

Analysis of the Current Situation of Industry-University-Research Resource Co-construction and Sharing and Suggestions for Countermeasures

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Abstract

This research takes Huizhou City in Guangdong Province as an example to deeply analyze the current situation of industry-university-research resources jointly built and shared, and puts forward corresponding countermeasures and suggestions. The background of the study is based on the location advantage and industrial foundation of Huizhou City as an important node city in the Guangdong-Hong Kong-Macao Greater Bay Area, and explores the important role of IUR cooperation in promoting regional economic development and scientific and technological innovation. The significance of the study is reflected in the fact that through IUR cooperation, Huizhou City is able to accelerate the transformation and industrialization of scientific and technological achievements and enhance the regional innovation capacity. The research aims to solve the problem of how to strengthen the industrial technology innovation capacity of Huizhou City, enhance regional competitiveness, and realize the effective way of transformation of scientific and technological achievements. The research methods adopt literature review, comparative analysis and field research to comprehensively sort out the current situation, internal motivation and external conditions of IUR cooperation in Huizhou City. The result shows that although Huizhou has made some progress in jointly building and sharing resources for IUR cooperation, it still faces the problems of insufficient capital investment, single mode of cooperation, poor flow of talents and unreasonable allocation of resources. The conclusion suggests that Huizhou city needs to increase capital investment, innovate the mode of cooperation, strengthen the cultivation and introduction of talents, and optimize the allocation of resources, in order to promote the efficient joint build and sharing of IUR resources, and to promote the high-quality development of the economy.

Keywords

Industry-university-research; Resources joint building and sharing; Transformation of scientific and technological achievements; Huizhou; Policy support.

1. Introduction

Industry-university-research (IUR) cooperation is an important way to promote scientific and technological innovation and industrial development, which is significant for enhancing the competitiveness of the regional economy and realizing socioeconomic sustainable development. As one of the important cities in Guangdong Province, Huizhou is located on the east coast of Guangdong, Hong Kong and Macao Greater Bay Area, and has a unique geographical location and industrial foundation, which is an important position for promoting the cooperation among industries, universities and research institutes in Guangdong Province.

Huizhou has significant locational advantages and economic characteristics in IUR cooperation. As an important node city in the Guangdong-Hong Kong-Macao Greater Bay Area,

Huizhou is close to scientific and technological innovation highlands such as Shenzhen and Guangzhou, enabling it to have convenient access to cutting-edge sci-tech resources and high-end talents. At the same time, Huizhou has a strong industrial foundation, especially in the fields of electronics and information, petrochemicals, automobile manufacturing and others, which provides broad application scenarios and market demand for IUR cooperation. In recent years, the government of Huizhou attaches great importance to the cooperation between industry, academia and research, and has issued a series of policies and measures, such as the “14th Five-Year Plan for Science and Technology Innovation in Huizhou”, aiming to promote the in-depth cooperation between colleges and universities, scientific research institutes and enterprises, and to accelerate the transformation and industrialization of scientific and technological achievements through policy guidance and financial support.

Huizhou actively promotes cooperation with universities and scientific research institutions at home and abroad, and has established a number of IUR cooperation platforms, such as the Huizhou Research Institute of Sun Yat-sen University, which further promotes the clustering and sharing of scientific and technological innovation resources. Huizhou has obvious geographical advantages, industrial foundation and policy environment in the cooperation, which provides strong support for promoting regional scientific and technological innovation and industrial upgrading. In the future, Huizhou is expected to realize high-quality economic development and become a highland of science, technology and industrial innovation in the Guangdong-Hong Kong-Macao Greater Bay Area, even in the whole country, under the impetus of the IUR cooperation.

