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Hong Kong Life and Health Industry Development Study

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Content

Summary

About this Report

With the continuous improvement of life expectancy and health awareness, the life and health industry is highly valued by local governments, enterprises and capital markets. In the 2022 Policy Address, HKSAR Government stated that it would vigorously develop life and health technology. According to the data, the global medical and healthcare expenditure reached US$8.3 trillion in 2018, accounting for 10% of the global gross domestic product (GDP). In 2020, the life and health sector raised US$70.9 billion worldwide; Hong Kong's healthcare expenditure increased at an average annual rate of 5.6% from 1990 to 2020, reflecting the growing demand for medical services and products.

Therefore, the Hong Kong Productivity Council (HKPC) and the HK Bio-Med Innotech Association conducted an in-depth study on the life and health industry in Hong Kong. From July to September 2022, they conducted a survey on the *Hong Kong Life and Health Industry Development Study*. A total of 330 enterprises were surveyed, including 273 enterprises in Hong Kong and 57 enterprises in other parts of the Guangdong-Hong Kong-Macao Greater Bay Area (hereinafter referred to as "enterprises surveyed in other parts of the Bay Area"). At the same time, local industry experts were invited to share their views on the development of Hong Kong's life and health industry. This report focuses on the characteristics of industry development,

grasps the industry situation, analyses the development opportunities, and can serve as a reference for the government and industry stakeholders as they formulate strategies to leverage Hong Kong's strengths and consolidate resources to unleash the life and health industry's boundless potential.

Survey Results

Industry classification

Hong Kong's life and health industry is mainly divided into nine sectors: Medication and pharmaceutical raw materials (28%), medical and diagnostic equipment (26%), traditional Chinese medicine (11%), health supplements (11%), medical services (8%), genetics and stem cells (3%), artificial intelligence in healthcare (3%), regenerative medicine (2%) and others - including cosmetic and skin care, medical consumables, etc. (8%). Enterprises surveyed in other parts of the Bay Area mainly engage in medical and diagnostic equipment (39%), medication and pharmaceutical raw materials (18%) and genetics and stem cells (13%).

Business nature

Among Hong Kong enterprises, 25% are engaged in research and 51% are engaged in manufacturing, including original brand manufacturers (OBMs), original design manufacturers (ODMs) or original equipment manufacturers (OEMs). In addition, 25% of enterprises surveyed in other parts of the Bay Area are engaged in research and 77% in manufacturing. Among all categories, Hong Kong enterprises have the highest proportion of research in genetics and stem cells (80%) and artificial intelligence in healthcare (80%), and the highest proportion of manufacturing in traditional Chinese medicine (63%).

Enterprise scale

75% of Hong Kong enterprises surveyed have no more than 50 employees. In terms of land use, more than 60% of Hong Kong enterprises with R&D laboratories have laboratories covering less than 1,000 square feet; almost 60% of Hong Kong enterprises with pilot production lines in Hong Kong have pilot production lines covering less than 1,000 square feet; more than 80% of Hong Kong enterprises with mass production lines in Hong Kong have mass production lines covering less than 10,000 square feet. In terms of output value, 20% of the Hong Kong enterprises surveyed achieved an annual total turnover of more than US$10 million, and the category with the highest proportion of this scale is genetics and stem cells (30%). A high percentage (35%) of enterprises surveyed in other parts of the Bay Area has 101-1,000 employees, 37% of enterprises with turnover of more than US$10 million, higher than the percentage of Hong Kong enterprises. 95% of enterprises set up laboratories in the Mainland, Taiwan or Macao. Most enterprises (43.9%) have a laboratory area of 10,000 square feet. All enterprises surveyed in other parts of the Bay Area have pilot production lines in the Mainland, Taiwan or Macao, with an area of 10,000 square feet as the majority (51%). The area of the mass production line is mainly 30,000-70,000 square feet (23%).

Investment in Hong Kong

38% of the surveyed Hong Kong enterprises intend to invest in Hong Kong (i.e., have considered developing new business or expanding its business in Hong Kong), of which 84% intend to invest in R&D business in Hong Kong, 65% intend to conduct pilot production and 67% intend to conduct manufacturing in Hong Kong. Among the enterprises surveyed, 70% and 65% of them need less than 5,000 square feet of land for R&D and pilot production. Those that need less than 10,000 square feet of land for manufacturing account for 51% of the surveyed enterprises. Among them, the proportion of investment in Hong Kong with a budget of more than US$3 million for R&D, pilot production and manufacturing are 21%, 27% and 48% respectively. In terms of enterprises surveyed in other parts of the Bay Area, 37% are interested in investing in Hong Kong, of which 100% are interested in investing in R&D, and 14% are interested in investing in pilot production and manufacturing in Hong Kong.

62% of them need less than 5,000 square feet of land for R&D and 43% for pilot production. 33% need less than 10,000 square feet of land for manufacturing. Among them, 27% estimate to invest more than US$3 million in Hong Kong for R&D, 47% for pilot production and 71% for manufacturing.

In this survey, the factors that affect Hong Kong enterprises to consider investing in Hong Kong, in descending order, are operating costs, government support and industry-related preferential policies, business environment, convenience of expanding into the Mainland market, and convenience of expanding into other overseas markets. Among them, they believe that Hong Kong needs to strengthen these areas including operating costs, and government support and industry-related preferential policies. The top five factors affecting the investment of enterprises surveyed in other parts of the Bay Area in Hong Kong are business environment, operating costs, convenience of expanding into other overseas markets, government support and industry-related preferential policies, and local clinical test data can be recognised by other countries and regions. Among them, there is still room for improvement in operating costs.

Commercialisation of research achievements

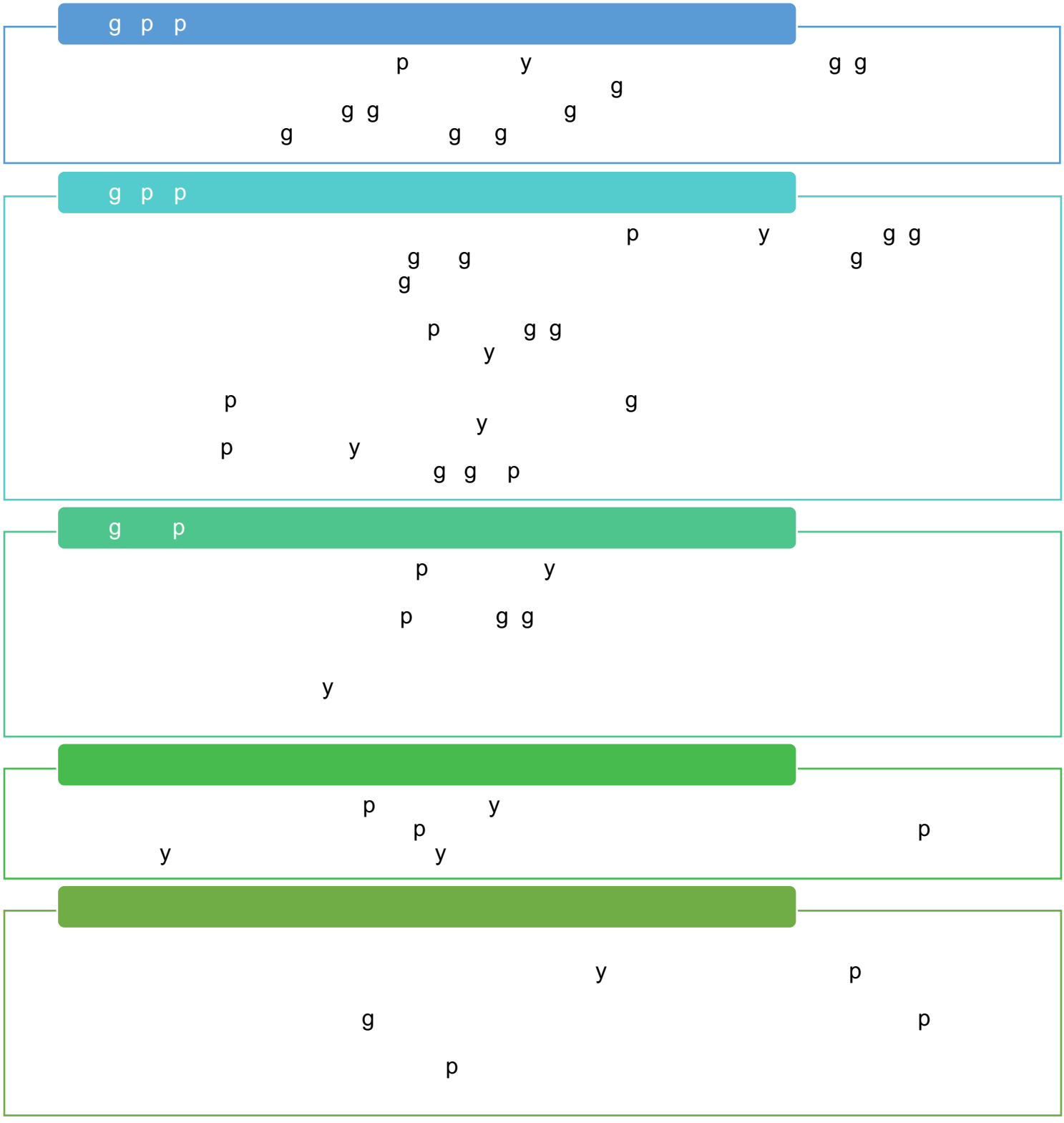
In the process of commercialising research achievements, the biggest challenges faced by Hong Kong enterprises are, in descending order, the lack of multi-skilled talent, insufficient funds and lack of investors, insufficient local supporting facilities, unable to develop products that are attractive to consumers due to insufficient understanding of market needs, and unable to implement large-scale production due to lack of relevant knowledge of production technology. The biggest challenge faced by enterprises surveyed in other parts of the Bay Area is the lack of multi-skilled talent, followed by difficulty in finding suitable plant sites for production in the surrounding areas of the company, unable to develop products that are attractive to consumers due to insufficient understanding of market needs, unable to implement large-scale production due to lack of relevant knowledge of production technology, and insufficient funds and lack of investors.

Enterprises surveyed in Hong Kong and other parts of the Bay Area believe that the lack of multi-skilled talent is the most serious problem faced by enterprises in the development process. In terms of talent, the enterprises in Hong Kong and the Greater Bay Area surveyed said that the five categories of talent most needed in the coming year were marketing, information technology/statistics/data analysis, product testing and certification, business management, manufacturing/industrial engineering. Among them, Hong Kong enterprises believe that the manufacturing/industrial engineering talent in Hong Kong are not enough, while the information technology/statistics/data analysis and product testing and certification talent are slightly insufficient. Enterprises surveyed in other parts of the Bay Area said that in addition to the adequate supply of talent in the product testing and certification categories, the other four categories were slightly insufficient.

Conclusions and Suggestions

Characteristics of Hong Kong's life and health industry

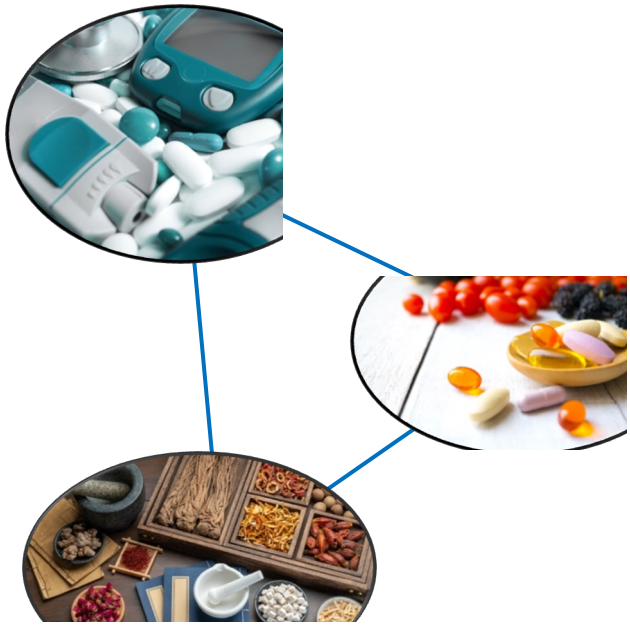
According to the survey results, the report summarises five characteristics of Hong Kong's life and health industry:



Suggestions

Based on the situation and characteristics of the life and health industry in Hong Kong summarised through the questionnaire survey, this research report takes into consideration the strengths of the industry, the challenges it faces and the support it needs, and the analyses and insights of experts from the industry, local universities and other research institutes, and puts forward four suggestions and seven measures, aiming to effectively promote the development of the life and health industry in Hong Kong.

Suggestion 1: Focus on the top three sectors of medical and diagnostic equipment, traditional Chinese medicine, and health supplements



Among the Hong Kong enterprises surveyed, the enterprises with businesses involving medical and diagnostic equipment occupy the second place (26%), indicating that this category has a substantial development base and scale in Hong Kong. On the other hand, the research and development capabilities and achievements of local enterprises in medical and diagnostic technology have led to the demand for corresponding machinery and equipment. With the experience and expertise of local manufacturers in manufacturing and processing, as well as the policy support of the government and relevant departments, there will be fresh momentum for the healthy and sustainable development of the medical and diagnostic equipment sector. In addition, in this survey, the number of enterprises related to traditional Chinese medicine ranked third (11%),

indicating that this category has a certain scale in Hong Kong and is worthy of further development. Hong Kong's traditional Chinese medicine industry has enjoyed unique, long-standing advantages.

With the policy support of the country and the HKSAR government, the traditional Chinese medicine industry has a strong momentum of development, which is bound to create higher value for Hong Kong. The number of enterprises related to health supplements ranks third (11%) on par with those related to traditional Chinese medicine, which also shows that the health supplements sector has a certain scale in Hong Kong. At present, only 30% of them have production lines in Hong Kong. However, more than 40% of health supplements enterprises intend to expand or establish production lines in Hong Kong. Therefore, if these enterprises receive support to expand their business in Hong Kong through relevant policies, infrastructure and other measures, they will be able to expand further and form clusters.

Suggestion 2: Accelerate the development of the emerging sector: genetics and stem cells

Medical science and technology have developed rapidly. Among the emerging fields, stem cell therapy and genetics therapy are the subsectors that receive the most attention and hold the most potential for wide application and significant market value, and are also recognised as an important field to develop cutting-edge medical technologies in many countries and regions. In recent years, Hong Kong has made outstanding achievements in genetics and stem cells-related research. Although only 3% of the Hong Kong enterprises surveyed are related to genetics and stem cells, the proportion of such enterprises engaged in research is the highest, up to 80%. It can be seen that the development of genetics and stem cells in Hong Kong is in the embryonic stage, but the market and scientific research achievements have a great potential for commercialisation, which needs to be developed. In addition, among the

enterprises with an annual total turnover of more than US$10 million, the category with the highest proportion is also genetics and stem cells. R&D is essential to the genetics and stem cells sector, and the industrialisation of research and development achievements will also drive the development of other related sectors (such as medical diagnostic equipment, reagents, etc.)

Suggestion 3: Nurture “Bio plus” multi-skilled talent

Hong Kong is home to several of the top 100 universities in the world, 46 members of the Chinese Academy of Sciences and Chinese Academy of Engineering, relatively abundant scientific research talent, and remarkable basic scientific research achievements in the field of life science and technology, which are recognized by the global industry. However, the commercialisation level of scientific research achievements is relatively weak. Talent is one of the key factors that cause this strong contrast. Many scientific research projects in the field of life and health lack relevant talent, such as marketing, manufacturing, and business operation, which to some extent hinders the translation of scientific research achievements into application. Therefore, the report suggests that Hong Kong nurtures “Bio plus” multi-skilled talent to meet the needs of the industry and support the long-term development of the industry. The “Bio plus” multi-skilled talent mentioned in this report are interdisciplinary and cross-field talent with in-depth knowledge and understanding of life and health research, and proficient in diverse fields such as marketing, management and operation and manufacturing. With the continuous innovation and in-depth development of the life and health industry, “Bio plus” multi-skilled talent will gradually become a scarce resource in the industry.

Suggestion 4: Enhance regulatory compatibility between the Mainland and Hong Kong

The research shows that the enhancement of regulatory compatibility between the Mainland and Hong Kong can not only help commercialise scientific research achievements, but also strengthen the complementary effect of advantages between

Hong Kong and other parts of the Bay Area and gather global innovation resources. Therefore, the report suggests that the regulatory compatibility between the Mainland and Hong Kong should be strengthened, to facilitate mutual recognition of medicines, medical devices, patents and clinical data between the two places, as well as the exchange of biological research samples, experimental reagents and genetic resources.

Measure 1: Proactively attract top-notch enterprises to Hong Kong

As an industry benchmark, the entry of top-notch enterprises into Hong Kong will also bring high-quality talent and technological innovation, and create a large number of job opportunities for Hong Kong. This will help promote the upgrading of the innovation and technology industry, expand employment, and improve the business environment. In addition, top-notch enterprises will also attract and drive the development of supporting industries, form industrial clusters, and then create a complete industrial ecosystem.

Measure 2: Leverage unique strengths of "Made in Hong Kong" as a gateway for Mainland enterprises to go global

The “Made in Hong Kong” brand has been recognised by the international community and industry, with unique advantages. The report suggests that Hong Kong can give full play to the unique brand advantages of "Made in Hong Kong", and attract outstanding startups with the potential to become unicorns to develop in Hong Kong. Through Hong Kong's unique role in global trade and consumers' confidence in "Made in Hong Kong", Mainland enterprises can use Hong Kong as a springboard to enter the international market.

Measure 3: Strengthen the awareness of Chapter 18A to attract overseas funds and potential startups to Hong Kong

The life and health industry has the characteristics of high investment, high output, high risk, and high technology intensive. Financing is vital for enterprises in every step from creation to growth. Therefore, financing is one of the key driving forces for the growth of biopharmaceutical enterprises. The report recommends strengthening the publicity of Chapter 18A of the Listing Rules of Hong Kong Exchanges and Clearing Limited (HKEX) to attract potential scientific research projects or start-up companies to Hong Kong for financing and business development. On the other hand, the presence of these enterprises in Hong Kong can also bring new technologies and specialised talent and help promote the development of Hong Kong's life and health industry to a certain extent.

Measure 4: Call on universities in Hong Kong to offer more interdisciplinary programmes to nurture multi-skilled talent

Interdisciplinary and cross-field talent (that is, Bio plus multi-skilled talent) not only are in urgent demand by the life and health industry, but also should become the key factor for the future development of different industries in the whole society. To meet the urgent needs of the industry for interdisciplinary talent, the report suggests that universities and colleges in Hong Kong refer to the data and results of this survey and add more interdisciplinary courses proposed by the industry, such as business management, marketing, and sales, testing and certification, manufacturing, to help students make better preparation to enter the workplace after graduation and cultivate talent in need for the industry.

Measure 5: Encourage enterprises to provide internships and on-the-job training with government funding

The report also encourages enterprises to provide more internship opportunities for graduates and encourages enterprises to hire students with different majors other than life science and technology, so that they can fully and comprehensively learn more about the life and health industry. This enhances the appeal of the life and health industry, attracts the interest of the young to join the industry, and strengthen the talent pool for the industry. The report also suggests that training institutions develop on-the-job training courses for employees in the life and health industry based on the survey results (such as enhancing knowledge in the fields of marketing, information technology, statistics, business management, etc. as mentioned in this report) to enrich the quality of talent. The report also encourages enterprises and employees to make good use of government subsidies and strengthen their competitiveness through on-the-job training.

Measure 6: Establish a direct dialogue and communication mechanism between Hong Kong and the local governments and relevant departments in the Mainland, add more accredited clinical trial sites in Hong Kong that are recognized by the National Medical Products Administration and strive for compatibility with regulations in the Mainland

Under "One Country, Two Systems", there are big differences in the formulation and implementation of policies between the two places. Therefore, the report suggests that HKSAR government and relevant departments should establish a direct dialogue mechanism with the local governments of other cities in Guangdong-Hong Kong-Macao Greater Bay Area to fully promote cooperation. The two places should follow a top-down approach and formulate policies, to accelerate the coordinated development of the life and health industry in Guangdong-Hong Kong-Macao Greater Bay Area.

