

How can Hong Kong's innovation and technology industry make a break-through? - from the perspective of innovation environment

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As mentioned in our April's issue of BOCHK Economic Monthly, although Hong Kong has some of the necessary conditions for the development of Innovation & Technology Industry and has spared no effort to promote them after the handover, it is a pity that it has always lacked practical results, with the fundamental reason being the lack of a world-class innovation environment. From domestic and international experience, the survival and development of the Innovation & Technology Industry is highly dependent on three treasures - a perfect innovation environment, clear development goals, and reasonable division of labor. The three treasures must work together in order to truly stimulate innovation and achieve good results. Among them, the innovation environment is the primary treasure, which is crucial to the Innovation & Technology Industry. If Hong Kong wants to make a breakthrough in the science and innovation industry in the future, it must first create a world-class innovation environment.

1. Eight elements covered by innovation environment

The innovation environment differed widely from the business environment. The business environment is mainly for trade and investment, focusing on safety, convenience and efficiency, which is an important foundation for business development. The innovation environment focuses on the innovative economy, stimulating innovation and promoting the application of research results, which is the primary condition for the development of the innovation and technology industry. The innovative environment is mainly composed of eight elements. Specifically:

The first element of an innovative environment is innovative thinking and entrepreneurship. The essence of innovation is breakthrough and creation, and all achievements of human civilization are the crystallization of innovative consciousness and creative thinking. General Secretary Xi Jinping's important assertion that "only innovators advance, only innovators are strong, only innovators win" is a profound understanding and summary of the objective law of human social development. The most important characteristic of Silicon Valley, the world's most famous innovation center, is the spirit of innovation that subverts conventional thinking, where entrepreneurs continue to create new technologies and new business models, giving rise to many original and emerging industries and technology giants with worldwide influence. As the most successful special economic zone in China, Shenzhen has created a miracle in the history of modernization, and the fundamental reason is that the whole city has a strong sense of urgency and crisis, daring to break through and take risks, resulting in many national firsts. This shows that the spirit of innovation is the soul of an innovative environment and an important prerequisite for the development of innovation and technology industries.

The second element of an innovative environment is the correct and feasible innovation model. From the global experience, there are two models to promote the innovation and technology industry. The first one is the local self-innovation model, which is based on the domestic/local independent innovation, and is based the original innovation and technology development on itself. Examples include the Europe, the United States, Japan, South Korea and Shenzhen. Although it takes a long time and invest a lot, they have independent technology property rights and unlimited development potential. Take Shenzhen as an example, high-tech enterprises as represented by Huawei have been insisting on independent innovation, creating patents and developing new products for a long time, and therefore have achieved great success. The second one is the platform introduction model, that is, the

establishment of a technology development and industrialization platform, hoping to introduce advanced technologies and innovative talents from advanced countries and regions to develop local innovation industries, which is exactly the model adopted by Hong Kong. However, since European countries and the United States have strict controls of their cutting-edge technologies, this trick to take a shortcut model is difficult to succeed. The innovation model is an important watershed for measuring the quality of the innovation environment and a key element in whether the innovation industry can truly achieve breakthroughs.

The third element of an innovative environment is the effective government guidance and promotion. This includes government financial support for R&D activities and industrial development, promoting rapid transfer of core technologies from various public R&D platforms to enterprises, providing tax incentives and government purchase orders directly to innovative enterprises to assist them grow and expand, and transferring patents generated by government-funded research projects to front-line research professionals to support them in establishing private technology enterprises and developing production, etc. The U.S. government not only funded research and development (R&D) in various ways, but also passed the Bayh-Dole Act in 1980 to enable the private sector to enjoy the patents generated by government-funded research projects, greatly promoting the conversion of research results. As a result of the implementation of the Bayh-Dole Act, Massachusetts has generated nearly 7,000 innovative companies, which have become the engine of the state's economy. Effective government guidance is a key pillar of a world-class innovation environment and a major driving force for the development of innovation and technology industry (the other major driving force is the market).

