# Research on the Evaluation of the Implementation Effectiveness of Huizhou's Talent Policies

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## Abstract

*As an important node city in the Guangdong-Hong Kong-Macao Greater Bay Area, the implementation effect of Huizhou's talent policies is of great significance for building a high-level talent highland in the Greater Bay Area. In recent years, Huizhou has introduced a series of talent support policies and achieved phased results, such as significant improvements in the total number of scientific and technological innovation talents, scientific research investment, and the implementation of talent policies. However, due to limitations in some factors such as population, economy, and scientific and technological innovation foundation, Huizhou City still faces many challenges in the field of talent competition, such as relatively weak talent attraction, narrow policy coverage, and facing strong competition from adjacent cities such as Guangzhou, Shenzhen, and Dongguan. Therefore, this study suggests that Huizhou should adopt the "Four Attractions" talent strategy of innovating spatial carriers, optimizing the industrial structure, implementing inclusive talent policies, and innovating the ecological system to accelerate the improvement of the implementation effectiveness of talent policies, create a characteristic scientific and technological innovation talent highland in Huizhou, and contribute to the high-quality development of Huizhou City.*

## Keywords

*Huizhou; Talent Policy Implementation; Policy Evaluation; Policy Comparative Study; "Four Attractions" Talent Strategy.*

## 1. Introduction

Huizhou City, as a member of the Guangdong-Hong Kong-Macao Greater Bay Area urban agglomeration, is listed as an "important node city in the Guangdong-Hong Kong-Macao Greater Bay Area" in the "Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area". Therefore, the implementation effectiveness of Huizhou's talent policies is of crucial importance for building a high-level talent highland in the Greater Bay Area. However, at the same time, the talent competition among cities in the Bay Area is also extremely fierce. Facing the highly attractive surrounding talent environment such as Hong Kong, Macau, Guangzhou, and Shenzhen, how Huizhou can accurately identify its own position, give full play to the relative advantages of its talent policy, accelerate the construction of a competitive scientific and technological innovation talent highland, and form a high-level scientific and technological innovation talent aggregation effect is one of the important issues currently faced by Huizhou.

## 2. Literature Review

The research related to talents and the construction of talent highlands in the Guangdong-Hong Kong-Macao Greater Bay Area (including Huizhou City) can be roughly divided into the following five directions.

## 2.1. Research on Talent Flow and Aggregation

The literature in this direction mainly focuses on the phenomenon of talent flow and aggregation, exploring the flow patterns, motivations, and influencing factors of talents within and outside the Guangdong-Hong Kong-Macao Greater Bay Area, as well as how to promote the rational flow and effective aggregation of talents through means such as optimizing the policy environment and improving the service system. For example, some scholars pointed out through a questionnaire survey of 168 technology-based enterprises that the collaborative innovation network has a significant positive impact on the talent agglomeration effect and innovation performance, and the talent agglomeration effect plays a partial mediating role in the collaborative innovation network [1]. Some scholars put forward a series of strategic suggestions such as multi-faceted collaboration for the collaborative development of talents in the Guangdong-Hong Kong-Macao Greater Bay Area based on the synergy theory [2, 3]. Some scholars, from the perspective of the talent ecological environment, took 11 cities in the Guangdong-Hong Kong-Macao Greater Bay Area urban agglomeration as research cases and used the QCA and NCA mixed methods to compare the types and evolution logic of the scientific and technological talent agglomeration paths in the five years after the establishment of the Guangdong-Hong Kong-Macao Greater Bay Area [4]; some scholars proposed that the goal of building a talent highland in the Guangdong-Hong Kong-Macao Greater Bay Area needs to be achieved by building a first-class talent system [5]; and there are also scholars' research on the spatial distribution characteristics and influencing factors of scientific and technological innovation talents in the Guangdong-Hong Kong-Macao Greater Bay Area [6].

## 2.2. Research on Industry-University-Research Cooperation and Talent Innovation

The literature in this direction mainly focuses on the industry-university-research cooperation and talent innovation activities within the Guangdong-Hong Kong-Macao Greater Bay Area. This includes studying how to strengthen the cooperation among universities, scientific research institutions, and enterprises to promote the transformation and industrialization of scientific and technological achievements. At the same time, it also focuses on how to stimulate the innovation vitality of talents through means such as innovating incentive mechanisms and improving the innovation environment. For example, some scholars proposed that two new institutions need to be established in the Greater Bay Area after studying the macro environment and the talent ecosystem: the Greater Bay Area Quality of Life Research Center and the Greater Bay Area Integration Research Think Tank [7]. Some scholars used the empirical research method to study the discipline layout of universities in the three regions of the Greater Bay Area, namely Hong Kong, Macau, and the nine mainland cities in the Pearl River Delta, to determine the deviation from the industrial structure and further identify the shortage and complementary problems of talent resources in the Greater Bay Area [8]. Other scholars believe that the construction of a high-level talent highland in the Guangdong-Hong Kong-Macao Greater Bay Area must integrate the innovative elements of the connection of the "education chain - science and technology chain - talent chain"; must construct a three-dimensional integrated spatial structure of "education dimension - science and technology dimension - talent dimension"; and must build a community that integrates the "education highland - science and technology highland - talent highland" [9]. Still other scholars pointed out from the perspective of improving the overall efficiency of the scientific and technological innovation system in the Guangdong-Hong Kong-Macao Greater Bay Area that compared with world-class bay areas such as the San Francisco Bay Area, the New York Bay Area, and the Tokyo Bay Area, there are still significant talent structure contradictions in the Guangdong-Hong Kong-Macao Greater Bay Area at present, and it is necessary to promote the construction of a scientific and technological

innovation talent highland by giving full play to the advantages of the new national system and focusing on strategic emerging industries [10].

## 2.3. Research on Talent Development and Regional Competitiveness

The literature in this direction mainly focuses on the relationship between talent development and regional competitiveness. This includes analyzing the contribution degree of talents to regional economic development and exploring how to enhance the overall competitiveness of the Guangdong-Hong Kong-Macao Greater Bay Area through the construction of a talent highland. At the same time, it also involves the research on issues such as regional talent structure, talent demand, and talent supply. For example, some scholars believe that the building of a world-class bay area requires a policy environment conducive to talent introduction, cultivation, and mobility, and the creation of a world-class innovative talent highland to form a strong international intellectual support for the construction of an international scientific and technological innovation center [11]. Other scholars have explored the issues of talent cultivation models and approaches in fields such as finance, law, e-commerce, innovation and entrepreneurship, and business English in the context of the construction of the Guangdong-Hong Kong-Macao Greater Bay Area [12].