The report suggests that the government should actively strive to include more local medical institutions or scientific research centres in the list of accredited clinical trial institutions in the Mainland, so that their clinical trial data can be used to apply for medicine registration in the Mainland, and promote Hong Kong to become an important platform for local and international pharmaceutical enterprises to enter the mainland market. At the same time, there are various relaxation policies and pilot plans to promote the development of life and health industry in Hong Kong and the Mainland, which have achieved satisfactory results and can be further strengthened. Therefore, the report suggests that the regulatory compatibility between the Mainland and Hong Kong should be strengthened to facilitate the mutual recognition of medicines, medical devices, patents and clinical data between the two places, as well as the exchange of biological research samples, experimental reagents and genetic resources. This aims at promoting the deeper integration of the life and health industry between Hong Kong and the Mainland, fully releasing the industrial potential, and giving full play to Hong Kong's distinctive advantages of enjoying strong support of the Motherland and being closely connected to the world. It will add new impetus to the establishment of Hong Kong as an International Innovation and Technology Hub and the development of the Greater Bay Area.

Measure 7: Accelerate the improvement of the infrastructure and supporting facilities of the life and health industry

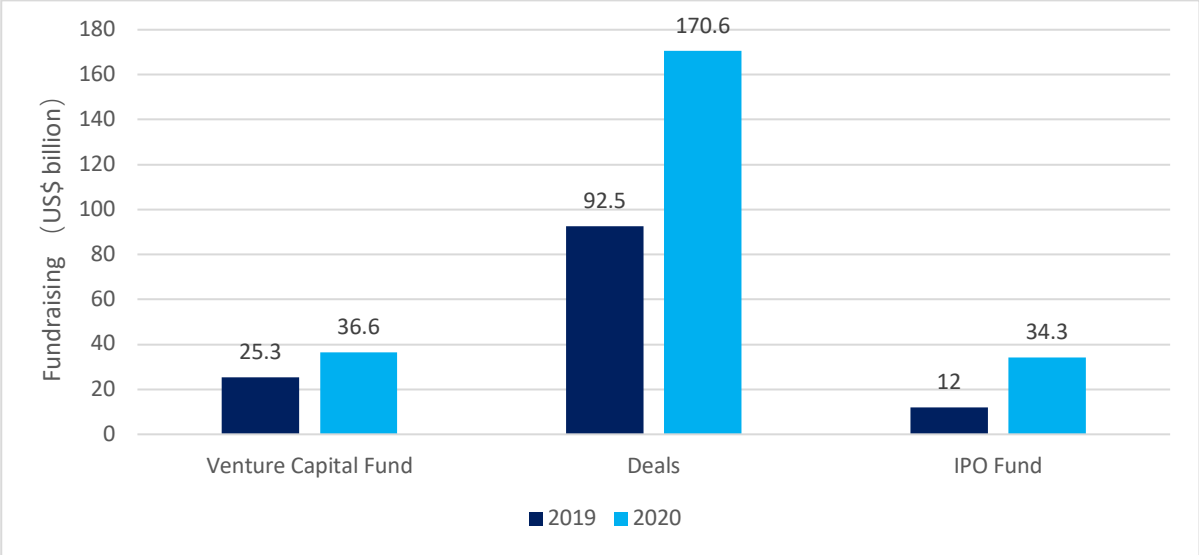
The research report suggests that the government can speed up the development of infrastructure and supporting facilities to support the development of the life and health industry, such as the construction project of the Hong Kong-Shenzhen Innovation and Technology Park (HSITP), the development of the San Tin Technopole in the Northern Metropolis, and the establishment of the InnoLife Healthtech Hub, to attract outstanding enterprises and talent to Hong Kong.

Chapter 1: Why does Hong Kong need to develop "Life and Health Industry"?

1.1 Current Status of Life and Health Industry

With the development of society, the improvement of living standards and the change of lifestyle, the demand for life and health products and services has increased sharply. The life and health industry is an emerging industry with huge market potential. Taking biotechnology and life science as the forerunner, it involves many production and service fields closely related to human health, such as pharmaceutical products, healthcare products, nutritional food, medical equipment, healthcare appliances, leisure and fitness, health management, and health consultation, etc.

Even before the outbreak of the pandemic, global medical and healthcare expenditure had been increasing. According to the 2020 report of the World Health Organisation, global medical and health expenditure reached US$8.3 trillion in 2018, accounting for 10%[1] of the global gross domestic product (GDP). The fund-raising activities of biotech companies around the world are accelerating. In 2020, the global biotech industry raised a total of US$36.6 billion of venture capital, up 45% from 2019. In the open



[1] https://apps.who.int/nha/database/DocumentationCentre/GetFile/60032341/en
[2] https://www.mckinsey.com/industries/life-sciences/our-insights/whats-ahead-for-biotech-another-wave-or-low-tide

Medical and health expenditures in the Mainland are also showing a gradual upward trend. In 2019, medical-related expenditures accounted for 6.64% of the GDP, and in 2020 it reached 7.12%[3]. From 2015 to 2019, the market scale of the life and health industry in the Mainland increased from RMB5.2 trillion to RMB8.1 trillion. It is expected that the market size will continue to increase and reach about RMB13.4 trillion in 2024[4]. In addition, since 2000, with the support and promotion of national policies, the Mainland's biotechnology industry has entered a stage of rapid development. In 2010, the total output value of the Mainland's biotechnology industry reached nearly RMB320 billion. In 2015, the total scale of the Mainland's biotechnology industry has risen to nearly RMB700 billion, an increase of nearly 120%. The scale of the Mainland's biotechnology industry was estimated to exceed RMB830 billion in 2020, and the industry scale would exceed RMB860 billion according to

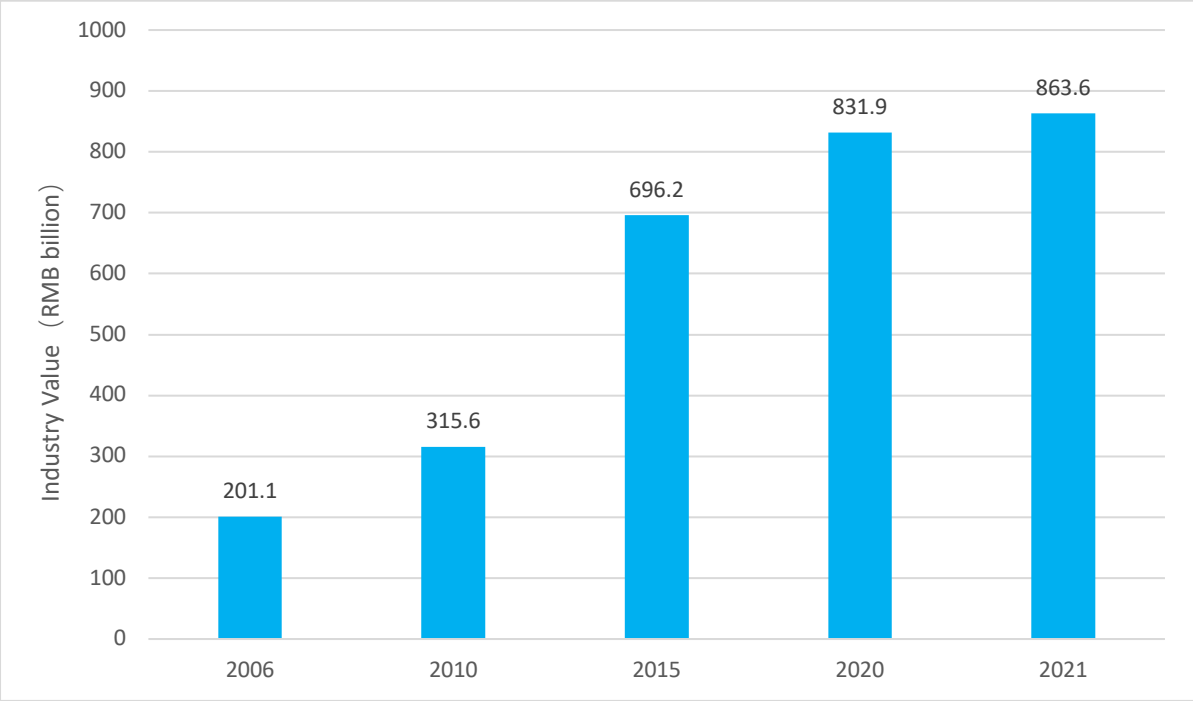


Figure 1.2: Market Growth of the Mainland's Biotech Industry, 2006-2021

[3]https://www.nhc.gov.cn/guihuaxxs/s10743/202107/af8a9c98453c4d9593e07895ae0493c8.shtml
[4]https://pdf.dfcfw.com/pdf/H3_AP202112241536431444_1.pdf?1640353706000.pdf
[5]https://www.qianzhan.com/analyst/detail/220/220617-092d2734.html

Over the past 30 years, Hong Kong's medical and health expenditure has increased steadily, with an average annual growth rate of 5.6% between 1990 and 2020, which is greater than the average annual growth rate of GDP of 3.4% during the same period6. According to the data, in 2019-20, the total private and public healthcare expenditure in Hong Kong was about HK$189.6 billion, accounting for 6.8% of the GDP7. These trends reflect the growing demand of Hong Kong residents for medical services and products. The aging population and the increasing health awareness of consumers are the main factors that drive the rising market demand for medical and health services and products. Hong Kong has advanced medical and healthcare services, and the life expectancy of its residents is the highest in the world. At the same time, like many developed economies, it will face the problem of population aging in the future. The proportion of Hong Kong's elderly population aged 65 or above is expected to rise from 20% of the total population in 2021 to 33.3% in 2039.

Hong Kong has made great achievements in various areas of the life and health industry, such as medical services, medical and health equipment, biotechnology, and traditional Chinese medicine. In terms of medical services, Hong Kong has 43 public hospitals and medical institutions, 49 specialist out-patient clinics and 73 general out-patient clinics, as well as 13 private hospitals[8]. According to Bloomberg's 2020 Bloomberg Health-Efficiency Index, Hong Kong's score ranked second in the world[9]. The CUHK Medical Centre is the first smart hospital in Hong Kong, and it is promoting innovative medical applications such as remote consultation and remote training.

[6] https://www.healthbureau.gov.hk/statistics/cn/dha/dha_summary_report.htm
[7]https://research.hktdc.com/tc/article/MzEzOTQ1MjMz
[8] https://www.hk01.com/sns/article/730553
[9] https://www.fsdc.org.hk/media/x42ochdn/20211115-fsdc-research-report-healthcare-financing_tc.pdf

Ranking	Economy	Health-Efficient Index
1	Singapore	67.79
2	Hong Kong	64.89
3	Taiwan	51.69
4	South Korea	50.79
5	Israel	46.44
6	Ireland	45.22
7	Australia	42.77
8	New Zealand	41.74
9	Thailand	41.40
10	Japan	40.21

Table 1.1: Bloomberg Health-Efficiency Index 2020[10]

In terms of the medical and health equipment industry, there are a total of 160 medical and health equipment manufacturers in Hong Kong, and 1,450 import and export merchants. According to the data in 2021, Hong Kong's total exports of medical and health equipment increased by 7.5%, while the Mainland is the largest export market for Hong Kong's medical and health equipment. During the period, Hong Kong's exports to the Mainland increased by 4.4%, and Hong Kong's exports to ASEAN and India also increased significantly by 47.1 % and 108.8%[11]. Many manufacturers in Hong Kong have moved their production bases to the Mainland. However, quality control, marketing, research and development, design, and procurement of materials and equipment continue to be conducted in Hong Kong. For Hong Kong manufacturers, products with growth potential include household appliances, hygiene and disinfection products, minimally invasive surgery equipment, orthopedic equipment, telemedicine products, and equipment and supplies for high-risk health diseases and injuries.

[10] https://www.bloomberg.com/news/articles/2020-12-18/asia-trounces-u-s-in-health-efficiency-index-amid-pandemic

[11] https://research.hktdc.com/tc/article/MzEzOTQ1MjMz

	2019		2020		2021	
	HK$ Mn	Growth %	HK$ Mn	Growth %	HK$ Mn	Growth %
Domestic Exports	29	+162.4	19	-33.1	12	-39.1
Re-exports	12,750	-2.1	14,980	+17.6	16,120	+7.6
Total Exports	12,770	-2.0	15,000	+17.5	16,130	+7.5

Table 1.2 Performance of Hong Kong's Exports of Medical and Health Equipment[12]

In terms of biotechnology, there are currently more than 250 biotechnology-related enterprises in Hong Kong, some of which are engaged in fields such as health products, medical treatment, diagnostic equipment, pharmaceuticals, or traditional Chinese medicine [12]. These enterprises will start with product research and development, then produce goods or provide services, and then carry out marketing and sales activities. The products developed by these enterprises will be adjusted for different market demands to meet the approval and certification of different countries and regions.

In terms of traditional Chinese medicine, traditional Chinese medicine has a long history in Hong Kong and is highly popularised. Traditional Chinese medicine is often deemed as an alternative and complementary approach to biomedical care. Traditional Chinese medicine has been incorporated into the medical system and supervised by relevant organizations. The Chinese Medicine Council of Hong Kong regulates the registration of traditional Chinese medicine, the licensing of traditional Chinese medicine merchants, and the registration of Chinese patent medicine. The Department of Health has the right to investigate and deal with merchants selling fake and toxic medicines in accordance with the Chinese Medicine Ordinance to ensure public health and safety. At present, traditional Chinese medicine has been incorporated into the local medical system, providing the public with a reliable treatment method other than western medicine, and helping to improve the quality of

[12] https://research.hktdc.com/tc/article/MzEzOTQ1MjMz

life of Hong Kong people. Hong Kong's traditional Chinese medicine products are famous for their high quality. The industry involves manufacturing and distribution (wholesale, retail, import and export trade). The total annual production volume exceeds HK$1.5 billion and HK$2 billion respectively, bringing new business opportunities and impetus to Hong Kong's economy[13].

Although Hong Kong has a certain foundation in some categories of the life and health industry, some core issues still need to be addressed for its long-term development. One of them is the "Valley of Death" that biotech startups will face in their early stages (limited by technical challenges and the shortage of scientific research funds for R&D and clinical trials, the early stages of development for biotech startups are usually called "Valley of Death"). Since the development of biotechnology requires a long investment cycle, general biopharmaceutical enterprises need at least 10 years to launch their products on the market and will face huge capital needs in the midway. However, most of the research projects funded in Hong Kong are scattered, and the funding period is relatively short. The market lacks stable and sufficient "patient capital" to support startups to survive the "valley of death" crisis, which makes biotechnology enterprises face huge funding gaps at different stages of development from basic research to applied research to product prototype[14].

[13]https://ls.chiculture.org.hk/tc/hot-topics/521
[14] https://www.iheima.com/article-338181.html

1.2 HKSAR Government's Policy in Life and Health Industry

The 9 major strategic industries proposed in the ″"Outline of the Fourteenth Five-Year Plan for the National Economic and Social Development and the Long-Range Objectives Through the Year 2035" ″include the biotechnology industry, and the 14th Five-Year Plan also shows support for Guangdong-Hong Kong-Macao Greater Bay Area (Greater Bay Area) to become an international technology and innovation centre. Hong Kong's 2021 Policy Address stated that Hong Kong should respond to the "needs of the country" and make better use of Hong Kong's advantages in life and health technology, and proposed to set up the "InnoLife Healthtech Hub" in the Hong Kong-Shenzhen Innovation and Technology Park in the Loop area. With 16 life and health-related laboratories in the InnoHK research clusters and the 8 State Key Laboratories in life and health disciplines as the basis, it focuses on scientific research in the field of life and health. This will help bring together top research teams from various universities and regions to jointly develop biomedical-related projects. The results can be applied to medicine development, treatment, rehabilitation and other fields, and more mid-stream and downstream R&D projects (i.e., product development and commercialisation) will be implemented. In the 2022 Policy Address, the HKSAR government further stated that it would strengthen the infrastructure, fully implement the construction project of the Hong Kong-Shenzhen Innovation and Technology Park, and accelerate the development of San Tin Technopole in the Northern Metropolis to increase the supply of land, meet the needs of industry development, and focus on attracting outstanding enterprises and talent related to several major industries, including the life and health technology industry, to settle in Hong Kong.

In recent years, Hong Kong has been actively developing the life and health industry. In addition to investing a large amount of funds in R&D activities, talent recruitment and commercialisation of research and development achievements are also one of the key tasks. By the end of March 2022, the Innovation and Technology Commission approved more than 600 biotechnology R&D projects, accounting for 12%[15] of the total R&D projects. The Innovation and Technology Fund has vigorously promoted the application of life and health technology and the development of startups. In May 2020,

[15] https://www.itib.gov.hk/zh-hk/publications/HK_factsheets_I_T_TC.pdf

the Food and Health Bureau (now renamed the Health Bureau) established the Hong Kong Genome Institute, which is responsible for carrying out the "Hong Kong Genome Project", establishing a local genome database, promoting the clinical application of genomic medicine and providing the basis for genetic research projects. Through this project, patients can receive more accurate diagnosis and personalised treatment as soon as possible. For example, there were children in Hong Kong who had been seeking medical treatment for a long time and failed to find the cause, and finally were diagnosed with rare diseases by genetic analysis[16].

The HKSAR government has also set up the Health and Medical Research Fund and the Chinese Medicine Development Fund for the two major areas of medical and health care and Chinese medicine. Since 2011, the Health and Medical Research Fund has supported 385 cancer-related projects, targeting colorectal cancer, lung cancer, breast cancer, blood cancer, etc., with a total value of HK$398 million[17]. In addition to supporting scientific research, the fund can be used to assist in formulating medical policies, improving medical practices, and promoting clinical medical services. For example, the government has carried out the breast cancer screening pilot plan based on the research results and the cost-benefit analysis of the citywide cervical cancer vaccination plan. The application research and research funding plan of traditional Chinese medicine will help accelerate the development of the industry of Chinese medicine, including optimising the quality and manufacturing system of proprietary Chinese medicine, registration of proprietary Chinese medicine, promotion of Chinese medicine, applied study and research, etc.

16 https://topick.hket.com/article/3071136/%E3%80%90%E5%9F%BA%E5%9B%A0%E7%B5%84%E8%A8%88%E5%8A%83%E3%80%91%E5%A5%B3%E7%AB%A5%E6%B1%82%E9%86%AB7%E5%B9%B4%E7%B5%82%E9%9D%A0%E5%9F%BA%E5%9B%A0%E5%88%86%E6%9E%90%E7%A2%BA%E8%A8%BA%E7%BD%95%E8%A6%8B%E7%97%85%E3%80%80%E6%B8%AF2%E8%90%AC%E6%9C%AA%E7%9F%A5%E7%97%85%E5%9B%A0%E6%82%A3%E8%80%85%E5%8F%AF%E5%85%8D%E8%B2%BB%E4%BD%9C%E5%85%A8%E5%9F%BA%E5%9B%A0%E7%B5%84%E6%B8%AC%E5%BA%8F

17 https://www.news.gov.hk/chi/2022/06/20220611/20220611_135446_331.html

In terms of talent recruitment, the government has launched a Research Talent Hub programme to support the industry to hire graduate or doctoral students and other professionals for research and development. The first round of the Global STEM Professorship Scheme also hired more than 40 outstanding scholars and their R&D teams from different regions to Hong Kong and brought more well-known research talent and their teams to the city[18].

In response to the financing problems of biotechnology companies, Hong Kong Exchanges and Clearing Limited ("HKEX") revised Chapter 18A of the Listing Rules in 2018, allowing biotechnology companies with no revenue but have passed the first phase of clinical trials for their core products, and meet other conditions (i.e. biotech companies must have at least one core product that has passed the concept stage, meet eligibility requirements for listing focused on R&D, intellectual property rights, product pipeline, etc., and have an expected market value of not less than HK$1.5 billion (has been approved a considerable amount of third-party investment provided by at least one sophisticated investor), financial records of at least two fiscal years and adequate operating working capital) to apply for listing in Hong Kong. By March 2022, 50 biotechnology companies with no income had been listed successfully through the new regulations[19]. This regulation has attracted many biotechnology enterprises to choose to list in Hong Kong. Hong Kong's mature financial market has also attracted life and health enterprises from other regions to come to Hong Kong. As of December 2021, a total of 88 health care and biotechnology enterprises were newly listed on the Hong Kong Exchanges and Clearing Limited, raising over HK$255 billion, making Hong Kong the second largest fundraising hub for biotechnology in the world, second only to the United States.

