Original Paper

Evaluation and Analysis of Regional Capacity for Industrial Undertaking in Guangdong Province Under the Context of Industrial Transfer

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Abstract

Industrial transfer and undertaking are unavoidable consequences of the free allocation of enterprises and resources in space, and reasonable transfer and undertaking in the region will have an impact on the region's future coordinated growth. This paper examines industrial transfer in Guangdong Province through a perspective of industrial undertaking place, primarily using the push-pull model of industrial transfer as a theoretical foundation. It measures and analyses 21 cities in Guangdong Province across four dimensions: regional infrastructure capacity, industrial scale advantage, market volume and potential, and regional brand effect. The three components of industrial scale effect gravity, regional infrastructure gravity, and regional industrial structure gravity are extracted by factors to interpret the undertaking capacity of each region, sort out the gradient and orderly transfer scheme from the Pearl River Delta (PRD) region to the east-northwest of Guangdong Province, and make some recommendations.

Keywords

industrial transfer, industrial undertaking, principal component analysis (PCA), evaluation system

1. Introduction

Industry is a kind of form formed after the accumulation of enterprises. And as firms move freely in space, industries also move in certain regions. Industrial transfer is an important economic phenomenon that is to some extent determined by the different levels of the region and, in turn, affects the different levels of the region. In terms of industrial structure, with the continuous development of the coastal economy and industry, the regional economic level will continue to increase, and the increased economic

level will, to a certain extent, raise the cost of economic development. This makes entrepreneurs start to look for more advantageous regions for production. There are two main flows of industrial transfer in Guangdong Province: one is the Guangdong Province to undertake external industries, generally accepted by the central city. And one is from the peripheral cities in Guangdong Province to take over some of the old industries from the developed cities.

Cities in Guangdong Province have different locations and endowments, and there are certain differences in the capacity of different cities to take over, so the measurement of the capacity of each region can be better compared horizontally. Specific industries in the transfer process can be avoided, to a certain extent, by blindness. In addition, the process of industrial transfer and undertaking needs to be combined with the city location and government policies to make industrial transfer more orderly.

Therefore, industrial transfer and undertaking is the kinetic energy to effectively promote balanced regional development, and orderly industrial transfer is an important guarantee for Guangdong Province to continue its high-quality development, as well as the kinetic energy of Guangdong Province to further reduce the balanced development of the region. In the process of industrial transfer, Guangdong should pay attention to the gradient of industrial transfer within the province, especially in the marginal regions, to take advantage of the opportunity to undertake industrial transfer, actively absorb capital and resources, and use the kinetic energy of industrial transfer to adjust the industrial structure of the region, especially the level of industrial industry, to further form a better overall spatial distribution of productive forces as well as a scientific system of industrial division of labour within the province.

2. Literature Review

Industrial transfer is undoubtedly an important path to break the shackles of regional economic development and promote national industrial transformation and upgrading (Kojima, 2020), because the essence of industrial upgrading is the process of industrial development from labor-intensive industries to technology-intensive industries (Gereffi & Stark, 2016). The theory and application of industrial transfer have become hot topics of research on regional industrial development and economic transformation. In terms of scope, industry transfer includes both international industry transfer, for example, around foreign direct investment (FDI) and other indicators, and a local regional perspective, mainly focusing on regional industry and economy-related issues.

The dynamics of industrial transfer and undertaking theory. Industrial clusters are organizations of firms and related organizations engaging in fan-like activities at well-defined spatial boundaries (Porter, 1998). Due to limited resources, geographical proximity, and close social ties, industries can cluster. However, when a large number of firms are concentrated in a particular region, rising prices of land and labor make the production costs of some firms increase, creating a push for these firms to relocate outward (Li et al., 2021). In addition, the receiving place often gives tax and land price concessions and creates a favorable production environment, and these strategies form a pulling force that attracts firms to relocate outward (Wang et al., 2023).

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The structure of the theory of industrial transfer and takeover. Porter (1990) divides the pattern of industrial transfer into two dimensions: vertical and horizontal relationships. The horizontal dimension refers to clusters of firms that produce similar products; the vertical dimension refers to complementary firms that can benefit from a network of supplier and customer relationships. Biggiero (2006) divide the pattern of clustered industrial transfer. Biggiero (2006) classify the modes of cluster industry transfer into selective relocation and replicative relocation. Most of the current research on domestic industry transfer is also divided into two dimensions. That is, the overall transfer of horizontal industry and the partial transfer of vertical industry chain. Generally speaking, horizontal industrial clusters are mostly manifested as the overall, passive, and thorough transfer of the industry when transferring, while partial industrial chain transfer is more manifested as the partial, active, and gradual transfer of the industry.

