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Evaluation of high-quality industrial development in Guangdong Province from the perspective of new quality productivity

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Abstract: As China's largest industrial province, Guangdong Province adheres to high-quality industrial development. This paper constructs the assessment index device of excellent industrial development in Guangdong Province from 4 dimensions: new quality innovation ability, new quality structure optimization, new quality quality benefit and green development. The factor analysis method was used to comprehensively consider the high-quality industrial development level of 21 prefecture-level cities in Guangdong Province. The consequences exhibit that the terrific industrial improvement degree of prefecture-level cities in Guangdong Province is no longer balanced, showing significant geographical differences. The comprehensive factor score of prefecture-level cities in the Pearl River Delta region is relatively high, and the mountain area is low. According to the results, further cluster analysis divided all prefecture-level cities in Guangdong Province (21 in total) into four categories: excellent, good, medium and poor industrial development quality level.

1. Introduction

The Central Economic Work Conference held at the stop of 2023 simply cited that industrial innovation have to be promoted via scientific and technological innovation, specifically through disruptive applied sciences and trendy applied sciences to create new industries, new models, new kinetic energy, and new quality productivity. High-quality industrial improvement is the groundwork to achieving new quality productivity. Guangdong Province's gross industrial output value has ranked first in China for many years, far ahead of other provinces. It has built a modern industrial system with complete industry, leading technology and strong comprehensive supporting capacity. However, the industrial development among prefecture-level cities is not balanced. In recent years, the proportion of industry in the city's GDP has declined in some cities, and the development speed has obviously lagged behind the trend of the tertiary industry [1]. This is similar to the unbalanced industrial development in many provinces in China. Therefore, an objective and comprehensive evaluation of the high-quality industrial development level in Guangdong Province can not only find its own problems, but also have important implications for other underdeveloped regions in China to achieve balanced industrial development and realize the transition from traditional productivity to new productivity.

In the early stage, Chinese scholars ' research on the level of high-quality industrial development began with the comprehensive evaluation of the new industrialization process, and selected per capita GDP, urbanization rate, industrial structure, etc.as indicators. The index system established at this stage is not comprehensive enough. Follow-up scholars ' methods for measuring the level of high-quality development comprehensively consider evaluation indicators such as growth, efficiency, external dependence, innovation, environment, and society [2]. In addition, the transformation and upgrading of related industries in the industrial field has attracted more and more scholars ' attention. Ma Jing and Yan Chaodong defined the concept of industrial transformation and upgrading as the evolution and change process of industrial industry aiming at improving the added value and competitiveness of industrial economy [3]. The indicators are constructed from four aspects to reflect the development level of industrial transformation and upgrading, and the different degrees of influence of different indicators on industrial transformation and upgrading are clarified. In the article "Evaluation of China's Provincial Industrial Competitiveness" by Ma Jibo, the proportion of new product sales and the proportion of R & D funds in the GDP of each province are introduced as the secondary indicators of technological innovation competitiveness in the index system [4].

To sum up, a distinctly diagnosed assessment index gadget has now not but been formed. A important reason is that there are new requirements for the development of high-quality industries. Now that ' new quality productivity ' has entered the central document, it points out the decisive force of stimulating new kinetic energy in the new development stage. Moreover, it is of great significance and practical needs to evaluate the high-quality development level of urban industry from multiple dimensions, which can help decision makers make more accurate decisions according to the shortcomings of a specific aspect. In addition, there is a lack of papers on the comprehensive evaluation of the high-quality industrial development of prefecture-level cities in Guangdong Province. In this context, this paper selects Guangdong Province as an instance to assemble an evaluation index system model for high-quality industrial development, and analyzes the internal mechanism and key factors affecting high-quality development. Finally, from multiple dimensions, the detailed situation of industrial development in Guangdong Province is summarized, and suggestions are put forward for the high-quality industrial development of Guangdong Province and other parts of the country, and the development of new quality productivity is explored together.

