World Journal of Economics and Business Research
ISSN: 2960-0081
DOI: https://doi.org/10.61784/wjebr3042

ASSESSING AND ENHANCING ANHUI PROVINCE'S INDUSTRIAL TRANSFER CAPACITY: A MULTIDIMENSIONAL APPROACH

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Abstract: The scientific assessment of regional industrial transfer capacity and the identification of its key determinants are crucial for fostering high-quality regional coordination and facilitating a smooth domestic economic cycle. This study proposes a data-driven framework for the comprehensive evaluation of regional industrial transfer capacity and the systematic identification of its influencing factors. Methodologically, we construct an evaluation index system based on three dimensions: industrial attraction, industrial support, and industrial development. The entropy-weighted TOPSIS model is employed to assess the development level of regional industrial transfer and analyze its evolutionary trends. Furthermore, an obstacle degree model is applied to pinpoint the key constraints hindering industrial transfer capacity, enabling the formulation of targeted policy recommendations. Empirically, we examine industrial transfer succession across cities in Anhui Province from 2015 to 2023. The results reveal a spatially heterogeneous pattern characterized by "one core with multiple nodes." Key obstacles include inefficiencies in sci-tech innovation input-output and suboptimal levels of openness to foreign markets. This study contributes a robust analytical tool for regional industrial transfer decision-making, offering both theoretical insights and practical guidance for industrial structure upgrading and agglomeration development.
Keywords: Industrial transfer; Anhui province; Entropy weight TOPSIS model; Obstacle degree model

1 INTRODUCTION

China's vast territorial expanse exhibits pronounced regional heterogeneity, with significant disparities in economic development, social progress, and resource endowments across its eastern, central, and western regions. These imbalances manifest in several critical dimensions: The eastern region demonstrates markedly faster structural adjustment and superior development quality compared to its western counterparts, while northern regions—particularly the northeast—grapple with insufficient developmental vitality, exacerbated by population outflow and accelerated aging. Furthermore, the current industrial spatial distribution remains suboptimal, lacking systematically differentiated regional industrial policies.

To address these challenges and realize the strategic objective of coordinated regional development, it is imperative to fully leverage the comparative advantages arising from the heterogeneity of regional resource endowments and development gradients. Industrial transfer—a phenomenon driven by interregional comparative advantage differentials or sectoral factor demand variations at specific developmental stages—constitutes an inherent mechanism of market economy evolution [1]. Enhancing regional industrial transfer capacity necessitates two foundational efforts: rigorous identification of key influencing factors, and scientific quantification of transfer potential. This demands the construction of a dynamic evaluation framework that integrates regional economic, social, and environmental dimensions. Such an approach holds dual significance: it not only facilitates the smoothing of domestic economic circulation but also serves as a critical enabler for achieving high-quality spatially integrated development.

Under the strategic imperative of fostering coordinated and high-quality regional development, industrial transfer has emerged as a critical focus in contemporary academic inquiry. Existing scholarship, as evidenced by key literature, primarily concentrates on three core dimensions: the systematic construction of evaluation index system, the methodological selection for capacity assessment, and the identification of critical influencing factors.

For the construction of regional industrial undertaking professional evaluation index system, scholars mostly build their comprehensive evaluation index system from different perspectives based on the theory of industrial transfer. For example, Zhang et al. used cloud theory and correlation function to build a potential measurement model of rural undertaking urban industrial transfer from the perspective of industrial attraction, industrial undertaking, industrial selection and industrial development capacity [2]; Liang et al. built an evaluation index system of industrial transfer capacity from seven aspects: economic development level, industrial structure level, opening-up level, technological innovation level, industrial supporting capacity, market development potential and labor cost [3]; Liu et al. built an index evaluation system for the ability of the western region to undertake manufacturing transfer from three aspects: Industrial attraction, industrial support and industrial development potential [4]; Xu et al. built an evaluation index system of industrial undertaking potential in the poverty belt from the five dimensions of industrial ecological carrying capacity, industrial attraction, industrial support, industrial development and industrial selection [5]. Wang and Liu built an improved "thrust pull resistance" interregional industrial transfer force system, and systematically analyzed the industrial transfer forces of industrial transfer out areas and industrial undertaking areas from the three dimensions of thrust factor, pull factor and resistance factor [6].

Scholarly research has employed diverse quantitative methodologies to assess regional industrial transfer capacity, reflecting varying theoretical perspectives and analytical objectives: Liu et al. applied shift-share analysis to decompose industrial transfer into three components: structural, competitive, and deviation effects, enabling comprehensive tracking of industrial relocation trends [7]. Yuan and He developed dual indices of industrial agglomeration and attraction intensity to delineate transfer patterns and identify potential receiving regions [8]. Peng et al. combined Euclidean distance measurement of geo-economic relations with industrial order degree modeling to quantify interregional structural complementarity [9]. Contemporary studies have advanced methodological sophistication through: Factor analysis [3]，Entropy-weighted TOPSIS [7]，Social network analysis [10]，Hybrid entropy-time series weighting [11]. This methodological evolution demonstrates a progression from unidimensional metrics toward integrated frameworks that capture the complex spatial, structural, and temporal dimensions of industrial transfer processes.

Further, in order to improve the level of regional industrial transfer, scholars carried out research on its driving factors. The specific research results are as follows: Wang and Jia believe that the comparative advantage and competitive advantage of the undertaking area are important factors affecting the industrial transfer of enterprises [12]; Yuan and He believe that the ability to undertake industrial transfer is determined by the investment environment, natural resources, convenient transportation, technological innovation, labor costs [8]; Qiu et al. believed that the investment environment, industrial clusters, independent innovation of enterprises, and industrial undertaking policies had an important impact on undertaking industrial transfer [13]. Zhang and Xue believe that the internal driving force of rural undertaking industrial transfer is mainly driven by economic capital benefits, resource and environmental benefits, and network system construction [2]; Sorodan et al. believed that the regional development level, scientific and technological innovation ability and market potential had the most significant impact on the industrial undertaking capacity [14]; Sun and Zhao believe that technological innovation ability, business environment quality and intellectual property protection are the key to enhance the attractiveness of industrial transfer [15]; Yue and Miao the best area to undertake resource intensive, labor-intensive, capital intensive and technology intensive industries is to undertake environmental advantages, labor, investment, scientific and technological innovation and other factors [16]; Wei et al. established a gravity model and believed that labor factors, trade environment, innovation ability and policy environment were the key factors affecting industrial transfer [17]. Wang et al. believed that the level of infrastructure, market size, industrial agglomeration and the cumulative effect of FDI had a significant promoting effect on the international industrial transfer in the region, while human capital had a significant negative inhibitory effect [18].