IUR cooperation is an important way to promote regional economic development and scientific and technological innovation, for Huizhou City, this mode of cooperation not only accelerates the transformation of scientific and technological achievements and industrialization, but also provides a strong support to enhance the regional innovation capacity. The economic development of Huizhou City has benefited from the promotion of the cooperation, especially in the field of electronic information, petrochemical energy and new materials and other “2+1” industries, through the cooperation, it improves the technological level and competitiveness of the industry, and also promotes the optimization and upgrading of the industrial structure. In 2023, Huizhou's GDP reached 563.968 billion yuan, an increase of 5.6% year-on-year, of which the value-added of industries above designated size increased by 5.2% year-on-year, especially the electronics industry, petrochemical energy and new materials industry, which grew significantly. This is inseparable from the in-depth advancement of the IUR cooperation.

In addition, Huizhou City has also achieved remarkable results in enhancing regional innovation capability. Through IUR cooperation, Huizhou has accelerated the construction of scientific and technological innovation platforms, such as the Dongjiang Laboratory, promoted the improvement of the system of scientific and technological incubation and breeding, and also facilitated the growth of the scientific and technological talent team. In 2020, the proportion of research investment in GDP in Huizhou reached 3.0%, exceeding the level of 2.5% for innovative countries and regions, and the turnover of technology contracts amounted to 1.12 billion yuan, an increase of 1.05 billion yuan compared with 2015. The turnover of technology contracts reached 1.12 billion yuan, an increase of 1.05 billion yuan over 2015, and these data fully demonstrate the important role of industry-university-research cooperation in enhancing regional innovation capacity. IUR Cooperation has played a key role in the economic development of Huizhou and the enhancement of regional innovation capacity, which not only promotes the technological innovation and structural upgrading of industries, but also accelerates the transformation of scientific and technological achievements, and provides a strong support for the high-quality

development of Huizhou.

This study aims to deeply analyze the current situation of IUR resource sharing in Huizhou City, and put forward effective countermeasures and suggestions to promote the innovative development of the regional economy. The core issue of the study focuses on how to strengthen the industrial technology innovation capacity of Huizhou City, enhance regional competitiveness, and realize an effective way of transforming scientific and technological achievements through IUR cooperation. The main contents of the study include: first, a comprehensive review of the current situation of IUR cooperation in Huizhou, including the policy environment, cooperation modes, successful cases and problems. Second, an analysis of the intrinsic motivation and external conditions of IUR cooperation in Huizhou, and an exploration of the mechanism for coordinating the interests of different main bodies. Third, the proposal of strategies to promote the construction and sharing of resources in Huizhou, including policy suggestions, innovation of cooperation mechanisms, talent cultivation model and so on. The goal of the research is to form a set of systematic IUR cooperation models, promote the transformation and industrialization of scientific and technological achievements, and provide theoretical support and practical guidance for the industrial upgrading and economic development of Huizhou and even Guangdong Province.

2. Literature Review

2.1. Theoretical Basis of Industry-University-Research Co-operation

By combing through the relevant literature on the theoretical basis of Industry-University-Research Cooperation, we can find that different scholars have interpreted and analyzed this concept from multiple dimensions. Yang Zongren (2015) defines IUR Cooperation from both the macro and micro levels, emphasizing the interaction between education, economy and scientific research systems, as well as the participation of government, finance and socioeconomic intermediaries. Sun Baohui (2024), on the other hand, argues from the triple helix theory that the integration of industry and education is the core of the reform of vocational education, emphasizing the importance of the top-level design, the match between the supply and demand of talents, and the guarantee mechanism for the type of education. Zhao Xu (2012), on the other hand, focuses on analyzing the interaction mechanism between the technology market model and industrial scalability, which is considered as the foundation of iIUR cooperation. Wu Xiuling (2024) further utilized the triple helix theoretical model to point out that the construction force and operation mode of the common technical service platform of higher vocational colleges and universities require the synergy of the government, enterprises and schools. It can be seen that the theoretical foundations of IUR cooperation mainly include the following, firstly, the synergistic participation of multiple subjects, that means the cooperation among the government, universities, research institutions and enterprises; secondly, the innovation and transformation of knowledge, which promotes the transformation of scientific and technological achievements into productive forces through cooperation; and thirdly, the systematic integration, which integrates the education, scientific research and industrial systems in order to achieve the optimal allocation of resources and the high efficiency of talent cultivation. These theoretical foundations provide clear guidance and practical paths for IUR cooperation.