## 2.4. Research on Talent Policies and Strategies

The literature in this direction mainly focuses on the policy formulation and strategic planning for the construction of the talent highland in the Guangdong-Hong Kong-Macao Greater Bay Area. This includes analyzing the effects of existing talent policies and exploring how to formulate more attractive and targeted policies to attract, cultivate, and retain talents. At the same time, it also involves the research on the strategic positioning, development goals, and development paths of the construction of the talent highland in the Guangdong-Hong Kong-Macao Greater Bay Area. For example, some scholars proposed that the construction of a high-level talent highland institutional system requires reconstructing the top-level design of talent development in the Guangdong-Hong Kong-Macao Greater Bay Area, focusing on the construction of a full-chain talent cultivation system, strengthening the attraction and environmental construction of international talents, enhancing the talent flow and integrated development in the Guangdong-Hong Kong-Macao Greater Bay Area, and increasing the supply of talent service guarantees through a systematic review of the talent policies in the Guangdong-Hong Kong-Macao Greater Bay Area [13]. Some scholars pointed out, from the perspective of policy tools, after conducting a coding analysis of the talent policies issued in the Pearl River Delta region of the Guangdong-Hong Kong-Macao Greater Bay Area, that the current regional talent policies have problems such as over-reliance on supply-side policy tools, unbalanced weights of various types of policy tools, insufficient application of talent flow policies, deviations in policy goal settings, prominent characteristics of policy integration into the Bay Area, and obstacles to coordinated development [14].

## 2.5. Research on International Comparison and Reference of Talent Highlands

The literature in this direction mainly focuses on the experiences and lessons of the construction of talent highlands at home and abroad, and explores how to draw on advanced international experiences to promote the construction of the talent highland in the Guangdong-Hong Kong-Macao Greater Bay Area. This includes analyzing the practices and achievements of other countries or regions in talent policies, talent cultivation, and talent flow, so as to provide useful references for the construction of the talent highland in the Guangdong-Hong Kong-Macao Greater Bay Area. For example, some scholars pointed out after comparing the higher education clusters and talent highland construction in the Guangdong-Hong Kong-Macao Greater Bay Area and the San Francisco Bay Area that the Guangdong-Hong Kong-Macao Greater Bay Area should start from the two main lines of "cultivation" and "attraction", and seek the realization path of promoting the construction of the talent highland through the development of the higher education cluster, including optimizing the higher education cluster system, improving the talent cultivation level of the talent highland, enhancing the talent attraction of the talent highland through institutional

opening, and promoting the integration of talents, science and technology, and industries through the integration of industry and education and the integration of science and education [15]. Another example is that some scholars, based on the current situation in Jiangsu Province, proposed that based on the theory of innovation-driven development and the special regional environment, talent development planning should be done well, the intensity of independent cultivation should be increased, the scientific and technological innovation platform should be upgraded, and the investment and service guarantee should be strengthened, so as to continuously amplify the "multiplier effect" of talent work in the process of integration and fusion and promote the construction of the talent highland [16].

### 2.6. Summary of Literature Review

Overall, there are already many literatures related to talents and the construction of talent highlands, most of which focus on the investigation and analysis of the Guangdong-Hong Kong-Macao Greater Bay Area. However, there are few studies specifically targeting Huizhou. At present, most of the literature on the construction of the talent highland in Huizhou is concentrated in the field of policy release, such as the release and interpretation of Huizhou's "1 + 2 + N" talent policy system [17], the introduction of Huizhou's "four-in-one" top-level design of "opinion + planning + scheme + supporting" [18], and the introduction of the implementation of Huizhou's talent development strategy [19]. Most of the materials are found in local newspapers and magazines, and there are few systematic and academic literatures introducing the construction of the talent highland in Huizhou. Especially, there are even fewer academic discussions on the talent development status and the construction of the talent highland at the city level in Huizhou, and the research in related fields is extremely insufficient and urgently needs further research and exploration.

## 3. Current Situation of Talents and Talent Highland Construction in Huizhou

In recent years, the Huizhou Municipal Government has introduced a series of talent support policies, including the improvement of related industrial chains and the continuous construction of scientific research platforms, and has also achieved some phased results, injecting strong impetus into the city's scientific and technological innovation development and talent introduction and cultivation, and opening a new stage for Huizhou to move towards the construction of a scientific and technological innovation talent highland.

### 3.1. Total Number of Scientific and Technological Innovation Talents and the Development of High-level Talents

Since 2022, Huizhou has launched the "1 + 2 + N" talent introduction and cultivation combination policy of the talent new deal version 3.0, comprehensively creating new advantages in talent competition. After a period of policy implementation, remarkable results have been achieved. By the end of 2023, the total number of talents in Huizhou exceeded 1.3 million, accounting for 19.40% of the total permanent population. Among them, the number of high-level talents exceeded 50,000 [20], including 24 double-employed and cooperative academicians, nearly 100 national-level talents, more than 150 scientific and technological leading talents, 71 municipal innovation and entrepreneurship teams, and nearly 20,000 doctoral and master's degree holders [21]. Nearly 100 of them were selected into provincial and national major talent programs. In 2023 alone, Huizhou newly introduced and cultivated more than 200,000 various types of talents, including more than 210 doctoral and post-doctoral talents, nearly 4,000 master's degree holders, selected 10 scientific and technological leading talents, 20 outstanding young scientific and technological talents, and 9 scientific and technological innovation and entrepreneurship teams [22].

In terms of talent cultivation in various fields, Huizhou has also achieved certain results. For example, in the cultivation of municipally managed top-notch talents, 10 Dongjiang Scholars and

50 municipally managed top-notch talents have been publicly selected successively, covering multiple fields such as scientific and technological innovation, business management, education, and medical care; in the cultivation of highly skilled talents, 10 Goose City Craftsmen, 50 municipally managed chief technicians, and 373 municipally managed young experts have been selected; in addition, nearly 500 highly skilled talents have been cultivated through a combination of competitions and training; in the cultivation of rural revitalization talents, through the "Hundred-Thousand-Ten Thousand Project" talent support "Sailing Plan", the "Science and Technology Deputy General Manager" project has been piloted, and 10 college scientific and technological talents have been initially employed and dispatched to county-level science and technology-based small and medium-sized enterprises to support and lead innovation and development. The third batch of 27 service group talents have been selected and dispatched to the front line of the grassroots level for temporary service; the three projects of "Cantonese Cuisine Master", "Guangdong Skilled Worker", and "Guangdong Domestic Service" have been vigorously implemented, and 153,900 person-times of subsidy-based vocational skills training have been carried out. Huizhou has also held special live broadcasts for job recruitment around key industries such as intelligent equipment manufacturing, petrochemical energy new materials, electronic information, and life and health, attracting more than 2.09 million people across the country to watch and pay attention [22]. In addition, Huizhou has also implemented the "Huicai" Talent Gathering Project, integrated resources to create a characteristic talent introduction and cultivation brand, upgraded and expanded the coverage of talent introduction and cultivation, and built a one-stop talent service platform to achieve efficient talent services.

## 3.2. Development of Scientific Research Investment and Scientific Research Environment

Huizhou is determined to build a stronger scientific and technological innovation foundation environment to support the construction of the talent highland in the Guangdong-Hong Kong-Macao Greater Bay Area. From 2018 to 2022, the average annual growth rate of the city's R&D (Research and Development) expenditure in Huizhou was nearly 20%, and the proportion of R&D expenditure in the city's GDP (Gross Domestic Product) increased from 2.3% to 3.4% [23]; the number of national high-tech enterprises increased from 1,105 to more than 3,400 in 2023, more than tripling in six years, and the number of science and technology-based small and medium-sized enterprises increased to 2,729, 1.3 times more than that in 2018, with the growth rates ranking first in the Pearl River Delta region [24]; the number of R&D personnel increased from 53,000 in 2018 to 90,200 in 2023 [22]. By the end of 2023, Huizhou had built 19 provincial key laboratories and new R&D institutions [24]. There were 58 post-doctoral research workstations, doctoral workstations, and post-doctoral innovation practice bases [21]. The number of provincial-level and above scientific and technological innovation platforms in the city increased to more than 250, and the number of various innovation and entrepreneurship platform carriers across the country reached 739 [20]. Huizhou has also promoted the construction and development of a batch of new R&D institutions such as the two major scientific apparatus of the Chinese Academy of Sciences, the Dongjiang Laboratory, the Huizhou Green Energy Research Institute, and the headquarters R&D center of Eve Energy, strongly supporting the construction of the talent highland in the Greater Bay Area.