The fourth element of an innovative environment is the close connection between technology and industry. This is the main way out for the practical application of the innovation environment and the most effective way to industrialize innovation achievements. Innovative countries/regions have accumulated rich experience in this field. For example, the United States has long implemented the development model of integration of industry, academia and research. In the 1980s, many consulting companies jointly invested by the government, universities and enterprises (i.e., the PPP model in the field of innovation and technology) were established, which greatly contributed to the rise of chip and other industries. Advocating the in-depth integration of industry, academia and research is also a new content in the national "14th Five-Year Plan" compared with the "13th Five-Year Plan". The core of the plan is the organic integration of upstream technology research and development with terminal technology applications, promoting in-depth communication between science and technology developers and technology demanders, improving the efficiency of productization of scientific and technological achievements, and at the same time lead small and medium-sized science and technology enterprises to jointly build innovative technology platforms through large enterprises to promote the integration of the upstream, midstream and downstream of the industrial chain, and the innovation of small, medium and large enterprises. These are similar to other innovative economies.

The fifth element of an innovative environment is the deep integration of innovative technology and innovative finance. From international experience, the development of the innovation industry cannot be achieved without the support of innovative finance, especially in the start-up stage of high-tech enterprises. In the 1960s and 1970s, innovative finance represented by venture capital, invested heavily in start-up companies in the electronics and computer industries in Silicon Valley, contributing to the emergence of Silicon Valley as the world's technological center in a way that other traditional financial institutions could hardly replace. Although suffering from the shock from the pandemic last year, the total amount of venture capital investment in the United States is still as high as US\$147.9 billion, a record high in the past decade, of which over US\$56 billion was invested in Silicon Valley. Shenzhen has obvious advantages in both early-stage investment and venture capital markets, which accounted for more than 60% of the financing in the Greater Bay Area and provided a large amount of capital for innovation and technology companies.

The sixth element of an innovative environment is to attract and cultivate innovative talents in any way possible. The development of innovative industries relies on the technological creation of high-tech talents, and the cultivation of innovative talents is to cultivate the technological future of a country or region. Silicon Valley has gathered more than 1 million technology professionals from all over the world, and more than 60 percent of the graduates working in Silicon Valley's technology and engineering fields were born outside the United States. Japan attaches great importance to the cultivation of high-tech and high-quality talents, and has put forward a series

of strategic plans for the cultivation of innovative talents since the late 1990s, establishing a sound mechanism for the cultivation, competition and exchange of talents and a healthy competitive environment. In the past five years, Shenzhen has optimized its talent policy system and introduced 1.2 million new talents, forming a good trend of accelerating talent gathering. The national “14th Five-Year Plan” advocates the in-depth implementation of the strategy of revitalizing the country through science and education, and includes a separate paragraph on stimulating the innovative vitality of talents, underlying the importance of talents cultivation.

The seventh element of an innovative environment is the reasonable cost of innovation. The cost of innovation is another important factor in measuring the quality of the innovation environment, which mainly includes the operating cost of innovative enterprises and the cost of living of employees. In the early years, the cost of innovation in Silicon Valley was much lower than of cities such as New York and London, thus facilitating the rapid rise of the innovation industry. However, costs and housing prices have risen sharply in recent years has squeezed innovation and entrepreneurship, forcing large technology companies such as Hewlett-Packard and Oracle to move out of Silicon Valley one after another. A study in the Mainland also found that the high cost of living has a significant inhibiting effect on the innovation capacity of cities. Taking Shenzhen as an example, although the price of commercial housing is directly comparable to that of Hong Kong, over 80% of the housing in Shenzhen is non-commercial housing with lower prices and rents (including urban villages and self-built housing by enterprises). In addition, the government provides substantial housing subsidies for technology professionals, so the actual cost of living is lower than that of Beijing and Shanghai, making Shenzhen the most innovative one among the four first-tier cities.

The eighth element of an innovative environment is rigorous intellectual property protection. The intellectual property system is essentially an incentive mechanism, which provide a lasting incentive for innovators to innovate through the protection of property rights. The world’s innovation and technology centers, such as San Francisco, New York, Tokyo, and London, have all implemented strict intellectual property protection regimes, which have led to the emergence of inventions that have ushered in rounds of new industrial revolutions and created a miracle of modern economic growth. In this sense, innovation-driven is intellectual property-driven; strict and reasonable intellectual property protection is the core element of the innovation environment and the basic guarantee for the development of innovation industry.