Research Methods. Quasi-natural experiments were conducted using the policy of national-level demonstration zones for undertaking industrial transfer, and Zeng et al. (2024) used DID analyses to discuss whether industrial transfer could achieve synergistic development of the economy and low carbon. Cao (2024) examined the impact of industrial transfer receiving demonstration zone policy on urban population size and conducted a mechanism analysis. Yu, et al. (2024) based on the data of Xiangnan and Xiangxi demonstration zones from 2013 to 2021, we constructed the evaluation index system of the capacity of undertaking industrial transfer, used the entropy weight TOPSIS method to measure the undertaking capacity, and identified the key factors affecting the undertaking capacity. Fu et al. (2023) analyzed the inter-regional industrial gradient transfer situation by calculating the industrial development gradient coefficient, identified the advantageous industries suitable for open transfer in the corridor area and the related industries that need to be transferred, calculated the capacity to undertake industrial transfer through the entropy-weight TOPSIS method, and analyzed the constraints affecting the capacity to undertake industrial transfer. Huang et al. (2023) explored the characteristics and influencing factors of provincial industrial transfer in the Yangtze River Delta region with the help of social network analysis, the QAP model, and other methods.

Evaluation index construction. Yang et al. (2022) constructed an evaluation index system for the ability to undertake industrial transfer from four aspects: stable growth support, structural optimization and coordination, efficiency kinetic energy supply, innovation, and green development, as well as the spatial and temporal differentiation characteristics, spatial correlation pattern, and influencing factors of the economy of the upper Yangtze River. Pang et al. (2021) measured the capacity of Heilongjiang Province to undertake industrial transfer from seven aspects, such as the level of economic development, the level of industrial structure, etc., and used the entropy value method for quantitative analysis. Liu et al. (2020) constructed an evaluation system to build an evaluation system for the ability to undertake manufacturing transfer in western regions from industrial attraction pull, industrial support power, and industrial development potential and used the entropy weight TOPSIS method to measure the undertaking ability of each region. Wang et al. (2023) believe that the industrial transfer forces of the industry transferring

place and the industry receiving place can be systematically analysed from the three dimensions of push factors, pull factors, and resistance factors.

In conclusion, industrial transfer is a complex economic phenomenon involving multiple subjects and multiple regions. This paper mainly takes the 'push-pull' model as the basis and carries out specific analyses by evaluating the factors in the region.

3. Research Methodology

3.1 Research Design of Evaluation Indexes of Regional Undertaking Capacity

The empirical study observes the industrial transfer in Guangdong Province from the perspective of industrial receiving places, and the data come from the statistical index data of 21 cities in Guangdong Province in 2022. The research has studied the variables from four dimensions, mainly taking the pull of the receiving place as the theoretical basis and measuring and analyzing from the regional basic ability, industrial scale advantage, market volume and potential, and regional brand effect.

3.1.1 Regional Basic Capability

The transfer and undertaking of industries need a physical foundation, and the development of most industries has certain requirements for regional basic capacity. Better transport connections can significantly improve transport efficiency, reduce transport costs, and promote market expansion and industrial agglomeration. This paper selects the total mileage of roads and motorways in the country to react to the basic transport capacity. At the same time, industrial gas emissions, to a certain extent, react to the existing clusters and capabilities of regional industries. While sulfur dioxide and nitrogen oxides are common production emissions of gases, and the production of water is the most important consumption of resources, this paper selected industrial sulfur dioxide emissions, industrial nitrogen oxide emissions, and the total amount of water resources to express the basic agglomeration capacity and the level of resources.