2. Establishment of index system

At present, the first-level indicators of China's industrial high-quality development index system have been relatively mature. This paper synthesizes the research of many scholars on the construction of China 's industrial high-quality development evaluation system, and refers to the continuous issuance of " Several Opinions on the High-quality Development of Guangdong in the New Era " [5-7] by Guangdong Provincial Party Committee and Provincial Government in 2023, and constructs the quality index system of industrial development in Guangdong Province from four aspects : new quality innovation ability, new quality structure optimization, new quality benefit and green development.

New quality innovation ability is an innovation ability that can realize new quality productivity and an important indicator of high-quality development of urban industry. From a global perspective, high-quality industrial development is closely related to the transformation of innovation methods [8]. Under this first-level index, three second-level indicators were selected: the number of R&D personnel of industrial enterprises above designated size, the internal expenditure of R&D funds of industrial enterprises above designated size, and the expenditure on new product development of industrial enterprises above designated size.

A necessary prerequisite for the long-term steady increase of city industrial stage is to have a coordinated and forward-looking industrial structure. Therefore, a total of five secondary indicators are selected : the proportion of the added value of advanced manufacturing industry in the industry above designated size, the proportion of advanced manufacturing industry, the proportion of industrial investment, the proportion of total industrial volume in the GDP of new product export of industrial enterprises above designated size, the total import and export volume and the export of new products of industrial enterprises above designated size. The first three indicators can reflect the scientific structure of the proportion of urban industrial economy in its overall economic importance, and the latter two secondary indicators reflect the proportion of high-profit and high-tech products exported.

Table 1: The index system of high-quality industrial development in Guangdong Province

<table>
<tr><th>goal layer</th><th>criterion layer</th><th>indicator layer</th><th>index attribute</th></tr>
<tr><td rowspan="16">High-quality industrial development level of Guangdong Province</td><td rowspan="3">New quality innovation ability</td><td>Industrial enterprises above designated size R & D activity personnel</td><td>+</td></tr>
<tr><td>Internal expenditure of R & D funds for industrial enterprises above designated size</td><td>+</td></tr>
<tr><td>Expenditure on new product development of industrial enterprises above designated size</td><td>+</td></tr>
<tr><td rowspan="5">New quality structure optimization</td><td>total import and export volume</td><td>+</td></tr>
<tr><td>New product export of industrial enterprises above designated size</td><td>+</td></tr>
<tr><td>The added value of advanced manufacturing industry accounts for the proportion of industries above designated size</td><td>+</td></tr>
<tr><td>Proportion of industrial investment</td><td>+</td></tr>
<tr><td>The proportion of total industry in GDP</td><td>+</td></tr>
<tr><td rowspan="5">New Quality Benefits</td><td>Sales revenue of new industrial products</td><td>+</td></tr>
<tr><td>Gross industrial output value above scale</td><td>+</td></tr>
<tr><td>Advanced manufacturing added value</td><td>+</td></tr>
<tr><td>The contribution rate of total assets of industrial enterprises</td><td>+</td></tr>
<tr><td>Total labor productivity of industrial enterprises</td><td>+</td></tr>
<tr><td rowspan="4">green development</td><td>The growth rate of energy consumption per unit of industrial added value</td><td>-</td></tr>
<tr><td>Industrial particulate matter emissions per unit of industrial output value</td><td>-</td></tr>
<tr><td>Industrial sulfur dioxide emissions per unit of industrial output value</td><td>-</td></tr>
<tr><td>Industrial nitrogen oxide emissions per unit of industrial output value</td><td>-</td></tr>
</table>

Compared with the general industrial development quality benefit, the new quality benefit will pay extra interest to the development of advanced manufacturing enterprise, which is the embodiment of the achievements of urban industrial development, and also the criterion to reflect whether the urban industrial development mode is scientific and advanced. Under this first-level indicator, there are five second-level indicators : sales revenue of new industrial products, gross industrial output value above scale, added value of advanced manufacturing industry, contribution rate of total assets of industrial enterprises, and total labor productivity of industrial enterprises.