2. Create a first-class innovation environment from eight directions

If we measure Hong Kong’s innovation environment by the above-mentioned standards, we will find that apart from the strict protection of intellectual property rights, the other seven elements of Hong Kong’s innovation environment are all inadequate, and many of them are still far from the world-class innovation environment. In view of this, Hong Kong needs to strive to catch up with these elements to make up for its shortcomings, make every effort to create a world-leading innovation environment, and strive to fulfill the important mission of building an international innovation hub entrusted to Hong Kong by the nation.

The first is to develop innovation and technology industries with innovative thinking. As a free trade port, Hong Kong has a first-class grasp and application of international business rules, but it has a major shortcoming in terms of innovative thinking. To create a world-class innovation environment in Hong Kong in the future, we must first establish a sense of innovation and innovative thinking in the main body of society, enhance the sense of urgency in innovation, and promote the entrepreneurial spirit of daring to be the first and working hard. Only in this way can the science and innovation industry be pushed to new heights and achieve new leaps. To enhance innovative thinking, we need to start with the government, to establish new concepts such as development first, people’s livelihood first, effective market and proactive government, to think creatively, plan holistically and strategically and promote systematically, so that Hong Kong can recreate its advantages and go to the next level.

The second is to change the innovation model to create an independent innovation industry. It should be noted that the platform introduction model that Hong Kong has been adopted in the past 20 years has not been successful, and there is a need to change the innovation model in order to seek breakthroughs. More importantly, “technological self-reliance and self-improvement” is one of the major additions to the “14th Five-Year Plan”, which

emphasizes that in order to build core competitiveness, we must insist on self-reliance and self-improvement, and have the ability to conduct independent R&D in technology. Accordingly, in the future, Hong Kong must always put “technological self-reliance and self-improvement” in an important position and insist on creating an innovative environment with the mode of local self-innovation, so as to drive the development of science and innovation industries, and resolutely abandon the past practice of developing an innovative economy with a business mindset. The existing Science Park model and the Loop development model, among others, need to be adjusted to meet the actual needs of the development of innovation and technology industries.

The third is to strengthen the government’s effective promotion and guidance. Hong Kong has not done enough in this area in the past and needs to improve. Firstly, we need to strengthen government support for R&D activities and industrial development, including injecting more funds into R&D of core cutting-edge science and technology, major science and technology projects, and building comprehensive science centers and innovation hubs. Secondly, we need to transfer core technologies rapidly from various public R&D platforms to enterprises, promote the gathering of various innovative elements to enterprises, and turn enterprises into the main body of technology development and application, as well as scientific research industrialization. Thirdly, we should refer to the Bayh-Dole Act of the United States and transfer the patent rights, especially international PCT patents, generated by government-funded scientific research projects to front-line scientific research professionals as far as possible, allowing them to rely on patents to obtain exclusive income from inventions and supporting them to establish innovative enterprises and develop production. Lastly, we need to provide tax incentives and government procurement orders to help innovative enterprises grow and expand. Of course, apart from the above, there are many other ways for the government to guide and promote the innovation industry. The key is to be effective, the core is to mobilize the enthusiasm of scientific and creative talents, and give full play to the pioneering spirit of creative talents.

The fourth is to promote the seamless integration of technology and industries. The integration of industry, academia and research is another shortcoming of Hong Kong. In the future, Hong Kong must, on the one hand, strongly support enterprises (especially Chinese enterprises and Hong Kong-invested enterprises with production bases in the Greater Bay Area) to take the lead in forming different types of innovation consortia to undertake major national research projects, and at the same time build more platforms for cooperation between industry, academia and research, and provide relevant infrastructure. On the other hand, we need to deepen the cooperation between industry, academia and research in local and other cities in the Greater Bay Area, especially manufacturing bases such as Dongguan, Foshan and Huizhou, so as to create better conditions for the industrialization of innovation and technology achievements.