## 3.3. Implementation of Talent Policies and Supporting Measures

In 2022, Huizhou issued the "Opinions on Accelerating the Construction of a Strong Talent City in the New Era" (Huizhou Municipal Party Committee Document [2022] No. 5), and constructed a "1 + 2 + N" talent policy system by improving 15 supporting detailed rules, that is, the version 3.0 of Huizhou's talent policies, proposing to rank among the forefront of national strong talent cities by 2035 and become the backbone force of the high-level talent highland in the Guangdong-Hong Kong-Macao Greater Bay Area. In 2023, under the guidance of the municipal talent policy system, efforts were focused on guiding the 7 counties (districts) to supplement and improve nearly 50

talent policies in combination with their respective functional orientations, industrial characteristics, and development needs, and the superimposed advantages of the city and county-level policies were significantly enhanced. For example, in the Daya Bay Economic and Technological Development Zone, for the new talent introduction housing subsidies, scientific research project support, etc., in line with the municipal talent policy, they are basically designed with a 1:1 matching [22]. Huizhou has built a talent "one-stop" service platform to provide services such as talent identification, assessment, recommendation, talent subsidies, children's schooling, talent household registration, and talent demand declaration for the city's high-level talents.

## 4. Comparative Analysis of the Implementation Effectiveness of Talent Policies in Huizhou and the Three Cities of Guangzhou, Shenzhen, and Dongguan

In order to more comprehensively examine the implementation status of Huizhou's talent policies, in addition to longitudinally and intuitively observing its own growth state, it is also necessary to conduct a horizontal comparative examination, which can make the observation more objective and comprehensive. This paper selects the three cities of Guangzhou, Dongguan, and Shenzhen, which border Huizhou in the Guangdong-Hong Kong-Macao Greater Bay Area, as references for comparative analysis, refer to Fig. 1. The data on the talent policies and the number of enterprises benefited in the four cities in this report come from the Qizhidao platform (www.qizhidao.com). This platform uses big data, cloud computing, and artificial intelligence technologies to collect and aggregate the talent-related enterprise-benefiting policies and the situation of policy-supported enterprises in various places. Although the collection and classification of relevant data cannot be confirmed to be completely accurate, it still has reference value from a statistical perspective. From another perspective, even if the policy data is biased (generally speaking, the amount of data collected by big data is less than the actual amount), it can also illustrate from another side that there are deficiencies in the publication of the implementation results of relevant policies in the city, and the policy implementation management should be strengthened.

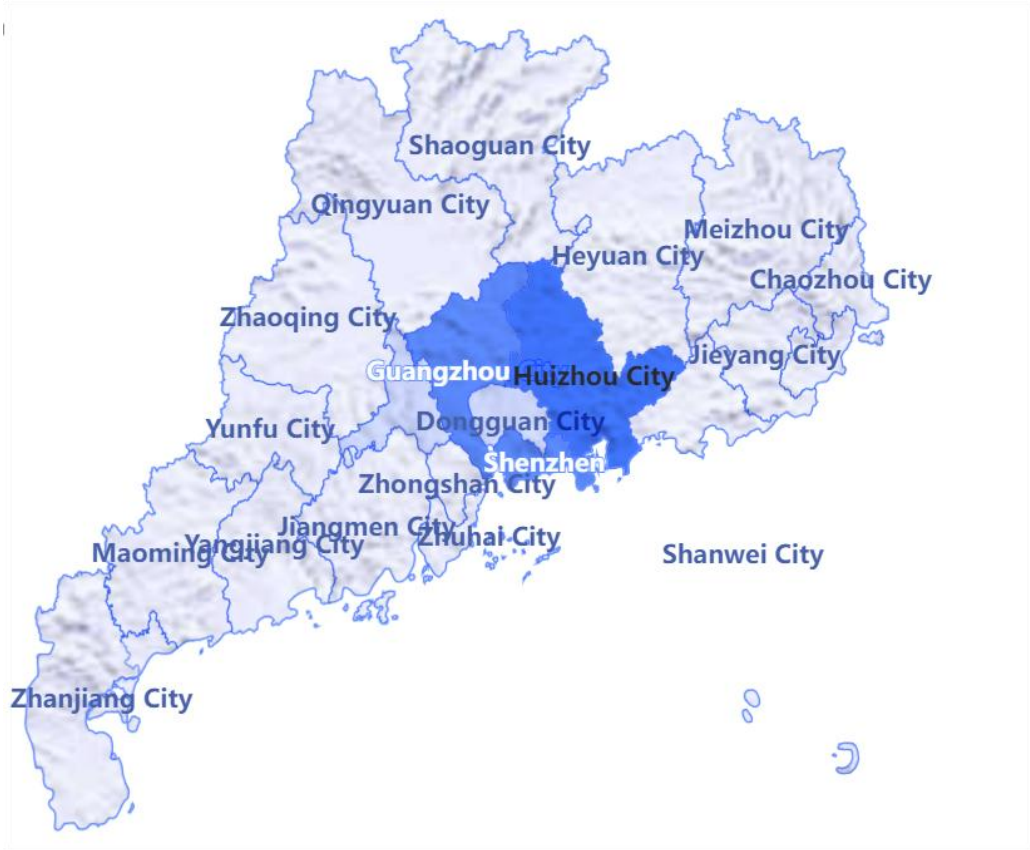



Fig. 1 Location Map of Huizhou and the Three Comparative Cities of Guangzhou, Shenzhen, and Dongguan

## 4.1. Comparison of Basic Data of Urban Development

Compared with the surrounding cities, Huizhou shows the following characteristics in terms of population, jurisdiction area, and economic development. For specific data, see the following table. The data source is the Hongheiku website (www.hongheiku.com).

Table 1. Comparison Table of Basic Data of Four Cities

| | Huizhou | Guangzhou | Shenzhen | Dongguan |
|---|---|---|---|---|
| The permanent population in 2024 (10,000 people) | 607.34 | 1,882.7 | 1,779.01 | 1,048.53 |
| The household registration population in 2024 (10,000 people) | 425.29 | 1,056.61 | 583.47 | 307.88 |
| Jurisdictional area (km2) | 11,159 | 7,436 | 1,997.47 | 2,512 |
| Population density (people/km2) | 544 | 2,531 | 8,908 | 4,172 |
| Population ranking in Guangdong | 7 | 1 | 2 | 3 |
| GDP data in 2023 (100 million yuan) | 5,639.68 | 30,355.73 | 34,606.4 | 11,438.13 |
| The number of existing enterprises in 2024 | 347,732 | 2,350,685 | 2,652,695 | 825,745 |
| The disposable income of urban residents in 2023 (yuan) | 52,621 | 80,501 | 76,910 | 67,286 |

From the perspective of population data, the permanent resident population of Huizhou is 6.0734 million, and the household registered population is 4.2529 million. The population scale is relatively small among the four cities, only about one-third of that of Guangzhou and Shenzhen and about 60% of that of Dongguan. Its population density is 544 people per square kilometer, which is much lower than that of the three comparative cities, reflecting Huizhou's relatively loose population distribution pattern and relatively small pressure on land resource carrying capacity.