3.1.2 Industrial Scale Advantage

In the process of industrial migration, cost is an important influencing element. Enterprises are more inclined to transfer production capacity to regions with abundant production factors and low operating costs. The cost advantage usually comes from the intensification of production and local resource advantages. Therefore, regions with industrial-scale advantages and lower costs are more likely to become the receiving regions. From the perspective of industrial scale advantage, the economic development of a region is often closely related to the number of industrial enterprises above the scale, the proportion of added value of the secondary and tertiary industries in GDP and the population. In this paper, the number of industrial enterprises above scale and the proportion of added value of secondary and tertiary industries to GDP are selected as indicators to reflect the strength of the regional industrial base and the perfection of the industrial chain. And the scale of industry cannot be separated from sufficient labor resources, so at the same time, we selected the urban household population to measure the human resources situation.

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3.1.3 Market Volume and Potential

In the process of industrial transfer, the market volume and potential of the receiving place are important gravitational forces for industrial transfer, which greatly affect the enterprise layout and industrial structure of industrial transfer. If the receiving place has a large market volume, it will give the transferred industry a better chance for growth. And the stronger the desire and ability for market consumption, the stronger the sustainable development of the industry will be. For example, the per capita disposable income is RMB 62,700 in the Pearl River Delta (PRD)region, while the East and Northwest of Guangdong are in the range of RMB 28,000–29,000. This imbalance between urban and rural areas is also an important factor affecting the different paths of industrial transfer. In this paper, the gross regional product is chosen to measure the economic volume of the region; the imports of goods and the total retail sales of consumer goods are chosen to measure the momentum of consumption; and finally, the disposable income per capita of all residents is chosen to describe the potential of consumption.

3.1.4 Regional Brand Effect

Regional brands can improve the visibility of the region, which will also improve the possibility of receiving industries. The government has sufficient financial income and expenditure to help better complete the regional publicity and branding work. At the same time, the branding effect of a region can also be measured by foreign investment and the export of goods. In this paper, we have chosen to measure the branding effect of the region by the revenue of the local budget, the expenditure of the local budget, the number of foreign-invested enterprises, and the amount of goods exported.

Table 1. Evaluation Indicator System of Industrial Acceptance Capacity of Various Regions in Guangdong Province

Primary indicator	Secondary indicator	Variable
Regional Basic Capability	Total mileage of domestic roads (km)	X1
	Total mileage of highways (km)	X2
	Industrial sulphur dioxide emissions (tons)	X3
	Industrial nitrogen oxide emissions (tons)	X4
	Total water resources (million cubic metres)	X5
Industrial scale advantage	Number of Industrial Enterprises Above Scale	X6
	Value-added of secondary industry as a proportion of GDP (%)	X7
	Share of added value of tertiary industry as a percentage of GDP (%)	X8
	Urban household population (10,000 people)	X9
Market volume and potential	Gross Domestic Product (million yuan)	X10
	Import of Goods (RMB 10,000)	X11
	Total Retail Sales of Consumer Goods (RMB 10,000)	X12

	Per capita disposable income of all residents (RMB)	X13
	Revenue of local finances within the general budget (RMB 10,000)	X14
Regional brand	Expenditure within the General Budget of Local Finance (RMB 10,000)	X15
effect	Number of Foreign-invested Enterprises	X16
	Export of goods (RMB)	X17

3.2 Factor Analysis

This study compiles statistical data on various indicators from 21 cities in Guangdong Province in 2022. The data is sourced from the Guangdong Provincial Statistical Yearbook of 2023 and the statistical yearbooks of individual cities in Guangdong Province. The study is grounded in the gravitational model of the receiving location and subsequently investigates variables across four dimensions. Nevertheless, there are additional factors that influence the pertinent aspects of industrial endeavors, and there is unavoidably a certain degree of correlation among these variables (Table 1). Principal Component Analysis (PCA) was selected as a method to reduce the dimensions of the research, making it more concise. Both elements of the discussion can be preserved to the highest degree, and the current variables can be appropriately consolidated. The missing data were handled using linear interpolation, specifically employing 2 interpolations out of a total of 357 data points.

3.2.1 Testing the Applicability of Factor Analysis and Extracting Principal Factors

The data of 17 indicators in four dimensions of Table 1 were imported into SPSS 26, and correlation analysis was carried out. As shown in Table 2, the KMO value is 0.656>0.6, which meets the requirements of factor analysis.