[18] https://www.bastillepost.com/hongkong/article/9368437/
[19] https://xueqiu.com/1434111201/216623988

Chapter 2: Development of Life and Health Industry in Other Regions

2.1 The Mainland (Especially Cities in Guangdong-Hong Kong-Macao Greater Bay Area)

Development status

Driven by factors such as the intensification of the aging population, the increase in medical and healthcare expenditures, and the increase in R&D investment in the industry, the market scale of the life and health industry in the Mainland has maintained a rapid growth in recent years. According to the information by PwC, the scale of the "Big Health" market in 2020 reached RMB13 trillion and has developed rapidly in the past eight years. The compound annual growth rate of the market scale reached 13%. At present, it has become the second largest market in the world[20]. In 2020, the scale of the medical industry in the Mainland was RMB1.79 trillion, and it was expected that the scale would increase to RMB1.89 trillion in 2021. Among them, biomedicines are developing rapidly, and their proportions were increasing year by year, reaching 20.84% in 2020; the proportions of traditional Chinese medicines are stable at around 25%[21]. With the advancement of the population aging in the future, the trend of increasing investment in the medical industry across the country is irreversible. The economic environment for the development of the industry is bright, and the general trend of the medial industry entering the "Golden Decade" will not change.

The National "14th Five-Year Plan" shows that the biotechnology industry is one of the country's nine strategic emerging industries, and proposes to promote the integration and innovation of biotechnology and information technology, and accelerate the development of biomedicine, biological breeding, biomaterials, bioenergy, etc., and make a bigger and stronger bioeconomy. The "14th Five-Year Plan for Bioeconomic Development" further points out that the basic frontier research of life science is still active, and the tide of biotechnology revolution has swept the world and accelerated its integration into economic and social development, providing new solutions for human beings to cope with major challenges such as life and health, climate change,

[20] https://finance.eastmoney.com/a2/202106201966741020.html
[21] https://m.askci.com/news/chanye/20200617/1748191162085.shtml

resource and energy security, food security and so on[22]. In response to the national strategic industrial layout, the "Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area" also promotes the close cooperation of high-quality medical and healthcare resources in the Greater Bay Area, optimises the regional innovation environment, and cultivates and expands various strategic emerging industries such as biomedicine, high-end medical diagnosis and treatment equipment, genetic testing, etc.[23] It is expected that with the promotion of national policies in the future, the number of enterprises in related industries and the number of research institutions and technology parks will continue to grow, which means that the market has great potential for development.

With the steady advancement of the development plan of the Guangdong-Hong Kong-Macao Greater Bay Area and the gradual introduction of corresponding facilitation measures, the biomedical industry in the Guangdong-Hong Kong-Macao Greater Bay Area can achieve all-round cooperation to better meet the needs of patients in the Greater Bay Area and other regions, and jointly capture the huge market in South China, and even the whole China and overseas. In the Guangdong-Hong Kong-Macao Greater Bay Area, the space for the biomedical industry will be released through urban renewal and land consolidation, and several new types of biomedical industrial parks/bases will be built to meet the needs of biopharmaceutical enterprises for research and development and industrialisation. Through industrial integration, complementary advantages, and the establishment of a two-way information sharing platform, the Greater Bay Area will surely develop a regional biotechnology cluster that is the best in Asia.

The Greater Bay Area has a nationally leading digital economy industry foundation. In the future, by building next-generation infrastructure, building a data sharing and innovative application platform, realising the potential of digital technologies such as AI and the Internet of Things to empower the development of the life and health industry, achieving the goals of optimising the diagnosis and treatment process and accelerating pharmaceutical research and development, the life and health industry

[22] https://www.ndrc.gov.cn/xxgk/jd/jd/202205/t20220509_1324417.html?code=&state=123
[23] https://research.hktdc.com/tc/article/Mzc0NDM1MzYy

will transition towards high-end, digital, and intelligent development. At the same time, the Greater Bay Area is committed to building the fourth comprehensive national science centre in the country. There are several major science facilities in the Greater Bay Area, such as the free electron laser, the medium-energy synchrotron radiation source, and the China Spallation Neutron Source will help basic research and innovation of life and health. The cities in the Greater Bay Area all have rich and diverse local facilities and resources, which can promote interdisciplinary research in a large extent according to local conditions, and jointly promote the leapfrog development of medical equipment and other industries in the Guangdong-Hong Kong-Macao Greater Bay Area.

Shenzhen is an important birthplace and core cluster of the national medical device industry. The total value of medical device production, export, the market value, and profit of listed companies of medical devices rank first among large and medium-sized cities in the Mainland. In the future, it will rely on the major science facilities of the Guangming Science City, and the construction of infrastructure for biomedical big data, and focus on the key fields of biomedicines, high-end biomedical engineering, precision medicines, and focus on supporting the development of basic research such as synthetic biology, brain science, and development of new drugs, cell therapy, genetic testing, biomedical imaging, etc.

By leveraging the rich scientific research and clinical medical resources of colleges and universities in Guangzhou, after years of development, Guangzhou has performed well in the fields of biomedicines, chemical drugs, traditional Chinese medicines, medical devices, health supplements, regenerative medicine, etc., forming a closed-loop industrial ecosystem with the Guangzhou International Bio Island as the leading research and development centre, the Guangzhou Science City as the pilot test incubation area, and the China-Singapore Guangzhou Knowledge City as the industrial transformation area.

With the foundation of electronic information and equipment manufacturing industry, Dongguan's medical device industry, which focuses on medical equipment and in vitro diagnosis, has made great progress. In the future, Dongguan will rely on major science facilities such as the China Spallation Neutron Source and Southern Advanced Photon Source to build a full-chain biomedical industry system of "R&D + clinical + manufacturing + application" centered on biomedicine and high-end medical equipment.

Zhongshan performs well in the fields of biomedicines, chemical drugs, and medical devices. It gathers innovative platforms represented by Akeso's innovative antibody drug R&D platform, provincial level inspection and testing institutions, and multiple CMO/CDMO platforms. Through the biomedical innovation platform jointly launched by the University of Hong Kong (HKU) and the Guangdong Pharmaceutical University (GDPU), external cooperation has been achieved.

Relevant policies

All local governments in the Greater Bay Area have formulated corresponding policies to support enterprises according to the development characteristics of their own life and health industries. Taking the financial assistance policy of Shenzhen for drug research and development as an example, for Class 1 chemical drugs, Class 1 biological products and Class 1 traditional Chinese medicine that have been licensed by the registered applicant in Shenzhen for production in the city and have obtained the clinical trial license, 40% of the pre-clinical R&D expenses can be subsidised on a discretionary basis, with a maximum of RMB8 million. For those that have completed Phase I, Phase II and Phase III clinical trials in the Mainland, according to different clinical trial stages, 40% of the R&D investment can be subsidized on a discretionary basis, with the funding capped at RMB10 million, RMB20 million and RMB30 million respectively; for those who entrust drug clinical trial institutions in Shenzhen as the lead unit to carry out clinical trials, the amount of funding will be increased by an additional 10%. The cumulative amount of financial support for each enterprise per year shall not exceed RMB100 million. In terms of the fields that receive subsidies,

the government has divided the fields of financial assistance very precisely and covered a wide range of beneficiaries. In terms of funding amount, the upper limit of financial assistance is about three times that of Suzhou and equals that of Shanghai.

At the same time, in response to the key needs of enterprises such as investment, R&D support, and industry service support, the Guangzhou Development District has introduced district-level and municipal-level supportive policies, and the level of financial assistance ranks first in the country. For example, for major projects, the maximum financial assistance for a single project is RMB500 million. The entire Greater Bay Area attaches great importance to the life and health industry and offers generous financial assistance.

Challenges and difficulties

As an emerging industry that is technology-intensive, innovation-intensive, knowledge-intensive, patent-intensive and data-intensive, the life and health industry has the characteristics of high return on output and great development potential, but it also has the characteristics of long cycle, high investment, and high risk. R&D projects need to go through the stages of R&D from the initial concept stage, clinical trials, approval, and listing, and need to face both commercial and financial risks that cannot be ignored. Therefore, although biomedicine is a sunrise industry with huge market potential, relevant enterprises also face different problems in business development[24].

- Difficulties in introducing new technology

There are two major barriers to the development of the biomedical industry in the Mainland. One of the barriers is technical barrier. With the vigorous development of the Mainland's economy and the support of policy, technology and capital, the biomedical technology in the Mainland has made a breakthrough. However, compared with overseas, it is still lagging. Under such circumstances, many local enterprises choose to cooperate with foreign pharmaceutical enterprises. The huge pharmaceutical consumption market in the Mainland has also attracted the interest of many overseas pharmaceutical enterprises to explore the Chinese market.

[24] https://research.hktdc.com/tc/article/Mzc0NDM1MzYy

However, due to the asymmetry in the biomedical system between the Mainland and overseas, many overseas enterprises will also have a long "pain period" and the risk of "acclimatisation" when entering the Mainland market.

- Difficulties in clinical trials

As a key link of clinical research, clinical trial is the key step of obtaining approval for new medicine research and development, and it is also the step that takes the longest time and requires the most funds in the entire process from R&D to marketing. The quality and efficiency of clinical trials directly affect the R&D efficiency and competitiveness of pharmaceutical enterprises. At present, clinical trials in the Mainland are booming with the continuous development of the biomedical industry. However, corresponding shortcomings have also been exposed, such as insufficient innovation, low standards, and insufficient time due to individual research experts taking up multiple projects. In addition, the distribution and geographical inequality of medical resources and development in the Mainland has led to the high concentration of most clinical trials in some regions and hospitals, resulting in the shortage of available resources in these regions, which is not conducive to the development of new medicines. Take Guangdong Province as an example, at present, there is fierce competition between scientific research institutions and enterprises that strive for clinical testing resources. In addition to obtaining permission to cooperate with hospitals, it is also necessary to find relevant suitable patients for testing. However, not only is the cost of relevant tests high, but also the shortage of available resources such as hospitals and patients. This creates obstacles to the development of innovative biomedicine.

- Difficulties in obtaining foreign medical certification

When the Mainland’s biopharmaceutical enterprises "go global" to expand overseas markets, they must be familiar with the rules of the target market, file an application with the regulatory body of the target country or region, conduct clinical trials, apply for listing, and conduct production and sales after obtaining certification and approval. With the continuous development of the biomedical industry in the Mainland, "going global" has become the general trend of corporate strategy. But as seen from the current situation, this road is not easy. One of the key factors hindering the

"going global" strategy is the lack of relevant experts in the fields of international clinical trial research, patent protection who are familiar with the regulatory regulations of target countries and regions.

- Financing and financial difficulties

Most projects such as bio-pharmaceutical projects need to be incubated for a long time and undergo a long clinical trial process, so that many small and medium-sized enterprises and startups need to bear huge financial risks and pressures at different stages of business development. The medical or technical personnel in charge of research and development may not have relevant financing and sales experience. In addition, the development and innovation of biological and pharmaceutical technologies are mostly high-risk businesses. Mainland banks and other financial institutions are more conservative about projects that have not yet generated income and may refuse to provide financing for projects that lack collateral. In view of this, in addition to obtaining angel investment or venture capital to finance related projects, enterprises also need relevant financial services to transform their biomedical projects into financially feasible businesses, and obtain full and sustainable financial arrangements for R&D, clinical trials, certification applications, product listing, etc.

2.2 Singapore

Development status

Singapore is one of the most successful countries in developing health industry in Asia. In 2000, the Government of Singapore launched a strategy to develop the biomedical industry. At the end of 2003, the Singapore Biopolis, a comprehensive research centre for biomedical science, was established to promote the development of the industry. Biomedical manufacturing industry in Singapore quadrupled from 2000 to 2010, with revenue rising from SG$6 billion to SG$23.3 billion, which accounts for 5% of Singapore's gross domestic product (GDP). It can be attributed to the introduction of outstanding biomedical multinational enterprises, substantial investment in infrastructure, accelerating technology development, building human resource networks, promoting industrial agglomeration, and raising public awareness, etc. by the Government of Singapore.

From 2011 to 2015, the government allocated SG$16.1 billion to support R&D[25]. These measures not only attracted some world-leading scientists and scientific research talent all over the world, but also attracted international pharmaceutical enterprises. Multinational enterprises such as Sanofi, GlaxoSmithKline, MSD and Novartis all have chosen to conduct business in Singapore with complete supporting facilities and established regional clinical trial centres. These enterprises not only provide opportunities for Singapore's further economic development, but also provide financial support to the scientists involved in the research.

Singapore has successfully shifted its positioning from an outpost in manufacturing to an outpost in the entire innovation and manufacturing value chain, as well as in Asia. The number of pharmaceutical and biological product manufacturers increased from 25 in 2000 to 52 in 2018, with average annual growth rate at 4%. A large proportion of these new plants are biopharmaceutical plants. There were

[25]https://www.mti.gov.sg/Resources/publications/Research-Innovation-and-Enterprise-RIE-2015

no biopharmaceutical plants in Singapore in 2000, while by 2019, there were an estimate of 18 biopharmaceutical plants in Singapore[26]. In terms of R&D employment, the number of biomedical researchers in Singapore is five times more than in the United States. With a population of approximately 5.6 million, Singapore had about 7,150 biomedical researchers in 2018, with an estimated 128 biomedical researchers per 100,000 inhabitants. With a population of 328.2 million in 2017, the United States had about 80,000 biomedical researchers, with only 24 researchers per 100,000 inhabitants[27].

As of 2019, biomedical manufacturing accounted for 20% (SG$19.57 billion) of the manufacturing industry's total added value, which was equivalent to 4% of Singapore's GDP. From 2000 to 2019, biomedical manufacturing was the fastest growing sub-sector in manufacturing, with a compound annual growth rate (CAGR) of 9% (in comparison, the average growth rate of Singapore's manufacturing industry is 5%). In this sub-sector, medical technology manufacturing sector's added value CAGR was 12% over the same period. In 2019, 24,384 people were employed in biomedical manufacturing, of which 65% were engaged in medical technology manufacturing and 35% were engaged in pharmaceuticals. Together, the value add to Singapore's GDP was close to SG$20 billion in 2019[26].

Relevant policies

To promote this biomedical cluster, the Government of Singapore has invested a lot in R&D, including through publicly funded research institutes, venture capitals, and the use of tax incentives to attract international companies and foreign direct investment. The government remains a major investor in biomedical R&D investment, investing SG$1.2 billion in 2018. From 2000 to 2018, the Government of Singapore invested approximately SG$14.16 billion in biomedical R&D, an average of SG$746 million per year.

[26] https://www.ciip.group.cam.ac.uk/reports-and-articles/singapores-biomedical-cluster/download/2021-02-19-SBS.pdf
[27] http://www.phirda.com/artilce_29308.html

In the early stages of development of the biomedical industry, the Government of Singapore launched a series of tax concessions and financial assistance to attract business investment and development. It includes the following measures:

- For investments in new manufacturing and services that introduce high-tech skills, the 25.5% corporate profits tax will be completely exempted for 5-10 years.
- A preferential tax rate of 13% for 10 years for companies engaged in new projects or scaling up or upgrading their business in Singapore that contributes to a major economic spin-off.
- Companies engaged in industries such as manufacturing, engineering services, R&D activities and construction are exempted from taxable income equivalent to a certain percentage of new fixed investments.

- Interest payable to foreign lenders exceeding SG$200,000 are exempted from withholding tax.
- Full or partial exemption from withholding tax on royalties for eligible companies.
- For companies more than 50% of which are owned by Singapore citizens or permanent residents, the ability to offset losses incurred from the sale of shares or liquidation of up to 100% of equity invested overseas against their other taxable income; and exemption of corporate tax on qualifying income earned from approved overseas investments and projects for up to 10 years.
- For operational headquarters, a concessionary corporate tax rate of 10% applies, while global headquarters are eligible for a full tax exemption.

Challenges and difficulties

One of the biggest challenges for Singapore biotech startups is securing sufficient funding to sustain operations. In the high-risk early development stage, startups must rely on angel investors. Apart from funding, startups still need to face other challenges. These include the need for innovative R&D, protection of intellectual property rights, lengthy development period before a product goes to the market and generates revenue, market access and regulatory issues. Unfortunately, only a few startups have the expertise to deal with the issues involved.

There is great opportunity and potential for biotech startups in Singapore. However, given the small and limited market potential in Singapore, biotech startups need a regional outlook to achieve success. These companies can cast their eyes beyond Asia. Strong government investment in biomedical sciences has attracted internationally renowned scientists and centres of academic excellence to Singapore. Together with local tertiary institutions, they play a key role in developing the research workforce capabilities urgently needed by biotech startups in Singapore.

Singapore's proximity to large emerging markets such as India and Indonesia, as well as small but dynamic countries such as Vietnam, undoubtedly brings geographical advantages. But for those seeking access to the Mainland, one of the region's most attractive healthcare markets, Hong Kong could be a better gateway to the Mainland. As public and private investment in the Mainland's healthcare business continues to grow, more entrepreneurs and researchers may choose to settle directly in cities such as Shenzhen or Shanghai.

2.3 Taiwan

Development status

In 1982, the Taiwan authorities listed biotechnology as one of the eight key science and technology industries[28], integrated regional resources, and implemented different measures, including the establishment of a development centre for biotechnology, the construction of biotechnology park and incubation centres, enacting the Act for the Development of Biotech and Pharmaceutical Industry, the launch of action plans, and laws and regulations to promote the development of Taiwan's biotechnology and pharmaceutical industry. In 1994, the Taiwan authorities promulgated the "Action plan for biotechnology industry" and established the "Biotechnology Industry Steering Group"[29]. From 1997 to 2001, five conferences were held to propose timetables in the areas of regulation and inspection system, research development and application, technology transfer and commercialisation, talent cultivation and acquisition, investment facilitation and cooperation, market information and service marketing.

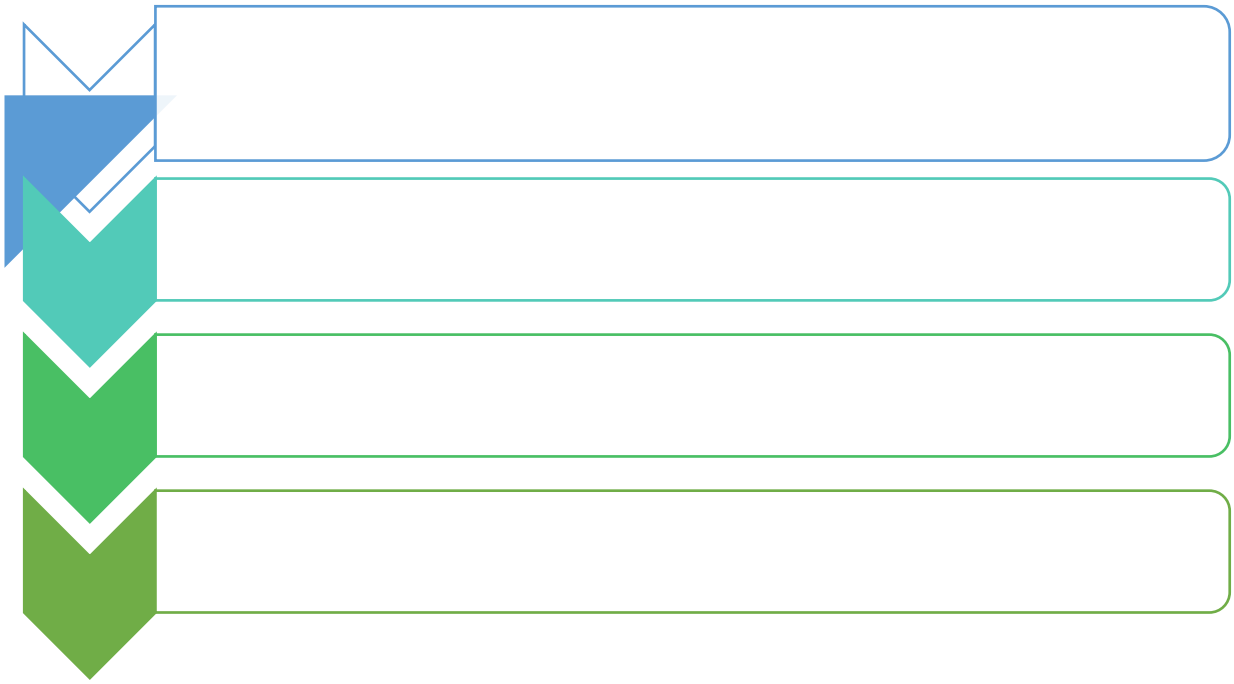
In 2002, the Taiwan authorities formulated four programmes for upstream basic research in the biotechnology industry[30], including the Research Program for Genomic Medicine, the Science and Technology Program for Agricultural Biotechnology, the Science and Technology Program for Biotechnology and the Research Program for the Chinese Herbal Medicine. In 2007, they further launched the “Biotech and New Pharmaceuticals Development Act”. The "Five plus two" industrial innovation programme in 2016 and the "Six Core Strategic Industries" in 2020 can also accelerate the development of Taiwan's biotechnology industry, which contributes to the upgrading of the medical industry and its external development[31].

