Construction and Thinking of Guangdong - Hong Kong - Macao Greater Bay Area International Science and Technology Innovation Centre

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Abstract: “To construct the International Science and Technology Innovation Centre” is the key content for China’s promoting the construction of Guangdong - Hong Kong - Macao Greater Bay Area. This paper will analyse the characteristics of Guangdong - Hong Kong - Macao Greater Bay Area International Science and Technology Innovation Centre from the aspects of the obviousness of its policy - oriented feature and numerous of international innovative platforms, came to a conclusion that the construction of Guangdong - Hong Kong - Macao Greater Bay Area International Science and Technology Innovation Centre still faces problems as: low degree of scientific and technological synergy, low degree of commercialization of scientific and technological achievements and the need for improvement of inclusive innovation culture. Basing on this, we gave out proposals and countermeasures as to establish a special policy of coordination mechanism for scientific and technological collaborative innovation, to improve the commercialization of scientific and technological achievements and to create a cultural atmosphere that advocates innovation, openness and inclusiveness in the bay area, etc.

1. Introduction

In February 2019, the Outline of Development Planning for Guangdong - Hong Kong - Macao Greater Bay Area was officially issued. The “Outline” mentions that Hong Kong, Macao, Guangzhou, and Shenzhen are regarded to be core engines of regional development of Guangdong - Hong Kong - Macao Greater Bay Area, and establishing the International Science and Technology Innovation Centre was listed as the core task. It also proposes to gather international innovation resources, by constructing an open regional collaborative innovation community, creating high - level technologically innovative carriers and platforms and optimizing regional innovation environments. We should focus on improving the transforming ability of scientific and technological achievements, and build a global scientific and technological innovation highland, as well as an important source of new emerging industries. In this study, we have analysed the characteristics of Guangdong - Hong Kong - Macao Greater Bay Area International Science and Technology Innovation Centre, and some problems of its construction are pointed out. Thereafter, several strategic reflections on the construction are put forward, may it provide any reference for promoting the construction of the International Science and Technology Innovation Centre.

2. Characteristics, Problems and Countermeasures of Guangdong - Hong Kong - Macao Greater Bay Area International Science and Technology Innovation Centre

2.1 Characteristics

Since China’s reform and opening up policy, the Pearl River Delta region, Hong Kong and Macao are now most dynamic regions in China’s economy. Especially in recent years, the development of science and technology is very prominent. Shenzhen has become the innovation capital of China and even the world. Therefore, the proposal of the Guangdong - Hong Kong -

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Macao Greater Bay Area strategy is undoubtedly of milestone significance. As the core content of the strategy, the International Science and Technology Innovation Centre owns the following characteristics:

(1) Guangdong - Hong Kong - Macao Greater Bay Area International Science and Technology Innovation Centre was constructed under a condition of “one country, two systems, three jurisdictions, three customs zones and three currencies” policies, which is absolutely the most definitive feature to distinguish it from other bay areas. Location is the decisive factor affecting the growth and development of Global Science and Technology Innovation Centre [1]. The location advantage of Guangdong - Hong Kong - Macao Greater Bay Area is incomparable in China. However, compared with other Bay Areas in the world, in order to achieve technological innovation, Guangdong - Hong Kong - Macao Greater Bay Area was inalienably required to coordinate among places. In terms of rules convergence, intellectual property protection, personnel exchange, material support and other aspects, innovative systems are needed to achieve the integrated development of the Greater Bay Area.

(2) Policy-oriented characteristic of Guangdong - Hong Kong - Macao Greater Bay Area is obvious. The Guangdong - Hong Kong - Macao Greater Bay Area strategy is a macro strategy led by the Chinese government, which caused its policy-oriented characteristic to be very obvious. Regardless of national or local perspectives, there are special leaders or organizations to promote the construction of Guangdong - Hong Kong - Macao Greater Bay Area, and a series of policy documents have been issued. Particularly, Guangdong Province, has issued hundreds of guidance documents in the past one year; Hongkong also sets its specialized agency for Guangdong - Hong Kong - Macao affairs, and has listed the construction of Guangdong - Hong Kong - Macao Greater Bay Area as one of the core tasks of the SAR Government. Macao, who’s five-year development plan particularly attached the content of its participation in the construction of Guangdong - Hong Kong - Macao Greater Bay Area.

