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Role of Hong Kong in Development of International Center of Science and Innovation in the Guangdong-Hong Kong-Macao Greater Bay Area

Abstract

It is important to clarify the role of Hong Kong (HK) and maximize its influence in the development of the international center of science and innovation in the Guangdong-Hong Kong-Macao Greater Bay Area (GBA), because of the historical outstanding contribution of HK in China's reform and opening-up, and its unique advantages in science and innovation. There are four aspects of advantages of HK in the science and innovation field. (1) Its well-developed education system and a culture of freedom as essential foundations to foster creative talents; (2) many areas of basic research in HK are at the cutting edge of international competitiveness, whilst frequent interactions among cities in GBA foster industrialization and commercialization of the scientific achievements; (3) its world-renowned modern services, including law, finance, accounting, management, and others, provide critical support to innovations in corporations; (4) the global vision and robust international image of HK can help research centers and enterprises in Chinese Mainland in many ways. However, HK also experiences weaknesses in industrial development, and suffers from high start-up costs. It is important to cultivate strengths of HK to meet the specific requirements of innovation in GBA policy whilst ease the existing problems. Furthermore, a better use of the 'One Country, Two Systems' policy is critical to give full play to HK's advantages, strengthen the interaction between HK and cities in Chinese Mainland, and promote the flow of key innovation elements. The significance will exceed the development of international center of science and innovation in GBA, but also benefit the broader innovation-oriented development and the ongoing reforms in science and technology in China.

Keywords

Guangdong-Hong Kong-Macao Greater Bay Area (GBA); international center of science and innovation; Hong Kong; 'One Country, Two Systems'

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Abstract: It is important to clarify the role of Hong Kong (HK) and maximize its influence in the development of the international center of science and innovation in the Guangdong-Hong Kong-Macao Greater Bay Area (GBA), because of the historical outstanding contribution of HK in China's reform and opening up and its unique advantages in science and innovation. There are four aspects of advantages of HK in the science and innovation field. (1) Its well-developed education system and a culture of freedom as essential foundations to foster creative talents; (2) many areas of basic research in HK are at the cutting edge of international competitiveness, whilst frequent interactions among cities in GBA foster industrialization and commercialization of the scientific achievements; (3) its world-renowned modern services, including law, finance, accounting, management, and others provide critical support to innovations in corporations; (4) the global vision and robust international image of HK can help research centers and enterprises in Chinese mainland in many ways. However, HK also experiences weaknesses in industrial development and suffers from high start-up costs. It is important to cultivate strengths of HK to meet the specific requirements of innovation in GBA policy whilst ease the existing problems. Furthermore, a better use of the "One Country, Two Systems" policy is critical to give full play to HK's advantages, strengthen the interaction between HK and cities in Chinese mainland, and promote the flow of key innovation elements. The significance will exceed the development of the international center of science and innovation in GBA and also benefit the broader innovation-oriented development and the ongoing reforms in science and technology in China.
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Keywords: Guangdong-Hong Kong-Macao Greater Bay Area (GBA); international center of science and innovation; Hong Kong; "One Country, Two Systems"

The concept of Guangdong-Hong Kong (HK)-Macao Greater Bay Area (GBA) was first formally proposed in China's relevant plans for "the Belt and Road" in 2015 and was subsequently included in the "13th Five-Year Plan" outline of China in 2016. In 2017, for the sake of strengthening the mutually beneficial cooperation of the mainland with HK and Macau, "promoting the construction of the GBA" was included in the government work report of that year and the report of the 19th National Congress of the Communist Party of China, becoming a national strategy. Issues such as "what kind of GBA to build" and "how to build the GBA" have received widespread attention and heated discussion in society. In February 2019, the Central Committee of the Communist Party of China and the State Council issued the *Outline Development Plan for the Guangdong-HK-Macao Greater Bay Area*, and the question of "what kind of GBA to build" was initially answered at the national level. The construction of an international center of science and innovation was listed as one of the important goals, requiring "deepening the innovation cooperation of Guangdong, HK, and Macao, building an open and integrated regional collaborative innovation community" and "building a global highland for science and innovation and an important source of emerging industries."