[28] https://www.pidc.org.tw/materials.php?id=680

[29] https://ws.ndc.gov.tw/Download.ashx?u=LzAwMS9hZG1pbmlzdHJhdG9yLzEwL3JlbGZpbGUvNjA5NS8xMTcxMS8wMDEyNDQ1XzEyLnBkZg%3D%3D&n=55Sf5oqA6ZG955%2Bz6LW36aOb6KGM5YuV5pa55qGIICDooYzli5XoqIjnlasucGRm&icon=..pdf

[30] http://homepage.ntu.edu.tw/~sljang/teachingMaterial/IE/bio.pdf

[31] https://view.ctee.com.tw/social/33985.html



Taiwan's biotechnology and healthcare industry is currently dominated by small and medium-sized enterprises. The increase in the growth rate of overseas cooperation and licensing transactions in Taiwan's biotechnology healthcare industry in 2017, coupled with the development of new products by biotechnology enterprises in the capital market, attracted overseas biotechnology enterprises to seek investment cooperation[32].

According to the statistics of the white paper on the biotechnology industry by Taiwan's economic affairs department, the turnover of Taiwan's biotechnology industry increased from TW$359 billion in 2012 to TW$601.1 billion in 2020, which is an increase of nearly 70%. In terms of the number of listed companies in the biotechnology industry, there was also a strong growth. The number of listed companies increased from 44 to 124, an increase of about twofold. In addition, it created more than 100,000 jobs and the export value reached more than TW$130 billion, which represented a thriving development of the industry. In 2020, the health and welfare sector was the largest in terms of revenue, worth TW$205.5 billion.

[32] https://www.hea.com.tw/infoDetail.asp?id=452

The second largest is the medical equipment sector, worth TW$192.4 billion. The pharmaceutical sector worth TW$89 billion[33].

In 2019, among the world's top 200 biotechnology companies, Taiwan's biotechnology companies accounted for 14 of them, ranking first in Asia. Taiwan's biotechnology industry mainly includes three major categories: pharmaceuticals, applied biotechnology and medical devices, and the output value of medical devices is the largest. According to the estimation of the Industry, Science and Technology International Strategy Center of Taiwan Industrial Technology Research Institute, the output value of medical device in Taiwan reached TW$109 billion in 2018. Contact lenses and high-end catheters provide impetus for the growth of medical material production in Taiwan.

In terms of the pharmaceutical industry, according to estimates from Development Center for Biotechnology, the output value of Taiwan's overall pharmaceutical industry reached TW$72.45 billion in 2018. This is mainly due to the gradual ease of the impact from adjustment required by the implementation of the Good Manufacturing Practice (GMP) standards of the International Pharmaceutical Inspection Convention (PIC/S), and the steady growth of exports to the United States, the Mainland, Japan, etc. According to the estimation of the Industry, Science and Technology International Strategy Center of Taiwan Industrial Technology Research Institute, in 2018, the total output value of Taiwan's biotechnology and pharmaceutical industry (such as raw materials, small molecule drugs, and biological agents) increased by 3.2%.

As for the capital market, there are currently 120 biotechnology companies listed in Taiwan. The combined total turnover of these companies in 2018 was TW$252.4 billion, an annual growth of 11%. Among them, 18 companies have a combined market value of more than 10 billion. These companies belong to industries such as pharmaceuticals, and healthcare and medical devices[34]. In addition, Taiwan is better than other regions in terms of scientific research in the way that Taiwan is the only

[33] https://view.ctee.com.tw/social/33985.html
[34] https://research.hktdc.com/tc/article/MzE5OTI3MDQx#:~:text=%E8%94%A1%E8%8B%B1%E6%96%87%E7%B8%BD%E7%B5%B1%E5%9C%A8%E9%96%8B%E5%B9%95,%E9%83%BD%E6%9C%89%E4%BA%AE%E7%9C%BC%E8%A1%A8%E7%8F%BE%E3%80%82

place in the world with a complete health insurance database for up to 25 years, which means that there is massive data to create artificial intelligence analysis systems, which will contribute to the development of preventive medicine[35].

Policy

Taiwan's legislature passed the “Act for the Development of Biotech and Pharmaceutical Industry” on the third reading, to appropriately relax the scope of application of high-risk medical devices, thereby encouraging the industry to invest in and develop these devices. The scope of application of the “Act for the Development of Biotech and Pharmaceutical Industry” has been extended from the new drugs, high-risk medical devices, animal and plant medicines, regeneration, precision medicine to digital medicine and strategic biotechnology pharmaceutical products in Taiwan. In addition, the Pharmaceutical Affairs Act and the "Fundamental Science and Technology Act" have been adjusted and amended to further improve the foundation of the legal system for industrial development[36]. In 2016, Taiwan began to promote the “The New Southbound Policy” and the "Five plus two" industrial innovation programme to encourage the development of the regional medical industry[37]. In 2018, the authorities also implemented "Regulations Governing the Application or Use of Specific Medical Techniques or Examinations, or Medical Devices" to make cell therapy in the field of regenerative medicine regulated by law[38].

[35] https://ibmi.taiwan-healthcare.org/zh/ibmi_news_detail.php?REFDOCTYPID=0q61b7oo7ibny817&REFDOCID=0qdi9gli8b3igco2
[36] https://home.kpmg/tw/zh/home/media/press-releases/2021/12/biotech-and-new-pharmaceutical-development-act-and-its-impact.html
[37] https://www.ey.gov.tw/Page/5A8A0CB5B41DA11E/86f143fa-8441-4914-8349-c474afe0d44e
[38] https://geneonline.news/taiwan-biotech-industry/

Challenges and difficulties

Taiwan's development of biotechnology industry has advantages in terms of laws and regulations, intellectual property rights, technical personnel, and language skills.

However, the development of Taiwan's biotechnology industry also faces many challenges. Taiwan's market is too small, and its existing resources are insufficient. Therefore, whether it is R&D and innovation of technology, or product manufacturing and sales, it is necessary to integrate with the international market to expand their market scale. Taiwan's insufficient integration with the international market has led to its inability to establish a complete biotechnology industrial chain so far, and it has failed to cultivate international-level companies and unicorns that Taiwan can be proud of and get a solid foothold in the international market. There are also few cases of international acquisitions.

In terms of talent, Taiwan has many excellent R&D talent, but lacks talent in key areas such as production, quality management and regulations. Opening the international market requires business negotiations, the establishment of business models, and contractual capabilities. However, Taiwan has a chronic shortage of talent for cross-regional marketing and operation management. Taiwan's biotechnology industry enterprises are still in the R&D stage and has not formed a complete biotechnology industrial chain yet[39].

[39] https://ibmi.taiwan-healthcare.org/zh/ibmi_news_detail.php?REFDOCTYPID=0q61b7oo7ibny817&REFDOCID=0qdi9gli8b3igco2

2.4 India

Development status

In 1986, the Department of Biotechnology (DBT) was established by the Ministry of Science and Technology to actively develop biotechnology in India. DBT has established several centres in the country. These centres are responsible for cultivating new skills in the field of biotechnology and expanding R&D in the private sectors. The scheme that attracts the most attention is the Biotechnology Industry Research Assistance Council (BIRAC). It is a non-profit public-sector enterprise established in 2012 by DBTI serves to stimulate, foster, and enhance the strategic research and innovation capabilities of the Indian biotech industry, particularly start-ups and small and medium-sized enterprises. In just six years since its establishment, BIRAC has supported 316 startups and generated US$125 million through 122 products and technologies, including cattle feed supplements, new processes for manufacturing human albumin and immunoglobulin, microfluidics-based diagnostics, and rapid tests for malaria[40].

The Government of India has funded research areas such as genetic engineering, molecular biology, agricultural and medical sciences, animal and plant tissue culture, biofertilizers and biopesticides, environment, human genetics, microbial technology, and bioprocess engineering. India has also made new efforts in addressing social issues such as healthcare, food and agriculture, energy and environmental security. International cooperation has become more strategic, with better impact and greater breadth. Industry partnerships are evolving.

India is the world's largest supplier of generic medicines, accounting for 20% (by quantity) of global generic medicine exports[41]. Currently, 8 of the top 20 generic medicine companies worldwide are from India.

[40] https://www.nature.com/articles/d41586-018-07671-9
[41] https://www.investindia.gov.in/zh-tw/sector/pharmaceuticals

Indian medicines are exported to more than 200 countries around the world, with the United States being the major market.

India's pharmaceutical industry has the third largest production in the world. It is worth noting that manufacturing costs in India are 33% lower than in Western markets and are further reducing. At the same time, the percentage of quality compliance of India-made medicines is also high. In fact, India has the largest number of US Food and Drug Administration (US FDA)-approved facilities outside the US (over 664), more than 2,050 World Health Organization Good Manufacturing Practice (WHO-GMP) approved pharmaceutical plants, and more than 697 facilities that comply with European GMP standards.

Policy

To promote the development of the biotechnology industry, the Indian government has launched various facilitation measures.

1. Accelerate drug approval
India has been changing the way it regulates medicines and is crossing the hurdles of lengthy medicine approval processes. The government has provided incentives for local manufacturing and reduced import taxes on Indian-made equipment.

2. National Digital Health Mission (NDHM)
NDHM aims to create a management mechanism to process digital health data and facilitate its seamless exchange; establish registries of public and private facilities, health service providers, laboratories, and pharmacies; and support clinical decision-making and provide services such as telemedicine. NDHM can make health systems more transparent and efficient.

3. Tax incentives
All healthcare education and training services are exempt from service tax.

4. Specific support policies for medical devices, equipment, and diagnostics

The Indian government has assisted the development of the medical device, equipment, and diagnostic industry through different policies, including the clear classification of various types of medical diagnostic equipment, which will be regulated according to their risk profile. The Regulation emphasizes third-party evaluation and certification to enhance the quality of the industry and products. At the same time, an online electronic platform is used to simplify the process of applying for a manufacturing license. It develops medical device parks around five device manufacturing clusters across the country to promote "manufacturing ecosystem cluster development" in India. The Andhra Pradesh Medical Technology Zone (AMTZ), an integrated healthcare ecosystem, is established to provide the capital-intensive scientific facilities required by most medical device manufacturers. AMTZ also focuses on critical component research to address long-term manufacturing hurdles. The Government will also give priority to local medical device and equipment suppliers during tender selection.

Challenges and difficulties

Although India has achieved excellence in generic medicines, there are also skepticism about them. Generic medicines are typically 30%-80% cheaper than the originator equivalents, and the question often asked is "Are generic medicines comparable in quality and performance to brand medicines?" Proponents of generic medicines claim that they are just as effective as brand or innovative medicines. Following this statement, India's Drugs Technical Advisory Board in May 2016 considered amending Rule 65 (11A) of the Drugs and Cosmetics Act, 1940 so that pharmacists can assign generic medicines and/or equivalent brands based on prescriptions for brand names. However, skeptics point out that the use of generic medicines may lead to prolonged disease and even treatment failure, because the bioavailability (BA) of generic medicines may not be as good as that of prescribed brands. Therefore, the key to affecting the quality of generic medicines is purity,

potency, stability, and drug release issues, which should be controlled within the appropriate limits, ranges, or distributions to ensure the desired medicine quality.

One of the main reasons for doctors' lack of confidence in generic medicines is the lack of strict regulatory requirements regarding the quantity of medicine in its generic version and the impurities allowed. However, since 2016, clear guidelines have been developed stating that the generic medicine to brand medicine ratio for key pharmacokinetic parameters [maximum concentration (Cmax) and area under the curve] should have a 90% confidence interval between 80% and 125% of 1.00. Regulatory agencies require BE (in vivo) to ensure that medicine-equivalent reference products are therapeutically identical to standard reference products. In some cases, in vitro dissolution studies are sufficient to demonstrate equivalence between the two drugs. But for highly water-soluble biopharmaceutical classification systems (classes 1 and 3), immediate-release products using currently available excipients and manufacturing techniques, in vivo-in vitro correlation, may not be possible. Indian regulators granted exemptions to tramadol, paracetamol, levofloxacin, memantine, moxifloxacin and temozolomide due to the high solubility and high permeability of these medicine substances. To ensure that the quality of generic medicines is comparable to their branded versions, and to strictly maintain this equivalence, Indian government should also legislate to ensure compliance in generic drug production and testing, so that doctors can prescribe drugs with confidence.

Chapter 3: Survey Results

3.1 Methodology

A 19-question questionnaire for this study on the development of life and health industry in Hong Kong was designed. In addition to basic economic data such as business nature, sales and employment, this survey included multiple-choice questions in four other categories, namely: (1) their challenges in the commercialisation of research findings and the support they need; (2) their considerations for developing their business in Hong Kong; (3) the attractiveness of the conditions of Hong Kong and other cities of the Greater Bay Area for their companies' development; (4) talent and other supporting facilities needed for the company's development in Hong Kong. A complete questionnaire is set at the Appendix for readers who are interested in the details. The survey was conducted from July to September in 2022 and targeted companies related to the life and health industry in Hong Kong and the Mainland, including biotechnology, traditional Chinese medicine, healthcare equipment, etc. We interviewed a total of 330 enterprises with questionnaires from the life and health industry, including 273 Hong Kong enterprises and 57 enterprises in other parts of the Bay Area.

3.2 Main Survey Findings

Background information of enterprises

There are 9 main categories of enterprises surveyed: medication and pharmaceutical raw materials, medical and diagnostic equipment, traditional Chinese medicine, health supplements, medical services, genetics and stem cells, artificial intelligence in healthcare, regenerative medicine, and others (including cosmetic and skincare, medical consumables, etc.). Hong Kong enterprises surveyed are mainly engaged in medication and pharmaceutical raw materials (36%), medical and diagnostic equipment (34%), traditional Chinese medicine (15%), health supplements (15%). Enterprises surveyed in other parts of the Bay Area are mainly engaged in medical and diagnostic equipment (56%), medication and pharmaceutical raw materials (26%) and genetics and stem cells (19%). Figure 3.1 shows the distribution of sectors of the enterprises surveyed.

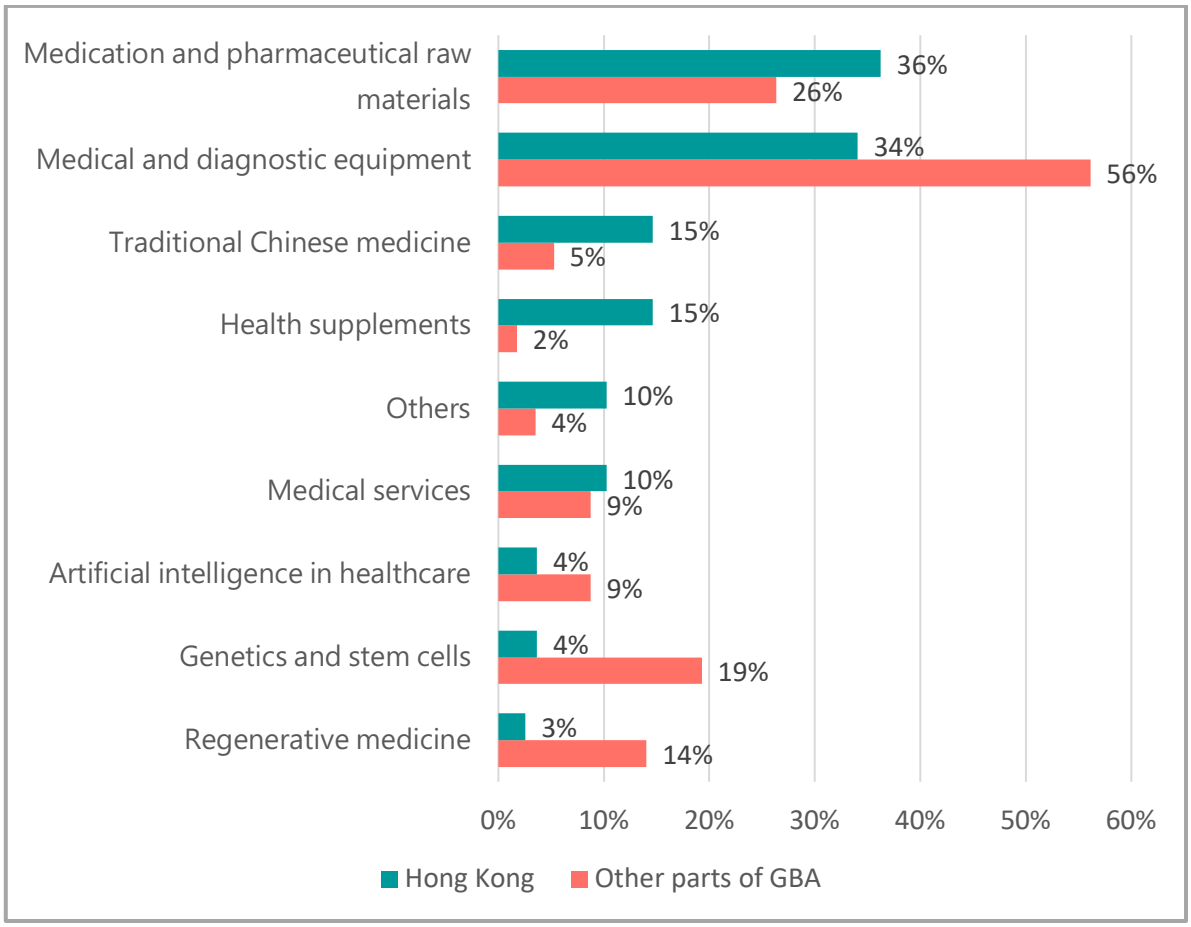


Figure 3.1: Distribution by Sector of the enterprises surveyed

(In this study, Greater Bay Area refers to the Greater Bay Area apart from Hong Kong)

In terms of business nature, as shown in Figure 3.2, the enterprises surveyed in Hong Kong are mainly engaged in: trade (48%), original brand manufacturer OBM (40%), research (25%). Enterprises surveyed in other parts of the Bay Area are mainly engaged in original brand manufacturer (74%), original design manufacturer (26%) and research (25%). Among all categories, Hong Kong enterprises have the highest proportion of research in genetics and stem cells (80%) and artificial intelligence in healthcare (80%), and the highest proportion of manufacturing in traditional Chinese medicine (63%).