Based on the above literature, this paper attempts to expand the existing articles from the following three aspects:

(1) Industrial transfer is a complex support attraction development composite system, which involves a multi-dimensional and multi-level dynamic interaction process, but the internal relationship between them has not yet been clearly identified quantitatively. Therefore, it is necessary to consider the selection of key indicators of the support, attractiveness and development of regional industrial transfer and reduce the impact of subjective factors on the indicators.

(2) In the evaluation method of industrial transfer succession, a single method is often used, but there are many factors affecting industrial transfer succession, and the evaluation results obtained by different methods are different. Therefore, it is necessary to build a data-driven measurement and evaluation method of regional industrial transfer succession, so as to objectively and truly predict the dynamic changes and trends of regional industrial transfer succession.

(3) Due to the differences among regions, the practicability of relevant research results needs to be improved, and the support for regional decision-making is limited. Therefore, using the data-driven method to accurately and quantitatively evaluate the regional industrial transfer succession can form the whole process and dynamic monitoring for different regions, so as to form differentiated and appropriate accurate countermeasures for different regions.

To address the aforementioned challenges, this paper uses the research ideas of Lin et al [19]. For reference, proposes a data-driven comprehensive evaluation method of regional industrial transfer succession, and observes the evolution trend of regional industrial transfer succession, so as to realize the upgrading of regional industrial structure, promote industrial agglomeration, and achieve the goal of leapfrog economic development.

In order to achieve the above research objectives, the second part of the paper is the method, the third part is the case analysis, and the fourth part is the conclusion.

2 METHODS

This part is a comprehensive introduction to the measurement, evaluation and identification methods, including the method process, data collection, data processing, and data model.

2.1 Method Processes

Due to the significant gap between the East and west of China's economic development, the urban-rural dual structure is obvious, and the regional development imbalance exists for a long time. At the same time, the cost of land and labor in the eastern region continues to rise, the resource and environmental constraints continue to upgrade, and the industry needs to upgrade to high-tech and high-end, forcing the industry to transfer to the central and western regions. Therefore, it is necessary to scientifically evaluate the mutual constraints of regional industrial support, attraction and development, and quantify the level of industrial transfer inheritance, which is also the motivation of this paper.

However, industrial transfer is a complex support attraction development complex system, involving multi-dimensional, multi-level dynamic interaction process. However, there is no clear quantitative understanding of the internal relationship between them. There are regional differences in influencing factors. There are significant differences in the establishment of data sets and the selection of evaluation methods in different regions. Therefore, it is a challenge for researchers to build a universal evaluation index system to accurately measure the development trend and dynamic evolution of industrial transfer inheritance.

To address these challenges, this paper establishes a data-driven comprehensive evaluation method of regional industrial transfer, which measures, evaluates and identifies the regional ecological carrying capacity. Data driven applications mainly include: data collection mainly constructs indicators from the perspective of industrial undertaking, industrial attraction and industrial development; The data processing includes dimensionless standardization processing by normalization method and determination of index weight by entropy method; Data modeling is to build the TOPSIS Model of regional ecological carrying capacity respectively. Data analysis is based on TOPSIS to scientifically evaluate the dynamic evolution trend of regional industrial transfer succession, and put forward targeted methods to improve regional industrial transfer succession in practice. It can be seen that data driven is applied to build a more universal comprehensive method for measuring, evaluating, analyzing and optimizing the identification of regional industrial transfer inheritance. Therefore, this method can provide support for the evaluation and improvement of industrial transfer in different regions, and can also provide support for the management decision-makers in different regions who are based on resource endowment to realize the upgrading of industrial structure and industrial agglomeration in the industrial undertaking areas.

2.2 Data Collection

The inheritance of industrial transfer is a comprehensive ability to effectively attract and undertake external transferred industries through the construction of systematic ability to promote the upgrading and development of industries in the region [20]. It is the result of the synergy of industrial attraction, industrial support and industrial development. Among them, industrial attraction includes market potential, consumption potential, income potential, labor attraction, land and capital attraction, etc. Industrial support includes infrastructure, resources and environment, and institutional support. Industrial development power includes the development level of industrial scale, the development level of scientific and technological innovation and the development level of opening to the outside world [21]. See table 1 for specific index construction

Table 1 Evaluation Index System of Industrial Transfer Relay

	Rule Layer	Indicatorlayer	Interpretation
Industrial Transfer Relay	Industry Attractiveness(Y1)	Per Capita GDP (yuan)(X1)	market potential
		Retail Sales of Consumer Goods (in billions of yuan)(X2)	consumption potential
		Per Capita Disposable Income of Urban Residents (yuan)(X3)	Earning Potential
		Number of People Aged 15-59 (in 10000)(X4)	Attracting labor force
		Average Salary of on-the-job Employees (yuan)(X5)	
		Per Capita Years of Education (years)(X6)	
		Average Selling Price of Houses (yuan/square meter)(X7)	Land attraction
		Proportion of Domestic and Foreign Currency Loan Balance of Financial Institutions to GDP(%)(X8)	Attracting funds
		Number of Industrial Enterprises above Designated Size (units)(X9)	Industrial attraction
		Proportion of Secondary and Tertiary Industries(%)(X10)	
	Industrial Supporting Capacity(Y2)	Highway Density (km/square kilometer)(X11)	Facility support
		Freight Turnover (10000 ton kilometers)(X12)	
		Industrial Water Consumption (100 million cubic meters)(X13)	Resource and environmental support
		Industrial Electricity Consumption (100 million kilowatt hours)(X14)	
		Urban Green Space Coverage Rate(%)(X15)	
		Days with Good Air Quality(%)(X16)	
		Comprehensive Utilization Rate of Industrial Solid Waste(%)(X17)	
		Total Fixed Assets Investment (100 million yuan)(X18)	Institutional guarantee support
		Administrative Fees and Confiscation Fees as a Percentage of GDP(%)(X19)	
	Industrial Development Potential(Y3)	Total Output Value of Industrial Enterprises above Designated Size (in billions of yuan)(X20)	Industrial scale development
		Total Industrial Profit (in billions of yuan)(X21)	
		Number of Patent Applications Authorized (units)(X22)	Technological

	R&D Budget (in billions of yuan)(X23)	innovation and development
	Number of High-tech Enterprises(X24)	
	Proportion of Total Import and Export Volume to GDP(%)(X25)	Development of level of opening-up to the outside world
	Actual Utilization of Foreign Capital Total (in billions of US dollars)(X26)	

2.3 Data Sources and Processing

2.3.1 Data sources

The research collected and sorted out the data reflecting the industrial attraction, industrial support and industrial development of regional industrial transfer. The data mainly came from the statistical yearbook of Anhui Province, the statistical yearbook of China's environment, the statistical yearbook and statistical bulletin of various cities in Anhui Province, the relevant data published by the ecological and environmental protection departments of Anhui Province and various cities, as well as the field survey data, etc.