The GBA is composed of two special administrative regions (HK and Macau) and nine cities in Guangdong Province. On a land of 56,000 square kilometers, there are two systems and three separate customs territories, which are different from the situations of other bay areas in China and even the world, and are new explorations and practices in deepening reform and opening up.

Historically, HK's role is indispensable in the reforms of cities in the GBA, especially Shenzhen. HK not only provides a kind of development experience and paradigm but also has profoundly influenced the system design and changes of Shenzhen through the interaction between the two places [1]. Judging from the practice of science and innovation today, HK has an open and inclusive cultural atmosphere, a sound legal environment, high-level university clusters, and a good scientific research foundation [2], which can make unique

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contributions to science and innovation in the GBA. Deconstructing HK's strengths and weaknesses in science and innovation and discussing the importance of "One Country, Two Systems" in building a more dynamic center of science and innovation and ways to play its role will help answer the question of "how to build an international center of science and innovation in the GBA."

1 HK's advantages and strengthening direction

HK's advantages in science and innovation are concentrated in the cultivation of various types of talents, legal environment, supporting services, and international markets. It has obvious complementarity with cities (represented by Shenzhen) in the mainland. However, most of these advantages are born in the traditional development track of HK. To truly contribute to the construction of the international center of science and innovation in the GBA, it must also be adjusted, developed, and strengthened toward the overall goal of science and innovation and breed new areas of advantage that better meet the specific requirements of science and innovation.

1.1 Education and talent training

(1) Talent is the key to innovation, and practice affirms HK's role in cultivating and delivering high-level innovative talents. Among the 22 heads of unicorn companies in the GBA, there are 4 Hong Kongers and 2 mainlanders who have studied in HK universities ①. This kind of talent training advantage is not only because HK has the highest density of world-class university clusters in China ②, but also due to its broad vision and relaxed atmosphere, which is conducive to cultivating curiosity, critical consciousness, and free exploration spirit, thereby releasing people's personality and potential, strengthening subject consciousness, and enhancing innovation ability [3].

(2) Compared with other cities in the GBA, HK is more attractive to overseas talents, and this attraction promotes the development of HK's universities and talent cultivation. The founder of SZ DJI Technology Co., Ltd. (hereinafter referred to as "DJI") has been grateful for the cultivation of Hong Kong University of Science and Technology on many occasions, saying that "I wouldn't be where I am today if I hadn't gone to HK" ③. About 70% of the total number of doctoral students in HK universities are mainland students. They generally say that they are attracted by factors such as a good research atmosphere, developed training system, professional faculty, and reputation in the globe. Angel investors in the GBA also show a preference for graduates from HK universities and affirm their advantages in technical capabilities, research spirit, and international vision.

Although there are criticisms that "HK's universities are ranked high, but the structure of talents cultivated does not meet the requirements of science, innovation, and industrial development," this structural problem is mainly due to the fact that science and engineering graduates in HK are short of employment positions and are underpaid. With more frequent interactions with other cities in the GBA and the development of the science and technology industry, science and engineering students will get more high-paying jobs and entrepreneurial opportunities, and the students' willingness to choose majors and the talent cultivation structure of universities will change accordingly. Relying on the existing good operating system, HK is capable of cultivating more innovative and entrepreneurial talents and those with industrial technology.

1.2 Basic research and application development

According to the chain-linked model of innovation, innovation may originate from knowledge creation/basic research, or it may be designed directly through knowledge application/technology development on the basis of the potential market [4]. But in the long run, innovation is inseparable from knowledge creation, and basic research must be utilized to continuously supplement new knowledge, so as to compensate for the decline in the marginal benefit of knowledge application [5]. Li Keqiang, a member of the Standing Committee of the Political Bureau of the CPC Central Committee and Premier of the State Council of China [6] pointed out: "Basic research determines the depth and breadth of science and innovation in a country, and the key problems lie in the weakness of basic research."