2.2. Current Situation of Industry-University-Research Cooperation at Domestic and Foreign Countries

The domestic and international IUR cooperation models have presented their own characteristics and trends in the continuous evolution and development. Internationally, some

scholars have found that the development model of Silicon Valley in the United States has formed an innovation ecosystem with Stanford University as the axis through the close cooperation between universities and neighboring high-tech enterprises, which has contributed to the prosperous development of the regional economy (Liu Qingxin, 1999), while the model of the Fraunhofer Institute in Germany emphasizes technology development in the field of applied research and provides contractual scientific research services for small and medium-sized enterprises, effectively connects academic research with industrial needs (Yang Zongren, 2015). In contrast, although Chinese universities have a late start in University-Industry-Research cooperation, in recent years, through policy promotion and mechanism innovation, such as the “985 Project” and the “2011 Plan”, they are gradually building up a cooperation network of government-industry-university-research centered on universities, emphasizing collaborative innovation and resource sharing to Collaborative innovation and resource sharing are emphasized to promote the transformation of scientific and technological achievements and regional economic development. However, China still needs to strengthen the intensity of cooperation, the construction of cooperation networks, and the proportion of cooperation with enterprises and the government, especially the proportion of cooperation with enterprises is on the low side, which indicates that there is room for further improvement in the transformation of scientific and technological achievements and industrial application (Wang Weichao et al., 2013). Generally speaking, both domestic and foreign IUR cooperation emphasizes the synergy among universities, industries and governments, but the specific implementation paths and cooperation modes have their own focuses, reflecting the strategic choices and practical explorations in the construction of S&T innovation systems in different countries.

2.3. Practical Cases of Industry-University-Research Co-operation in Huizhou

Through cooperation with Sun Yat-sen University, Huizhou City has established the Huizhou Research Institute of Sun Yat-sen University, forming an IUR cooperation model with local characteristics. Relying on the scientific research advantages of Sun Yat-sen University and the industrial foundation of Huizhou, the research institute has constructed the achievement transformation chain of “small test + medium test + enterprise incubation + achievement promotion”, effectively promoted the transformation and industrialization of scientific and technological achievements, and provided a strong impetus for the local economic development and industrial upgrading (Liu Qijiang et al., 2023). In addition, the institute also focuses on talent cultivation and scientific and technological innovation, and promotes technological innovation and enterprise development by building research centers and engineering centers with enterprises, as well as providing a series of public service platforms for enterprises, such as testing, scientific and technological services, which further promotes the in-depth integration of industry, academia and research (Ji Hongbing, 2018). It can be seen that the construction of the Huizhou Research Institute of Sun Yat-sen University not only strengthens the cooperation between the university and the local community, but also promotes the close integration of science and technology innovation with local industries, which provides strong support for the industrial transformation and economic development of Huizhou City.

2.4. Effectiveness and Problems of Industry-University-Research Co-operation

In exploring the effectiveness and problems of IUR cooperation, many scholars have put forward their insights through different perspectives and research methods. Su Jintaki (2010) emphasized the importance of the IUR cooperation model for the reform of education and research in universities in his study, and considered this cooperation model as an effective way to improve the level of teaching and research and cultivate high-quality applied talents.

While Zhang Meizhen et al. (2019) identified and evaluated the risks of IUR Cooperation projects from the project risk management perspective through FMEA and fuzzy logic, pointed out that the implementation and control stage is the main source of project risks, and put forward the corresponding risk control countermeasures. Gong Zhanzhong (2015) took the example of district and university integration construction in Dalian High-tech Zone to discuss the practice of government, industry, academia and research collaborative innovation, and concluded that this mode has a positive effect on enhancing the independent innovation ability of enterprises and stimulating the enthusiasm of universities for research, but also pointed out the problems in cooperation, such as insufficient cooperation motivation and low rate of transformation of achievements. Overall, IUR Cooperation has achieved remarkable results in promoting education reform, research innovation and talent cultivation, but it also faces problems such as risk management, cooperation motivation and results transformation. Future research needs to further explore how to optimize the cooperation mode, improve the efficiency of cooperation, and how to strengthen the depth and breadth of IUR Cooperation.