2.3.2 Data processing

In order to scientifically quantify the importance difference of each evaluation index, first normalize the original data to eliminate the dimensional influence, and then use the information entropy theory to objectively determine the weight of each index. The specific implementation steps are as follows

(1) Construction of standardized evaluation matrix for regional industrial transfer

Suppose the original evaluation index matrix of regional industrial transfer succession is:

$$X=\begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix} \tag{1}$$

x_{ij} is the original value of the research object i and index j,

In view of the dimensional heterogeneity and inconsistent direction of the evaluation index system of industrial transfer undertaking (positive indicators are positively correlated with undertaking capacity, and negative indicators are negatively correlated), in order to achieve the comparability and aggregation of multi index data, the normalization method is used for dimensionless processing. Among them, the positive indicator is treated according to formula (2) and the negative indicator is treated according to formula (3) to obtain the standardized matrix R (formula 4)

$$r_{ij}=\frac{x_{ij}-\min(x_{ij})}{\max(x_{ij})-\min(x_{ij})} \tag{2}$$

$$r_{ij}=\frac{\max(x_{ij})-x_{ij}}{\max(x_{ij})-\min(x_{ij})} \tag{3}$$

$$R=\begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ r_{m1} & r_{m2} & \cdots & r_{mn} \end{bmatrix} \tag{4}$$

r_{ij} refers to the standardized value of the research object i and index $j, i=1,2,\cdots,m$; $j=1,2,\cdots,n$.

(2) Determination of Index Weight

In order to objectively quantify the relative importance of each evaluation index of industrial transfer, the entropy method is used to allocate the weight. The specific method is as follows: first determine the information entropy H_j (see formula 5). The greater the value $1-H_j$, the higher the information utility value of the index, and the greater its weight in the evaluation of industrial transfer succession; Then use formula 7 to determine the weight of each index.

$$H_j=-\frac{1}{\ln m}\sum_{i=1}^{m} f_{ij}\ln f_{ij} \tag{5}$$

$$f_{ij}=\frac{r_{ij}}{\sum_{i=1}^{m} r_{ij}} \tag{6}$$

$$w_j = \frac{1-H_j}{\sum_{j=1}^{n}(1-H_j)} \tag{7}$$

2.4 Data Model

2.4.1 Entropy weight TOPSIS method

Scholars' comprehensive evaluation of industrial transfer succession mainly includes principal component analysis, analytic hierarchy process, fuzzy comprehensive evaluation, entropy method and entropy weight TOPSIS method. However, the principal component analysis method is not accurate enough in explaining the succession of industrial transfer, and needs a large sample size; Analytic hierarchy process and fuzzy comprehensive evaluation method are significantly affected by subjective judgment in the process of weight determination; The entropy method is not enough to express the gap between the actual bearing capacity and the ideal state of the region. The entropy weight TOPSIS method has the advantage of objective weighting of entropy method. By improving the calculation of the proximity between the evaluation object and the positive and negative ideal solution, the authenticity of the evaluation results is significantly improved. Therefore, this paper uses the entropy weight TOPSIS method to comprehensively evaluate the regional industrial transfer undertaking [22].

(1) Construction of weighted decision matrix

In order to enhance the objectivity of the results and fully reflect the differences between the evaluation indexes, the weighted idea is introduced in the evaluation of industrial transfer inheritance. The weight of each index w_j determined by the entropy weight method, and then the weighted standardized decision matrix is constructed, as shown in formula (8).

$$V = \begin{bmatrix} v_{11} & v_{12} & \cdots & v_{1n} \\ v_{21} & v_{22} & \cdots & v_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ v_{m1} & v_{m2} & \cdots & v_{mn} \end{bmatrix} = \begin{bmatrix} z_{11}.w_1 & z_{12}.w_2 & \cdots & z_{1n}.w_n \\ z_{21}.w_1 & z_{22}.w_2 & \cdots & z_{2n}.w_n \\ \vdots & \vdots & \vdots & \vdots \\ z_{m1}.w_1 & z_{m2}.w_2 & \cdots & z_{mn}.w_n \end{bmatrix} \tag{8}$$

(2) Determining positive and negative ideal solutions

Let V^+ represent the maximum value of the index j in the weighted evaluation data in the object i, that is, the best scheme, as the rational solution; V^- Represents the minimum value of the jth index in the ith object in the weighted evaluation data, that is, the most unsatisfactory scheme, as the negative ideal solution. See formulas (9) and (10) for specific calculation

$$V^+ = \{\max v_{ij} \left| i = 1,2,\cdots,m\right.\} \tag{9}$$

$$V^- = \{\min v_{ij} \left| i = 1,2,\cdots,m\right.\} \tag{10}$$

(3) Calculate the Euclidean distance from the positive (negative) ideal solution

Let the distances from each evaluation object vector to the positive and negative ideal solutions be D_i^+ and D_i^-, respectively, as follows:

$$D_i^+ = \sqrt{\sum_{j=1}^{n}(V_{ij} - V_j^+)^2} \qquad (i = 1,2,\cdots,m) \tag{11}$$

$$D_i^- = \sqrt{\sum_{j=1}^{n}(V_{ij} - V_j^-)^2} \qquad (i = 1,2,\cdots,m) \tag{12}$$

(4) Calculate closeness C_i

$$C_i = \frac{D_i^-}{D_i^+ + D_i^-} \tag{13}$$

Closeness C_i represents the relative closeness between the evaluation object and the rational solution, and its value range is [0,1]. When $C_i \rightarrow 1$, it indicates that the industrial transfer inheritance of the object approaches the optimal water; On the contrary, when $C_i \rightarrow 0$, it reflects its weak carrying capacity. The ranking analysis based on the pasting progress value can realize the quantitative comparison and grading of the carrying capacity of different research objects, and provide a scientific basis for the decision-making of industrial transfer.

2.4.2 Obstacle model

In order to further identify and quantify the key obstacle factors of industrial transfer inheritance, the paper calculates

the obstacle degree of each factor to the promotion of industrial transfer inheritance based on the index deviation degree, so as to determine the main limiting factors, and provide the basis for optimizing the regional industrial transfer inheritance [23]. The specific steps are as follows:
(1) Calculate index deviation

$$D_j = 1 - r_{ij} \tag{14}$$

The greater the deviation degree of the indicator, the farther the indicator deviates from the optimal state, and the stronger the barrier effect.
(2) Calculate obstacle degree
The deviation degree and weight are integrated to calculate the obstacle degree of each factor.

$$O_j = \frac{D_j \bullet w_j}{\sum_{j=1}^{n}(D_j \bullet w_j)} \tag{15}$$

The larger the O_j value, the stronger the impediment of this factor to the promotion of industrial transfer.