(1) HK has obvious advantages in basic research and has long been the leader in the GBA especially in high-level achievements and scientific research influence. Taking 2017 as an example ④, the total number of papers published by HK scientific and technical personnel ranks second in the GBA (the first is Guangzhou), while the number of highly cited papers, total downloads, and citations of papers ranks first. But at the same time, HK's application development is relatively lagging. In 2017, the number of patents was only 1/33 of Shenzhen's, ranking 8th among 11 cities in the GBA. This may be due to the fact that HK's scientific research is

① The list of unicorn companies and their heads mentioned in the paper comes from the Hurun Greater China Unicorn Index 2018. The growth, education, and development of each head are sorted by the authors on the basis of network information.

② According to the QS2018 World University Rankings, Hong Kong has 4 universities in the top 50, while there are only 3 in the mainland (2 in Beijing and 1 in Shanghai).

③ A special report on the InvestHK website "Break through the strong boundaries of aerial photography and capture new visions." [2016-04-26]. https://web.archive.org/web/20160426090530/http://www1.investhk.gov.hk/zh-hk/success-stories/seeing-the-unseen.

④ Data source: Comprehensive Analysis and Outlook Report on Scientific Research and Innovation in the GBA in 2018 issued by the Department of Information Systems, City University of Hong Kong.

dominated by universities and tends to basic research and publishing papers. Shenzhen is dominated by enterprises, and the enthusiasm for application development and patent application is higher.

(2) The salary system of HK universities contributes to HK's basic scientific research. The construction of the GBA provides opportunities to better promote the transformation of scientific research results into technology and products. The remuneration of faculty in HK colleges and universities is generous and single-incentive. Most of the research projects and rank promotion only rely on papers as output requirements. Therefore, the work of the universities focuses on theoretical research, and less on engineering technology research. While this has achieved the advantages of HK's basic scientific research, it also makes it lack motivation for technological development. On the one hand, universities should focus on cultivating students and basic research. HK's good scientific research conditions, environment, and achievements are of great significance to the science and innovation of the GBA and even China. On the other hand, considering the contradiction between this single evaluation system and the demand of innovation for application development, application assessment indicators can be appropriately increased. At the same time, the HK-Shenzhen interaction should be strengthened and efforts should be made to complement each other's advantages of HK and other cities in the GBA. Besides, a relaxed environment and convenient conditions should be provided for the HK research teams which are interested in conducting applied research. By unblocking the path of research achievements to the back end, HK's high-level scientific research achievements will be promoted to serve innovation, so that HK will truly become a source of innovation and drive the development of surrounding areas.

1.3 Modern service industry

(1) HK's highly developed modern service industries such as finance and law have laid a solid foundation for the financing of high-tech industries and other supporting services in the GBA. The nine cities in the Chinese mainland represented by Shenzhen, Guangzhou, and Foshan in the GBA already have a good industrial foundation and a considerable number of booming start-ups, but the development of industries such as finance, consulting, and professional services is still relatively lagging. HK's highly mature financial market, international investment and financing experience, and supporting services provide strong support for enterprises in the GBA. In 2017, a total of 253 Chinese mainland companies and 169 companies with Chinese capital background were listed in HK, raising a total of 466.9 billion HKD ⑤, which injected a lot of international capital into the development of Chinese mainland companies. At the same time, under HK's more complete market supervision, these companies also use HK's experience and service industry talents to continuously optimize their internal accounting and supervision systems and establish a good international image.

(2) HK's intellectual property protection system is relatively complete, and it has the opportunity to take precedence in developing intellectual property trading and exploring the scientific innovation insurance system. Intellectual property is the most economical, effective, and lasting innovation incentive, which can protect the private gains of knowledge producers and encourage more people to continue research and development at new heights [7]. A good and trustworthy intellectual property system must rely on a good legal framework of the whole society. HK's first-class legal environment and practices of rule of law objectively have the ability to protect intellectual property rights and subjectively avoid the high transaction costs caused by distrust. With more frequent interactions with the mainland and more attention to science and innovation, HK may explore an intellectual property protection, transaction, and insurance system that conforms to international consensus and China's national conditions. To make this possibility a reality, it requires the full implementation of the *Closer Economic Partnership Arrangement* (CEPA) and the promotion of the flow of key talent elements to enable HK to directly participate in the service supply of the GBA. It also requires HK to actively explore and adapt to changes, truly transform its traditional advantages into a service industry that meets the needs of science and innovation, seek new development momentum, and strengthen coordination between cities.

