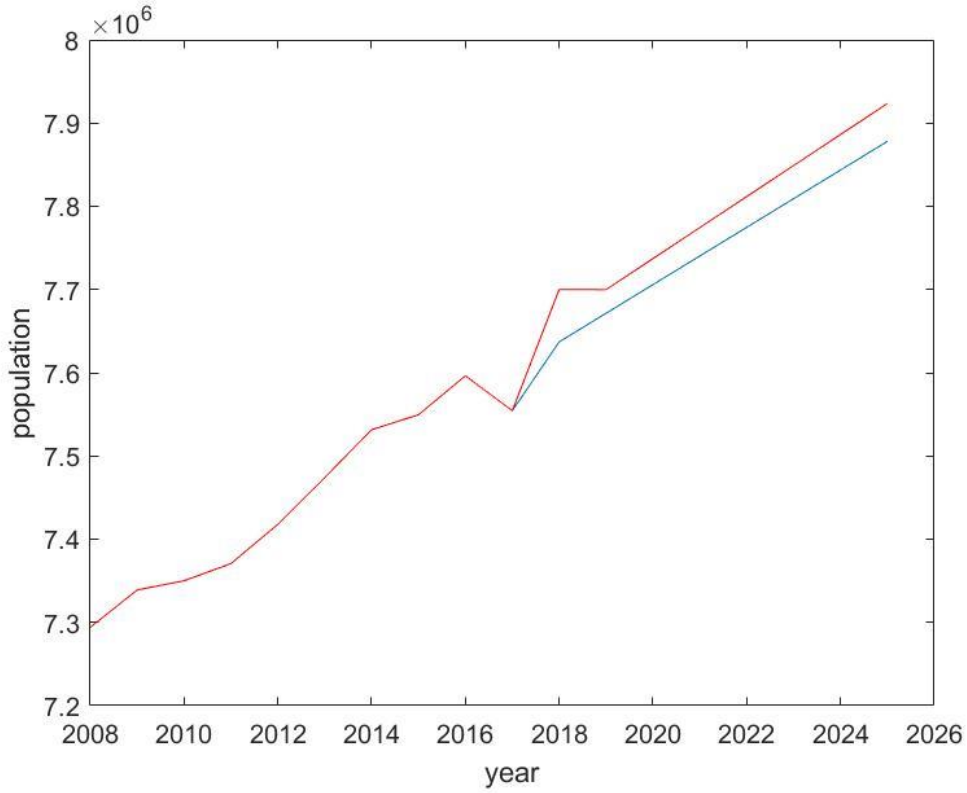

Figure 2 Changes in population policy before and after policy reform

Take Tangshan City as an example for analysis. According to the existing population policy, that is, the reduction of aging progress and the further implementation of the two-child policy, the population of Tangshan City has shown a rapid growth trend. Compared with the forecast before policy implementation, the growth trend has become steeper, as shown in Figure 2. Further demonstrate the impact of policy transition on the population, which in turn affects economic development trends.