3 CASE STUDY

Using the above research methods, this paper focuses on the inheritance of industrial transfer in 16 cities of Anhui Province. At the theoretical construction level, firstly, based on the three dimensions of industrial attraction, industrial support level and industrial development potential, this paper constructs a comprehensive evaluation index system of industrial transfer inheritance. At the method application level, Entropy TOPSIS method and obstacle degree model are integrated to accurately and quantitatively evaluate the level and spatio-temporal dynamic evolution trend of regional industrial transfer inheritance, and identify and quantify the key obstacle factors of industrial transfer inheritance. At the level of policy system, this paper designs policy recommendations for various regions in Anhui Province to promote industrial upgrading and achieve high-quality development of economic integration by means of industrial transfer, and summarizes management enlightenment.

3.1 Case Study Background

Anhui Province is an important member of the Yangtze River Delta region and a key province in the rise of central China, and also an important destination for domestic industrial gradient transfer. Anhui Province is close to provinces such as Shanghai, Jiangsu and Zhejiang, which are important industrial transfer out areas of the country. It has successively set up demonstration zones for undertaking industrial transfer in the Wanjiang City belt and Anhui pilot free trade zone. It has clearly focused on emerging industries and promoted the transformation and upgrading of traditional industries in the "14th five year plan" of Anhui Province. It also has the advantage of developed transportation network and is competitive in land, labor and energy costs, attracting a large number of manufacturing enterprises to migrate. Automobile industry clusters have been formed in Hefei and other places, labor-intensive industries have been formed in Northern Anhui, and green industries have been formed in southern Anhui. Under the strategy of "integration of the Yangtze River Delta" to promote the coordinated development of industries, it has become the "bridgehead" for the transfer of industries from Shanghai, Jiangsu, Zhejiang and other provinces to the central and western regions. However, there are still some problems, such as unbalanced regional development, insufficient industrial supporting facilities, intensified competition, especially the environmental pressure caused by the transfer of traditional manufacturing industry. Therefore, it is typical to study the inheritance level of industrial transfer in 16 cities of Anhui Province to achieve high-quality economic development, which can also be used as a reference for other provinces.

3.2 Results

The Entropy TOPSIS method is used to comprehensively evaluate the level of regional industrial transfer and the spatio-temporal dynamic evolution trend of its subsystems; Further, with the help of obstacle degree model, the key driving factors of regional industrial transfer succession are identified. The specific results are as follows:

3.2.1 Analysis on the evolution law of comprehensive evaluation of industrial transfer succession in various regions of Anhui province

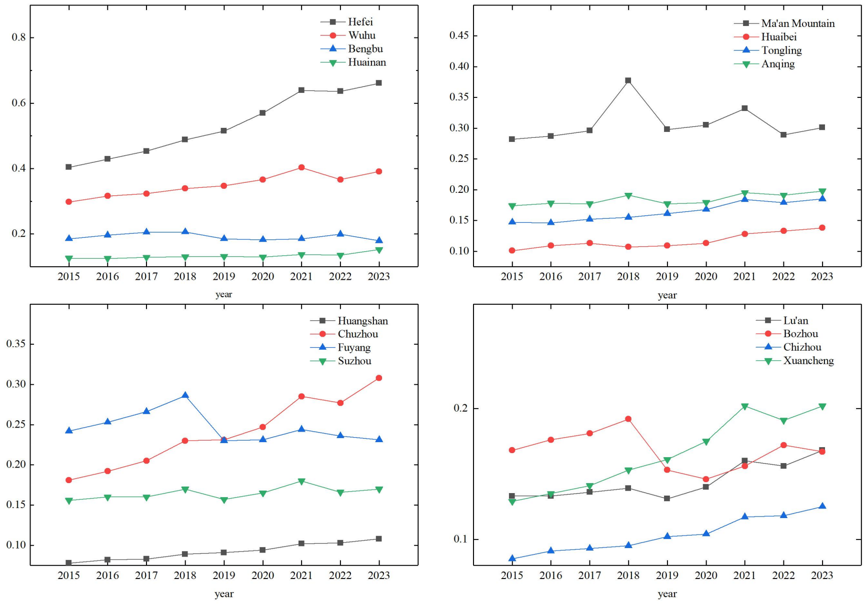

Figure 1 Comprehensive Evaluation Results of Industrial Transfer Relay

As shown in figure 1, according to the comprehensive evaluation results of industrial transfer undertaking in 16 cities of Anhui Province from 2015 to 2023, it can be seen that the comprehensive evaluation results of Hefei, Chuzhou, Wuhu, Xuancheng and other cities showed a significant upward trend, especially Hefei, which increased from 0.404 in 2015 to 0.661 in 2023, with the fastest growth rate and ranking first in the province; Ma'anshan, Fuyang and other cities showed fluctuating growth, but the overall trend was upward; However, Huaibei, Chizhou, Huangshan and other cities have a low base and slow annual growth rate. The reason is that Hefei has abundant scientific and technological innovation resources and the capital dividend, Chuzhou claims to be adjacent to Jiangsu, Zhejiang and Wuhu with complete industrial system, but Huaibei, Chizhou, Huangshan and other places have problems such as single industry, insufficient innovation investment and population outflow. The results of comprehensive evaluation in southern Anhui are generally higher than those in Northern Anhui, and the growth rate of Chuzhou, Xuancheng and other central cities is significant. The main reason is that southern Anhui has more regional advantages, forming a high-end industrial cluster, while northern Anhui has a high proportion of agriculture, slow industrialization, and prominent infrastructure and talent shortages.