The fifth is to accelerate the development of innovative finance to provide more capital for the innovation industry. In recent years, Hong Kong has passed legislative amendments to provide better conditions for new economy enterprises to list in Hong Kong in the form of common stock with Weighted Voting Rights, and the SAR government has also helped promote R&D and innovation activities in Hong Kong through tax incentives and subsidies to stimulate and guide market capital to invest in Hong Kong’s start-ups. However, there is still a big gap when compared with San Francisco, Shenzhen and other innovative cities. In the future, Hong Kong can follow the three paths below: (1) At the capital market level, study the possibility of extending the existing special arrangement for listing and raising capital by biotechnology enterprises to other areas of innovation (e.g. AI). (2) To further strengthen the linkage between the innovation sectors in the stock markets of Shenzhen and Hong Kong by improving the interoperability arrangements such as the “Shenzhen-Hong Kong Stock Connect” and “Wealth Management Connect”, so as to provide more investment tools for domestic and overseas investors. (3) In May 2020, the People’s Bank of China and four other ministries and commissions issued the “Opinions on Financial Support for the Construction of the Greater Bay Area of Guangdong, Hong Kong and Macao”, which introduced a series of new policies on private equity fund investment, including allowing Hong Kong and Macao’s institutional investors to participate in private equity investment funds and venture capital enterprises in the Greater Bay Area through Qualified Foreign Limited Partnership (QFLP), orderly promotion of Qualified Domestic Limited Partnership (QDLP) and Qualified Domestic Investment Enterprise (QDIE) pilot schemes, support for overseas investment by Mainland private equity investment funds, and pilot schemes for equity investment by non-investment enterprises. Hong Kong must join hands with other cities in the Greater Bay Area to take the lead in implementing these measures for cross-border capital flows, so as to promote the joint development of innovative financial services in the Greater Bay Area and develop Hong Kong and

the Greater Bay Area into the leading innovative financial platform in Asia.

The sixth is to accelerate the cultivation and introduction of innovative talents. The main reason for the serious shortage of creative talents in Hong Kong is the relatively small number of local students who are willing to enroll in science and technology, and the restrictions on the importation of talents, such as the lack of positions in creative fields and low income. In the future, Hong Kong needs to strongly support the development of high-level research universities in Hong Kong and the Greater Bay Area, strengthen the cultivation of basic science talents, and implement a more open talent policy to actively attract first-class international talents. In addition, Hong Kong must also improve the incentive and protection mechanism for innovation of talents, strengthen the cultivation of innovative, applied and skilled talents, and strengthen the team of high-standard engineers and highly skilled talents. The national “14th Five-Year Plan” advocates the in-depth implementation of the strategy of revitalizing the country through science and education, and includes a separate paragraph on stimulating the innovation of talents, which shows the importance of talents cultivation and the revitalization of the country through science and education. By accelerating the nurturing and introduction of innovative talents, Hong Kong is also complementing and supporting the national plan.

The seventh is to strictly control the costs of innovation. According to a study published by global real estate services provider Savills, the cost of starting a new company in Hong Kong is the highest in the world, and the price of renting a Grade A office in Central is nearly the most expensive in the world, making the cost of doing business for local start-ups much higher. This is one of the major reasons stifling the growth of start-ups in Hong Kong. In the future, Hong Kong must make more efforts to control the cost of innovation, especially the implementation of the “New Home Ownership Scheme” to reduce the cost of living, and at the same time, through demonstration and planning, cooperate with cities in the Greater Bay Area to maintain a reasonable cost of innovation, so as to promote the innovation industry to a higher level.

The eighth is to give full play to the advantages of the intellectual property protection system. At present, Hong Kong has a relatively good foundation and conditions for the development of intellectual property industries. In order to achieve the goal of becoming an international technology and innovation center in the future, it is necessary to strengthen the protection of intellectual property rights, and the following policy innovations can be explored. (1) Explore the dovetailing of the legal system and collaborative protection mechanism for intellectual property rights protection in Guangdong, Hong Kong and Macao, and promote the gradual establishment of an intellectual property rights system in the Greater Bay Area that is in line with international standards. Introduce intellectual property arbitration and mediation mechanisms, and explore the establishment of a diversified intellectual property dispute resolution mechanism. (2) Launch intellectual property transactions and promote the reasonable and effective circulation of intellectual property rights. Establish a public service platform for overseas intellectual property information and explore a new model for foreign intellectual property cooperation services. (3) To give full play to the radiation of the IP service industry cluster development area, promote the integration of high-end IP services with regional industries, and promote the handling of IP disputes through non-litigation dispute resolution.