Table 2. KMO and Bartlett's Test

KMO Sampling Suitability Measure		0.656
Bartlett's Test of Sphericity	Approx.Chi-Square	711.285
	df	136
	P value	0.000

During the factor extraction process, components with initial trait values exceeding 1 are typically chosen while ensuring that the cumulative explanation rate reaches at least 80%. The eigenvalues of the first three principal components, as shown in Table 3, are 9.155, 3.288, and 2.155. These eigenvalues correspond to variance-explained rates of 53.852%, 19.339%, and 12.677%, respectively. The cumulative variance explained rate, which represents the total variance explained by the three principal components, is 85.868%. This indicates that the three principal components provide a more comprehensive explanation of the factors. In this paper, we have ultimately opted to extract the three primary factors.

Table 1. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.155	53.852	53.852	9.155	53.852	53.852
2	3.288	19.339	73.191	3.288	19.339	73.191
3	2.155	12.677	85.868	2.155	12.677	85.868
4	0.740	4.355	90.222			
5	0.596	3.505	93.727			
6	0.403	2.372	96.099			
7	0.267	1.572	97.672			
8	0.146	0.857	98.529			
9	0.117	0.690	99.220			
10	0.064	0.375	99.594			
11	0.037	0.219	99.813			
12	0.025	0.148	99.961			
13	0.005	0.032	99.993			
14	0.001	0.005	99.998			
15	0.000	0.001	99.999			
16	9.039E-05	0.001	100.000			
17	6.056E-05	0.000	100.000			

3.2.2 Identify the Principal Component

Principal component F1 is primarily indicative of the industry's volume and scale, as well as the cost advantage resulting from intensive production. Therefore, F1 is referred to as the gravitational effect of industrial scale. Principal component F2 primarily represents the benefits of infrastructure, resources, and clusters. Therefore, F2 is referred to as regional infrastructure gravity. Principal component F3 primarily represents factors related to the industrial structure and is therefore referred to as regional industrial structure gravity. The expression of F can be obtained by calculating the percentage of variance in Table 3.

$F1 = -0.061X1 + 0.001X2 - 0.035X3 - 0.024X4 - 0.056X5 + 0.095X6 + 0.010X7 + 0.065X8 + 0.087X9 + 0.105X10 + 0.100X11 + 0.103X12 + 0.093X13 + 0.103X14 + 0.102X15 + 0.089X16 + 0.102X17$

$F2 = 0.215X1 + 0.272X2 + 0.153X3 + 0.227X4 + 0.233X5 - 0.025X6 - 0.151X7 + 0.076X8 + 0.079X9 + 0.070X10 + 0.032X11 + 0.075X12 - 0.018X13 + 0.048X14 + 0.072X15 - 0.008X16 + 0.005X17$

$F3 = -0.003X1 + 0.032X2 + 0.227X3 + 0.251X4 + 0.026X5 + 0.200X6 + 0.378X7 - 0.299X8 - 0.086X9 - 0.027X10 - 0.007X11 - 0.025X12 + 0.147X13 - 0.033X14 - 0.073X15 + 0.189X16 + 0.056X17$

$F = 0.53852 * F1 + 0.19339 * F2 + 0.12677 * F3$

Table 2. Component Matrix

	Component		
	1	2	3
X1	-0.563	0.706	-0.006
X2	0.013	0.894	0.070
X3	-0.318	0.503	0.489
X4	-0.219	0.747	0.540
X5	-0.511	0.766	0.057
X6	0.867	-0.083	0.430
X7	0.094	-0.497	0.814
X8	0.593	0.249	-0.644
X9	0.799	0.259	-0.184
X10	0.963	0.229	-0.057
X11	0.917	0.104	-0.015
X12	0.946	0.247	-0.055
X13	0.852	-0.058	0.318
X14	0.943	0.159	-0.072
X15	0.932	0.236	-0.157
X16	0.811	-0.025	0.408
X17	0.934	0.016	0.121

4. Findings and Discussion

4.1 The Ranking of Cities Is Based on Their Total Capacity Score (F) for Undertaking Industrial Transfer

In terms of overall conclusions, the ranking of the regional industrial receiving capacity basically shows an arrangement from the central cities of the PRD to the peripheral cities. First-tier cities in the PRD such as Shenzhen, Guangzhou, Dongguan and Foshan have the optimal capacity to take on industries, and a similar situation can be observed if the number of foreign-invested enterprises (FIEs) and FDI are used to rank them, which further demonstrates the robustness of the scoring system. Shaoguan, Zhanjiang and

Qingyuan in Eastern Western and Northern Guangdong have a better capacity to take over the relevant industries in the PRD under the theoretical framework of the gravitational attraction of industrial transfer and are more likely to take over the relevant industries in the PRD.