3.2.2 Analysis on the evolution law of industrial attraction evaluation in various regions of Anhui province

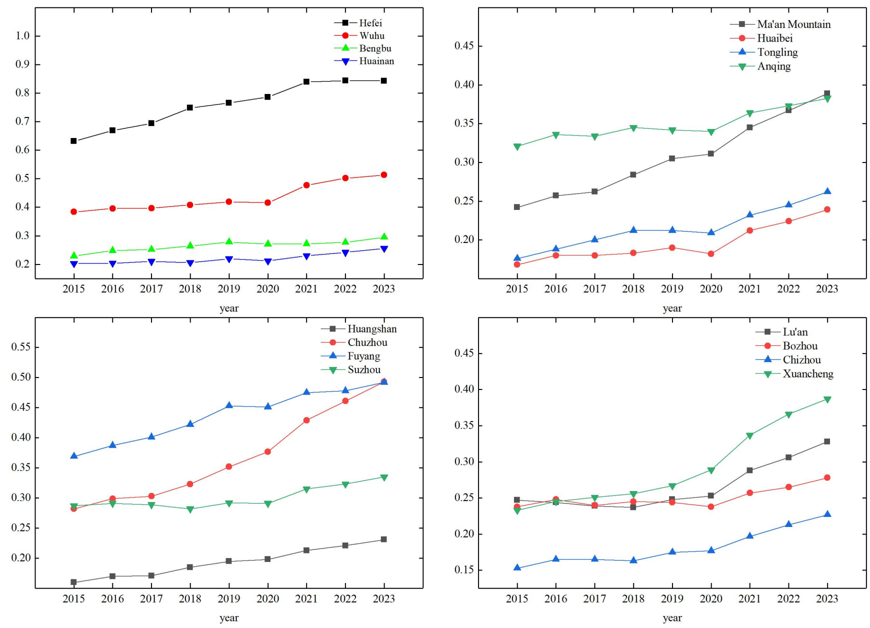

Figure 2 Comprehensive Evaluation Results of Industrial Attraction

In figure 2, the evaluation results of the attractiveness of industrial transfer in Anhui Province from 2015 to 2023 show that the attractiveness of various cities is on the rise, but the growth rate is dissimilated, and the overall performance is characterized by "core leading and gradient dissimilation". As the core of the province, Hefei has a long-term leading attraction index (0.843 in 2023), followed by Wuhu, Chuzhou, Fuyang and other cities, forming a secondary growth pole; The attractiveness of Huaibei, Chizhou, Huangshan and other cities is relatively weak (less than 0.3 in 2023). The reason is that Hefei has formed a strong agglomeration effect by virtue of scientific and technological innovation and high-end manufacturing industry, and Wuhu and Chuzhou have benefited from the integration of the Yangtze River Delta and enhanced their ability to undertake industrial transfer. At the same time, the attraction of cities along the Yangtze River) and cities adjacent to the Yangtze River Delta has increased rapidly due to convenient transportation and complete supporting facilities. However, traditional resource-based cities such as Huaibei and Huainan have limited attractive growth due to their single industrial structure and slow transformation.

3.2.3 Analysis on the evolution law of industrial support level evaluation in various regions of Anhui province

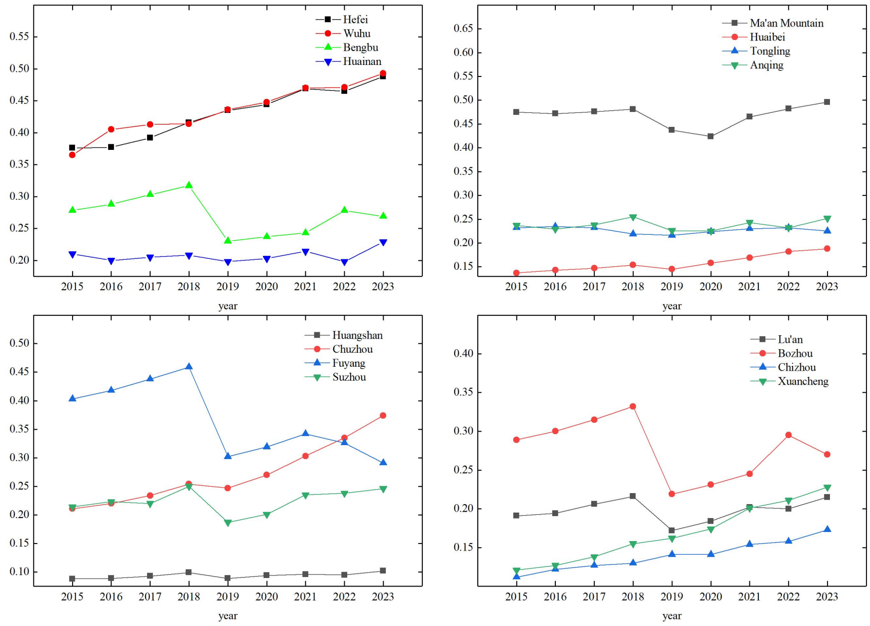

Figure 3 Comprehensive Evaluation Results of Industrial Support Level

According to figure 3, it can be seen that there are significant differences in the evaluation results of industrial transfer support among cities in Anhui Province from 2015 to 2023, and they show different trends over time, with a pattern of "strong in the South and weak in the north, high in the East and low in the West". Specifically, Ma'anshan, Hefei, Wuhu and other cities have strong support (0.496, 0.488, 0.493 in 2023), while Huangshan, Chizhou, Xuancheng and other places have weak support (0.102, 0.173, 0.228 in 2023), reflecting the imbalance of economic foundation and policy resources between Wanjiang City belt and Northern and southern Anhui. From the perspective of change trend, Hefei, Wuhu and other central cities have maintained a steady rise relying on scientific and technological innovation and industrial agglomeration; Chuzhou increased from 0.211 in 2015 to 0.374 in 2023, with a significant increase in support; The peak values of Fuyang and Bozhou both appeared in 2018, showing certain volatility. The main reason is that Chuzhou, Wuhu and other cities close to the Yangtze River Delta benefit from the regional collaborative policy, and the industrial undertaking capacity is enhanced; Some cities in Northern Anhui are restricted by infrastructure and industrial chain support, and the transformation is slow. At the same time, the industrial base also shows differences. Hefei, Ma'anshan and other industrial bases are strong and have strong support; Huangshan and Chizhou are dominated by tourism and have weak anti risk ability. For short-term fluctuations, Fuyang, Bozhou and other places were more significantly impacted by the epidemic, leading to a decline in support.