3. Fully utilize the special role of government

From international experience, due to the different nature of the innovation economy from that of the traditional economy, the government has played a key role in creating a first-class innovation environment and developing the innovation industry by planning, programming, participation, promotion and services. Hong Kong is no exception. In addition to strengthening the Government’s effective promotion and guidance, the Government should also take the following three actions in promoting the innovation industry.

The first is to clarify the development goals of the creative industry. The overall objective of the development of Hong Kong’s innovation and technology industry is undoubtedly to cooperate with the national “14th Five-Year Plan” to build an international innovation and technology hub. Under this general goal, more specific industrial development targets should be set based on the strengths of Hong Kong and the needs of the country. In addition to

the four major areas of biomedicine, artificial intelligence, smart city and financial technology that the government has been encouraging, the following two major areas should also be considered in the future. (1) Hong Kong has been in the front of the world in biomedicine, neuroscience, genomics, vaccine technology, stem cell technology, Chinese medicine, artificial intelligence, computing science and information technology, smart city, etc., and also has advantages in the development of the Internet of Things, big data analysis, cloud computing, information and risk management, network security, etc., and can build on its strengths to support the development of related industries in the future. (2) The national “14th Five-Year Plan” proposes to accelerate the growth of nine strategic emerging industries, including new generation information technology, biotechnology, new energy, new materials, high-end equipment, new energy vehicles, green environmental protection, and aviation, aerospace and marine equipment, and to promote the deep integration of Internet, big data, AI and other industries. Hong Kong should also take matching measures to identify industries suitable for its development, set development goals and promote them, and strive for an early breakthrough.

The second is to formulate a plan for the development of the innovation and technology industry. To better achieve the above development goals, the government should absorb successful experiences from other countries, formulate a medium- and long-term development plan for Hong Kong’s innovation and technology industries, identify development priorities, development strategies, promotion policies and supporting measures, and serve as an action agenda for Hong Kong’s transformation into an innovative economy, unite and lead various sectors of the community to work together, and regularly review and revise the plan to ensure the smooth realization of the development goals. At the same time, we can also formulate specific plans for the development of innovative industries that need to be encouraged in Hong Kong, such as biotechnology development plans and Chinese medicine development plans. In the past, the United States has formulated and implemented a number of development plans in the process of developing the chip industry, such as the Sematech program, which focuses on IC manufacturing processes and equipment, the Information Highway Initiative (NII), and the National Nanotechnology Initiative (NNI), all of which have achieved great success and can be used as reference for Hong Kong.

The third is to deepen the regional cooperation in the innovation industry. As Hong Kong is a small economy, coupled with the above-mentioned innovation factors are not fully equipped, regional cooperation is needed to make up for the shortcomings. To deepen cooperation with the Greater Bay Area is one of the most important things. From a general perspective, future cooperation in innovation in the Greater Bay Area should be based on complementing each other’s shortcomings. On the one hand, we should use Hong Kong’s global top-notch basic research capability to make up for the shortcomings of basic research in the Greater Bay Area. On the other hand, we should use the superior product development and industrialization capability in the Greater Bay Area to make up for Hong Kong’s shortcomings, and do our best to help the industrialization of scientific research results in Hong Kong. Specifically, if we subdivide the whole process of the development of the innovation industry into six segments: basic research (P1), applied research (P2), development research (P3), product development (P4), product production (P5) and marketing (P6), then in the future, P1-P3 should mainly be carried out in Hong Kong, P4 should be based on cooperation with the Greater Bay Area, P5 should mainly be placed in the Pearl River Delta, and P6 should be shared by Hong Kong and other cities in the Greater Bay Area (with Hong Kong focusing on external marketing and other cities in the Greater Bay Area focusing on internal marketing) to form a reasonable division of labor and synergy. Hong Kong should facilitate the formation of this model of cooperation in science and innovation in the Greater Bay Area by creating a world-class innovation environment. If succeeded, the Greater Bay Area will be well positioned and capable of catching up with or surpassing Silicon Valley in the United States.