In the actual process of industrial transfer, government policies have further guided this orderly transfer.2023 The 'Several Measures on Promoting the Orderly Transfer of Industries to Facilitate the Coordinated Development of the Region' emphasizes the formation of an orderly cooperative relationship between the PRD and the municipalities in eastern and western Guangdong, and the adoption of innovative modes of inter-regional transfer of industries. The orderly transfer of industries in Guangdong Province is the result of a combination of industrial capacity and urban location thinking.

Therefore, from the perspectives of industrial undertaking capacity and city location, most of the PRD region should play the role of the first echelon of industrial undertaking capacity, mainly undertaking industries transferred from outside, while cities in the Eastern, Western and Northern Guangdong regions with excellent undertaking capacity can undertake industries in the PRD region, thus forming a graded and orderly transfer programme.

Table 5. Ranking of Cities in Terms of F-score

Region	Location	F1	F2	F3	F
Shenzhen	PRD region	3.17617	0.26921	-0.5786	1.689
Guangzhou	PRD region	1.99975	1.728	-1.37538	1.237
Dongguan	PRD region	1.10842	-0.90037	2.22201	0.704
Foshan	PRD region	0.72056	-0.50437	1.42453	0.471
Huizhou	PRD region	-0.16758	0.46953	1.68259	0.214
Qingyuan	Northern	-0.84626	2.20924	0.81647	0.075
Zhongshan	PRD region	0.08803	-0.87407	0.98238	0.003
Zhanjiang	Western	-0.58999	0.88832	0.56715	-0.074
Shaoguan	Northern	-0.77292	1.42103	0.36316	-0.095
Jiangmen	PRD region	-0.24692	-0.05058	0.25991	-0.11
Zhuhai	PRD region	0.15997	-1.25487	-0.27161	-0.191
Zhaoqing	PRD region	-0.55279	0.33332	0.25983	-0.2
Meizhou	Northern	-0.6366	0.81567	-0.65198	-0.268
Maoming	Western	-0.43071	0.08056	-0.81287	-0.319
Shantou	Eastern	-0.12533	-1.17858	-0.3064	-0.334
Yangjiang	Western	-0.6045	-0.23103	-0.1678	-0.391
Jieyang	Eastern	-0.26848	-0.54788	-1.33465	-0.42
Heyuan	Northern	-0.605	0.10843	-0.98979	-0.43
Yunfu	Northern	-0.53451	-0.40249	-0.87189	-0.476

| Shanwei | Eastern | -0.42549 | -0.97008 | -0.93418 | -0.535 |
| Chaozhou | Eastern | -0.44581 | -1.409 | -0.28285 | -0.548 |

4.2 Specialized Ranking and Situation in Eastern, Western and Northern Guangdong

4.2.1 In Terms of F1 Industry Scale Effect Gravity

In terms of F1 industry scale effect gravity, Shantou, Jieyang and Shanwei have certain advantages.

Shantou: The province has identified Shantou as the primary platform for industrial transfer. Shantou High-Tech Zone Liuhewei serves as the primary hub for the orderly transfer of industries among these platforms. Within the scope of the main platform and Shenzhen's plans to build industrial parks, Shenzhen and Shantou's industrial transfer cooperation to implement the spirit of 'nuclear + sub-centre', the establishment of the Shenzhen-Shantou Industrial Cooperation Park Management Committee, and the development and operation of the company, to explore the establishment of a new 'enclave'. In addition, the high-tech zone in the east area to actively develop the headquarters economy, to create a platform for the development of scientific and technological services; relying on the international cable landing station and wind power of the huge market; Haojiang area to actively develop the high-end equipment manufacturing industry; Haimen area and Chaonan area to do more and more to strengthen the textile and garment industry; and actively supporting the upstream and downstream industries to form a leading edge.

Shanwei: Shanwei implements the 'east and west' strategy, comprehensively connects to Shenzhen, and takes the initiative in docking Hengqin and Qianhai's two cooperation zones. Shanwei should quicken the rate of systematic expansion to establish a prominent hub and platform for growth in the eastern region of Guangdong Province. At the same time, Shanwei's 'industrial map' is south of the coastal engineering equipment manufacturing base, north of Luhe Industrial Transfer Industrial Park, west of Shenzhen-Shantou Special Co-operation Zone Expansion Area, and east of the South China Sea petrochemical Shanwei base.