3. Research Methodology and Source Material

3.1. Research Methodology

3.1.1 Documentary Research Method

Literature research method is a research method that collects, organizes and analyzes existing literature in order to obtain information, explore laws and construct theories. It is widely used in various disciplinary fields, especially in history, literature, information science and so on. This method focuses on the systematic sorting and in-depth analysis of existing literature, aiming to understand the research topic and reveal the principles and connections behind the phenomena through second-hand information.

3.1.2 Comparative Analysis Method

Contrastive analysis is a method of research in which two or more objects are compared against each other in order to reveal the similarities and differences between them. This method is widely used in various disciplines, including the social sciences, natural sciences, and engineering and technology. Comparative analysis can analyze qualitative or quantitative data with the aim of identifying the characteristics, strengths, weaknesses, and potential room for improvement of the research object. Effective comparative analysis requires clear criteria and dimensions of comparison to ensure that comparisons are fair and scientific, thus providing a basis for decision-making.

3.2. Source Material

The data sources for this study may include the following three aspects: first, official statistics and policy documents released by the Huizhou municipal government or related departments, which usually cover the basic situation and policy orientation of IUR cooperation; second, academic databases and library resources are utilized to collect relevant academic papers and research reports, in order to understand the dynamics and results of the research on IUR cooperation and sharing in the academic community; third, the Internet resources and news reports can also provide certain background information and latest developments. The comprehensive analysis of these data and information helps this study to comprehensively understand the current situation of IUR resource sharing in Huizhou City and put forward targeted countermeasures and suggestions.

4. Analysis of the Current Situation of Industry-University-Research Resource Co-construction and Sharing in Huizhou City

4.1. Overview of the Current Situation of Industry-University-Research Resource Co-construction and Sharing in Huizhou City

Huizhou has realized steady growth in industrial resources, educational resources and scientific research resources, and in the growth of industrial resources, the growth rates of the electronic information industry and the automobile and equipment manufacturing industry exceeded the average level, showing the strong momentum of development in these fields. The growth of educational resources is reflected in the increase of higher education and professional training, while the growth of scientific research resources is reflected in the increasing investment in research and development cooperation projects. Huizhou's investment and construction in industry-university-research resources is achieving remarkable results, providing strong foundations for the city's sustainable development and industrial upgrading.

The mode of cooperation in Huizhou in terms of the common construction and sharing of resources for industry, academia and research is mainly reflected in the close tripartite cooperation among the government, universities and enterprises. For example, the Huizhou Research Institute of Sun Yat-sen University, in cooperation with the Huizhou Municipal Government, has built a number of industry-university-research bases, through which enterprises are able to cooperate directly with the university research team to accelerate the transformation of scientific research achievements. The Institute has built 29 engineering centers with enterprises and maintained long-term cooperation, docking more than 300 enterprises, and creating benefits of more than 2 billion yuan from IUR cooperation (Ji Hongbing, 2018). Successful cases include 13 engineering centers jointly built by the Institute and enterprises, resulting in 23 IUR cooperation projects amounting to 9.18 million yuan, and it is worth noting that the Green Solvent Engineering Technology Center jointly built by the Institute and Huizhou Yuxin Chemical Co.(Liu Qiqiang, 2014). In addition, the research institute also actively develops international cooperation, and closely cooperates with the Hebrew University of Israel and other scientific research teams to jointly promote the design and industrialization of marine anticorrosive coatings and flavors of natural aromatic materials.

Despite certain achievements, there is still the problem that financial investment is insufficient, especially in basic research and applied research, and there is still a big gap compared with developed regions. The depth and breadth of IUR cooperation are still insufficient, some cooperation projects still remain at the superficial level, and lack of in-depth cooperation in technology research and development and talent training. In addition, the allocation of resources is not reasonable enough, and some high-quality resources are not fully utilized, which affects the overall efficiency of IUR cooperation. Overall, Huizhou has made some progress in the sharing of resources among industries, universities and research institutes, but compared with advanced regions, there is still plenty of room for improvement.