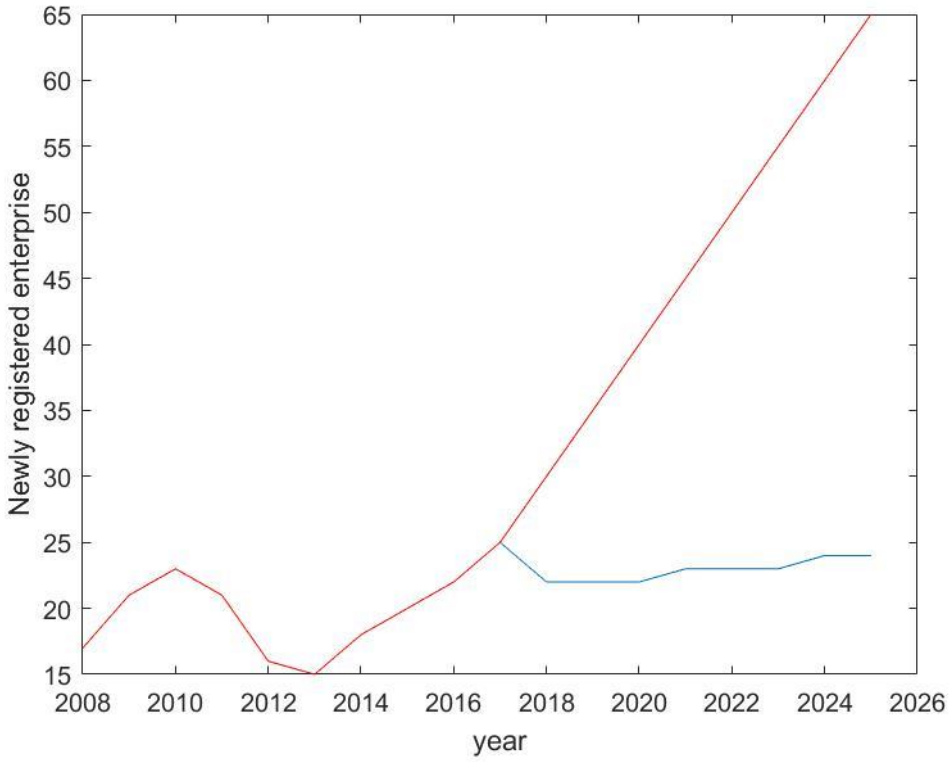

Figure 3 Changes in the number of newly registered companies before and after the policy reform

The number of newly registered enterprises is the main indicator to measure the development of the market economy of the enterprise. If the government has not issued relevant policies, the number of newly registered enterprises in Tangshan City will develop in a blue curve as shown in the figure, and it will not appear faster in the next 10 years growth of.

According to the foreign trade-related policies introduced in 2017, the number of newly registered enterprises in 2017 was changed, and then the time series was used to predict the change in the number of new enterprises in the next 10 years after the policy reform. It is found that with the support of policies, the number of new enterprises has increased dramatically. The contribution of this indicator to economic vitality has been greatly improved.

In summary, policy transition has a high degree of impact on economic vitality and plays a role that cannot be ignored.

3. The Impact of Tangshan's Policy Transformation on Economic Vitality

As a coastal city, Tangshan City has developed in coordination with the "three major sectors" in recent years, and the coastal economy has accelerated industrial clustering. The government has therefore adjusted its foreign trade-related policies. Changes in policies will affect the specific values of import and export. This article uses time series to analyze and predict the factors before the policy change, and compare it with the policy change.

After the factor values are compared. Analyze the changes in economic vitality before and after policy changes. Further analyzes the effects on the regional economic vitality change from the perspective of changing trend of population and enterprise vitality.

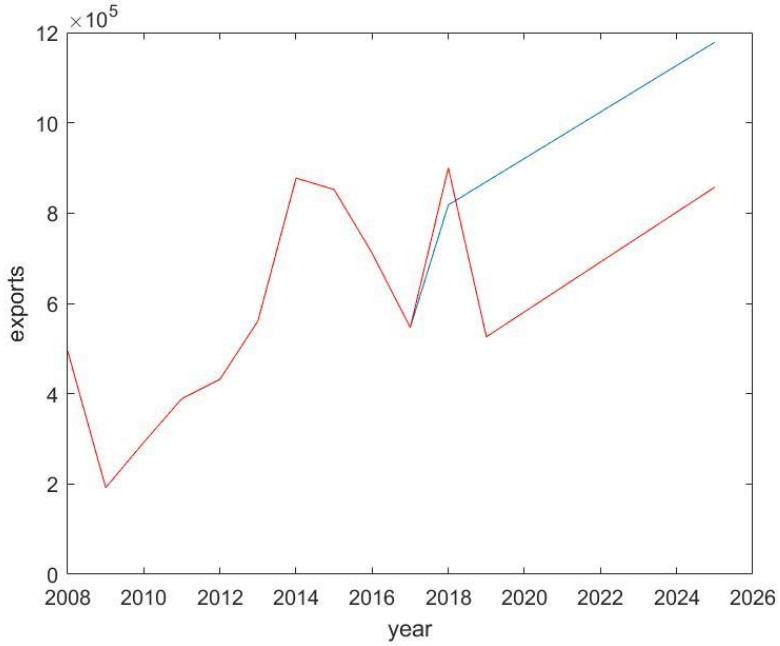

Figure 4 Changes before and after export policy reform

In order to encourage foreign trade, increase the flow of freight, and promote overall economic development with the port economy, the government has made a series of policy adjustments. Such as reducing tariffs and reducing trade procedures. After the adjustment of foreign trade policy, the overall export volume of Tangshan City has increased compared with the forecast value before adjustment.