3.2.4 Analysis on evolution law of industrial development potential evaluation in various regions of Anhui province

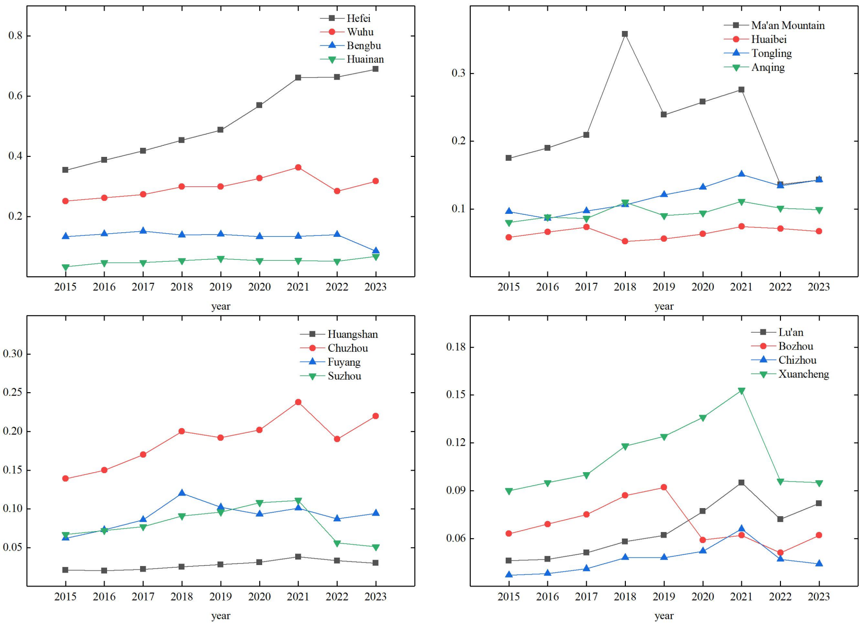

Figure 4 Comprehensive Evaluation Results of Industrial Development Capacity

According to figure 4, it can be seen that there are significant differences in the evaluation results of industrial transfer development ability among cities in Anhui Province from 2015 to 2023. The industrial development ability presents a pattern of "Hefei is one pole, Wuhu and Chuzhou are two points". The driving effect of core cities is obvious, but the regional balance needs to be strengthened. Specifically, Hefei, Wuhu, Chuzhou and other cities have strong development capacity, while Huangshan, Chizhou, Huainan and other places have weak development capacity. Hefei's development capacity continues to lead, growing from 0.354 in 2015 to 0.689 in 2023, showing a steady upward trend; Wuhu and Chuzhou followed, but Chuzhou fluctuated after reaching a peak of 0.238 in 2021. In contrast, the development capacity of Huangshan has always been at a low level, only 0.03 in 2023. As the provincial capital city, Hefei enjoys the advantages of policy, resources and technology, and the effects of scientific and technological innovation and industrial agglomeration are significant; Wuhu and Chuzhou are close to the Yangtze River Delta and have strong ability to undertake industrial transfer. At the same time, Hefei, Wuhu and other cities have received more policy support and infrastructure investment. However, due to the high proportion of traditional industries in Northern Anhui and the lack of transformation power, Huangshan, Chizhou and other places are limited by the requirements of ecological protection and the single industrial structure, and the growth is slow.

3.2.5 Analysis on the obstacle factors of industrial transfer inheritance in Anhui province

Through the above analysis, it can be found that the overall level of industrial transfer inheritance in various cities in Anhui Province is good, but there are still significant differences. Therefore, this paper introduces the obstacle degree model to further reveal the key factors that hinder the improvement of the level of industrial transfer in various cities of Anhui Province, and specifically analyzes them from the two levels of criteria and indicators.

(1) Obstacle factor analysis of criterion layer

Based on Figure 5, we can see the obstacle degree results of the standard layer of industrial transfer in 16 cities of Anhui Province from 2015 to 2023. It can be seen that the order of the obstacle degree of the criterion layer from large to small is industrial development potential, industrial attraction and industrial support. The average obstacle degree was 0.63, 0.215, 0.155. This shows that the industrial development potential is the key factor restricting the promotion of regional industrial transfer, and the obstacle level of this factor shows an upward trend. It can be seen that although all cities in Anhui Province have increased investment in scientific and technological innovation, continuously increased the level of foreign capital utilization, and increased the proportion of foreign exports, due to significant regional differences and the impact of the epidemic, the industrial development in Anhui Province is unbalanced, so that the industrial development potential is still the first factor restricting the undertaking of industrial transfer. At the same time, the industrial attraction and industrial support have declined to varying degrees, which also shows that the attraction of industrial factors in Anhui Province has been rising, the market potential has been continuously improving, the infrastructure has been significantly improved, the effectiveness of resource and environmental protection has been outstanding, and the system security system has been continuously improved, which has become a strong guarantee for undertaking industrial transfer.

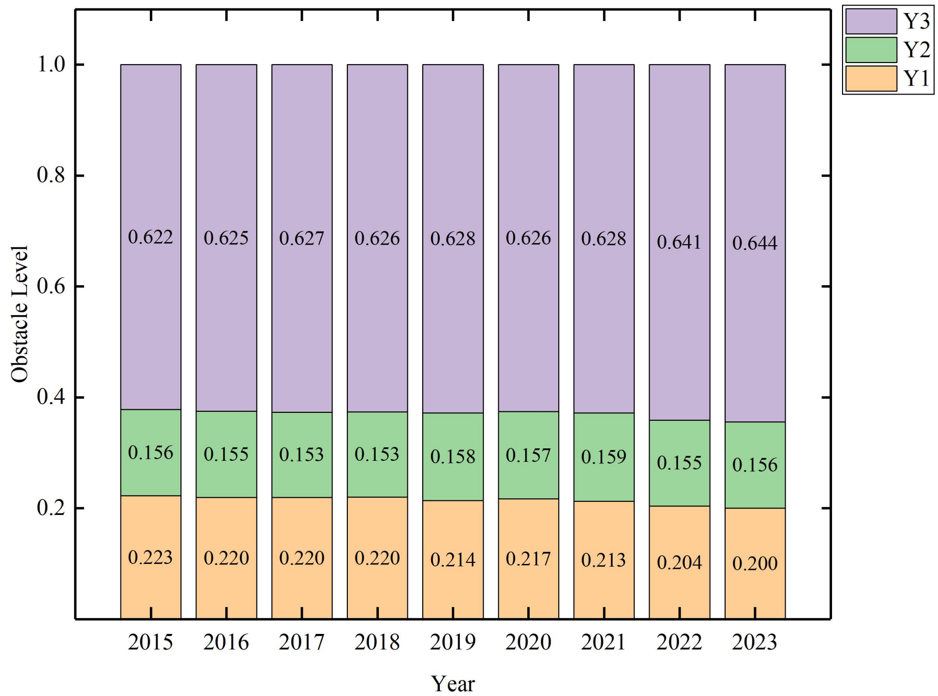

Figure 5 Obstacle Level of Anhui Industrial Transfer Inheritance Criteria (2015-2023)

(2) Obstacle factor analysis of index layer

Because there are many subdivision types of the indicator layer and the research time span is large, in order to facilitate the research, this paper selects 2015 and 2023, and selects the top five obstacle factors and discusses them according to the obstacle degree of the indicator layer. See Table 2 for details.