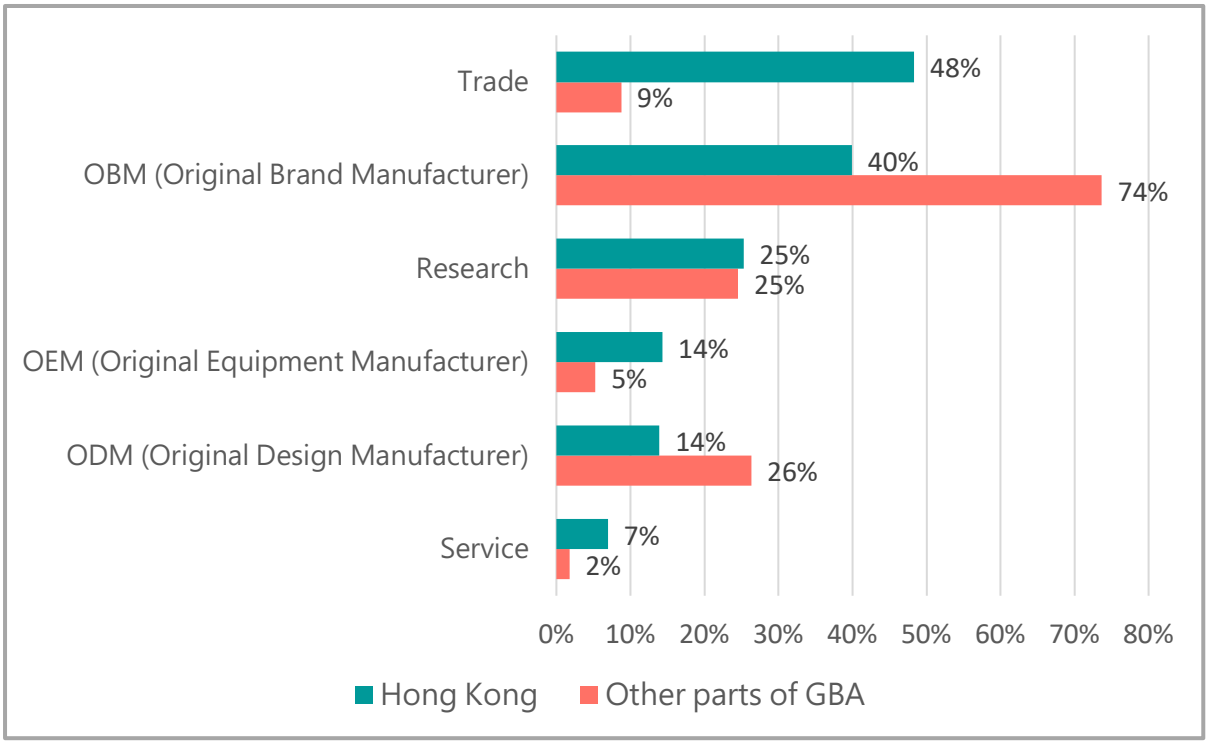
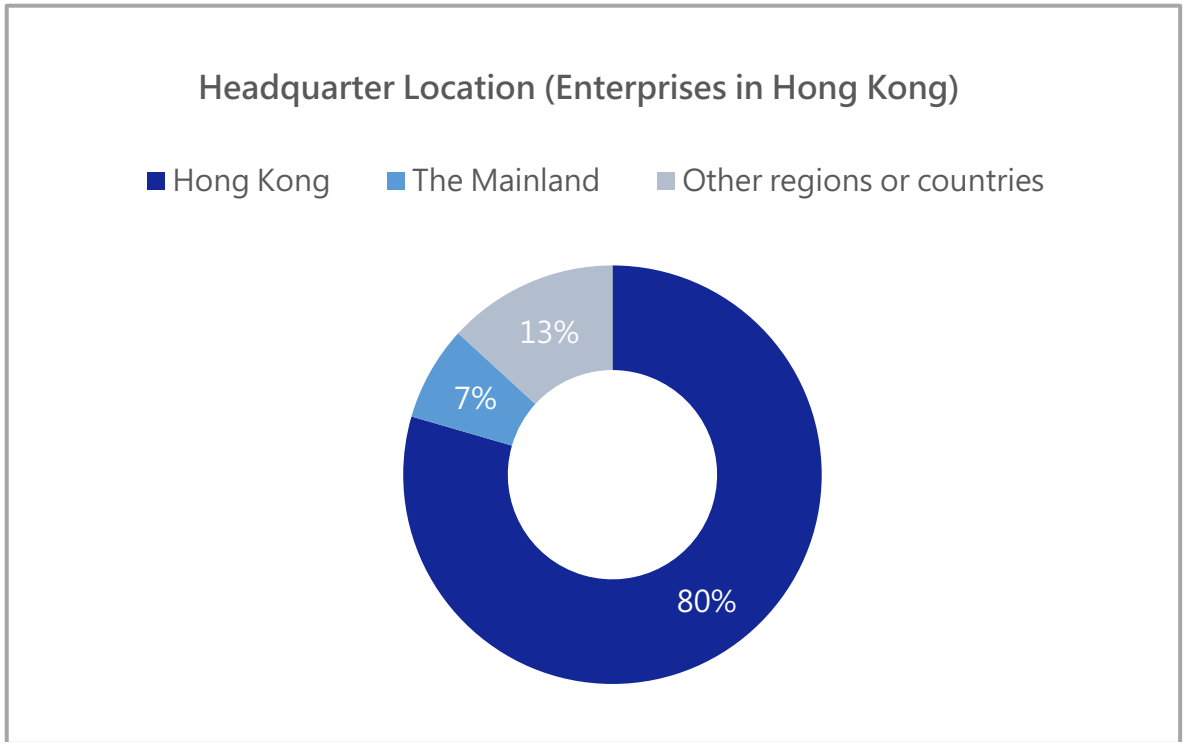
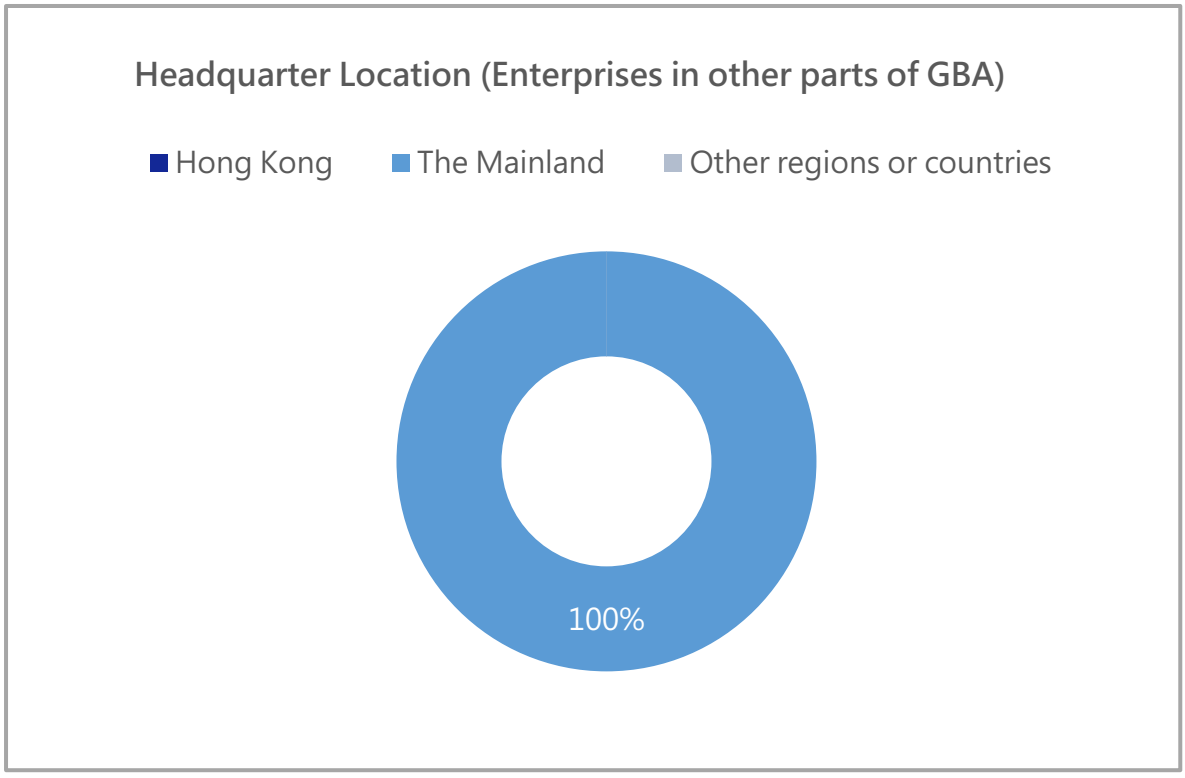


Figure 3.2: Business nature of enterprises surveyed

As shown in Figure 3.3, 80% of the surveyed Hong Kong enterprises are headquartered in Hong Kong, followed by the Mainland, accounting for 7%. Some enterprises are headquartered in other regions, including Europe, Southeast Asia, the United States, etc. Among enterprises surveyed in other parts of the Bay Area, all of them are headquartered in the Mainland.





In terms of main sales markets, the study found that 79%, 42% and 25% of the surveyed Hong Kong enterprises chose Hong Kong, the Mainland, and Europe and the United States as their main sales markets respectively. Among enterprises surveyed in other parts of the Bay Area, 91%, 33% and 30% respectively took the Mainland, Europe and the United States, and other Asian regions or countries as their main sales markets. Figure 3.4 shows detailed information on the main sales markets of enterprises surveyed.

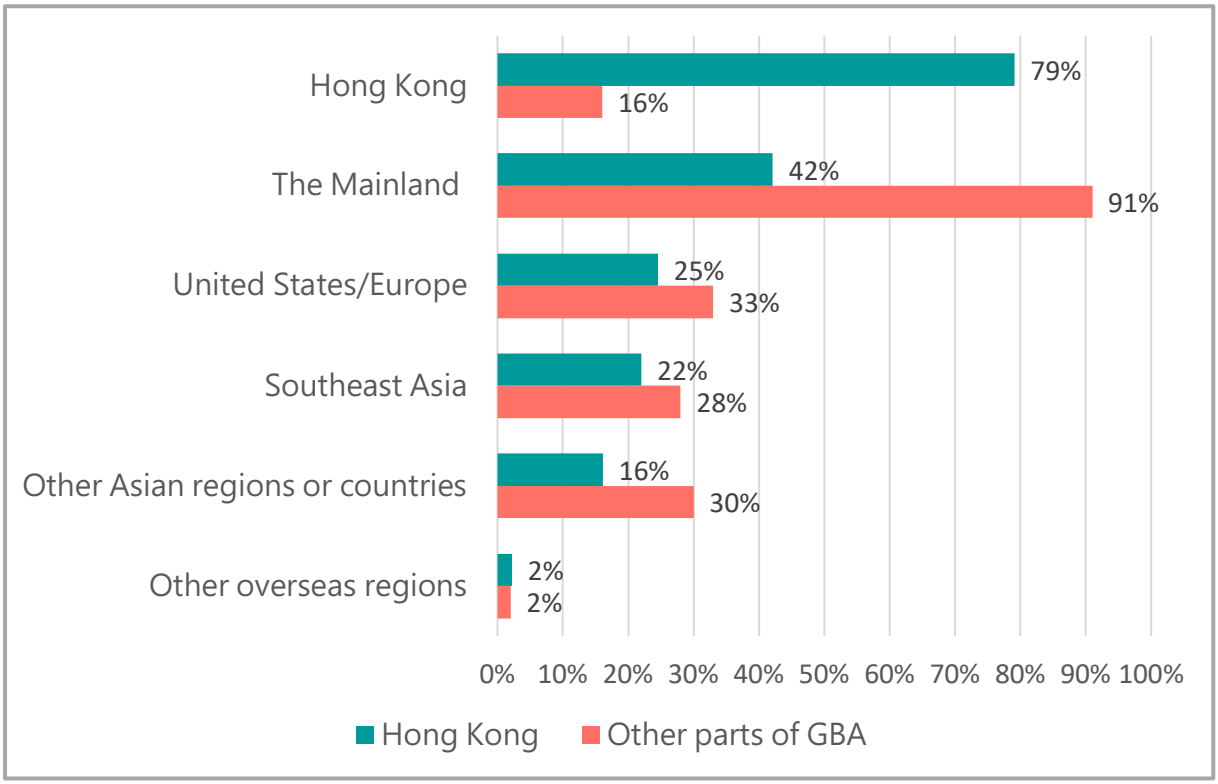


Figure 3.4: Main sales markets of enterprises surveyed

In terms of annual revenue, Hong Kong enterprises mainly have a revenue of less than US$5 million, accounting for 60%; 9% of enterprises with a revenue between US$5.01 million and US$10 million; 20% of them have a revenue of more than US$10 million. Enterprises surveyed in other parts of the Bay Area also have an annual revenue of less than US$5 million as the majority, accounting for 56%; 7% of them have an annual revenue between US$5.01 million and US$10 million; 37% of them have an annual revenue of more than US$10 million, i.e., with a much higher proportion than Hong Kong enterprises. Please refer to Figure 3.5 for details.

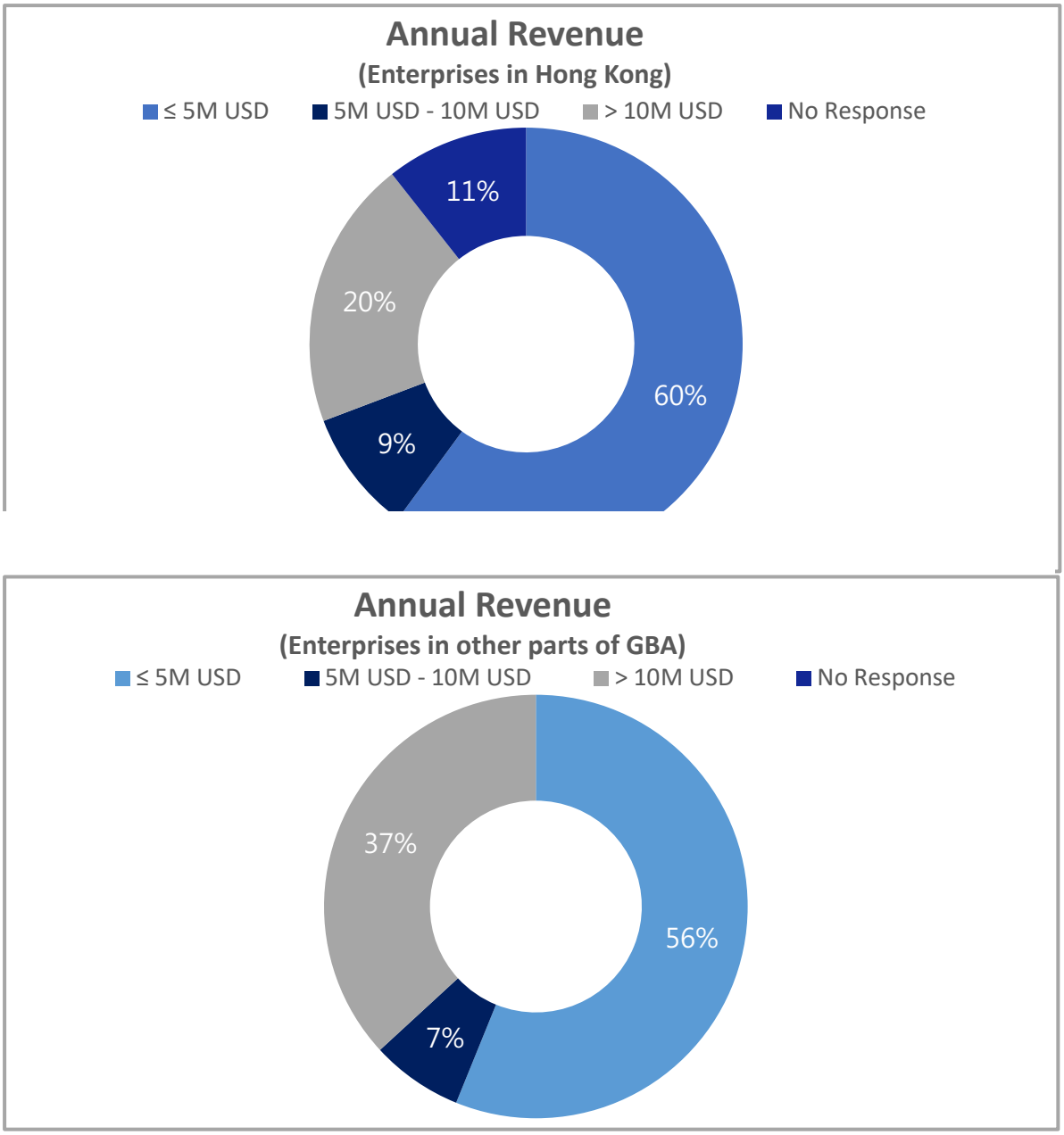
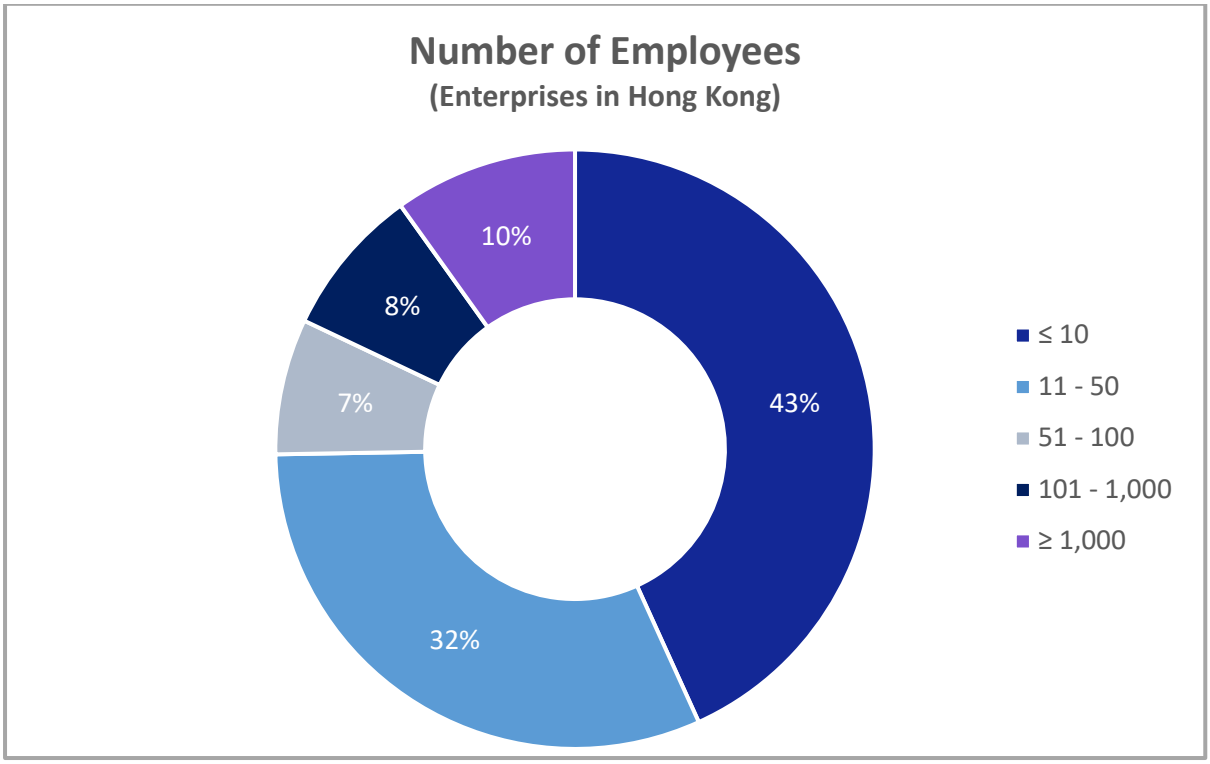


Figure 3.5: Total annual revenue of enterprises surveyed

It can be seen from Figure 3.6 that Hong Kong enterprises surveyed with less than 10 employees take up the majority (43%). It is followed by an employee number of 11-50 (32%) and more than 1,000 (10%). Enterprises surveyed in other parts of the Bay Area have slightly different employee proportion, with the largest number of employees of 101-1,000 (35%); it is followed by the staff size of 11-50 (28%) and 51-100 (23%).