In terms of economic development, the GDP data in 2023 was 563.968 billion yuan, which was significantly lower than 3.46064 trillion yuan in Shenzhen, 3.035573 trillion yuan in Guangzhou, and 1.143813 trillion yuan in Dongguan, ranking last among the four cities in terms of economic aggregate. The disposable income of urban residents is 52,621 yuan, which is also slightly lower than that of the other three cities, indicating that the overall income level of its residents lags behind that of the surrounding more economically developed cities.

In addition, Huizhou has only 5 universities and a relatively small number of scientific research institutions. Compared with cities like Guangzhou and Shenzhen, it has fewer higher education resources and scientific research institutions, and thus has inherent deficiencies in talent independent cultivation and scientific research innovation capabilities.

## 4.2. Comparison of Basic Data on Urban Scientific and Technological Innovation

The basic conditions for scientific and technological innovation in Huizhou are relatively weak. From the comparison of the number of scientific and technological innovation enterprises in the following table 2, Huizhou has a large gap with the comparison cities both in terms of absolute quantity and per capita data. For example, in terms of the number of science and technology-based small and medium-sized enterprises, Huizhou has 3,723, which is far lower than that of Shenzhen (22,697) and Guangzhou (15,415), and also lower than that of Dongguan (4,404). This indicates that Huizhou has achieved certain results in the cultivation and attraction of science and technology-based small and medium-sized enterprises, but there is still a huge gap compared with strong scientific and technological innovation cities. In terms of the number of high-tech enterprises, Huizhou has 3,721, which is extremely small compared with the other three cities and is even less than 40% of that of Dongguan. This data reflects that the development speed of Huizhou's high-tech industry is relatively slow and, to some extent, also reflects that the foundation for developing new quality productive forces is slightly poor. In terms of the number of specialized, refined, characteristic, and new "little giant" enterprises, Huizhou has only 58, and the gap with the three comparison cities is even larger, less than 30% of that of Dongguan. This shows that the number of enterprises with the characteristics of specialization, refinement, specialization, and novelty in the segmented fields in Huizhou is seriously insufficient, and the innovation ability and core competitiveness of enterprises urgently need to be improved.

Table 2. Comparison of the Number of Scientific and Technological Innovation Enterprises

| | Huizhou | Guangzhou | Shenzhen | Dongguan |
|---|---|---|---|---|
| Small and medium-sized scientific and technological enterprises | 3,723 | 15,415 | 22,697 | 4,404 |
| High-tech enterprises | 3,721 | 14,241 | 24,766 | 10,565 |
| Specialized, refined, peculiar and new small and medium-sized enterprises | 1,082 | 5,829 | 617 | 2,982 |
| Specialized, refined, peculiar and new “little giant” enterprises | 58 | 335 | 1,028 | 204 |
| Intellectual property management system | 371 | 5,459 | 6,284 | 2,813 |
| Integration of informatization and industrialization management system | 28 | 1,628 | 89 | 144 |
| National green factory | 34 | 61 | 106 | 28 |

Furthermore, from the perspective of the total number of patents in the following fig.2, Huizhou is lower than Guangzhou, Shenzhen, and Dongguan in terms of the total number of appearance patents, utility model patents, and invention patents. Especially in terms of the number of invention patents, which is the indicator that best reflects the quality of regional talents, Huizhou has only 23,934 pieces, with a gap of 24.7 times compared to 591,231 pieces in Shenzhen and also a huge gap of 4.4 times compared to that in Dongguan. This data further indicates that there is a huge gap

in the quality of scientific and technological innovation talents in Huizhou compared with neighboring cities. Of course, the actual gap in segmented scientific and technological innovation industries still needs further investigation and analysis. On the other hand, regarding the current huge talent quality gap, in the upcoming talent competition in the Guangdong-Hong Kong-Macao Greater Bay Area, will the talents in Huizhou be subject to the siphon effect from Guangzhou, Shenzhen, and Dongguan? Or will there be a talent radiation effect in Huizhou? This issue remains to be further investigated and evaluated.

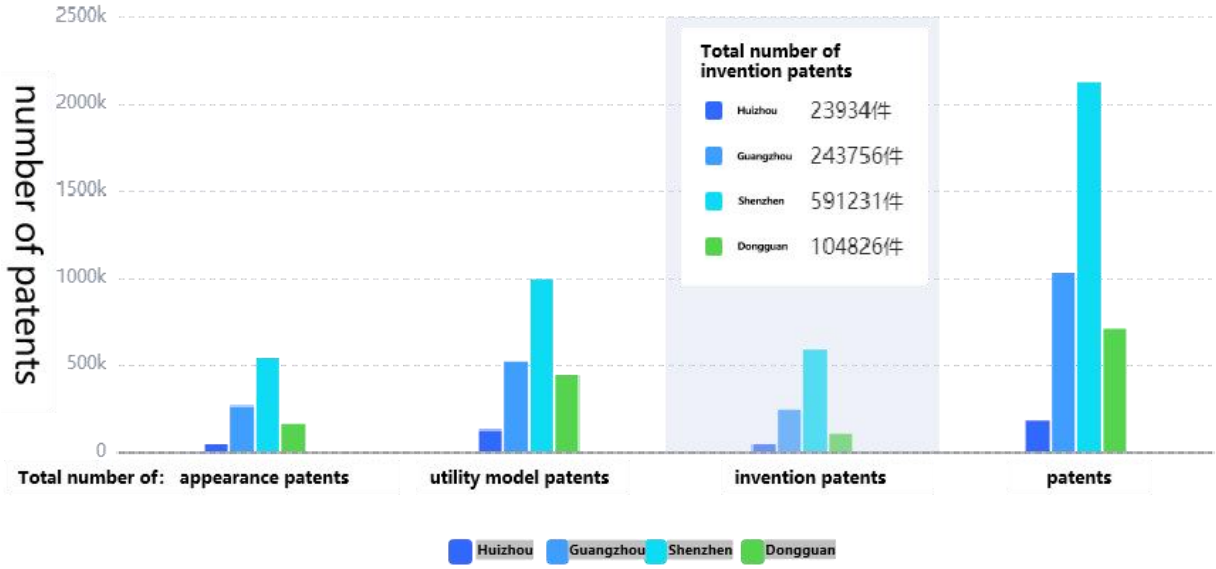


Fig. 2 Comparison of the Number of Various Patents

In conclusion, the overall data of the city's scientific and technological innovation foundation reflects that: Huizhou has a certain industrial foundation and development potential in terms of the scientific and technological innovation foundation conditions and quality, but compared with the rapid growth of its neighboring cities, it still appears relatively weak. This will be in an unfavorable situation for the upcoming urban talent competition and the transformation and cultivation of the economic society towards new quality productive forces.