China's industrial development should be driven by innovation while taking into account environmental protection and achieving high-quality and sustainable development [9]. Therefore, four secondary indicators of energy consumption growth rate per unit of industrial added value, industrial particulate matter emissions per unit of industrial output value, industrial sulfur dioxide emissions per unit of industrial output value, and industrial nitrogen oxide emissions per unit of industrial output value are selected. In summary, the comprehensive evaluation index system of high-quality industrial development in Guangdong Province is proven in Table 1.

3. Model analysis

3.1 Research route

At present, the established index system is mainly from the theoretical point of view, with many indicators and high data dimension, which is difficult to deal with. The processing techniques of high-dimensional facts ordinarily consist of the use of entropy weight method, primary factor analysis, community analytic hierarchy system (ANP) and component evaluation to method the unique data. Due to the large number of secondary indicators of the model established in this paper, and the complex relationship between each index, the factor analysis method is used to reduce the dimension of the preliminary data, extract the main elements of the amazing improvement of replicating urban enterprises, and calculate the score. Finally, according to the scores, cluster analysis is carried out, and the high-quality industrial development level of cities in Guangdong Province is divided into four categories: excellent, good, medium and poor.

3.2 Research method

This paper ordinarily makes use of factor analysis and k-means clustering analysis. Factor evaluation is a multivariate statistical approach primarily based on the thought of dimensionality reduction, in which the elements correspond to the secondary symptoms in the complete contrast mannequin developed in this paper, and the complicated variables are aggregated into a few impartial frequent factors. These frequent elements can replicate the important records of the authentic many variables. While reducing the extent of variables, they moreover replicate the internal relationship between variables, and can except lengthen accumulate the weight of the most important factor. According to these main factors, a comprehensive evaluation of the high-quality industrial development level of prefecture-level cities in Guangdong Province can be made.

The specific steps for constructing the evaluation index system of high-quality industrial development in Guangdong Province are as follows:

(1) Construct a m ×n matrix, m is the number of prefecture-level cities in Guangdong Province, n is the number of secondary indicators.

$$X_{m\times n=}\left\{\begin{matrix} X_{1,1} & \cdots & X_{1,j} & \cdots & X_{1,n} \\ \vdots & & \vdots & & \vdots \\ X_{i,1} & \cdots & X_{i,j} & \cdots & X_{i,n} \\ \vdots & & \vdots & & \vdots \\ X_{m,1} & \cdots & X_{m,j} & \cdots & X_{m,n} \end{matrix}\right\} \tag{1}$$

(2) Standardize the original data to eliminate the influence of the dimension and numerical difference of each variable on the calculation.

(3) Calculate the KMO value of the model. Factor analysis requires variables to be continuous and

relevant. Therefore, KMO test and Bartiett sphericity test are needed before analyzing the data.

$$KMO = \frac{\sum\sum_{i \neq j} r_{ij}^2}{\sum\sum_{i \neq j} r_{ij}^2 + \sum\sum_{i \neq j} a_{ij}^2} \tag{2}$$

Among them, r_{ij}^2 is the simple correlation coefficient between the two variables; a_{ij}^2 is the partial correlation coefficient between the two variables. Where, when i = j, $r_{ij} = 1$.

(4) Calculate the correlation coefficient matrix.

$$r_{ij} = \frac{\sum_{k=1}^{m} (Z_{jk} - \overline{Z}_j)(Z_{ik} - \overline{X}_j)}{\sqrt{\sum_{k=1}^{m} (Z_{jk} - \overline{Z}_j)^2 \cdot \sum_{k=1}^{m} (Z_{ik} - \overline{X}_j)^2}} \tag{3}$$

(5) The eigenvalues and eigenvectors of the correlation coefficient matrix are solved, and the contribution rate is calculated.

$$(R - \lambda E) \cdot X = 0 \tag{4}$$

(6) Determine the number of common factors.

(7) The factor load matrix is rotated, and the most commonly used maximum variance method is used for rotation.

(8) The common factor is regarded as the analysis variable, and the factor score is calculated.

Clustering analysis is a classification method that divides the research objects with high similarity into one class according to the data characteristics. At present, there are a variety of clustering methods. This paper chooses Kmeans clustering method, which is an unsupervised algorithm. Its essence is to iterate the class center points through the cycle, calculate the Euclidean distance from each object to the new class center point and reclassify according to the principle of nearest distance.