Finally, it is worth mentioning that famous science and innovation centers such as Silicon Valley and Shenzhen have established their own innovative cities images, and Shenzhen has spared no effort to highlight its positioning as the “City of Innovation”, which has played a positive role in mobilizing domestic and international resources to build up the innovation industry. In the future, Hong Kong should make efforts in shaping the image of an innovative city and continuously strengthen the soft power of the development of innovation industry.

主要經濟指標 (Key Economic Indicators)

	2019	2020	2020/Q4	2021/Q1
一. 本地生產總值 GDP				
總量 (億元) GDP(\$100 Million)	27,997	26,277	7,138	6,975
升幅 (%) Change(%)	-1.2	-6.1	-2.8	7.9
二. 對外貿易 External Trade			2021/5	2021/1-5
外貿總值 (億元) Total trade(\$100 Million)				
總出口 Total exports	40,961	39,275	3,938	18,852
進口 Total imports	45,714	42,698	4,193	20,102
貿易差額 Trade balance	-4,753	-3,422	-255	-1,250
年增長率 (%) YOY Growth(%)				
總出口 Total exports	-5.6	-1.5	24.0	29.4
進口 Imports	-8.1	-3.3	26.5	25.7
三. 消費物價 Consumer Price				
綜合消費物價升幅 (%) Change in Composite CPI(%)	2.9	0.3	1.0	1.1
四. 樓宇買賣 Sale & Purchase of Building Units			2021/6	2021/1-6
合約宗數 (宗) No. of agreements	74,804	73,322	9,381	50,336
年升幅 (%) Change(%)	-5.5	-2.0	13.7	53.7
五. 勞動就業 Employment			2021/2-2021/4	2021/3-2021/5
失業人數 (萬人) Unemployed(ten thousands)	139	259.1	24.8	23.3
失業率 (%) Unemployment rate(%)	2.9	5.5	6.4	6.0
就業不足率 (%) Underemployment rate(%)	1.1	3.1	3.3	2.8
六. 零售市場 Retail Market			2021/5	2021/1-5
零售額升幅 (%) Change in value of total sales(%)	-11.1	-24.3	10.5	8.9
零售量升幅 (%) Change in volume of total sales(%)	-12.3	-25.5	7.8	8.0
七. 訪港遊客 Visitors				
總人數 (萬人次) arrivals (ten thousands)	5,590	356.9	0.5	2.8
年升幅 (%) Change(%)	-14.2	-93.6	-34.8	-99.2
八. 金融市場 Financial Market			2021/4	2021/5
港幣匯價 (US\$100=HK\$)				
H. K. Dollar Exchange Rate (US\$100 = HK\$)	779.3	775.2	776.8	776.2
貨幣供應量升幅 (%) change in Money Supply(%)				
M1	2.6	30.1	24.8	29.6
M2	2.8	5.8	5.6	7.1
M3	2.7	5.8	5.5	7.1
存款升幅 (%) Change in deposits(%)				
總存款 Total deposits	2.9	5.4	5.7	7.3
港元存款 In HK\$	2.5	6.2	8.1	8.9
外幣存款 In foreign currency	3.2	4.6	3.4	5.7
放款升幅 (%) in loans & advances(%)				
總放款 Total loans & advances	6.7	1.2	0.2	0.9
當地放款 use in HK	7.1	1.7	1.6	2.1
海外放款 use outside HK	5.8	0.1	-3.2	-1.9
貿易有關放款 Trade financing	-0.7	-6.2	-2.8	3.0
最優惠貸款利率 (%) Best lending rate (%)	5.0000	5.0000	5.0000	5.0000
恆生指數 Hang Seng index	28,189	27,231	28,828	29,152