4.2. Analysis of Influencing Factors of Industry-University-Research Resource Co-construction and Sharing in Huizhou City

For the analysis of effect factors on Huizhou City's industry-university-research resource sharing, this study focuses on the three dimensions, including policy, economy, and social culture.

In terms of policy factors, the Huizhou government has promoted the deep integration of industry, academia and research through the establishment of research institutes in cooperation with universities, such as the Huizhou Research Institute of Sun Yat-sen University (Ji Hongbing, 2018). The government provides support such as venues and funds, while leveraging the scientific research power and talent resources of universities to promote the transformation and industrialization of scientific and technological achievements. For

example, the research institute has jointly built 13 engineering centers with enterprises, resulting in 23 IUR cooperation projects amounting to 9.18 million yuan (Ji Hongbing, 2018), which reflects the positive role of policy guidance in promoting IUR cooperation.

In terms of economics, the development of the petrochemical industry in Huizhou has provided a broad market and financial support for IUR cooperation. The Huizhou Research Institute of Sun Yat-sen University has driven innovation and output growth by integrating resources from various parties, such as jointly building research centers with enterprises, helping enterprises to obtain support for provincial science and technology projects (Liu Qiqiang, 2014). The Huizhou Research Institute of Sun Yat-sen University also provides professional technical support to enterprises through technical services and project incubation, which promotes economic benefits and demonstrates that economic development has a significant positive effect on IUR cooperation.

In terms of social and cultural, IUR cooperation in Huizhou City has been influenced by the social and cultural environment. The Huizhou Research Institute of Sun Yat-sen University has improved public awareness and acceptance of the petrochemical industry by writing atlases of petrochemical science knowledge, establishing science education bases, and creating a favorable social atmosphere (Liu Qi-Qiang, 2014). In addition, the institute has strengthened its interaction with the community, youth, and enterprises by organizing various science popularization activities and promoted the social application of scientific and technological achievements, which highlights the positive guidance of cultural development on IUR cooperation.

On the whole, the influencing factors of jointly building and sharing resources among industries, universities and research institutes in Huizhou City are multifaceted, and the guidance of policies, economic support and the sociocultural environment have all played important roles. Therefore, Huizhou City has achieved remarkable results in jointly building and sharing resources among industries, universities and research institutes.

5. Problems of Industry-University-Research Resource Co-construction and Sharing in Huizhou City

The main problems that exist in Huizhou in terms of jointly building and sharing resources of industry, academia and research includes: insufficient capital investment, single mode of cooperation, poor flow of talents and unreasonable allocation of resources.

5.1. Inadequate Funding

The primary problem is insufficient financial input. Although the Huizhou government has already provided some financial support for IUR cooperation by establishing research institutes in cooperation with universities, there is still a big gap between Huizhou's investment in basic research and applied research compared with developed regions. This has led to some potential research projects being difficult to carry out or sustain due to lacking sufficient financial support. For example, some enterprises may not be able to establish in-depth cooperation with universities or research institutes at the early stage, because of lack of funds. Thus, the pace of technological innovation and industrial upgrading is limited. In addition, insufficient funding also affects Huizhou's investment in research infrastructure construction, limiting the sharing and efficiency of research resources.

5.2. Single Mode of Cooperation

Another problem is that cooperation mode is single. At present, IUR cooperation in Huizhou City is mostly carried out in a government-led mode with the participation of universities and enterprises. Although this mode can ensure the stability of cooperation and the continuity of policies, but it has certain limitations. These limitations are mainly reflected in the fact that

the flexibility and innovativeness of the cooperation may be limited, because government-led cooperation tends to pay more attention to short-term benefits and policy orientation, and neglects long-term research needs and market changes. In addition, this model may lead to unbalanced allocation of resources, as some SMEs and emerging fields may find it difficult to participate in IUR cooperation due to the lack of sufficient policy support and financial investment. Therefore, Huizhou City needs to explore more diversified and market-oriented modes of IUR cooperation, in order to promote the joint building and sharing of resources between industry, academia and research.