The Euclidean distance between two sample points x and y is expressed as:

$$d(x, y) = \left(\sum_{i=1}^{n} (x_i - y_i)^2\right)^{\frac{1}{2}} \tag{5}$$

3.3 Results analysis

3.3.1 Model test

By calculating the KMO value, it can be viewed whether or not the pattern is appropriate for thing analysis. The large the KMO value is, the extra appropriate the pattern is to use the issue evaluation approach for complete evaluation. When the KMO of the model is greater than 0.5, the sample can be analyzed by factor analysis. The KMO test value of the model in this paper is 0.607, and the Bartlett sphericity test P value is 0.000 (< 0.05). Therefore, the preconditions of the factor model can be satisfied and factor analysis can be carried out.

3.3.2 Common factor extraction

Further, according to the criteria of common factor cumulative variance contribution greater than 85.00 %, when four common factors are selected, the cumulative variance contribution rate is 87.640 %, so four common factors are extracted, and the results are shown in Table 2.

Table 2: Principal component analysis results of total variance interpretation

component	Initial eigenvalue			Extract the load sum of squares			Square sum of rotational loads		
	grand total	variance proportion	accumulation %	grand total	variance proportion	accumulation %	grand total	variance proportion	accumulation %
1	8.946	52.622	52.622	8.946	52.622	52.622	8.040	47.295	47.295
2	2.625	15.441	68.063	2.625	15.441	68.063	3.466	20.389	67.685
3	2.294	13.497	81.560	2.294	13.497	81.560	1.977	11.628	79.313
4	1.034	6.080	87.640	1.034	6.080	87.640	1.416	8.327	87.640
5	.821	4.831	92.471						

3.3.3 Naming of common factors

According to Tables 3 and 4, the extracted principal component of the first common factor has higher load weight, which is 47.295%. This points out that all three indicators under the first-level index of new quality innovation ability and the load values of the eight indicators of total import and export, sales revenue of new industrial products, added value of advanced manufacturing industry, export of new products of industrial enterprises above designated size, and total industrial output value above designated size are larger. These eight indicators are broadly speaking associated to innovation capability openness, so they are named innovation and open development factors.

The second common factor principal component load weight is 20.389%, indicating that the load values of the three indicators of industrial particulate matter emissions per unit industrial output value, industrial nitrogen oxide emissions per unit industrial output value, and industrial sulfur dioxide emissions per unit industrial output value are large, so they can be named as green development factors.

The third common factor principal component load weight is 11.628%, which indicates that the load values of the three indicators of the total labor productivity of industrial enterprises, the contribution rate of total assets of industrial enterprises, and the proportion of the added value of advanced manufacturing industry in the above-scale industries are relatively large, so it can be named as quality benefit factor.

The fourth common factor principal component load weight is 8.372 %, indicating that the load value of the three indicators of the growth rate of energy consumption per unit of industrial added value, the proportion of industrial investment in each city, and the proportion of total industrial output to GDP is relatively large, so it can be named industrial structure and energy consumption factor.

Table 3: Rotated component matrix table

	component			
	1	2	3	4
Internal expenditure of R & D funds for industrial enterprises above designated size	0.982	0.136	-0.021	-0.072
R & D personnel in industrial enterprises above designated size	0.980	0.170	-0.039	-0.044
Expenditure on new product development of industrial enterprises above designated size	0.979	0.119	-0.027	-0.077
total export-import volume	0.977	0.142	-0.041	-0.071
Sales revenue of new industrial products	0.973	0.201	-0.045	0.000
Advanced manufacturing added value	0.969	0.208	0.039	-0.053
New product export of industrial enterprises above designated size	0.964	0.137	-0.058	-0.039
Gross industrial output value above scale	0.929	0.269	0.011	0.040
Industrial particulate matter emissions per unit of industrial output value	0.134	0.947	0.041	-0.038
Industrial nitrogen oxide emissions per unit of industrial output value	0.250	0.937	0.058	-0.097
Industrial sulfur dioxide emissions per unit of industrial output value	0.270	0.900	-0.008	0.031