(3) The economic characteristics of “the Port of Knowledge” are obvious to be the economic foundation to build an international science and technology innovation centre. The per capita GDP in the Pearl River Delta region is close to US$ 20, 000. Hong Kong has long before crossed the middle-income trap, and Macao’s per capita income is already at the highest level in the world. The output value of the tertiary industry in the Greater Bay Area has surpassed the secondary industry, and the service industry accounts for an obviously large proportion of the total economic output. In terms of development level, the level of the future development of the Greater Bay Area may be considered as a knowledge-based economy. Guangdong - Hong Kong - Macao Great Bay Area has obvious advantages in terms of world-class airport group and seaport group, which also has dense expressway network and self-contained infrastructure network [2]. Globally, most of the bay areas are developing marine economy and port economy, they are important growth pole for global economic development, and leaders in technological change. Up to 60% of the world’s total economic volume is concentrated in the bay areas. Back to Guangdong - Hong Kong - Macao Greater Bay Area, which was based on the Pan Pearl River Delta, owns a land area of 56,500 square kilometres, a population of 67.65 million, and 13% of China’s total economy scale. The population, land area and port container of Guangdong - Hong Kong - Macao Greater Bay Area are all the top of the four bay areas, with a total GDP of up to $1.38 trillion surpassing the San Francisco Bay Area, second to only the New York Bay Area. It owns many world-class hub cities like Hong Kong, Shenzhen, Guangzhou and Macao, with high value-added industries of competitive advantages and aggregation effects like high-end manufacturing (Dongguan, Foshan and other Pearl River Delta cities), IT innovation (Shenzhen), commercials (Guangzhou), entertainments (Macao and Zhuhai), and shipping industry (the whole region). The integration of the port economy and the knowledge economy has laid a good foundation for the establishment of the International Science and Technology Innovation Centre.

(4) Numerous of universities or colleges and international innovative platforms. Owning the world-class universities, scientific and technological research institutions is a requirement to construct the International Science and Technology Innovation Centre [3]. As of January 2020,

there are nearly 200 universities and universities or colleges in Guangdong - Hong Kong - Macao Greater Bay Area, of which more than 150 are in Guangdong, most of which are public universities or colleges. At present, there are four universities or colleges in Hong Kong that listed in the top 100 universities or colleges in the world, including The University of Hong Kong, The Chinese University of Hong Kong, The Hong Kong University of Science and Technology and City University of Hong Kong. There are 17 degree-granting universities or colleges, 8 of which are funded by the University Grants Committee, 1 was publicly funded but not by the University Grants Committee, and 8 by self-financing. And there are 12 universities or colleges or institutions in Macao, 4 of which are public universities or colleges, namely, University of Macau, Macau Polytechnic Institute, Macao Institute for Tourism Studies and Macau Security Forces Training College, and 6 of which are private universities or colleges, including City University of Macau, Macau University of Science and Technology, etc. Currently, there are 43 national key laboratories in Guangdong - Hong Kong - Macao Greater Bay Area. Among them, Hong Kong has more than 40 academicians of “the two institutes”, 16 state key laboratory partner laboratories, and 6 branches of national engineering technology research centres. Furthermore, Guangdong - Hong Kong - Macao Greater Bay Area is home to more than 18,900 national high-tech companies. Each year, international patent applications from Guangdong - Hong Kong - Macao Greater Bay Area account for more than half of the country. From the perspective of international experience, Guangdong - Hong Kong - Macao Greater Bay Area is China’s “leader in science and technology reform”.