5.3. Poor Flow of Talent

Talent is a key factor in jointly building and sharing resources between industry, academia and research, but Huizhou City has certain problems in talent mobility. It cannot be ignored that there are relatively few higher education and research institutions in Huizhou, which limits the cultivation and introduction of talents. In this way, at the same time, the industrial structure and employment environment of Huizhou City may not be sufficient to attract and retain high-end talents, leading to a serious brain drain. In addition, the inadequacy of incentives and career development paths for talents in Huizhou City also affects the motivation and creativity of talents. These problems not only affect the quality and efficiency of IUR cooperation in Huizhou City, but also constrain the innovation ability and competitiveness of Huizhou's industries.

5.4. Unreasonable Allocation of Resources

In the process of jointly building and sharing resources for industry, academia and research in Huizhou, the unreasonable allocation of resources is also a prominent problem. On the one hand, there is an imbalance in the geographical distribution of scientific research resources and industrial resources in Huizhou, and some resource-rich regions may waste resources due to the lack of effective integration and utilization. On the other hand, Huizhou City has overly concentrated on certain fields or enterprises in the distribution of resources for industry, academia and research, while neglecting the needs of other fields and small and medium-sized enterprises. This unreasonable allocation of resources not only affects the overall efficiency of IUR cooperation in Huizhou City, but may also lead to the homogenization of industrial structure and the decline of innovation capacity. Therefore, Huizhou city needs to solve the problem of unreasonable resource allocation by optimizing policy guidance, strengthening resource integration and improving the efficiency of resource utilization.

6. Countermeasures and Suggestions for the Co-construction and Sharing of Industry-University-Research Resources in Huizhou City

In order to improve the quality and efficiency of jointly building and sharing of IUR resources in Huizhou City, it is necessary to start from increasing capital investment, innovating the mode of cooperation, strengthening the cultivation and introduction of talents, optimizing the allocation of resources, etc. Through the joint efforts of the government, universities, enterprises and all walks of life, we can build a more open, efficient and synergistic system of IUR cooperation.

6.1. Increase Funding and Optimise Efficiency in the Use of Funds

The primary countermeasure to the insufficient financial input in the joint building and sharing of industry-university-research resources in Huizhou is to increase the financial input. The government should increase financial support for IUR cooperation projects, especially in the fields of basic research and applied research, in order to ensure that scientific research projects can be carried out smoothly. At the same time, it can encourage enterprises to

increase their research investment by setting up special funds, providing tax incentives, risk compensation and other measures, especially by giving more attention and support to the innovation projects of SMEs. In addition, optimizing the efficiency of the use of funds is also essential. Through the establishment of a strict mechanism for project evaluation and fund supervision, it can be ensured that funds can be accurately invested in the scientific research projects with the greatest potential and needs, so as to avoid a waste of resources.

6.2. Innovative Modes of Cooperation to Promote Diversified Cooperation

To solve the problem of single mode of cooperation, Huizhou City should explore and innovate the mode of cooperation and promote diversified cooperation between industry, universities and research institutes. This includes encouraging the establishment of more flexible cooperation mechanisms between enterprises, universities and research institutions, such as joint research centers and technology transfer platforms, in order to promote technology exchange and knowledge sharing. At the same time, market-oriented operation mechanisms can be introduced, such as attracting more social capital to participate in IUR cooperation through venture capital and crowdfunding. In addition, the government can encourage cross-industry and cross-field cooperation through policy guidance and incentives to break down industry barriers, so as to promote the optimal allocation and effective use of resources.