## 4.3. Comparison of Urban Talent Policy Data

First, the number of talent policies and the number of supported enterprises in Huizhou are significantly fewer. As can be seen from the data in Table 3 below, the number of enterprise-benefiting talent policies in Huizhou is 103 (see Appendix 1 for the detailed list), which is less than one-fourth compared with that in Guangzhou (452 items), Shenzhen (418 items), and Dongguan (419 items), and the number is obviously fewer. The number of enterprises supported by Huizhou's talent policies is 1115, which is far lower than that in Shenzhen (48,096), Guangzhou (10,996), and Dongguan (5,273). Combining with the number of existing enterprises in the city in Table 1, the enterprise benefit rates of the talent policies in the four cities are 0.32% (Huizhou), 0.48% (Guangzhou), 1.81% (Shenzhen), and 0.64% (Dongguan), respectively. It can be seen that from the perspective of enterprise average data, Huizhou is also inferior to the other three neighboring cities, and the gap is very large. Thirdly, in terms of the single highest subsidy amount, Huizhou is 10 million yuan, which is a relatively small subsidy amount compared with 220 million yuan in Shenzhen and 30 million yuan in Guangzhou and Dongguan. These data indicate that Huizhou's talent policies are relatively less active in terms of formulation and promulgation, and there are also large gaps in the implementation scope and effect, and the attraction to high-end talents and major projects is also relatively small. Huizhou's efforts to attract talents in the

Guangdong-Hong Kong-Macao Greater Bay Area to work and live in Huizhou through talent policies are likely to be in vain. In the current talent competition and talent highland construction in the Guangdong-Hong Kong-Macao Greater Bay Area, Huizhou is also in an extremely unfavorable position.

Table 3. Comparison of the Number of Talent Policies and the Situation of Benefiting Enterprises

| Key Indicators | Huizhou | Guangzhou | Shenzhen | Dongguan |
|---|---|---|---|---|
| Items of enterprise-benefiting policies | 103 | 452 | 418 | 419 |
| Number of supported enterprises | 1,115 | 10,996 | 48,096 | 5,273 |
| The highest amount of a single subsidy(million yuan) | 10 | 30 | 220 | 30 |

Second, from the perspective of the number of enterprises supported by talent policies at all levels in Table 4, Huizhou has a certain number of supported enterprises at the national, provincial, municipal, and district levels, and the distribution is relatively balanced. The pyramid structure formed from top to bottom is not particularly obvious. Looking at the proportion of the number of talent policies at the four levels, the number of municipal and district-level supporting policies in Huizhou is slightly insufficient. This indicates that there are deficiencies in the flexible application of district-level policy resources in Huizhou, and it fails to fully utilize the policy strength of the municipal and district levels to effectively support key industry enterprises and general talents. Comparing with the three comparison cities, Huizhou is obviously at a lower level in the number of enterprises supported by talent policies at all levels. Whether it is 10 at the national level compared with 199 in Guangzhou, 189 in Shenzhen, and 18 in Dongguan; 109 at the provincial level compared with 833 in Guangzhou, 360 in Shenzhen, and 167 in Dongguan; 406 at the municipal level compared with 2,671 in Guangzhou, 34,148 in Shenzhen, and 3,919 in Dongguan; or 709 at the district level compared with 9,050 in Guangzhou, 28,140 in Shenzhen, and 2,132 in Dongguan, it can be seen that the number of enterprises supported by Huizhou is far less than that of the other three cities. This reflects that there is a certain gap between Huizhou's talent policies support strength and coverage in scale and those of neighboring cities.

Table 4. Comparison of the Number of Enterprises Supported by Talent Policies at All Levels in Each City

| | Huizhou | Guangzhou | Shenzhen | Dongguan |
|---|---|---|---|---|
| National - level | 10 | 199 | 189 | 18 |
| Provincial - leve | 109 | 833 | 360 | 167 |
| Municipal - level | 406 | 2671 | 34148 | 3919 |
| District - level | 709 | 9050 | 28140 | 2132 |

Third, looking at the growth situation of the number of enterprises supported by talent policies in the four cities in the past five years as shown in following Fig. 3, from 2019 to 2023, the growth of the number of enterprises supported by Huizhou's talent policies is relatively flat, and the growth rate is relatively small. Relatively speaking, Shenzhen and Dongguan had an explosive growth in 2020 and 2021, which indicates that Huizhou's talent policies are also slightly insufficient in terms of expansion and aggressiveness. Looking at the specific values over the years, Huizhou has always been at a relatively low level in the number of enterprises supported by talent policies. Whether compared with Guangzhou, Shenzhen, or Dongguan, Huizhou has a large gap in the number of supported enterprises. For example, in 2023, there were 704 in Guangzhou, 5,881 in Shenzhen, and 980 in Dongguan, while Huizhou had only 139. This reflects that the coverage of Huizhou's talent policies is relatively narrow.

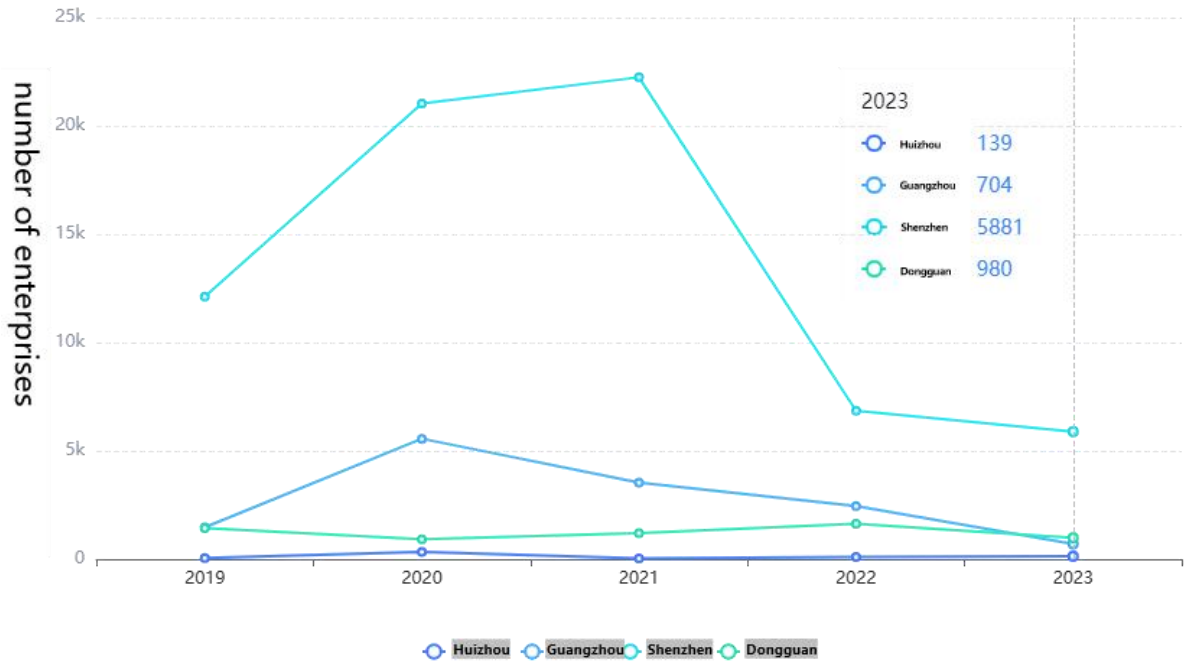



Fig. 3 Trend of the Number of Enterprises Supported by Talent Policies in Each City in the Past Five Years