Jieyang: Jieyang's main platform for undertaking the orderly transfer of industries to the South China Sea Petrochemical Industrial Zone as the core of the construction is the integration of Huilai County Industrial Cluster and Jieyang High-Tech Industrial Development Zone, the dominant industry positioning for green petrochemicals, new energy, and high-end equipment manufacturing. Among them, Jieyang City and Dongguan City have close communication and cooperation, focusing on creating a 'core double zone' main platform to strengthen investment and strengthen the Dongguan-Jieyang counterparts to help build a cooperation park. At the same time, to take multiple parks and staggered development, Jieyang City relies on the city's 12 key industrial parks, optimizes the business environment, explores the modern mode of integration of industry and city, and promotes the staggered development of industrial parks.

4.2.2 In Terms of F2 Regional Infrastructure Gravity and F3 Regional Industrial Structure Gravity

In terms of F2 regional infrastructure gravity and F3 regional industrial structure gravity, Qingyuan, Shaoguan and Zhanjiang all belong to the same level.

Qingyuan: Qingyuan City, take the initiative to undertake the industrial spillover of the Greater Bay Area, the main platform for industrial undertaking mainly by the Guangzhou and Qingyuan Industrial Transfer Industrial Park, Fogang County Industrial Transfer Industrial Park, Qingyuan Economic Development Zone, which consists of three parks. Focusing on the demonstration role of Guangzhou-Qingdao integration, high-level construction of a Guangzhou-Qingdao textile and garment industry orderly transfer park and striving to build manufacturing platform. With the wave of industrial transfer, actively cultivate new leading industries, upgrading them to create a modern light textile and garment industry cluster.

Shaoguan: Shaoguan City to undertake industrial focus on manufacturing high-quality development of new high ground. Focus on big data, electronic information, advanced equipment manufacturing, and biomedical—three leading industries—to implement the' strong chain' project. Shaoguan, in the process of undertaking industry, the cost of attraction. In terms of human resources, Shaoguan's vocational education is more developed; more than 40,000 vocational education students graduate each year. This part of human resources can bring low costs for enterprises. Adopt 'a district multi-park' form, high standard construction of Shaoguan to undertake orderly transfer of industry main platform, relying on Dongguan's counterparts to help collaborative relationship with high-quality construction of counterparts to help industry cooperation park.

Zhanjiang: In the context of industrial transfer, Zhanjiang's strategic location is superior. Zhanjiang is located at the Hainan Free Trade Port, the western land and sea new channel, the Northern Gulf Cities and other national strategies at the intersection. At the same time, there are BASF, China's refining, Baogang Iron and Steel, and other large-scale projects to support green iron and steel and green petrochemicals. Two hundred billion industrial clusters in the harbor are rapidly rising. At the same time, Zhanjiang's economic development pillar industries include the marine industry, the country's first batch of marine economic innovation and development demonstration cities, and the national marine economic development demonstration zone. The strong foundation of these core industries also means that Zhanjiang has a broad prospect of undertaking the industrial chain. In addition, Zhanjiang actively integrates into the Greater Bay Area through the reverse enclave mode, such as the industrial integration and development space between Zhanjiang and Guangzhou and Dongguan.

Table 6. Ranking of Industrial Acceptance Capabilities in Eastern, Western and Northern Guangdong

Industrial scale effect gravity			Regional infrastructure gravity			Regional industrial structure gravity		
Region	Locations	F1	Region	Locations	F2	Region	Locations	F3
Shantou	East	-0.12533	Qingyuan	Northern	2.20924	Qingyuan	Northern	0.81647
Jieyang	East	-0.26848	Shaoguan	Northern	1.42103	Zhanjiang	Western	0.56715
Shanwei	Eastern	-0.42549	Zhanjiang	Western	0.88832	Shaoguan	Northern	0.36316
Maoming	Western	-0.43071	Meizhou	Northern	0.81567	Yangjiang	Western	-0.1678
Chaozhou	Eastern	-0.44581	Heyuan	Northern	0.10843	Chaozhou	Eastern	-0.28285
Yunfu	Northern	-0.53451	Maoming	Western	0.08056	Shantou	Eastern	-0.3064
Zhanjiang	Western	-0.58999	Yangjiang	Western	-0.23103	Meizhou	Northern	-0.65198
Yangjiang	Western	-0.6045	Yunfu	Northern	-0.40249	Maoming	Western	-0.81287
Heyuan	Northern	-0.605	Jieyang	Eastern	-0.54788	Yunfu	Northern	-0.87189
Meizhou	Northern	-0.6366	Shanwei	Eastern	-0.97008	Shanwei	Eastern	-0.93418
Shaoguan	Northern	-0.77292	Shantou	East	-1.17858	Heyuan	Northern	-0.98979
Qingyuan	Northern	-0.84626	Chaozhou	Eastern	-1.409	Jieyang	Eastern	-1.33465