1.4 Global vision and international image

HK's international city characteristics are important support for the construction of the international center of science and innovation in the GBA.

(1) Doing a good job in science and innovation requires a global vision and international responsibility. Broad horizons, inclusive mentality, and sufficient exchange of ideas and collisions of ideas are of great significance to the cultivation of innovative talents. The characteristics of HK's harmony with different ethnic groups in its multiculture have cultivated a global, future-oriented way of thinking, as well as stronger cross-cultural communication and collaboration capabilities. These are helpful to explore solutions that are both innovative and strategic and in line with international norms and practices in the construction of the GBA, respond to global challenges, and build international competitiveness.

(2) A good international image can promote the two major

⑤ Data source: HK Stock Exchange statistics as of September 30, 2019. "Chinese mainland companies" refer to companies registered in the Chinese mainland; "companies with Chinese capital background" refer to companies whose main operating assets and business are in the Chinese mainland but registered in offshore fields overseas.

processes of "bringing in" and "going out," which is conducive to the development of science and innovation. As an international free port, HK has an image of openness, tolerance, and rule of law, which is deeply rooted in the hearts of people and possesses a high reputation in the globe. Affected by factors such as history, politics, and culture, with the rapid development of China, many countries in the world have shown misunderstanding and distrust of the Chinese mainland. "One Country, Two Systems" gives HK the opportunity to become a buffer zone and bridge link between Chinese mainland and other countries. It has more flexibility in purchasing advanced instruments, introducing overseas teams, and conducting cooperative research. This not only is a major source of advantages for HK's own scientific research but also makes a unique contribution to cultivating innovative talents and driving the development of science and innovation in the GBA. From the perspective of attracting and building international companies and entering the international market, HK can provide not only a satisfactory option for capital and enterprises of other countries that value the Chinese market but have doubts but also more experience and convenience for Chinese companies and products to go global to jointly build an "international brand."

2 HK's exploration and lessons learned

Although it has many advantages and achieved certain achievements, HK's own science and innovation is still facing severe challenges such as manufacturing hollowing and weak ability to transform scientific research achievements [2]. These deficiencies that have been exposed and have warning significance have provided many lessons for the GBA.

(1) The "industrial upgrading" should be understood correctly, and basic industries and manufacturing should not be completely abandoned in pursuit of high value-added industries. The manufacturing industry is the foundation for the realization of ideas and a solid backing for regional and national development. The lack of industrial foundation and manufacturing capacity is considered to be an important factor restricting HK's current science and innovation. The founder of DJI praised "Shenzhen has the world's best technology product production chain" and will transfer research and development (R&D) activities from HK to Shenzhen. His judgment of "HK cannot go back" is also on the basis of the lack of industry system in HK. The person in charge of the Hong Kong Science & Technology Parks Corporation also believes that "(HK) lacks large enterprises, with insufficient midstream product development and downstream manufacturing industries and very small chances of research achievements becoming products." This has issued a warning to many cities that are on the road of developing the tertiary industry and focusing on high-tech industries.

(2) The stability and execution of innovation policies have an important impact on policy effects. At the beginning of the 21st century, HK focused on science and innovation and introduced measures, starting earlier than most cities in the mainland. However, due to the lack of top-level design, long-term planning, internal consensus, the willingness of "stakeholders" to participate, and the external resources and assistance, many ideas have changed and aborted during the implementation process. For example, the HK Cyberport, established under a large number of preferential policies and fiscal exemptions, eventually became a real estate project. This not only delays HK's valuable opportunity to develop the technology industry and seek new growth drivers but also reduces the people's confidence in the technology industry and trust in the government, increases the current resistance to the development of science and innovation, and causes long-term negative effects. Driven by the policy of establishing an international center of science and innovation, many cities in the GBA have increased their investment in innovation and built a large number of incubators and industrial parks. In addition, special attention should be paid to "not forgetting the original intention" in the implementation process.