Fourth, let's look at the industry attributes of the enterprises supported by the talent policies. The top five industries of the enterprises supported by Huizhou are technology services, mechanical and electrical, electronic information, construction engineering, and new materials. The total proportion of the top five industries is 70%, exceeding about 60% of the other three cities, indicating that the industry concentration of the enterprises subsidized by Huizhou's talent policies is relatively high. Secondly, the proportion of the top five industries is relatively average, unlike the two cities of Guangzhou and Dongguan, where the subsidy industry concentration is relatively high. Thirdly, from the perspective of the subsidy industry ranking, the subsidy industry ranking structure in Huizhou is significantly different from that of the other three cities. The subsidy proportion for the construction engineering industry is relatively high, almost twice that of the other three cities, while the subsidy for the Internet industry is relatively small and does not enter the top five industries. To some extent, this reflects that Huizhou's support for emerging industries is relatively weak, which is not conducive to attracting relevant innovation and high-end talents. The data on the industry attributes of the subsidized enterprises shows that the industry concentration of the enterprises subsidized by Huizhou's talent policies is relatively high; however, the proportion among the top five industries is relatively average, and no industry has an obvious advantage, and the support for highly innovative emerging industries is insufficient; the subsidy industry structure in Huizhou is significantly different from that of the surrounding cities, and it is rather difficult to form an effect of attracting talents spillover from Guangzhou, Shenzhen, and Dongguan from the perspective of talent attraction.

Table 5. Proportion of Industries of Enterprises Supported by Talent Policies in Each City (Top Five)

| Huizhou | | | Guangzhou | | | Shenzhen | | | Dongguan | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Industry | Number of Enterprises | Proportion (%) | Industry | Number of Enterprises | Proportion (%) | Industry | Number of Enterprises | Proportion (%) | Industry | Number of Enterprises | Proportion (%) |
| Technic | 194 | 17.4 | Technic | 2,475 | 22.5 | Technic | 7,886 | 16.4 | Mechani | 1,291 | 24.4 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| al Services | | 0 | al Services | | 1 | al Services | | 0 | cal and Electric al | | 8 |
| Mechani cal and Electric al | 187 | 16.7 7 | Internet | 1,956 | 17.7 9 | Internet | 6,068 | 12.6 2 | Technic al Services | 679 | 12.8 8 |
| Electron ic Informat ion | 142 | 12.7 4 | Constru ction Enginee ring | 839 | 7.63 | Mechani cal and Electric al | 5,747 | 11.9 5 | New Material s | 626 | 11.8 7 |
| Constru ction Enginee ring | 139 | 12.4 7 | New Retail | 802 | 7.29 | Electron ic Informat ion | 5,536 | 11.5 1 | Electron ic Informat ion | 605 | 11.4 7 |
| New Material s | 123 | 11.0 3 | Mechani cal and Electric al | 736 | 6.69 | New Retail | 5,348 | 11.1 2 | Constru ction Enginee ring | 307 | 5.82 |
| Total | 785 | 70.4 0 | Total | 6,808 | 61.9 1 | Total | 30,585 | 63.5 9 | Total | 3,208 | 60.8 4 |

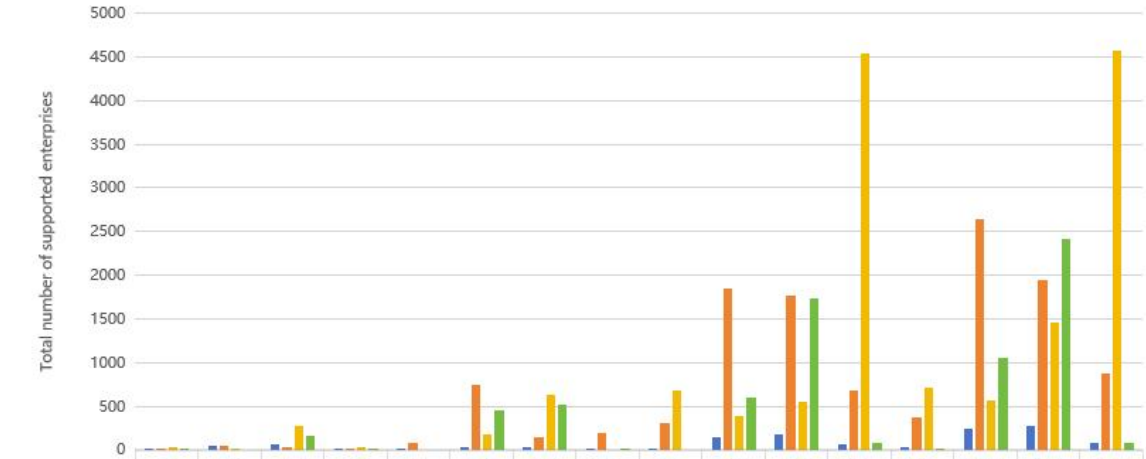
## 4.4. Comparison of Support for Innovation Carriers by Core Departments

From the data in Table 6 below, in terms of support for urban innovation carriers, the total number of enterprise-benefiting policies of the three core departments (Development and Reform, Industry and Information Technology, Science and Technology) in Huizhou is 86 (see Appendix 2 for the specific policy list), which is significantly less than that in Guangzhou (193 items), Shenzhen (221 items), and Dongguan (131 items). This indicates that Huizhou is relatively less active in formulating innovation carrier support policies, and the policy coverage may be relatively narrow. Looking at the number of supported innovation carriers, the total number of enterprises supported by Huizhou is only 855. Compared with Guangzhou (3,907), Shenzhen (5,133), and Dongguan (4,833), the gap is even more significant. Although the number of relevant policies in Dongguan is not prominent, the number of supported enterprises exceeds that in Guangzhou and is close to that in Shenzhen, which is sufficient to reflect that Dongguan's support for innovation carriers in terms of strength and breadth far exceeds that of Huizhou. Next, looking at the data of the single highest subsidy amount of the support policies, the single highest subsidy amount of the relevant policies in Huizhou is 50 million yuan, which is the same as that in Guangzhou and Dongguan, but far lower than that in Shenzhen (300 million yuan for the Development and Reform Department). This indicates that Huizhou's financial support for innovation carriers is also not outstanding, which will lead to a lack of competitiveness in attracting large-scale innovation carrier projects. Finally, looking at the differences in the support strength and effect of the three core departments, compared with the other three cities, the innovation carrier support in Huizhou and Dongguan mainly relies on the science and technology department, and the support numbers of the industry and information technology department and the development and reform department are relatively small. In Shenzhen and Guangzhou, the proportion of the support number of the industry and information technology department exceeds 20%, which indicates that the industry and information technology department and the development and reform department in Huizhou still have a large space for improvement in supporting innovation carriers. These data reflect that Huizhou's support for innovation carriers is very limited in terms of policy strength, influence, competitiveness, and coverage.