Table 2 shows that the main obstacle factors of the succession of industrial transfer in Anhui Province show strong stability in both time and space dimensions. Among them, the investment in scientific research and innovation (x23), the number of high-tech enterprises (x24), the proportion of total imports and exports in GDP (X25), the number of patent applications (X25) and the actual amount of foreign capital utilized (x26) are the core obstacle factors with the highest frequency. In addition, the turnover of goods (X12) and retail sales of social consumer goods (x2) also constitute constraints on the undertaking of industrial transfer in some regions.

Table 2 Obstacle Degree of Anhui Industrial Transfer Inheritance Index Layer (2015-2023)

Year	Hefei	Wuhu	Bengbu	Huainan	Ma'an Mountain	Huaibei	Tongling	Anqing
	X24(0.17)	X24(0.142)	X23(0.132)	X23(0.124)	X23(0.13)	X23(0.125)	X23(0.123)	X23(0.132)
	X25(0.151)	X23(0.137)	X24(0.129)	X24(0.119)	X24(0.129)	X24(0.119)	X24(0.12)	X24(0.126)
2015	X23(0.135)	X25(0.12)	X25(0.11)	X25(0.108)	X25(0.11)	X25(0.106)	X22(0.1)	X25(0.108)
	X22(0.117)	X22(0.107)	X22(0.105)	X22(0.096)	X22(0.104)	X22(0.1)	X25(0.081)	X22(0.102)
	X12(0.09)	X12(0.086)	X2(0.069)	X26(0.073)	X12(0.079)	X2(0.067)	X26(0.084)	X26(0.078)
	X25(0.36)	X24(0.136)	X23(0.127)	X23(0.126)	X24(0.127)	X23(0.127)	X23(0.129)	X23(0.135)
	X12(0.219)	X25(0.136)	X24(0.12)	X24(0.122)	X23(0.126)	X24(0.122)	X24(0.124)	X24(0.124)
2023	X26(0.218)	X23(0.113)	X25(0.116)	X25(0.11)	X25(0.119)	X25(0.11)	X22(0.106)	X25(0.115)
	X5(0.051)	X22(0.111)	X22(0.104)	X22(0.1)	X22(0.107)	X22(0.102)	X26(0.084)	X22(0.104)
	X21(0.045)	X26(0.106)	X26(0.085)	X26(0.079)	X26(0.086)	X26(0.08)	X25(0.072)	X26(0.086)
Year	Huangshan	Chuzhou	Fuyang	Suzhou	Lu'an	Bozhou	Chizhou	Xuancheng
	X23(0.121)	X23(0.133)	X23(0.139)	X23(0.131)	X23(0.128)	X23(0.131)	X23(0.121)	X23(0.127)
	X24(0.114)	X24(0.129)	X24(0.133)	X24(0.125)	X24(0.121)	X24(0.124)	X24(0.115)	X24(0.121)
2015	X25(0.1)	X25(0.114)	X25(0.116)	X25(0.111)	X25(0.109)	X25(0.111)	X25(0.101)	X25(0.104)
	X22(0.096)	X22(0.105)	X22(0.099)	X22(0.103)	X22(0.099)	X22(0.103)	X22(0.095)	X22(0.101)
	X26(0.071)	X2(0.068)	X26(0.081)	X2(0.068)	X26(0.071)	X26(0.066)	X12(0.069)	X12(0.069)
	X23(0.123)	X23(0.139)	X23(0.139)	X23(0.134)	X23(0.131)	X23(0.132)	X23(0.123)	X23(0.128)
	X24(0.114)	X25(0.137)	X24(0.13)	X24(0.125)	X24(0.122)	X24(0.124)	X24(0.117)	X24(0.124)
2023	X25(0.103)	X24(0.135)	X25(0.126)	X25(0.118)	X25(0.117)	X25(0.117)	X25(0.103)	X25(0.115)
	X22(0.097)	X22(0.114)	X22(0.109)	X22(0.104)	X22(0.1)	X22(0.105)	X22(0.099)	X22(0.103)
	X26(0.076)	X26(0.098)	X26(0.089)	X26(0.084)	X26(0.084)	X26(0.083)	X26(0.078)	X26(0.086)

Further analysis shows that although Anhui province continues to increase investment in scientific and technological innovation, there is still a significant gap in R&D intensity compared with developed provinces in the Yangtze River Delta. The uneven spatial distribution of innovation resources is prominent. High tech enterprises are highly

concentrated in core cities such as Hefei and Wuhu, while the innovation foundation in northern and Western Anhui is weak, resulting in the imbalance of regional innovation factor allocation. This pattern makes the process of industrial upgrading slow in some cities, and it is difficult to effectively undertake the transfer of high value-added industries.
From the perspective of innovation output, although the number of patents shows a rapid growth trend, there are structural weaknesses: the proportion of high-quality invention patents is relatively low, the efficiency of technology transformation is insufficient, and the supporting effect of innovation achievements on industrial upgrading is limited, which directly restricts the carrying capacity of high-end manufacturing industry. In terms of the development of export-oriented economy, Anhui's dependence on foreign trade is lower than the national average, and the use of foreign capital is still dominated by the low-end links of the manufacturing industry, resulting in the weak ability to undertake international industrial transfer, which makes it difficult to deeply integrate into the high-end of the global value chain.
In terms of infrastructure, although the comprehensive transportation network has been continuously improved, the efficiency of the multimodal transport system is low, and the space for logistics cost optimization is large, which affects the stability of the supply chain and reduces the transfer willingness of enterprises to cost sensitive industries. The development of the consumer market shows the characteristics of regional differentiation. Core cities such as Hefei and Wuhu have contributed the main increment, but the overall consumption demand is insufficient, which restricts the carrying capacity of labor-intensive industries such as light industry and service industry.

4 CONCLUSIONS AND POLICY SUGGESTION

4.1 Conclusions

According to the research analysis and discussion, this paper draws the following conclusions: (1) from a comprehensive point of view, the industrial transfer succession in Anhui Province from 2015 to 2023 shows a "one pole and many points" trend, among which Hefei has the strongest industrial transfer succession, Wuhu, Chuzhou, Ma'anshan and Fuyang have the highest carrying capacity, while other cities have weak carrying capacity. (2) According to the analysis of the three subsystems, the industrial attraction is characterized by "core leading and gradient alienation". Hefei's attraction index has been leading for a long time, followed by Wuhu, Chuzhou, Fuyang and other cities, while Huaibei, Chizhou, Huangshan and other cities are relatively weak. The support of industrial transfer is characterized by "strong in the South and weak in the north, high in the East and low in the west". The support of Ma'anshan, Hefei, Wuhu and other cities is strong, while the support of Huangshan, Chizhou, Xuancheng and other places is weak. The industrial development capacity presents a pattern of "one pole and two points". Hefei, Wuhu, Chuzhou and other cities have strong development capacity, while Huangshan, Chizhou, Huainan and other places have weak development capacity. (3) By analyzing the obstacle factors, it can be seen that the biggest obstacle in the criteria layer is the industrial development potential, while the input-output of scientific and technological innovation and the development level of opening-up in the indicator layer are the core obstacle factors with the highest frequency. In addition, the turnover of goods (X12) and retail sales of social consumer goods (x2) also constitute the constraints of industrial transfer in some regions.