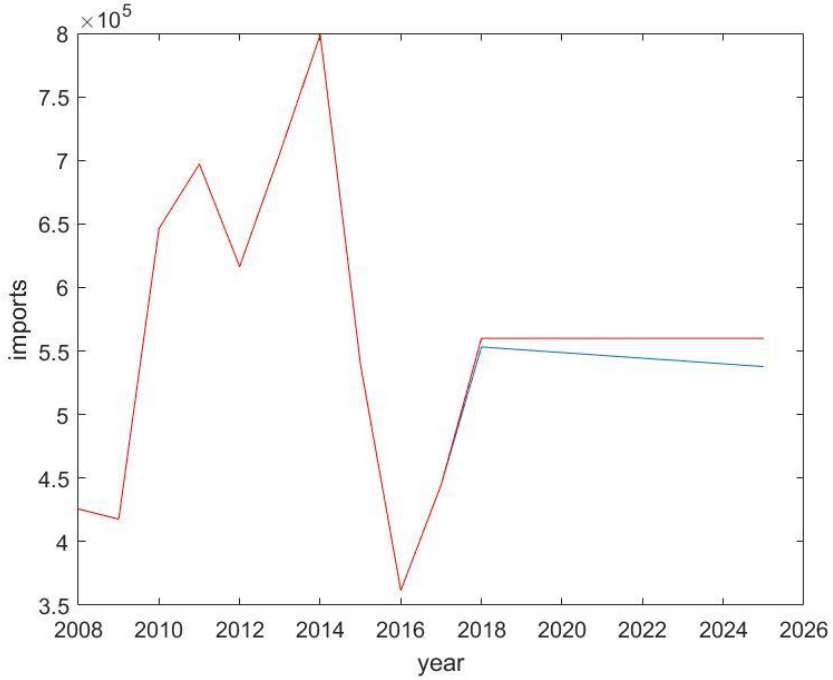

Figure 5 Changes before and after the import policy reform

For imports, policy adjustments have less effect on them. The government's adjustment measures can only promote the overall foreign trade willingness of Tangshan Coin and cannot help traders to obtain import preferences. Under such circumstances, the foreign trade industry still plays an indispensable role in increasing economic vitality.[3]

4. Calculation of economic vitality index value and city ranking

Similar to the first nroblem.the analvsis of the data obtained bv SPSS to obtain the exnression of the factors.the variance contribution rate of each factor as the weight.the weighted average of the economic vitality index score is as follows.

$$F = 0.351 \cdot a + 0.345 \cdot b + 0.333 * c \quad (6)$$

$$ECO = 0.94296 \cdot F \quad (7)$$

Among them, a is the number of new enterprises from 2019 to 2018; b is the number of surviving enterprises in 2019; c is the number of cancellations from 2009 to 2018.

Component score coefficient matrix

	composition 1
Quantity of Newly established Enterprises from 2009 to 2018	.351
Quantity of Surviving Enterprises in 2019	.345
Quantity of Cancelled Enterprises from 2009 to 2018	.333

The final weights obtained by factor analysis and weighted calculations by factor score functions to obtain comprehensive scores. Used to measure regional economic vitality.

Total variance interpretation

	Initial eigenvalue			Extract the sum of the squares of the loads		
composition	A total of	Percentage variance	Cumulative %	A total of	Percentage variance	Cumulative %
1	2.829	94.296	94.296	2.829	94.296	94.296
2	.171	5.704	100.000			
3	1.074E-7	3.581E-6	100.000			

It can be seen that the cumulative variance contribution rate reaches 86.722%, which indicates that the first two factors include 86.722% of all index information, and the amount of information extracted is relatively large. Therefore, it can be explained that factor analysis is more effective in extracting the original variable information.