Table 6. Comparison of the Number of Policies, the Total Number of Supported Enterprises, and the Single Highest Subsidy Amount of Key Departments in Each City for Supporting Innovation Carriers

| | Key Indicators | Number of Enterprise-benefiting Policies(items) | Total Number of Supported Enterprises | The Highest Amount of a Single Subsidy(million yuan) |
|---|---|---|---|---|
| Huizhou | Development and Reform Department | 9 | 48 | 30 |
| | Industry and Information Technology Department | 19 | 75 | 50 |
| | Science and Technology Department | 58 | 732 | 50 |
| | Total | 86 | 855 | 50 |
| Guangzhou | Development and Reform Department | 8 | 92 | 30 |
| | Industry and Information Technology Department | 72 | 1,251 | 50 |
| | Science and Technology Department | 113 | 2,564 | 50 |
| | Total | 193 | 3,907 | 50 |
| Shenzhen | Development and Reform Department | 33 | 471 | 300 |
| | Industry and Information Technology Department | 64 | 1,178 | 50 |
| | Science and Technology Department | 124 | 3,484 | 50 |
| | Total | 221 | 5,133 | 300 |
| Dongguan | Development and Reform Department | 10 | 52 | 30 |
| | Industry and Information Technology Department | 26 | 192 | 50 |
| | Science and Technology Department | 95 | 4,589 | 50 |
| | Total | 131 | 4,833 | 50 |

Furthermore, looking at the number of enterprises supported by innovation carriers at each level in Fig. 4 below, in addition to the small quantity and poor coverage of support for the scientific and technological innovation space in Huizhou, there are also problems in the support level. The development and reform department mainly relies on municipal policies for support, while the industry and information technology department mainly relies on national and provincial policies for support. The municipal and district-level policies are zero, and the district-level support number of the science and technology department is 0. There are large differences in the policy configurations among departments. Overall, the support strength of innovation carriers in Huizhou at each level is relatively weak, and it shows a decreasing trend from the national level to the district level. This reflects that Huizhou's support policies for innovation carriers lack systematicness and coherence, and it is difficult to form an effective hierarchical support system. Secondly, the number of enterprises supported by different departments at each level varies greatly, which also reflects the poor coordination among departments. There is no unified innovation carrier support strategy, resulting in unbalanced resource allocation and affecting the overall support effect.




| | Development and Reform Department | | | | Industry and Information Technology Department | | | | Science and Technology Department | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Huizhou | Guangzhou | Shenzhen | Dongguan | Huizhou | Guangzhou | Shenzhen | Dongguan | Huizhou | Guangzhou | Shenzhen | Dongguan | Huizhou | Guangzhou | Shenzhen | Dongguan |
| National - level | 3 | 54 | 58 | 4 | 5 | 37 | 36 | 9 | 23 | 147 | 177 | 61 | 31 | 238 | 271 | 74 |
| Provincial - level | 2 | 49 | 26 | 5 | 73 | 746 | 147 | 187 | 305 | 1842 | 1768 | 679 | 380 | 2637 | 1941 | 871 |
| Municipal - level | 34 | 1 | 273 | 40 | 0 | 177 | 639 | 0 | 673 | 393 | 555 | 4538 | 707 | 571 | 1467 | 4578 |
| District - level | 9 | 0 | 158 | 4 | 0 | 450 | 524 | 4 | 0 | 606 | 1730 | 80 | 9 | 1056 | 2412 | 88 |

Fig. 4 Number of Enterprises Supported by Innovation Carrier Policies at Each Level in Each City

In conclusion, compared with the neighboring cities in the Guangdong-Hong Kong-Macao Greater Bay Area, Huizhou still has a large gap in the number of talent policies, implementation effectiveness, surrounding industry coordination, policy gradient coordination of core departments, and support for innovation carriers, especially emerging industries. Conversely, it also indicates that there is still a large room for improvement in the implementation of Huizhou's talent policies in these aspects.

## 5. Problems in the Implementation of Huizhou's Talent Policies

In the past three years, the implementation of Huizhou's talent policies and the construction of a scientific and technological innovation talent highland have achieved certain results. However, compared with neighboring cities such as Guangzhou, Shenzhen, and Dongguan, it still faces many competitions and challenges. Considering factors such as its population size, economic development level, and scientific and technological innovation foundation conditions, the implementation of Huizhou's talent policies has the following problems:

First, due to the limitations of population and economic scale, the talent attraction is relatively weak. The permanent resident population and household registered population of Huizhou are relatively small compared with neighboring cities, and the economic aggregate and the disposable income of urban residents are relatively low, which not only affects the talent attraction, but also affects the comprehensive competitiveness of the city and industries.

Second, the foundation of scientific and technological innovation is relatively weak, and high-end talents are facing the situation of being strongly attracted by cities such as Hong Kong, Macau, Guangzhou, and Shenzhen. The number of science and technology-based small and medium-sized enterprises and high-tech enterprises in Huizhou is significantly different from that of neighboring cities. The number of specialized, refined, characteristic, and new enterprises is also scarce, and the number of invention patents is far from that of cities such as Hong Kong, Macau, Guangzhou, and Shenzhen. These data related to scientific and technological innovation indicate that Huizhou is in a relatively inferior position in terms of talent quality, talent innovation efficiency,

and the cultivation of new quality productive forces at the fundamental level. Moreover, in the subsequent regional competition process, the gap with other cities may further widen. Especially in terms of high-end talents, it suffers from a significant siphon effect from neighboring cities.

Third, the educational foundation is not solid enough, and the driving force for independent talent cultivation is not strong. Huizhou has a relatively small number of universities and scientific research institutions, and there are inherent deficiencies in independent talent cultivation and scientific research and innovation capabilities. Especially in higher education, it is obviously weaker compared with surrounding cities, resulting in a relatively insufficient driving force for the transformation and development of new quality productive forces in the "education - science and technology - talent" trinity [25, 26].

Fourth, the coverage of talent policies is narrow, and there are insufficient and uneven support for talents in the scientific and technological innovation industry. Compared with the three neighboring cities of Guangzhou, Shenzhen, and Dongguan, Huizhou has a small number of enterprise-benefiting talent policies, a relatively low single highest subsidy amount, and the number of enterprises supported by policies at all levels is backward in terms of scale and coverage compared with neighboring cities. Judging from the talent policies and the growth of the number of supported enterprises in the past five years, both show a relatively flat growth trend, indicating that the expansiveness and aggressiveness of Huizhou's talent policies are insufficient. In addition, from the perspective of the industry distribution of enterprises receiving talent subsidies, Huizhou has phenomena such as high industry concentration, weak support for emerging industries, and large differences in subsidy industry structures compared with surrounding cities, indicating that the current industrial and policy support directions in Huizhou have poor coordination with those of surrounding cities, and it is difficult to undertake the talent spillover effect of advantageous industries in surrounding cities.

Fifth, the support for innovation carriers is limited, and the coordination of talent support policies among key departments is weak. Compared with Guangzhou, Shenzhen, and Dongguan, Huizhou has advantages in land and space. However, in the actual implementation of policies, there are obvious deficiencies in the support for innovation carriers (including space support). For example, key departments such as the Development and Reform, Industry and Information Technology, and Science and Technology have a small number of enterprise-benefiting policies for innovation carriers, a small total number of supported enterprises, weak financial support, and poor coordination among departments. The support levels lack systematicness and coherence. Especially at the district level, the utilization of talent policy resources is inflexible, and the number of municipal and district-level supporting policies is seriously insufficient, with neither coverage advantage nor diversity advantage.