6.3. Strengthening the Cultivation and Introduction of Talents and Optimising the Talent Mobility Mechanism

Talents are the core resources of IUR cooperation, so strengthening the cultivation and introduction of talents is the key to enhance the ability of Huizhou City to jointly build and share resources between industry, academia and research. The government and universities should increase investment in education, improve the quality of education, and train more high-quality professionals. At the same time, by providing favorable treatment, good working environment and development opportunities to attract and retain high-end talents. It is also necessary to optimize the mechanism for the mobility of talents, promoting the mobility of talents among different institutions and fields by establishing a platform for the exchange of talents and providing services such as career development counselling, so as to enhance the efficiency of the use of talents and the vitality of innovation.

6.4. Optimising the Allocation of Resources and Increasing the Efficiency of Resource Utilisation

In response to the unreasonable allocation of resources, Huizhou City needs to optimize the allocation of resources and improve the efficiency of resource utilization through policy guidance and market mechanisms. Specifically, the government should guide the flow of resources to areas and regions with potential and demand by formulating reasonable industrial policies and regional development plans. In addition, it should establish and improve resource-sharing platforms, such as research facility-sharing platforms and data-sharing platforms, so as to promote the open sharing and efficient utilization of resources. At the same time, information exchange and IUR cooperation will be strengthened, and the effective docking and integration of resources will be promoted through the regular activities such as industry-university-research meetings and technology exchange meetings. Through these measures, the overall advantages of Huizhou's industry-university-research resources can be better utilized to promote industrial innovation and upgrading.

7. Discussions and Conclusions

7.1. Discussions

Huizhou City has made progress in jointly building and sharing resources for industry, universities and research, but it also faces a lot of challenges. From the analysis of the current situation, Huizhou's industrial resources, educational resources and scientific research resources have shown positive growth, especially in the fields of electronic information industry and automobile and equipment manufacturing industry, Huizhou has shown a strong momentum of development. The popularization and enhancement of educational resources and the increase in scientific research investment have provided a strong foundation for the sustainable development and industrial upgrading of Huizhou. However, problems such as insufficient capital investment, single mode of cooperation, poor flow of talents and unreasonable allocation of resources are still restricting the further development of jointly built and shared resources of industry, university and research in Huizhou.

Insufficient financial input limits the development of scientific research projects and the construction of scientific research infrastructure, which affects the competitiveness of Huizhou in scientific and technological innovation and industrial upgrading. The single mode of cooperation limits the flexibility and innovation of IUR cooperation, which is not conducive to the optimal allocation and effective utilization of resources. The poor flow of talents and unreasonable allocation of resources further aggravate these problems, affecting the overall efficiency and quality of industry-university-research resources jointly building and sharing in Huizhou. Therefore, Huizhou city needs to take effective measures to solve these problems in order to promote the efficient jointly building and sharing of industry-university-research resources.

7.2. Conclusions

This study puts forward a series of countermeasure suggestions for the problems existing in the process of jointly building and sharing resources among industries, universities and research institutes in Huizhou City. Firstly, increasing financial investment is the key. The government should increase financial support for IUR cooperation programs and encourage enterprises to increase their research investment. Secondly, innovate the cooperation mode and promote diversified cooperation. Through the establishment of a more flexible cooperation mechanism and the introduction of a market-oriented operation mechanism, we can break down industry barriers and promote the optimal allocation of resources. In addition, strengthening the cultivation and introduction of talents. Optimizing the mechanism of talent mobility and improving the using efficiency and innovation vitality of talents are the keys to enhance the ability of jointly building and sharing resources among industries, universities and research institutes in Huizhou City. Finally, optimize the allocation of resources, improve the efficiency of resource utilization, and promote the open sharing and efficient use of resources through policy guidance and market mechanism.

In the future, Huizhou City has great potential for development in the jointly building and sharing of industry-university-research resources. Through the joint efforts of the government, universities, enterprises and all walks of life to build a more open, efficient and synergistic IUR cooperation system. Huizhou City is expected to make greater breakthroughs in scientific and technological innovation and industrial upgrading, which will lay a solid foundation for the city's long-term development. At the same time, Huizhou's experience can also serve as a reference for other cities to promote the healthy development of industry-university-research resources together building and sharing on a nationwide scale.

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