(3) A long-term view should be taken on the issue of real estate, and HK should beware of replacing science and innovation by real estate. In addition to avoiding the degradation of science- and innovation-related construction into real estate projects, in general, high housing prices and land prices will also have a negative impact on science and innovation. When discussing HK's weaknesses in attracting talents or companies, excessive housing prices have been repeatedly mentioned. ① Excessive housing prices "kidnap" people's free thoughts, exploration desires, and pioneering spirit. This is not conducive to the birth of creative individuals and also inhibits the motivation of innovative talents to transform creativity into practice. ② Housing prices have a significant impact on the development of the real economy. High housing prices not only increase the cost and risk of enterprise entry in the early stage of setting up but also increase the difficulty of investing in building factories and realizing industrialization. The land policy and real estate industry in the mainland have almost taken HK as a model. So far, every city should pay attention to and try to avoid the "minefield" that has been identified in HK.

3 Making good use of "One Country, Two Systems" policy to build an international center of science and innovation

In the existing discussion on the construction of the GBA, regional integration and the free flow of elements are often regarded as the key to promoting development [8]. From this perspective, "One Country, Two Systems" seems to be a

barrier to the flow of elements, which is not conducive to regional integration. However, based on the above analysis on the role of HK in building the international center of science and innovation in the GBA, this paper believes that "One Country, Two Systems" is the unique feature of the GBA, and making good use of "One Country, Two Systems" is conducive to the construction of the international center of science and innovation in the GBA and will also inject new impetus into the reform and development of China's science and innovation.

(1) Some of HK's advantages in science and innovation are dependent on the premise of "One Country, Two Systems." Making good use of "One Country, Two Systems" and promoting the non-equal flow of key innovation elements can make HK a frontier for expanding opening-up and promoting innovation. ① HK has a natural advantage of gathering global innovation elements. As an international free port, HK has access to many important resources such as information, technology, and equipment that are difficult to obtain in the mainland, which can buffer international conflicts and promote exchanges and interaction. ② HK's world-renowned legal system and financial system still need to operate under the framework of "One Country, Two Systems." Respecting social differences and maintaining appropriate barriers will make HK achieve unique advantages. Only on this basis may HK make a unique contribution to the construction of the GBA. ③ HK's free, open, and inclusive atmosphere is conducive to cultivating innovative talents with international vision, cutting-edge knowledge, and spirit of exploration. While creating a highland of talents, HK also contributes more high-level scientific research results. Therefore, the "uniqueness" of HK has important strategic significance for both the GBA and China as a whole. Taking "One Country, Two Systems" as the starting point for analysis instead of integration is more conducive to enhancing HK's driving effect on the GBA and promoting the construction of the international center of science and innovation.

(2) "One Country, Two Systems" has made HK a relatively independent policy experiment field. Both experience and lessons have provided GBA and China as a whole with low-cost and parallel experimentation opportunities to promote science and innovation. For a long time, the HK government has less been involved in practical affairs. Even if many resources have been invested in science and innovation in recent years, the total amount of funds and the procedures and cycles of project demonstration are often considered incompatible with the enthusiasm and quick response of mainland partners in the GBA. However, the development of science and innovation is a new challenge for all cities, and mistakes on the road of experimentation are inevitable. Carefulness may miss good opportunities, but fast-paced construction may also lead to waste of resources and even other unexpected consequences. On the basis of "One Country, Two Systems" and actions in accordance with respective preferred styles, the risk of "putting eggs in one basket" can be avoided. Carrying out differentiated attempts and exploring solutions on different paths can contribute more experience to the improvement of science- and innovation-related systems.

(3) With the establishment of common goals and the more frequent interaction between HK and the mainland, HK will also become a pressure valve forcing the reform of the mainland's science and technology system and promoting opening-up. The system difference makes it inevitable that there will be frictions in the interaction between the two regions. In order to stimulate and strengthen their advantages for common construction goals, the two regions must jointly explore ways to improve and promote development through reforms. The "9 + 2" cities in the GBA have their own characteristics, and there are great differences in innovation resources and foundation, social maturity, and development level. HK's role in reform is not to provide textbook-style action plans, but to emancipate the mind and promote reflection. Other cities in the GBA and HK learn from each other through interactions and frictions and innovate themselves, which is conducive to the formation of systems, policy systems, and social environments that are compatible with the construction goals and requirements of the international center of science and innovation.

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