4.2 Policy Suggestion

Based on the research conclusion and the actual situation of cities in Anhui Province, this paper puts forward some policy suggestions to promote the continuous improvement of industrial transfer capacity of cities in Anhui Province
(1) Coordinated development of various regions and undertaking the transfer of industries according to local conditions
Based on their own resource endowment, industrial base and regional advantages, cities in Anhui should form complementary synergy with other cities in the Yangtze River Delta and the province, avoid homogeneous competition, and form differentiated industrial transfer strategies. Relying on the advantages of technological innovation, industrial clusters and Yangtze River port, Wanjiang City Belt cities focus on undertaking advanced manufacturing. With the advantages of human capital, agriculture and coal resources, Northern Anhui focuses on undertaking labor-intensive industries and building green agricultural product supply bases and new energy bases such as photovoltaic and energy storage. Taking advantage of ecological advantages, Southern Anhui can undertake the transfer of green industries such as ecological industry, culture, tourism, health and oxygen, and characteristic agriculture. With differentiated positioning and collaborative linkage, Anhui can form a new industrial undertaking pattern of "science and innovation leading the Wanjiang River, manufacturing upgrading Northern Anhui, and ecological empowerment Southern Anhui".
(2) Optimize the allocation of regional innovation resources and promote the deep integration of "science and innovation+industry"
Innovating the talent evaluation mechanism and establishing the flexible flow mechanism of talents in various regions of Anhui Province; Accelerate the construction of Anhui Science and technology market and promote the transformation of scientific and technological achievements; Set up innovation funds to promote industrial transfer, and strengthen the coordination of Finance and technology, industry, and fiscal and tax policies in various regions. Thus, the optimal allocation of innovation elements such as talents, technology and capital in various regions of Anhui Province can be realized, and the short board of unbalanced regional scientific and technological innovation can be solved. At the same time, based on regional innovation differences, the pattern of the core innovation circle centered on Hefei, the entrepreneurial innovation circle centered on Wuhu, Ma'anshan and Bengbu, and the application innovation circle

represented by cities in southern and Northern Anhui has been formed. Realize the development potential of science and technology innovation driven industries in various regions, and continue to improve the level of industrial transfer in Anhui Province.

(3) Enhance the supporting capacity of the industrial chain to attract high-quality foreign investment and enhance the development potential of industrial transfer

Anhui Province should take the key industries such as new energy vehicles, integrated circuits and artificial intelligence as the guide, sort out the key links in the upstream and downstream, establish the strategy of "lack of chain and supplement of chain, weak chain and strong chain", strengthen the precise investment attraction of the industrial chain, enhance the attraction of foreign investment in key fields, encourage foreign-invested enterprises to increase capital and shares, and set up investment companies and regional headquarters. We will carry out "investment in Anhui" in depth, build institutionalized platforms such as "Huidong global" sea going activities and seafaring round tables, and strengthen docking and cooperation with internationally renowned investment institutions and international funds. Give play to the investment attraction function of Anhui pilot Free Trade Zone, national development zones, provincial international cooperation industrial parks and other open platforms, attract overseas top 500 companies and leading multinational companies to invest and cooperate in Anhui, and improve the quality and level of foreign capital utilization in Anhui Province. Promote the upgrading from production base to R&D center and regional headquarters, enhance the added value and competitiveness of traditional industries, and create a good industrial foundation for industrial transfer [24].

(4) Build an efficient logistics network, tap the county consumption potential, and enhance the comprehensive support of industrial undertaking

Through infrastructure upgrading and county logistics sinking, build an efficient logistics network and open the aorta of industrial undertaking. Lay out secondary distribution centers, form a three-level network of "hubs+nodes+terminals", build regional logistics hubs, and connect the Yangtze River Delta logistics corridor. Promote the seamless connection between the ports of the Yangtze River and the Huaihe River and railways and highways, and reduce the cost of bulk logistics. With the help of expansion and demand industry linkage, tap the county consumption potential. Support the construction of cold chain warehousing in northern and Western Anhui, and meet the high-end market demand in Shanghai, Jiangsu and Zhejiang. Use the urban and rural public transport network for express delivery to reduce the rural terminal distribution cost. Build a township business center, introduce the combination of chain brands and local characteristics, and promote live e-commerce into the county. Anhui Province can form a positive cycle of "logistics cost reduction - consumption expansion - industrial upgrading", and transform the county potential into the core competitiveness to undertake the industrial transfer in the Yangtze River Delta.

5 SUMMARY AND PROSPECT

At present, China's regional development is unbalanced and inadequate, and the sustainable promotion of regional coordinated development is facing difficulties [25-26]. Give full play to the resource endowment and development degree of various regions, and reasonably arrange regions to undertake industrial transfer. The key is to find out the key factors that affect regional industrial transfer, and scientifically and accurately assess the level of regional industrial transfer. Therefore, this paper proposes a data-driven comprehensive evaluation method of regional industrial transfer succession, observes the evolution trend of regional industrial transfer succession, and identifies its key influencing factors, so as to reasonably undertake the transferred industries, realize the upgrading of industrial structure, and promote industrial agglomeration.

Although this study has made some breakthroughs and innovations on the basis of previous literature, there are still some limitations. On the one hand, the research of this paper is based on the static and ex post basis of regional industrial transfer, and does not fully consider the dynamic and predictive changes of the ability of different regions to undertake industrial transfer. Future related research will refine the time node to further study the prediction of regional industrial transfer; On the other hand, due to the availability of data and the number of missing values, this study focuses on 16 prefecture level cities in Anhui Province. Although the research results can clearly show the status of prefecture level cities' industrial transfer, the county-level industrial characteristics are also obvious. Future research will break through the limitations of incomplete county-level data and focus on the county-level in order to obtain more targeted policy recommendations.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

FUNDING

This research was supported by the Anhui Province Social Science Innovation and Development Project (No. 2022CX076) , (No. 2023CX023); Key Research Projects of Philosophy and Social Sciences in Anhui Province (No.2023AH052209); Major research projects of philosophy and Social Sciences in Anhui Province (No. 2022AH040204); Provincial New Professional Quality Improvement Project (No. 2023xjzlts069).

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