The proportion of total industrial output in GDP	0.120	0.624	-0.250	0.469
Total labor productivity of industrial enterprises	-0.002	-0.074	0.926	-0.093
The contribution rate of total assets of industrial enterprises	-0.125	0.034	0.890	-0.064
The added value of advanced manufacturing industry accounts for the proportion of industries above designated size	0.455	0.459	0.486	-0.352
The growth rate of energy consumption per unit of industrial added value	0.111	-0.094	-0.094	0.823
The proportion of industrial investment in each city	-0.348	0.093	-0.051	0.587

3.3.4 Score calculation

F1, F2, F3 and F4 are used to signify the rankings of 4 common factors of innovation and open development, green development, quality and efficiency, industrial structure and energy consumption, respectively. The variance contribution percentage of the four factors is used as the weight coefficient of each factor. The weighted average is used to calculate the comprehensive score of industrial high-quality development level of 21 prefecture-level cities in Guangdong Province. The total score of the factor is calculated as follows:

$$F=\frac{\lambda_1}{\sum\lambda_i}F_1+\frac{\lambda_2}{\sum\lambda_i}F_2+\frac{\lambda_3}{\sum\lambda_i}F_3+\frac{\lambda_4}{\sum\lambda_i}F_4 \tag{6}$$

Substitute into the data in Table 2 to calculate:

$$F=0.540F_1+0.233F_2+0.132F_3+0.095F_4 \tag{7}$$

The ranking results are shown in Table 4:

From the consequences of table 4, it can be viewed that the degree of high-quality industrial development in Guangdong Province shows a strong spatial aggregation, and 7 of the top 10 cities are cities in the Pearl River Delta. In the current evaluation model system of industrial high-quality development, the number of cities with green development factor scores greater than 0 is the largest, followed by industrial structure and energy consumption factors, quality and efficiency factors, and innovation and open development factor scores greater than 0. The number of cities is small; the comprehensive score shows that a total of 6 cities are greater than 0. It indicates that most prefecture-level cities in Guangdong Province want to be reinforced in phrases of innovation and development, great and effectivity; more than half of the cities have achieved relatively good results in green development. In short, Guangdong Province has a good performance in a few head cities under the comprehensive evaluation system constructed in this paper, such as Shenzhen, Guangzhou, Dongguan, Foshan and other cities, which have formed obvious advantages compared with other prefecture-level cities. In general, the level of high-quality industrial development in Guangdong Province still needs more comprehensive and coordinated development.

Table 4: Comprehensive evaluation ranking results of high-quality industrial development of prefecture-level cities in Guangdong Province

	Innovation and open development		green development		quality benefit		Industrial structure and energy consumption		overall merit	
City	Score	Ranking	Score	Ranking	Score	Ranking	Score	Ranking	Score	Ranking
Shenzhen	1.79	1	-0.03	15	0	7	-0.06	18	1.7	1
Dongguan	0.52	2	0.18	1	-0.06	15	0.09	3	0.74	2

Foshan	0.29	4	0.18	2	0.05	4	0.07	4	0.59	3
Guangzhou	0.42	3	0.04	12	0.04	6	-0.07	19	0.42	4
Huizhou	0.05	5	0.17	3	-0.01	9	0.07	5	0.27	5
Maoming	-0.2	14	0.04	13	0.38	1	-0.05	17	0.18	6
Zhongshan	-0.09	8	0.12	7	-0.08	18	0.03	8	-0.01	7
Yangjiang	-0.21	16	-0.05	17	0.04	5	0.18	1	-0.04	8
Zhaoqing	-0.18	12	0.03	14	-0.01	8	0.1	2	-0.05	9
Zhanjiang	-0.21	15	-0.04	16	0.22	2	-0.03	15	-0.06	10
Zhuhai	-0.12	10	0.14	4	-0.05	13	-0.1	20	-0.12	11
Jiangmen	-0.18	13	0.13	6	-0.08	16	0	10	-0.13	12
Jieyang	-0.32	10	0.12	8	0.06	3	0.01	9	-0.13	13
Shantou	-0.27	17	0.14	5	-0.06	14	-0.02	14	-0.21	14
Qingyuan	-0.08	7	-0.22	18	-0.04	12	0.04	7	-0.3	15
Chaozhou	-0.32	20	0.11	10	-0.08	19	-0.01	13	-0.3	16
Shanwei	-0.28	18	0.05	11	-0.14	21	-0.01	12	-0.37	17
Shaoguan	-0.13	11	-0.29	19	-0.01	10	-0.01	11	-0.44	18
Yunfu	-0.09	9	-0.38	20	-0.08	17	0.05	6	-0.49	19
River source	-0.38	21	0.12	9	-0.11	20	-0.22	21	-0.58	20
Meizhou	-0.02	6	-0.58	21	-0.02	11	-0.05	16	-0.67	21