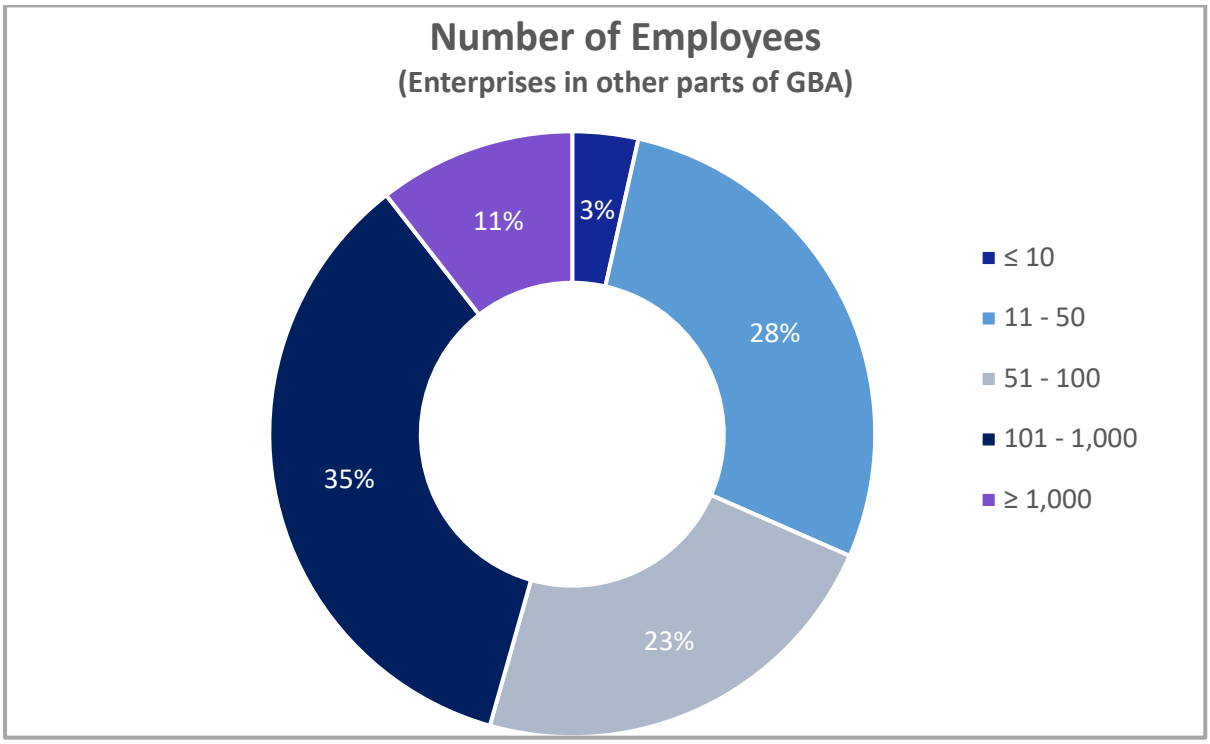


Figure 3.6: Number of employees in enterprises surveyed

Current business situation

The questionnaire provides insight into the actual R&D activities of enterprises surveyed. As shown in Figure 3.7a, 37% of Hong Kong enterprises are engaged in R&D activities. Of which, 27.8% set up laboratories in Hong Kong; 14% set up laboratories in the Mainland, Taiwan or Macao; 2.2% set up laboratories in Southeast Asia. Laboratories in Hong Kong mainly operate in facilities that cover less than 1,000 square feet (17.6%); and in the Mainland, Taiwan or Macao, laboratories mainly operate in facilities that cover 1,001-5,000 square feet (5.5%). A small number of enterprises' laboratories are in the United States, Europe, Australia, Canada and other places. Figure 3.7b shows the R&D activities of enterprises surveyed in other parts of the Bay Area. 95% of enterprises surveyed in other parts of the Bay Area are engaged in R&D activities. 95% of enterprises set up laboratories in the Mainland, Taiwan or Macao. Most laboratories cover an area of 10,000 square feet (43.9%) and only 5% of enterprises surveyed in other parts of the Bay Area have laboratories in Hong Kong.

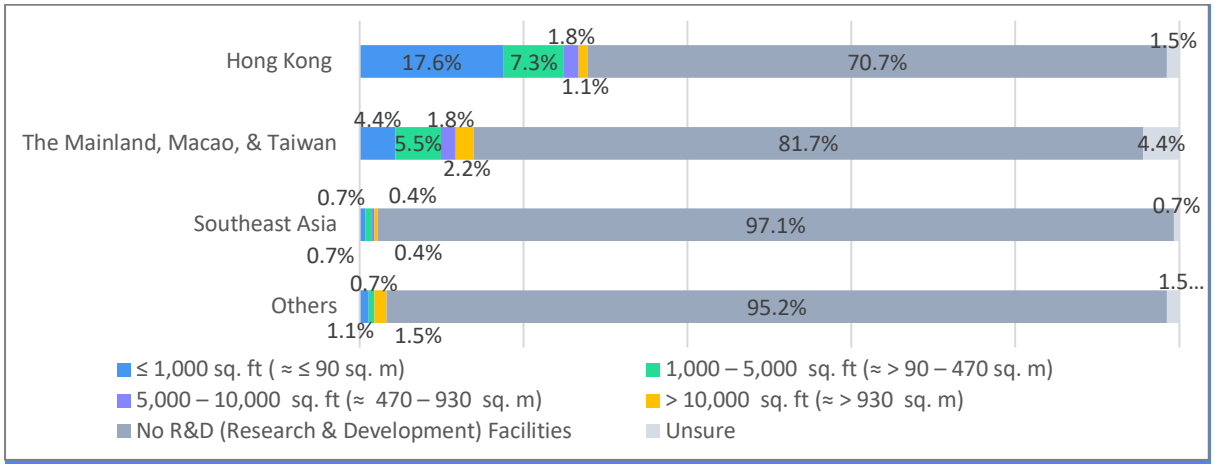


Figure 3.7a: Location and size of R&D laboratories of Hong Kong enterprises

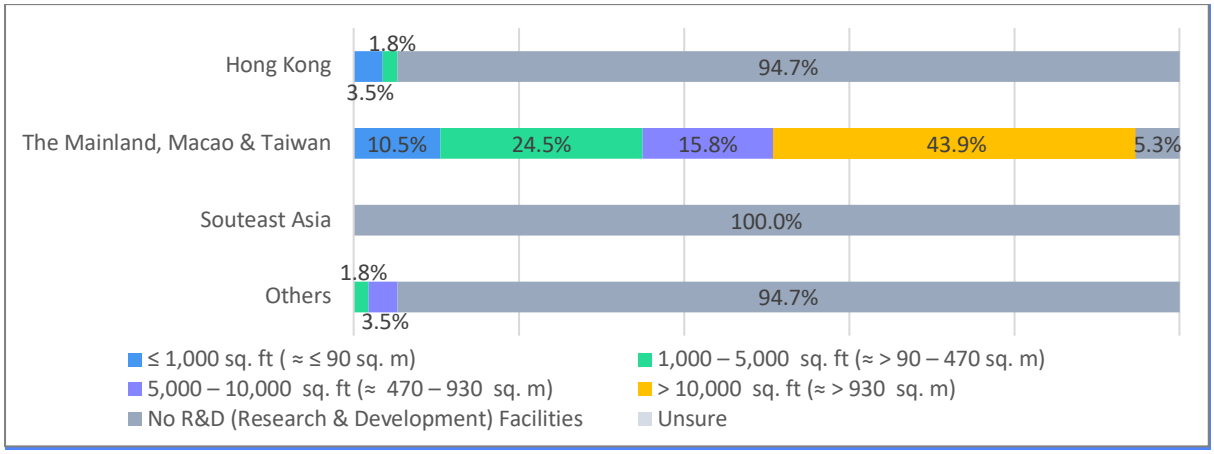


Figure 3.7b: Location and size of R&D laboratories of enterprises surveyed in other parts of the Bay Area

According to Figure 3.8a, in terms of pilot production activities, 31% of Hong Kong enterprises have pilot production activities. 18% of enterprises have pilot production lines in Hong Kong; 16.5% have pilot production lines in the Mainland, Taiwan or Macao and 2.2% of the pilot production lines were set up in Southeast Asia. The pilot production lines in Hong Kong mainly operate in facilities that cover less than 1,000 square feet (10.2%); pilot production lines in the Mainland, Taiwan or Macao mainly operate in facilities that cover less than 1,000 square feet and 1,001-5,000 square feet (both at 5.1%). A small number of enterprises' pilot production lines are in the United States, Europe, Australia, Canada, etc. Figure 3.8b shows the pilot production activities of enterprises surveyed in other parts of the Bay Area. 86% of enterprises surveyed in other parts of the Bay Area have conducted trial production activities. All of them have trial production lines located in the Mainland, Taiwan or Macao. Most pilot production line covers 10,000 square feet, accounting for 51%; however, no pilot production line is in Hong Kong.

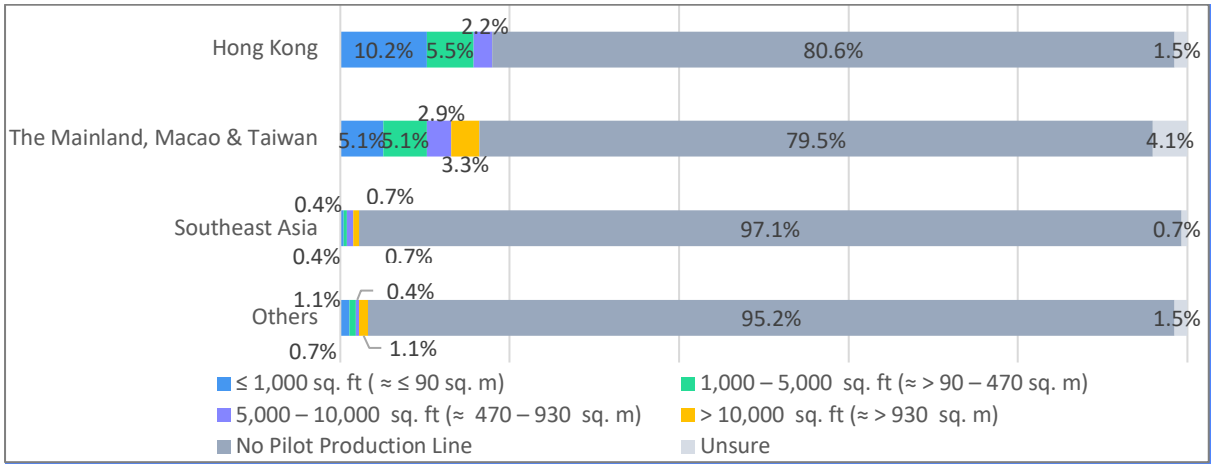


Figure 3.8a: Location and size of pilot production lines of Hong Kong enterprises

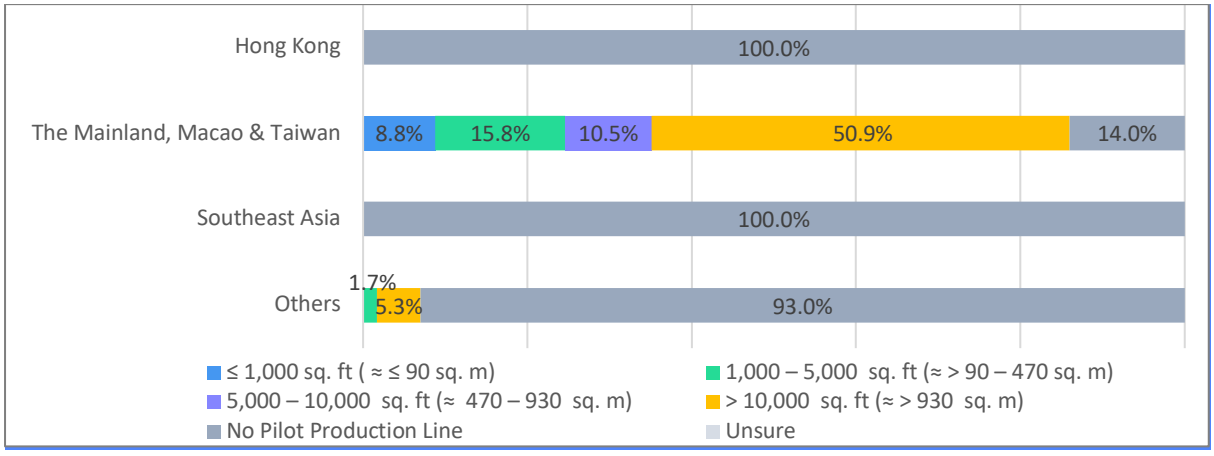


Figure 3.8b: Location and size of pilot production lines of enterprises surveyed in other parts of the Bay Area

Figure 3.9a shows the mass production activities of enterprises surveyed. 41% of Hong Kong enterprises have mass production activities. Of which, 23% set up production lines in Hong Kong; 21% set up production lines in the Mainland, Taiwan or Macao; 3.3% set up production lines in Southeast Asia. The mass production lines in Hong Kong mainly operate in facilities that cover 1,001-5,000 square feet (12.8%), followed by less than 1,000 square feet (6.6%); Hong Kong enterprises' mass production lines in the Mainland, Taiwan or Macao mainly operate in facilities that cover 1,001-5,000 square feet (7.3%), followed by 100,000 square feet (4.4%). A small number of enterprises' mass production lines are in the United States, Europe, Canada, Africa, etc. Figure 3.9b shows the mass production activities of enterprises surveyed in other parts of the Bay Area. 81% of enterprises surveyed in other parts of the Bay Area have mass production activities. 81% of enterprises surveyed in other parts of the Bay Area have production lines located in the Mainland, Taiwan or Macao; however, no production line is in Hong Kong. The production lines mainly cover 30,000-70,000 square feet (23%).

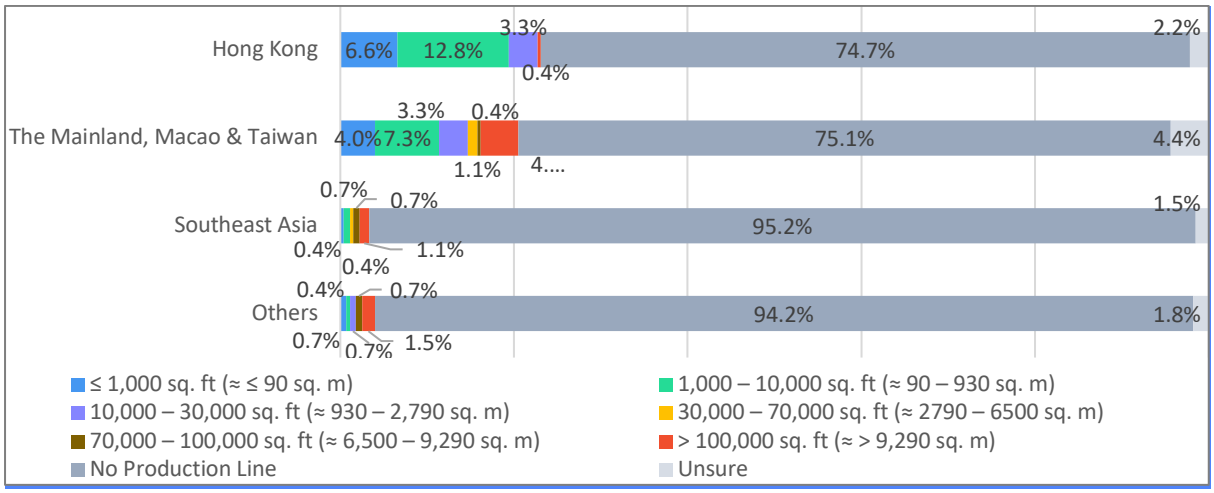


Figure 3.9a: Location and size of mass production lines of Hong Kong enterprises

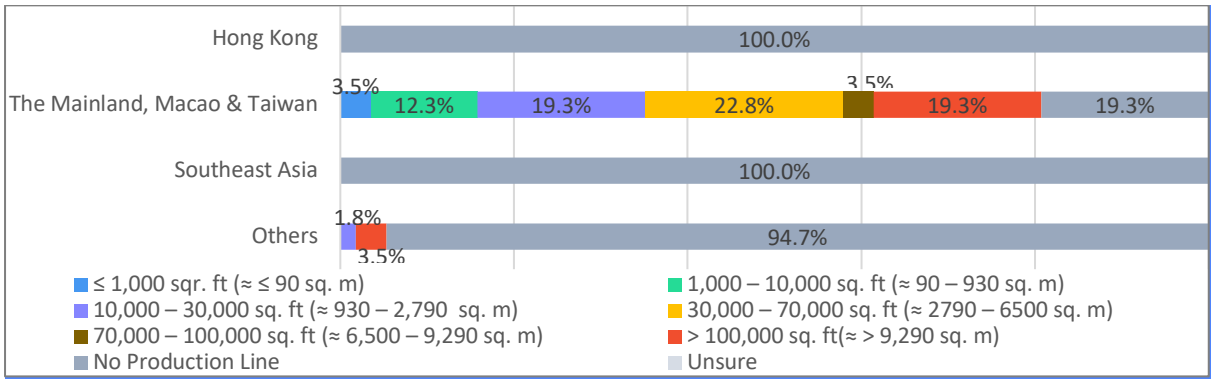


Figure 3.9b: Location and size of mass production lines of enterprises surveyed in other parts of the Bay Area

This report investigates the human resources needs of life and health-related enterprises in the next 12 months. According to the results, the top five most needed talent in Hong Kong were Marketing (38%), Information technology/Statistics/Data analysis (35%), Product testing and certification (34%), Business management (33%) and Manufacturing/Industrial engineering (29%). Among them, 66% of enterprises in need of Manufacturing/Industrial engineering talent think that Hong Kong does not have sufficient talent supply at present; about 50% of enterprises in need of Information technology/Statistics/Data analysis and Product testing and certification talent believe that there is currently insufficient talent supply in Hong Kong. The talent supply in Marketing and Business management is relatively sufficient, and only 30% and 29% of enterprises believe that local supply is insufficient. Please refer to Figure 3.10a for details. As shown in Figure 3.10b, the top five categories of talent needed by enterprises surveyed in other parts of the Bay Area were Marketing (68%), Manufacturing/Industrial engineering (60%), Business management (60%), Product testing and certification (60%) and Information technology/Statistics/Data analysis (56%), same as Hong Kong enterprises' top five categories of talent in needs. Among them, the categories that were deemed to have insufficient talent supply in Hong Kong were Information technology/Statistics/Data analysis (38%), Marketing (37%), Manufacturing/Industrial engineering (35%) and Business management (35%). The supply of Product testing and certification talent in Hong Kong is relatively sufficient, with only 27% of enterprises believing that talent supply in this category is insufficient.