(5) Shenzhen and Hong Kong’s scientific and technological innovation capabilities are at the advanced level in the world. “With only less than 2% of the country’s land area and 8% of the total population, Guangdong has created 16% of national invention patents and nearly half of PCT patent applications. The total number of patent pledges, licenses and transfers accounted for more than 16% of the country’s total.” [4] According to the *“Global Innovation Index 2019”* issued by the World Intellectual Property Organization, WIPO, Cornell University and other institutions, Shenzhen - Hong Kong ranks as the second largest technology cluster in the world. Since 2001, the correlation between Shenzhen’s patent applications and GDP has reached 0.9799, ranking first in major cities across China. In Shenzhen, 90% of R & D personnel are in enterprises; 90% of applied patents come from enterprises; more than 90% of major scientific research projects and invention patents come from leading enterprises. A number of Shenzhen high-tech companies such as Huawei, Tencent, BYD, DJI, etc. have a share in the global market by virtue of technological innovation advantages. As one of the three major international financial centres in the world, Hong Kong has a unique advantage in developing financial tech. More than 70 of the world’s top 100 banks have operations in Hong Kong. In addition to the developed financial industry, Hong Kong’s advanced communication technology enables enterprises to easily apply fintech. Coupled with the “one country, two systems” policy, Hong Kong has continued to have its own economic, social and legal system advantages, allowing talent, funds and information to flow freely. All these factors provide an ideal breeding ground for Hong Kong to develop international fintech. Hong Kon’’s financial tech ecosystem has flourished in the past few years, with more than 550 financial tech companies now.

(6) By all belonging to the Lingnan cultural circle, they have a certain culture atmosphere that’s inclusive for innovation. The original driving force of innovation is not only science and technology, but also culture [5]. Guangdong, Hong Kong and Macao are important bridges connecting the countries along the 21st Century Maritime Silk Road, and are the cultural interchange of the three major language families: Chinese, English and Portuguese. According to statistics, among the 45 million overseas Chinese, nearly 30 million of them are from Guangdong, distribute in more than 100 countries and regions all around the world. Guangdong - Hong Kong - Macao Greater Bay Area belongs to the core circle of Lingnan culture, and is a gathering point for the conflict and integration of modern Chinese and Western cultures. The Pearl River Delta is the earliest region in China’s reform and opening up, which is adjacent to Hong Kong and Macao. It is deeply affected by the climate of reform and opening up. It is the region with the most obvious characteristics of China’s outward-oriented economy and the region with the highest degree of market economy and

international cooperation in China. It is these characteristics that have created the characteristics of openness, inclusiveness, innovation and spill-over in the Greater Bay Area, and a cultural atmosphere of technological innovation.

2.2 Problems

(1) Institutional obstacles lead to low scientific and technological synergy. The first is reflected in the low level of sharing of scientific and technological resources. Guangdong - Hong Kong - Macao Greater Bay Area has different political, economic, and legal systems, which leads to the existence of many institutional and policy barriers in terms of scientific and technological synergy. Barriers to administrative divisions have also caused competition among cities in the Greater Bay Area, forming the concept of sticking to their own regional development. The above problems lead to low sharing of science and technology resources and even competing circumstances. The second is the poor circulation of innovation factors. Social systems vary widely. Reflected in taxation, social security, intellectual property protection, etc., the policies of the three places are very different. The customs clearance process is too cumbersome, which leads to the inability of personnel to communicate freely, and scientific research experiments or testing supplies are not smooth enough, which is not conducive to the free flow of scientific research elements between research institutions and enterprises. The “Cross-city Patent Cooperation Ratio” is an important indicator of the degree of collaborative innovation development among cities in the Greater Bay Area. According to the patent database of Clarivate Analytics (the period range is from 2014 to 2018), the statistical analysis of the four major bay areas in the world in the past five years shows that the San Francisco Bay Area has the highest degree of collaborative innovation, and the “Cross-city Patent Cooperation Ratio” is 10.33% , Followed by Tokyo Bay Area of 3.28%, New York Bay Area of 1.57%, Guangdong - Hong Kong - Macao Greater Bay Area of 0.95%, which shows that Guangdong - Hong Kong - Macao Greater Bay Area still has great room for improvement in the field of urban collaborative innovation.

(2) The commercialization of scientific and technological achievements is low. Compared with other bay areas, the scientific and technological achievements of Guangdong - Hong Kong Greater Bay Area are insufficiently transformed and the degree of commercialization is low, which is not conducive to the development of innovative technology industries. The integration of industry and finance is not close enough, and the spill-over effect of university research results is not obvious. It only stays at the dissertation and laboratory test stage, most of which was not transformed. Although there are many invention patents, the number of cited patents is small and the rate of return is very low. For example, although the number of patents at Stanford University is small, its annual license income is about $ 100 million, which is higher than the sum of all universities or colleges in the Greater Bay Area.