3.3.5 Cluster analysis

Using cluster analysis, 21 prefecture-level cities in Guangdong Province are divided into four categories: high-level, high-level, good-level, and general-level industrial high-quality development levels, as shown in Table 5.

Shenzhen is China's first special economic zone, a separately listed city under the national plan, and the core engine of the Guangdong-Hong Kong-Macao Greater Bay Area. It is one of the cities with the highest level of high-quality industrial development.

Table 5: Cluster analysis results of high-quality industrial development in Guangdong Province

Type	City
excellent	Shenzhen
good	Dongguan, Foshan, Guangzhou, Huizhou
medium	Zhuhai, Shantou, Zhongshan, Jiangmen, Yangjiang, Zhanjiang, Maoming, Zhaoqing, Jieyang
poor	Shaoguan, Heyuan, Meizhou, Shanwei, Qingyuan, Chaozhou, Yunfu

The four cities of Dongguan, Foshan, Guangzhou and Huizhou ranked second, classified as cities with a high level of industrial high-quality development. These four cities are all affiliated to the Pearl River Delta and the Guangdong-Hong Kong-Macao Greater Bay Area at the same time. Their geographical location is superior and new, and they have obvious advantages in innovation and development and foreign investment attraction.Except for Guangzhou, the cities of this grade rank in the top five in the four common factors. The scores of other common factors in Guangzhou are relatively high, but the score of green development factor is 12, which is relatively backward.

Nine cities, including Zhuhai, Shantou, Zhongshan, Jiangmen, Yangjiang, Zhanjiang, Maoming, Zhaoqing and Jieyang, are ranked third, which are classified as cities with medium industrial high-quality development. The overall scores of the four common factors in such cities are relatively general, but there will be individual common factors with higher scores.For example, Maoming City and Zhanjiang City ranked first and second respectively in the quality and efficiency factor score, and Yangjiang City and Zhaoqing City ranked first and second respectively in the industrial structure and energy consumption factor score.

Shaoguan, Heyuan, Meizhou, Shanwei, Qingyuan, Chaozhou and Yunfu are the third block, which are classified as cities with poor level of high-quality industrial development. The scores of all kinds of common factors in these cities are not high, among which five prefecture-level cities belong to the mountainous areas of Guangdong Province, most of which have developed primary industry.

4. Conclusions and Policy Recommendations

This paper refers to the research of other scholars on industrial transformation and upgrading and the index system of high-quality industrial development, and keeping up with the pace of the times, this paper constructs an index system suitable for the high-quality development of urban industry in China at present, and selects Guangdong Province, the most developed industry in China, which has common problems with the industrial development of other provinces in China, as an example. From the four aspects of new quality innovation ability, new quality structure optimization, new quality quality benefit and green development, 17 indicators are selected to construct the index system of high-quality industrial development in Guangdong Province. The following conclusions are drawn:

① This paper uses the factor analysis method to confirm that the high-quality industrial development level of all prefecture-level cities in Guangdong Province is not balanced, and gives the ranking of all prefecture-level cities in Guangdong Province in four aspects, such as innovation and open development, green development, etc., to help each prefecture-level city more detailed and fully understand its own strengths and weaknesses in industrial development. In general, the level of high-quality industrial development in Guangdong Province still needs more comprehensive and coordinated development.