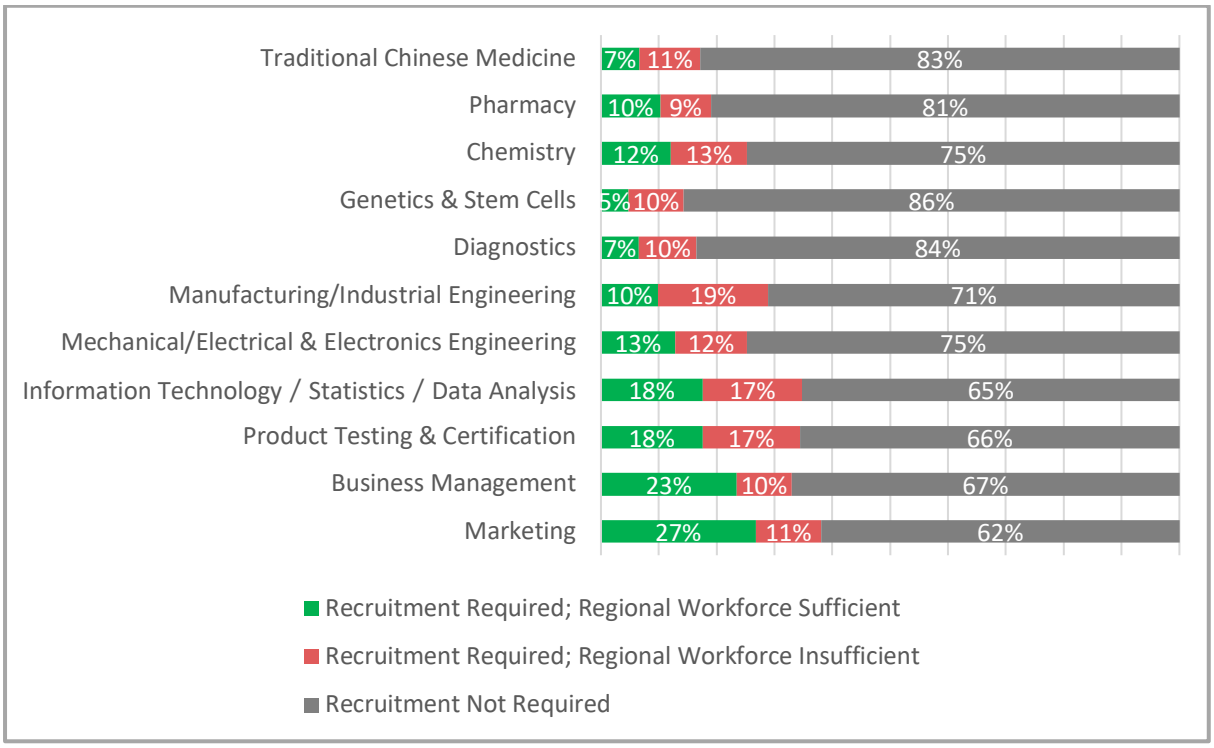


Figure 3.10a: Needs in terms of talent of Hong Kong enterprises in the next 12 months

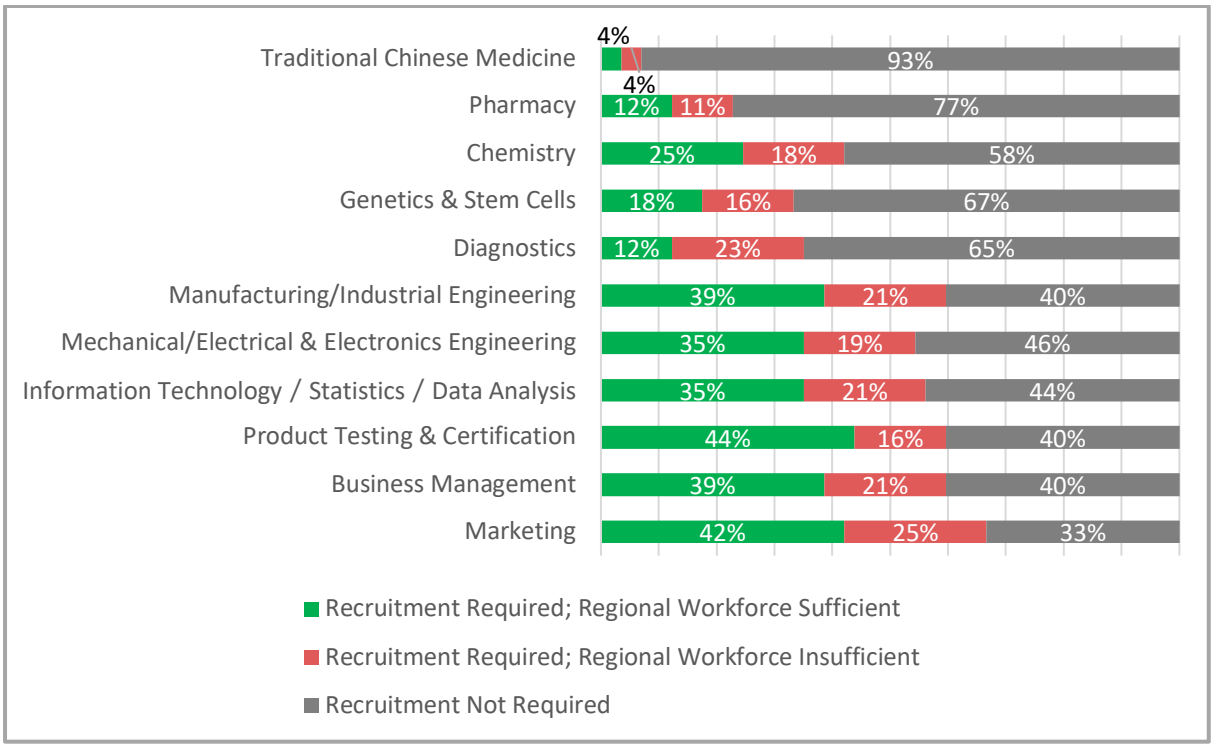


Figure 3.10b: Needs in terms of talent of enterprises surveyed in other parts of the Bay Area in the next 12 months

Commercialisation on research findings

One of the focuses of this research report is the commercialisation of research findings and understanding the challenges that enterprises encounter in the process of the commercialisation of research findings. Referring to Figure 3.11, among the 11 options, the top five challenges faced by Hong Kong enterprises were Lack of multi-skilled talent (37%), Insufficient funds and lack of investors (36%), Insufficient local supporting facilities (27%), Unable to develop products that are attractive to consumers due to insufficient understanding of market needs (20%) and Unable to implement large-scale production due to lack of relevant knowledge of production technology (19%). For enterprises surveyed in other parts of the Bay Area, the biggest challenge in the process of the commercialisation of research findings is also Lack of multi-skilled talent (88%), followed by Difficulty in finding suitable plant sites for production in the surrounding areas of the company (28%). Other top challenges are "I Unable to develop products that are attractive to consumers due to insufficient understanding of market needs " (26%), " Unable to implement large-scale production due to lack of relevant knowledge of production technology " (26%) and "I Insufficient funds and lack of investors " (25%).

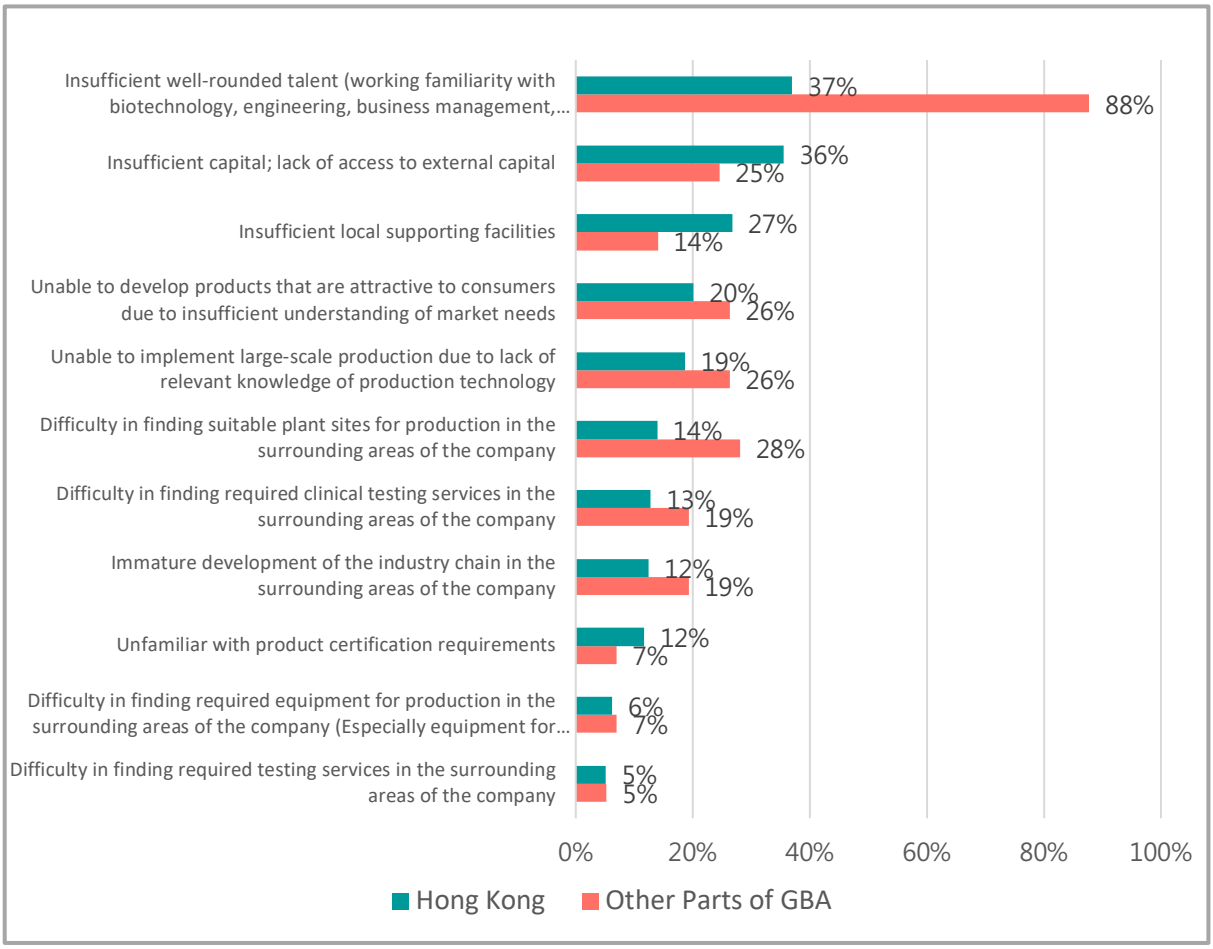


Figure 3.11: Challenges faced by enterprises surveyed in the commercialisation of research findings

The report also attempts to find out what kind of support is most helpful for companies to commercialise their research findings. As shown in Figure 3.12, among the 11 options, the five measures that Hong Kong enterprises believe will help the most are implementing various funding schemes (40%), strengthening the training of multi-skilled talent (35%), simplifying the procedures for certification application in Hong Kong (28%), providing business matching service for companies to find suitable suppliers (21%) and improving overall local supporting facilities (18%). For enterprises surveyed in other parts of the Bay Area, the measures that are most helpful are slightly different, in descending order: strengthening the training of all-rounded talent (54%), implementing various funding schemes (49%), providing support on Hong Kong product certification (46%), simplifying the procedures for certification application in Hong Kong (32%) and promoting the development of a complete local industry chain (30%).

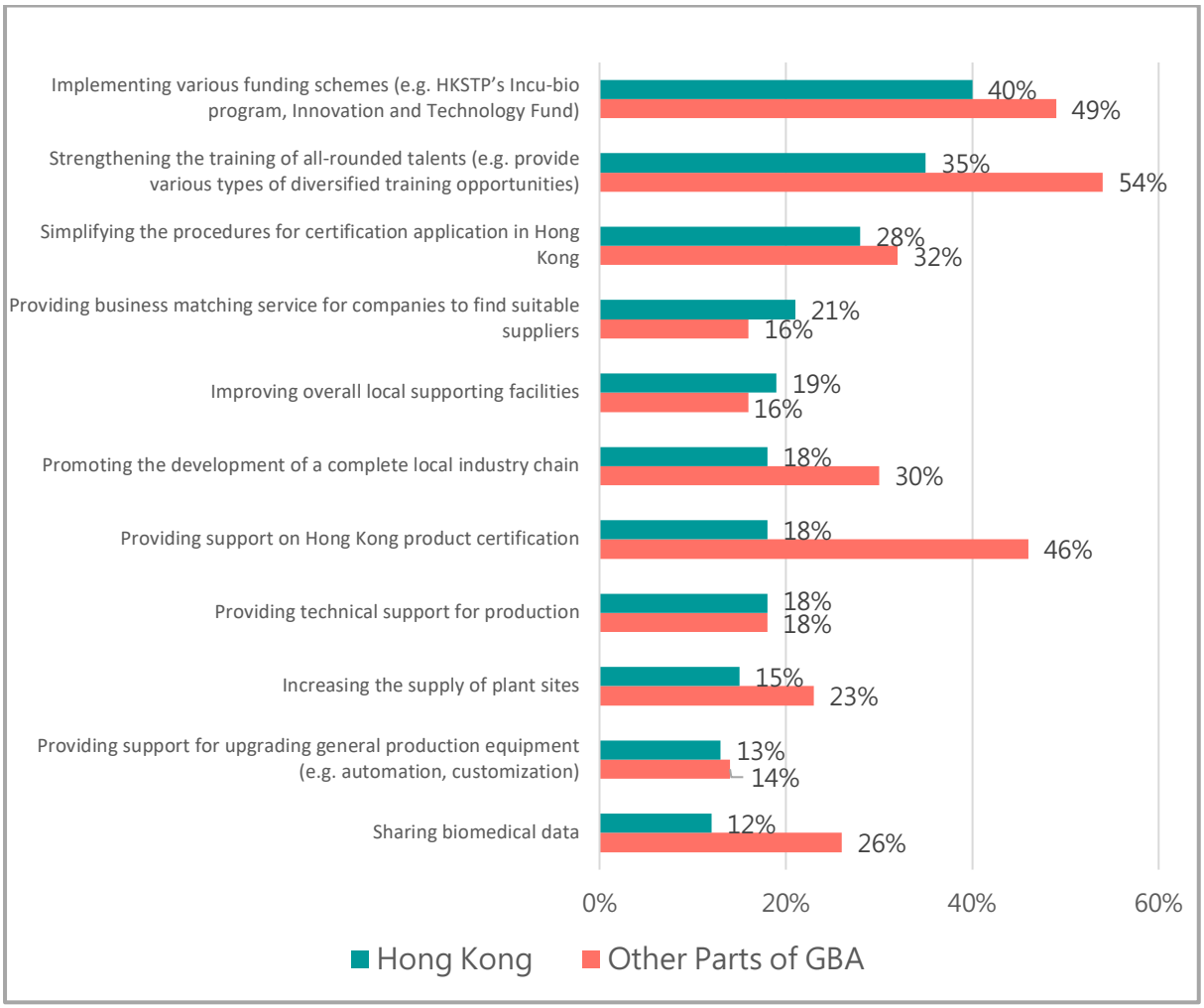


Figure 3.12: The most helpful support for enterprises surveyed to commercialise their research findings in Hong Kong

In terms of policies, to help enterprises commercialise their research findings, the three most helpful measures for Hong Kong enterprises surveyed are Products originated in Hong Kong can be imported to mainland China with zero tariff (75%), Developing 'Hong Kong- Shenzhen Innovation and Technology Park', providing scientific research resources, funds, etc. (69%), and Allowing easier transfer of scientific research samples, experimental reagents, and genetic resources between the Mainland and Hong Kong (67%). Enterprises surveyed in other parts of the Bay Area stated that the three measures that can best help commercialise their research findings are Clinical test data in Hong Kong can be recognized by the National Medical Products Administration (NMPA) for drug registration purposes, Allowing easier transfer of scientific research samples, experimental reagents, and genetic resources between the Mainland and Hong Kong, and Work Plan for Regulatory Innovation and Development of Pharmaceutical and Medical Device in the Guangdong-Hong Kong-Macao Greater Bay Area (Work Plan): Loosen the restrictions so that some of the medical equipment used by Hong Kong public hospitals and drugs registered in Hong Kong can be used in designated healthcare facilities in the Greater Bay Area. Please refer to Figure 3.13a and Figure 3.13b for details.

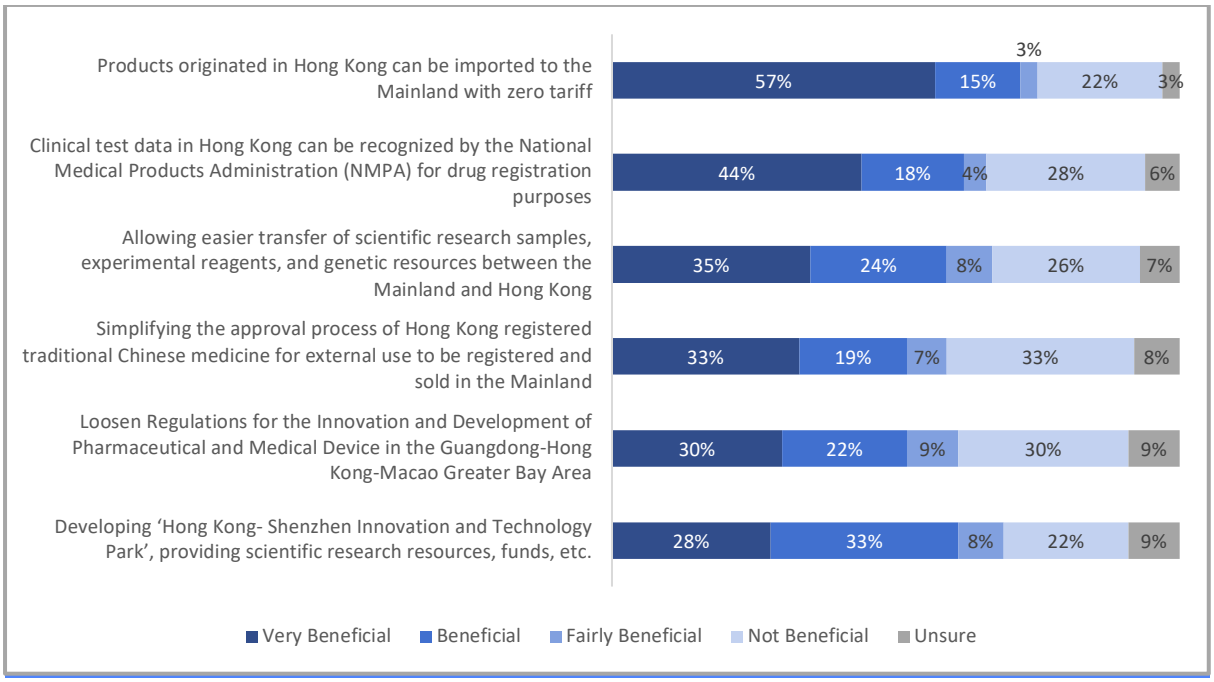


Figure 3.13a: Benefits brought by measures of the Greater Bay Area for Hong Kong enterprises to commercialise their research findings in Hong Kong

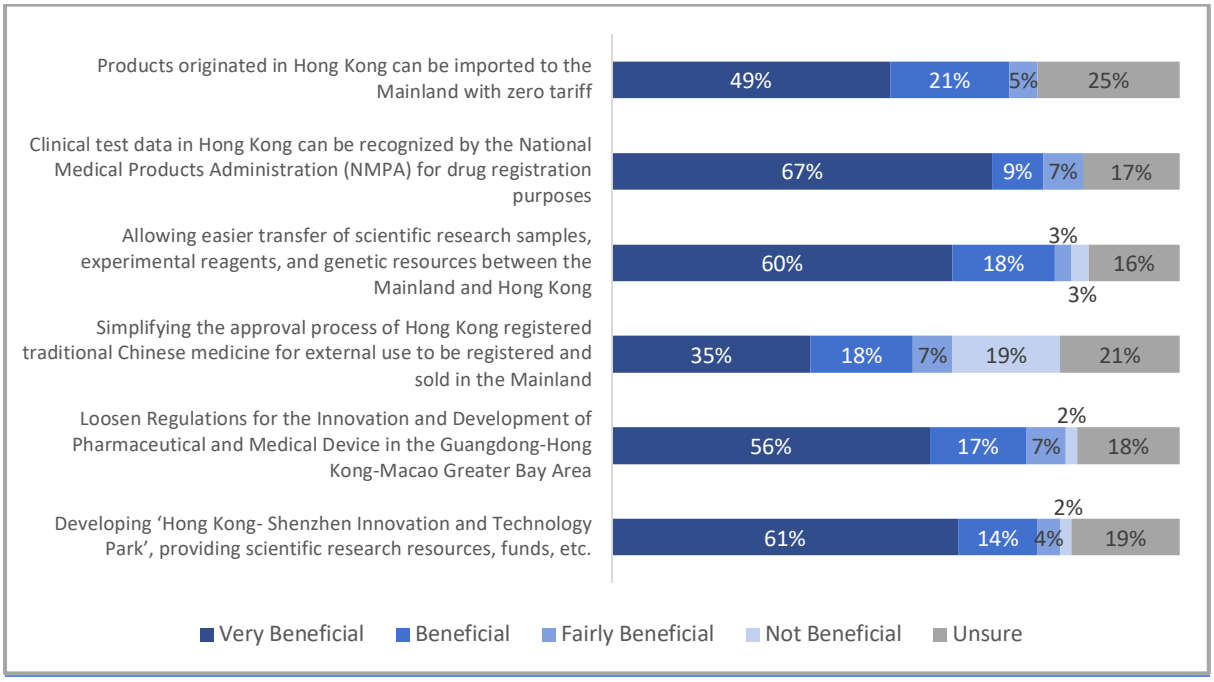
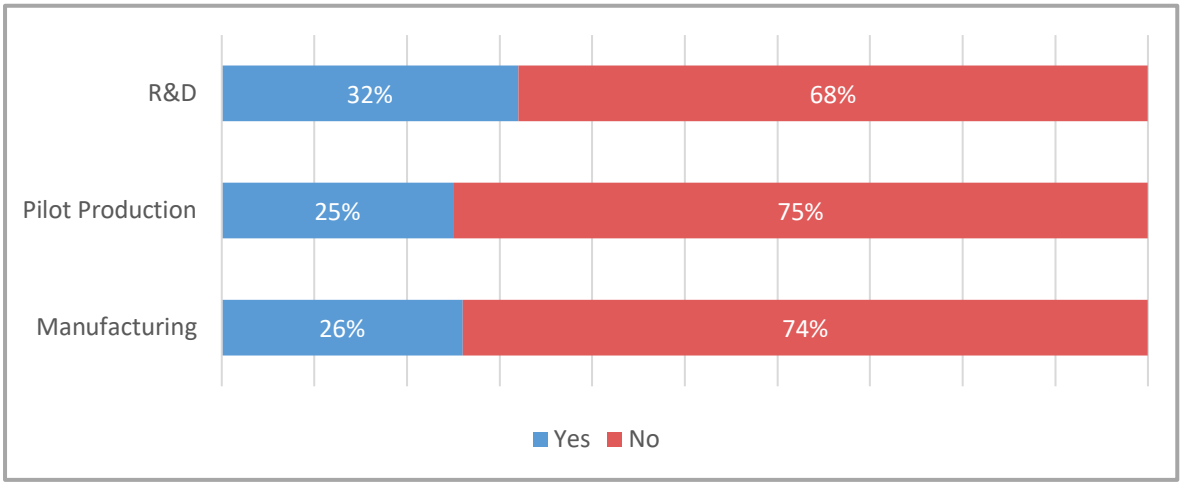


Figure 3.13b: Benefits brought by measures of the Greater Bay Area for enterprises surveyed in other parts of the Bay Area to commercialise their research findings in Hong Kong

Considerations for investing in Hong Kong

As shown in Figure 3.14a, 38% of Hong Kong enterprises surveyed stated that they are interested in investing in Hong Kong (including relocating their business to Hong Kong or expanding their business in Hong Kong). Among them, 84% said they are interested in investing in R&D, 65% said they are interested in investing in pilot production, and 67% said they are interested in investing in manufacturing. According to the data shown in Figure 3.14b, 37% of enterprises surveyed in other parts of the Bay Area intend to invest in Hong Kong, of which 100% intend to invest in R&D, while 14% intend to invest in pilot production and manufacturing in Hong Kong.