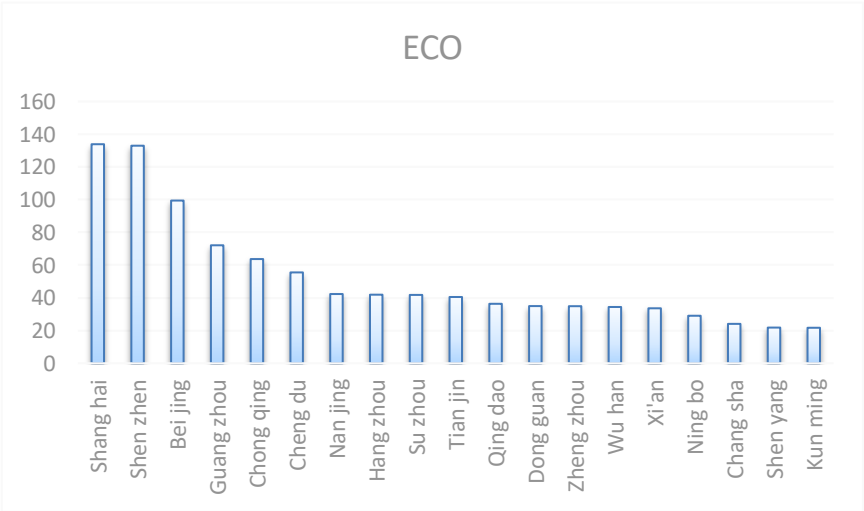

Figure 5 Sorting of ECO values of various cities

Comprehensively collected the number of newly established companies from 2009 to 2018, the number of companies surviving in 2019, and the number of companies canceling from 2009 to 2018 to obtain a comprehensive indicator ranking. The top three indicators are Shanghai , Shenzhen, Beijing.

5. Suggestions for improving economic vitality

In recent years, fierce international competition and the deterioration of the international trade environment have made improving economic policies and stimulating economic vitality an effective means to improve regional comprehensive competitiveness. Against the background of the government's vigorous promotion of the coordinated development of Beijing, Tianjin and Hebei, we should make new strategic guidance for Tangshan, further promote economic development, and lead the people to a better life.

Tangshan is near the sea, coal and other heavy industries are more developed. In recent years, through the efforts of major departments, the proportion of the three major industries has become more reasonable, and the proportion has been increasing. The proportion is difficult to decline, and the high-energy-consuming industries have a large proportion, the technology investment is relatively insufficient, and it lacks originality. [3]

However, due to government support for a long time, Tangshan's foreign trade has been piloted and finally decided to release it. This policy has made Tangshan's foreign trade situation significantly more significant than in the past 30 years, allowing local enterprises to use foreign capital to grow and develop rapidly. As far as the degree of openness is concerned, whether compared with other coastal cities or in terms of its role in promoting urban transformation is far from ideal. As an open city, Tangshan City's location advantages, coastal advantages, port advantages, and open policy advantages have not been fully utilized. As a decision maker, after carefully studying Tangshan's development in recent years and making certain forecasts for future development, I think We can also speed up Tangshan's economic advancement in the following areas. [5]

As a decision maker of Tangshan's economic construction, in order to show the region's economic vitality, sustainable development and stronger regional competitiveness, this article proposes the following:

5.1 Encourage banks to provide loan services

In the case of indirect financing occupying a dominant market position, economic growth depends to a large extent on the promotion of external funds, that is, the input of credit funds. For enterprises, the development of an enterprise is inseparable from the support of external funds. The borrowed funds can not only support the circulation of corporate funds, but also promote the construction of municipal infrastructure in the form of taxation. For individuals, a series of loans such as home loans and car loans can reflect the basic living standards of citizens. Actively providing loan services can promote a virtuous circle of funds.

5.2 Promote friendship exhibitions for new and new companies

The development of new and emerging enterprises can promote the opening of trade volume and prevent the occurrence of market monopolies. Both the opening of the import and export trade market and the promotion of the flow of talents have a positive impact.

5.3 Open economy

In a modern society dominated by international trade, we will continue to deepen two-way opening, further optimize the opening layout, and actively integrate into the country ’s “Belt and Road” policy. The excess capacity inside Tangshan was launched. In international cooperation, we will increase the intensity of introducing advanced technologies internally, strengthen the capability of independent research and development and independent innovation of enterprises, and influence each other internally and externally to accelerate the pace of Tangshan's transformation.

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