## 6. Conclusions and Recommendations

In response to the above problems, based on the current needs of Huizhou's development of new quality productive forces and the goals and positioning of building a scientific and technological innovation talent highland in the Guangdong-Hong Kong-Macao Greater Bay Area, this study creatively proposes the "Four Attractions" talent strategy for accelerating the construction of Huizhou's talent highland, namely: attracting talents with spatial innovation carriers, attracting talents with optimized industrial structure, attracting talents with inclusive talent policies, and attracting talents with an innovative ecosystem.

### 6.1. Attracting Talents with Spatial Innovation Carriers and Undertaking the Spillover of Surrounding Talents

Leveraging Huizhou's relatively abundant land and space resources, actively undertake the industrial transfer and talent spillover from neighboring cities such as Guangzhou, Shenzhen, and Dongguan. Build industrial transfer and undertaking bases and provide preferential land policies and industrial support policies. For example, for the electronic manufacturing enterprises

transferred from Shenzhen, offer policies such as land lease concessions and tax reductions to attract enterprises to settle in, and at the same time, attract relevant technical and management talents to come for employment. Strengthen talent exchange and cooperation with neighboring cities, establish a flexible talent flow mechanism, encourage talents from neighboring cities to work part-time, start businesses, or carry out project cooperation in Huizhou, and fully utilize the talent resource advantages of neighboring cities to actively undertake the spillover of surrounding talents.

### 6.2. Attracting Talents with Optimized Industrial Structure and Promoting Talent Flow and Sharing

Enrich Huizhou's industrial formats through industrial collaboration and the cultivation of emerging industries. On the one hand, strengthen the cooperation between Huizhou and neighboring cities in industrial collaboration. Establish an industrial collaborative innovation alliance to promote the cooperation and talent exchange among enterprises in the upstream and downstream of the industrial chain. For example, in the electronic information industry chain, the electronic manufacturing enterprises in Huizhou establish cooperative relationships with chip design enterprises in Shenzhen and software R&D enterprises in Guangzhou to realize the flow and sharing of talents in the industrial chain. Through industrial collaboration, improve Huizhou's position in the industrial division of the Greater Bay Area, attract more relevant industrial talents to gather in Huizhou, and at the same time, promote the growth and development of local talents in Huizhou. On the other hand, actively cultivate emerging industries such as artificial intelligence, biomedicine, and new energy vehicles. Formulate special industrial talent support policies, set up emerging industry development funds, and attract enterprises and talents to enter emerging industry fields.

### 6.3. Attracting Talents with Inclusive Talent Policies and Covering More Levels of Talents

Further lower the threshold of Huizhou's talent policies to enable more talents to enjoy policy benefits. In addition to focusing on high-end and innovative talents, expand the coverage of policies to various talent groups such as skilled workers and grassroots talents. For example, for skilled workers working in Huizhou, provide policies such as skills improvement subsidies and housing subsidies. By expanding the scope of policy beneficiaries, let different levels and types of talents feel Huizhou's attention and support for talents, and enhance their sense of favor and belonging to Huizhou. Further increase the publicity of Huizhou's inclusive talent policies to improve awareness and attract more potential talents to pay attention to Huizhou.

### 6.4. Attracting Talents with an Innovative Ecosystem and Stimulating Talent Innovation Vitality

Increase investment in the construction of innovation platforms and build a multi-level innovation platform system including scientific research laboratories, enterprise technology centers, innovation and entrepreneurship incubation bases, etc. For example, support enterprises to jointly build joint laboratories with universities and scientific research institutions and carry out industry-university-research cooperation projects. Strengthen the support for innovation and entrepreneurship incubation bases and provide start-up enterprises with site, capital, technical guidance and other support. Through the construction of the innovation platform system, gather various innovation resources and attract innovative talents and teams to carry out scientific research and entrepreneurial activities in Huizhou. Establish and improve the innovation incentive mechanism, give generous rewards to innovative talents and innovation achievements. Improve the intellectual property protection system and strengthen the protection of talent innovation achievements.

## 7. Innovations and Future Research Plans

The innovations of this study are mainly reflected in the following aspects: First, the use of data is innovative. The research collects the talent-related enterprise-benefiting policies and the situation of supported enterprises in various regions through the Qizhidao platform, making full use of the current popular cutting-edge technologies such as big data, cloud computing, and artificial intelligence to obtain research data, which is rarely used in similar studies. This data source is not only rich and comprehensive but also of great reference value. It can compare the implementation status of talent policies in Huizhou, Guangzhou, Shenzhen, and Dongguan from a new perspective and effectively fill the gaps in previous studies at the data level. Second, there is an innovative exploration in the research method. The research is carried out by combining longitudinal analysis and horizontal comparison. Longitudinally, it deeply explores the development trend of Huizhou's own talent policy implementation in terms of scientific and technological innovation talents, scientific research investment, and policy implementation. Horizontally, it comprehensively compares the multi-dimensional data of the three surrounding cities in terms of urban development foundation, scientific and technological innovation foundation, talent policy, and the support of core departments for innovation carriers. This cross-cutting research method is different from previous partial or single-dimensional studies. It can not only clearly show the development track and achievements of Huizhou's talent policies but also take into account its relative position and deficiencies in the talent competition in the Greater Bay Area, laying a solid foundation for the subsequent proposal of the targeted and feasible "Four Attractions" talent strategy.

Based on this study, further research will be carried out in the following directions: First, expand the scope of research. Expand the research objects to other cities in the Guangdong-Hong Kong-Macao Greater Bay Area and other regions with high-level talent highland construction in China, conduct extensive comparative studies on talent policies, and summarize the experiences and lessons of different regions to provide more reference cases for the optimization of talent policies in Huizhou and the whole country. Second, conduct research on the synergy between talent policies and industrial development, deeply explore the synergetic relationship between talent policies and the development of urban strategic industries, and analyze how they promote each other to achieve the integrated development of talents and industrial innovation and talents and urban construction. Third, carry out long-term follow-up research. Continuously pay attention to the impact of talent policies in Huizhou and other Greater Bay Area cities on the construction of a scientific and technological innovation talent highland in the long term in the future, focus on the dynamic changes in talent structure, emerging industries, innovation ecology, and other aspects, and deeply analyze the long-term interaction between policies and urban development to help the dynamic adjustment and sustainable development of policies.

## Acknowledgements

Fund 1: The General Project of the Guangdong Human Resources Research Association's 2024 Annual Topics, "Comparative Study on the Construction Strategies and Effects of the Highland for Industrial Scientific and Technological Innovation Talents in the Nine Cities of the Guangdong-Hong Kong-Macao Greater Bay Area" (Project No.: GDHRS-24-02-012).

Fund 2: The Co-construction Project of the Huizhou Federation of Social Sciences' 2024 Annual Topics, "Research on the Path for Huizhou to Accelerate the Building of Highland for Scientific and Technological Innovation Talents under the Background of Developing New Qualitative Productive Forces" (Project No.: HZSK2024GJ092).

Fund 3: The construction site of the first-class undergraduate major at Guangzhou Institute of Technology in 2022 - Marketing major; and the school-level scientific research project of Guangzhou Institute of Technology, "Research on the Development Path of High-tech Industries in the Guangdong-Hong Kong-Macao Greater Bay Area Supported by Green Innovation" (Project No.: 2023XBZ03).

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