4.3 Cluster Analysis

In this paper, the total component F is used as the variable and divided into two groups for K-mean clustering (Level 3) in the Pearl River Delta region and the Eastern Western and Northern regions. This paper argues that the primary and secondary cities in the PRD (Guangzhou, Shenzhen, Foshan and Dongguan) should actively undertake high-quality industries from abroad and, at the same time, transfer

some of the local high-quality industries to the primary and secondary cities in Eastern, Western and Northern in an orderly manner (Zhanjiang, Shaoguan, Qingyuan, Maoming, Yangjiang, Shantou, Jieyang, Meizhou and Heyuan). Tertiary cities can become industrial co-locations of primary and secondary cities when their capacity to take over industries is low.

In recent years, has also formally identified the main platform of Shantou, Zhanjiang, Maoming, Qingyuan, Jiangmen 5 cities as the main platform of the provincial key support for the construction of the main platform, which will focus on resources and elements, the implementation of stacked support policies, and give play to the focus of the main platform to play a leading, demonstrative, and driving role in undertaking the orderly transfer of industries. You can see that the clustering results are very close.

Table 7. K-mean Clustering According to the Region Where the City Is Located

Cluster Members	Pearl River Delta Region	Eastern, Western and Northern
Primary and secondary	Guangzhou, Shenzhen, Foshan, Dongguan	Zhanjiang*, Shaoguan, Qingyuan*, Maoming*, Yangjiang, Shantou*, Jieyang, Meizhou, Heyuan
tertiary	Zhuhai, Jiangmen, Zhaoqing, Huizhou, Zhongshan	Shanwei, Chaozhou, Yunfu*

Note. Cities with * are the main platforms that the province will focus on supporting the construction

5. Conclusions and Recommendations

Principal component F1 industrial scale effect gravity, principal component F2 regional infrastructure gravity and the principal component F3 regional industrial structure gravity can basically cover the relevant discussion elements under the framework of the gravity theory of receiving places.

Basically, the regional industrial receiving capacity is arranged from the Pearl River Delta (PRD) to Eastern, Western, and Northern. From the perspectives of industrial undertaking capacity and city location, most of the PRD region should play the role of the first tier of industrial undertaking capacity, mainly undertaking industries transferred from the outside, while cities in the Eastern, Western, and Northern regions with excellent undertaking capacity can undertake industries in the PRD region, thus forming a gradient and orderly transfer programme.

Specifically, primary and secondary cities in the PRD (Guangzhou, Shenzhen, Foshan and Dongguan) should actively undertake high-quality industries from abroad while at the same time transferring some of the local high-quality industries in an orderly manner to primary and secondary cities in Eastern Western and Northern (Zhanjiang, Shaoguan, Qingyuan, Maoming, Yangjiang, Shantou, Jieyang, Meizhou and Heyuan). And the tertiary cities can become the industrial co-cities of the primary and secondary cities when the capacity of industry acceptance is low.

From the experience of cities with stronger capacity, (1) to make a number of main platforms for undertaking the orderly transfer of industries. Support the cities in eastern, western and northern to build one main platform for undertaking the orderly transfer of industries based on the existing parks in each city. (2) insisting on the establishment of paired industrial transfer cooperation parks. Supporting cities in the PRD and East,Western and Northern to build industrial transfer cooperation parks within the scope of the main platform for undertaking the orderly transfer of industries in cities in Eastern, Western, and Northern , relying on the relationship of counterpart support and cooperation. (3) Exploring various forms of two-way 'enclave economy'. To support PRD municipalities in exploring the construction of enclave economies in Eastern, Western, and Northern.

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