②Innovation and open development have the greatest impact on the high-quality industrial development of a city. Shenzhen ranks first in the innovation and open development factor score, and the other three factor scores are relatively low, but the comprehensive score is still the first.Therefore, if a city wants to quickly improve its high-quality industrial development level, it should first improve its innovation ability and openness.

③The geographical region and coverage prerequisites have a sizeable additive impact on the outstanding improvement of industry. Seven of the pinnacle ten cities are Pearl River Delta cities, and the industrial improvement stage of Shenzhen is greater than that of different prefecture-level cities in Guangdong Province at a couple of levels, displaying a discontinuous advantage. In addition, the high-quality development level of urban industry in mountainous areas is mostly general, which is in the last level. In order to help the high-quality industrial development of Guangdong Province, this paper puts forward the following suggestions based on the above conclusions:

Based on the above conclusions, this paper places ahead the following tips:

According to the opinions on the high-quality development of Guangdong in the new era issued by the Guangdong Provincial Party Committee and the provincial government in 2023, " opinions on high-quality construction and manufacturing of a strong province, " we will speed up the development of high-tech manufacturing in Guangdong Province, continue to introduce high-tech manufacturing projects, and accelerate the transformation and upgrading of high-pollution and traditional industrial industries in key cities. Focusing on twenty strategic industrial clusters and park leading industries in Guangdong Province, we will continuously improve the industrial development chain of the park, promote the supporting development of upstream and downstream industries, form a distinctive and complete industrial cluster, and promote the industry to become bigger and stronger.

At the same time, we will provide fixed-point assistance and guidance for the high-quality industrial development of other cities in the province and even in other cities in China, and realize the ' first rich drive and then rich ' in the high-quality industrial development, so as to make the high-quality industrial development of Guangdong Province more balanced.

This paper finds that innovation and development are crucial to high-quality industrial development. Therefore, the relatively backward mountainous cities in Guangdong Province and other backward industrial cities in China should actively follow the advanced cities in Guangdong Province, send learning groups to conduct in-depth research on the reasons for their success, introduce policies that can attract foreign talents and enterprises, accelerate the introduction of high-tech industries suitable for their own characteristics and supporting upstream and downstream industries, and strive to improve this city 's innovation ability and openness. At the identical time, we need to pay interest to the building of infrastructure such as highways and investment in higher education to enhance industrial development potential.

References

[1] Wan Qing. Policy research on accelerating industrial transformation and upgrading in Guangzhou [D]. South China University of Technology, 2020.

[2] Li Chunmei. Evaluation of the development quality of China's manufacturing industry and its influencing factors-Empirical analysis from panel data of manufacturing industry [J]. Economic issues, 2019, (08): 44-53.

[3] Ma Jing, Yan Chaodong. China's industrial transformation and upgrading effect evaluation, regional disparity and its dynamic evolution [J]. Modern Economic Discussion, 2020, (08): 78-89.

[4] Ma Jibo. Evaluation of provincial industrial competitiveness in China [J]. Modern industrial economy and informatization, 2023, 13 (07): 1-4.

[5] Guangdong has issued policies to promote high-quality manufacturing [EB / OL]. (2020-04-10) [2023-08-14].

[6] The province's high-quality development conference was held to inspire the spirit and work hard to promote the high-quality development of Guangdong to achieve a new leap [EB / OL]. (2023-01-28) [2023-08-14].

[7] Several opinions of the Guangdong Provincial People's Government of the CPC Guangdong Provincial Committee on the high-quality development of Guangdong in the new era [EB / OL]. (2023-05-29) [2023-08-14].

[8] Jiang Hong. Construction of urban industrial development quality index system and empirical analysis-Analysis of the differences in industrial economic development between Qingdao and Suzhou, Nanjing, Hangzhou, Chongqing and other cities [J]. Journal of Qingdao Administrative College, 2023, (05): 43-47.

[9] Qin Ye. The spatial spillover effect of green technology innovation on industrial carbon emissions-based on the moderating effect of heterogeneous environmental regulation [J]. Techno-economic and management research, 2023 (06): 31-35.