(3) From an international perspective, the culture of inclusive innovation still needs to be improved. According to 2017 statistics, the proportion of immigrants in Tokyo Bay Area, New York Bay Area, and San Francisco Bay Area was 2.61%, 3.5%, and 5.87%, and Guangdong - Hong Kong - Macao Greater Bay Area was only 1.85%, which was the lowest proportion among the four major bay areas. That’s to say, the society has a low degree of openness, and its cultural characteristics are obviously inclined to “focus more on manufacturing and less on creativity”. In addition, Guangdong - Hong Kong - Macao Greater Bay Area has historically enjoyed commercial prosperity, especially in Hong Kong, where finance is well developed, but there are also economic and ecological environments that are keen to pursue commercial interests. Enterprises pursue profits, young people in the society respect the financial industry, and form a cultural atmosphere of “making money, be the winner of life”, which makes science and technology innovation lack capitals, manpower and other factors.

2.3 Thoughts and countermeasures

(1) Establish a special policy coordination mechanism for the collaborative innovation of science and technology in Guangdong - Hong Kong - Macao Greater Bay Area. The first is to establish a science and technology coordination decision-making coordination agency that is jointly

participated and coordinated by the governments of Guangdong, Hong Kong and Macao. With the operation of this agency, the problems and contradictions in the coordinated development of science and technology in the three places can be solved, and complementary advantages, dislocation development, and coordinated development can be well achieved. The second is to explore the establishment of a “Green Card System” for Guangdong - Hong Kong - Macao Greater Bay Area, to open up channels for personnel circulation, and achieve the free circulating of personnel. The third is to increase the sharing and circulation of capital, “necessities for human life”, “chemical metallurgy”, “physics”, etc., in order to achieve the deep integration of the three places in major technological research, innovation platform construction, and scientific and technological achievements transformation, to further promote the more convenient flow of funds and frights, and gather factors such as science and technology innovation, finance, and industry.

(2) Improve the commercialization of scientific and technological achievements. The first is to promote the combination of technology and capital, improve the system of the financial service technology industry, establish a support system for incubation funds in the Greater Bay Area, attract more capital to the technology innovation industry, and push innovation results to the market. The second is to use the advanced system of intellectual property protection in Hong Kong and Macao to promote the transformation of intellectual property into real productivity. The third is to achieve a benign interaction between government, industry, academia, and research, and establish a collaborative network conducive to the commercialization of scientific and technological achievements. Give full play to the spill-over effects of universities or colleges, promote the cooperation between entrepreneurs and scientists and multi-party cooperation between first-class universities or colleges, emerging industries and scientific research institutions, and cultivate a venture capital operation system to improve the conversion rate and return rate of scientific and technological achievements.

(3) Create a culture of innovation, openness and inclusiveness in the Greater Bay Area. On the one hand, an innovation fault tolerance mechanism that encourages innovation and tolerates failure should be established. On the other hand, we should absorb the advanced practices from other international science and technology innovation centres, integrate the concept of innovation and entrepreneurship into the education system, and create a social environment that emphasizes innovation and encourages entrepreneurship.

3. Conclusion

Constructing the International Science and Technology Innovation Centre is a core element of the Guangdong - Hong Kong - Macao Greater Bay Area strategy. Now Guangdong - Hong Kong - Macao Greater Bay Area basically has the economic conditions, innovative platforms and cultural atmosphere to build an international science and technology innovation centre. Although Guangdong - Hong Kong - Macao Greater Bay Area currently has problems such as low levels of internal scientific and technological resources sharing, poor circulation of innovation elements, and insufficient transformation of scientific research results caused by institutional reasons. However, under the macro guidance and strong national to local policy support from the Chinese government, with numerous international innovation platforms and the reserve power of first-class universities or colleges, it created its regional advantages of world-class scientific and technological power and resources with strong basic research capabilities. By establishing a special science and technology co-innovation policies coordination mechanism for Guangdong - Hong Kong - Macao Greater Bay Area, increasing the commercialization of scientific and technological achievements, and creating a cultural atmosphere advocating innovation, openness, and inclusiveness in the Greater Bay Area, will be positive to build an innovation and development area with international competitiveness, an international science and technology innovation centre with global influence.

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