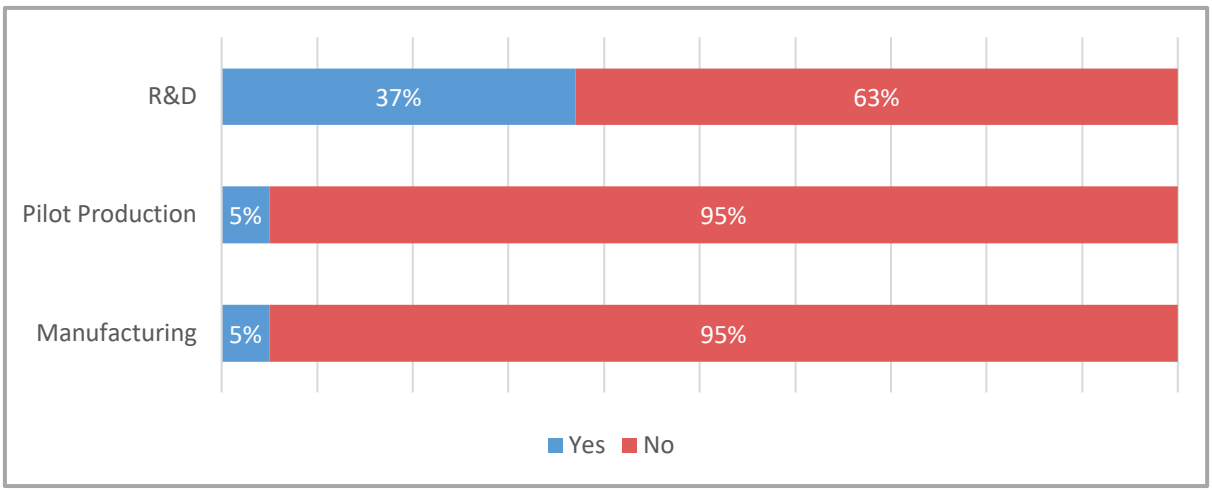


Figure 3.14b: Considerations of enterprises in other parts of the Bay Area for relocating or expanding their business to/in Hong Kong

Enterprises are influenced by a range of factors when considering investing in Hong Kong. As shown in Figure 3.15, when Hong Kong enterprises consider investing in Hong Kong, the factors in descending order of importance are operating costs (4.05), government support and industry-related preferential policies (3.97), business environment (3.94), convenience of expanding into the Mainland market (3.82) and convenience of expanding into other overseas markets (3.72). The factors influencing the investment of enterprises surveyed in other parts of the Bay Area in Hong Kong were business environment (4.11), operating costs (4.11), convenience of expanding into other overseas markets (4.02), government support and industry-related preferential policies (4.02), and local clinical data recognized by other countries (3.95). Among the top five factors for Hong Kong enterprises surveyed to consider investing in Hong Kong, they believe that Hong Kong needs to strengthen the areas including operating costs (2.70) and government support and industry-related preferential policies (2.97). For enterprises surveyed in other parts of the Bay Area, among the top five factors influencing their consideration of investing in Hong Kong, there is still room for improvement in operating costs (2.65), while the other four factors perform well.

Factors	Enterprises surveyed in Hong Kong		Enterprises surveyed in other parts of the Bay Area	
	Importance	Performance	Importance	Performance
Operating costs (e.g., rent, wages, raw materials costs, production costs, logistics costs, etc.)	4.05	2.70	4.11	2.65
Government support and industry-related preferential policies (e.g., various funding schemes)	3.97	2.97	4.02	3.26
Business environment (e.g., tax rate and tax system, free movement of capital, goods, information, laws and regulation)	3.94	3.23	4.11	3.51
Convenience of expanding into the Mainland market	3.82	3.06	3.86	3.04
Convenience of expanding into other overseas markets	3.72	3.04	4.02	3.75
Local clinical test data can be recognized by other countries	3.70	2.94	3.95	3.19
Raw material supply in local or surrounding areas	3.47	3.00	3.44	2.84
Supply of scientific research talent	3.44	2.85	3.77	3.37
Testing and certification services in local or surrounding areas	3.40	3.06	3.44	3.00
Support from manufacturers in local or surrounding areas	3.38	2.92	3.51	2.77
Mature industry chain in local or surrounding areas	3.36	2.95	3.60	2.79
R&D facility support (e.g., accredited laboratories, rental of testing equipment, etc.)	3.34	2.71	3.65	3.28
Supply of industrial technological talent	3.34	2.75	3.19	2.75
Suitable laboratory sites and plant sites	3.25	2.48	3.7	2.51
Outstanding local scientific research achievements (e.g. Chinese medicine, diagnosis)	3.04	3.04	3.33	3.26

Figure 3.15: Importance of factors for enterprises considering investing in Hong Kong and Hong Kong's Performance

The report investigates the needs of enterprises when developing their business in Hong Kong in the future. The first part is the requirement for setting up a laboratory. As shown in Figure 3.16a-c, 70% of Hong Kong enterprises surveyed require less than 5,000 square feet of laboratory space to set up a laboratory. 72% will invest less than US$3 million. The most important complementary facilities are Cleanroom, Laboratory under Good Laboratory Practice and Cell Culture Laboratory. 62% of enterprises surveyed in other parts of the Bay Area estimate that they require less than 5,000 square feet of laboratory space and with an investment of less than US$3 million (76%). The most important complementary facilities are Cleanroom, Cell Culture Laboratory, Laboratory under Good Laboratory Practice.

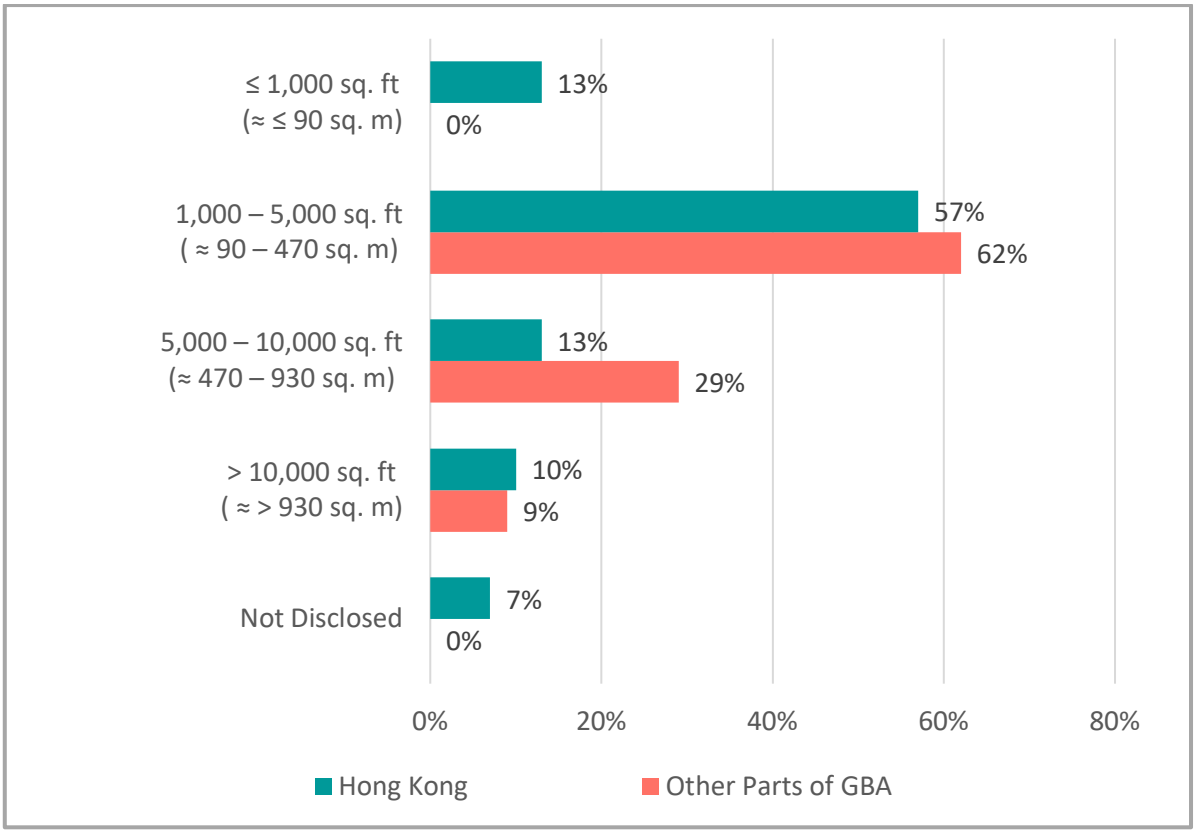


Figure 3.16a: Floor space needed for enterprises to set up a new R&D laboratory in Hong Kong

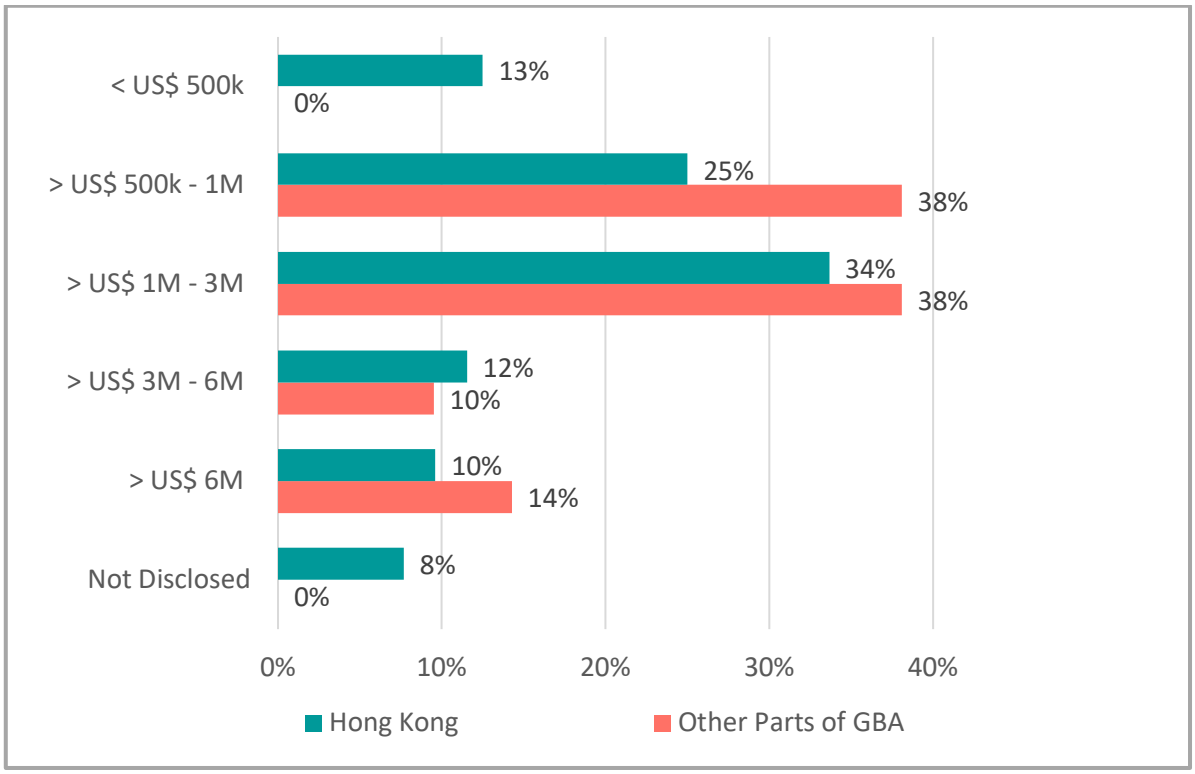


Figure 3.16b: Investment needed for enterprises to set up a new R&D laboratory in Hong Kong

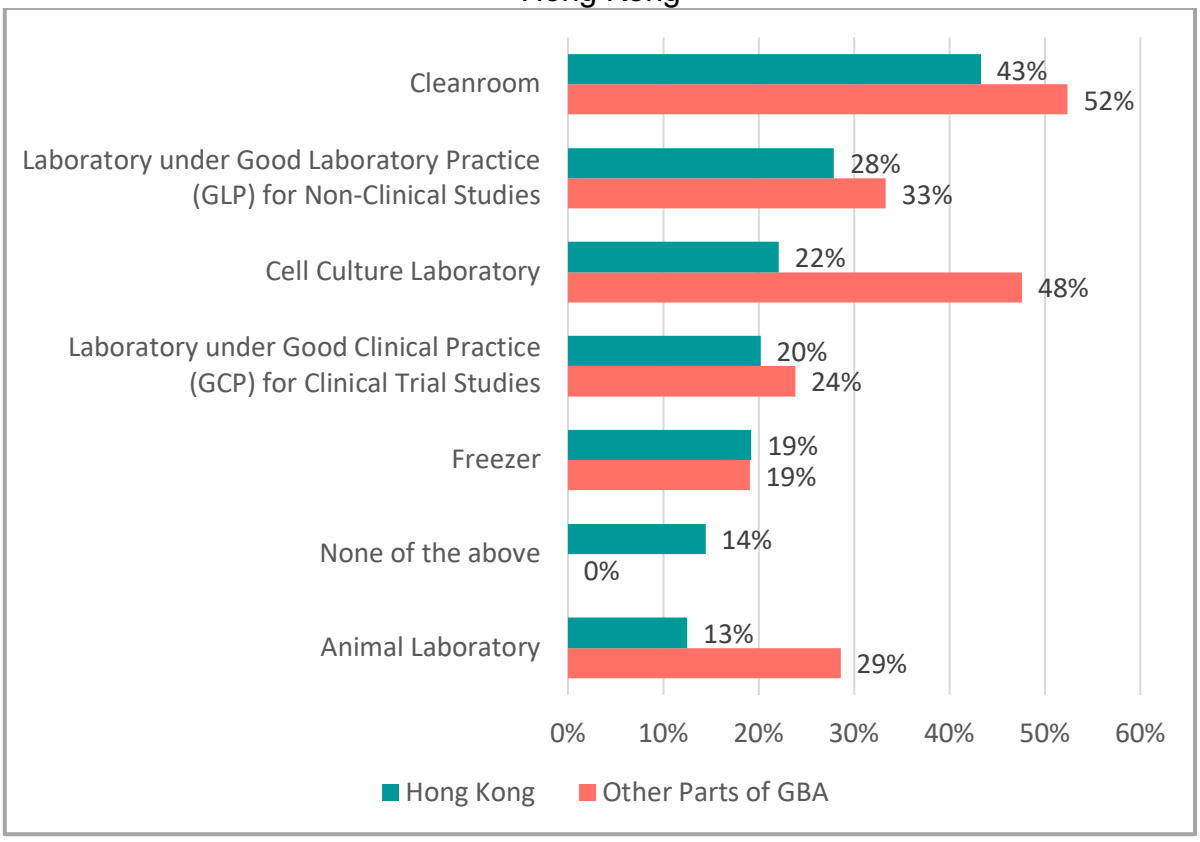


Figure 3.16c: Complementary facilities needed for enterprises to set up a new R&D laboratory in Hong Kong

The second part is the requirement for setting up pilot production line. As shown in Figure 3.17a-c, 65% of Hong Kong enterprises surveyed need less than 5,000 square feet to set up a pilot production line. 65% estimates that the investment amount is less than US$3 million. The most important complementary facilities are Production workshop under Good Manufacturing Practice, Dust-free workshop, Stable water and electricity supply. 43% of enterprises surveyed in other parts of the Bay Area require less than 5,000 square feet of area for trial production lines, and 52% investment is less than US$3 million. The most important complementary facilities are Production workshop under Good Manufacturing Practice, Stable water and electricity supply, Dust-free workshop.

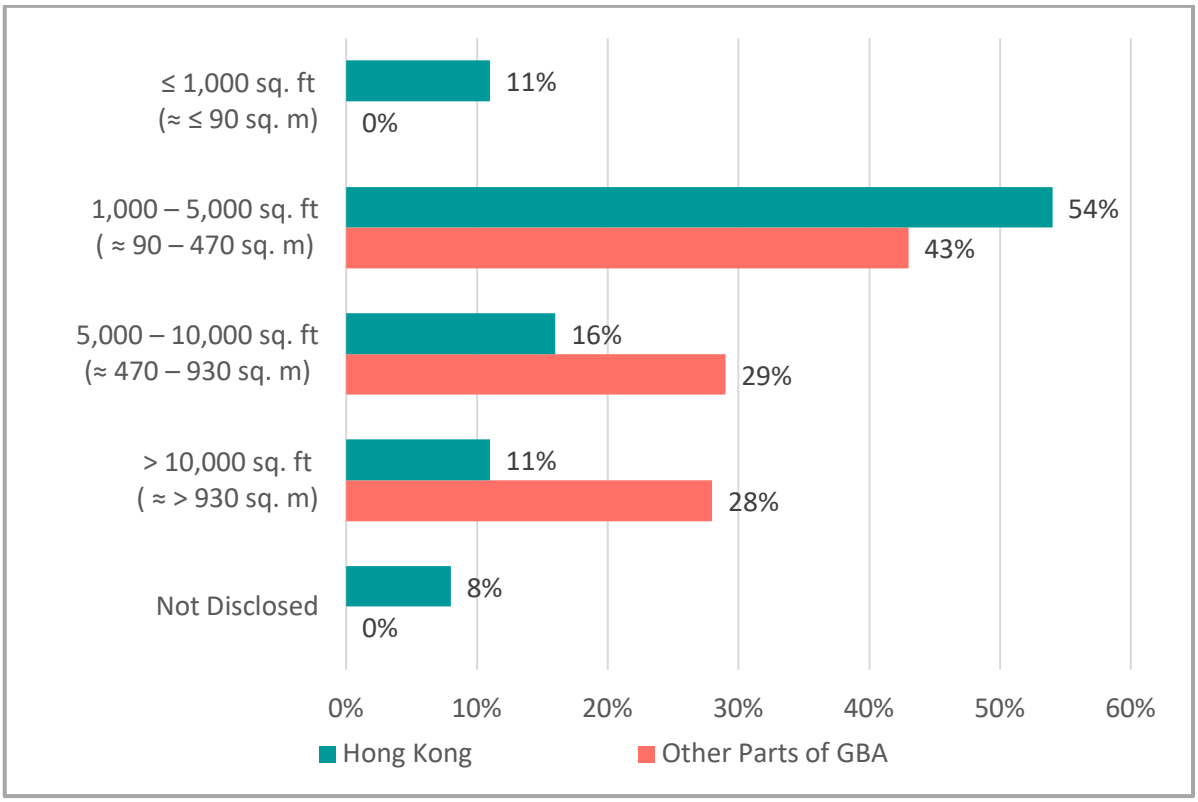


Figure 3.17a: Floor space needed for enterprises to set up a new pilot production line in Hong Kong

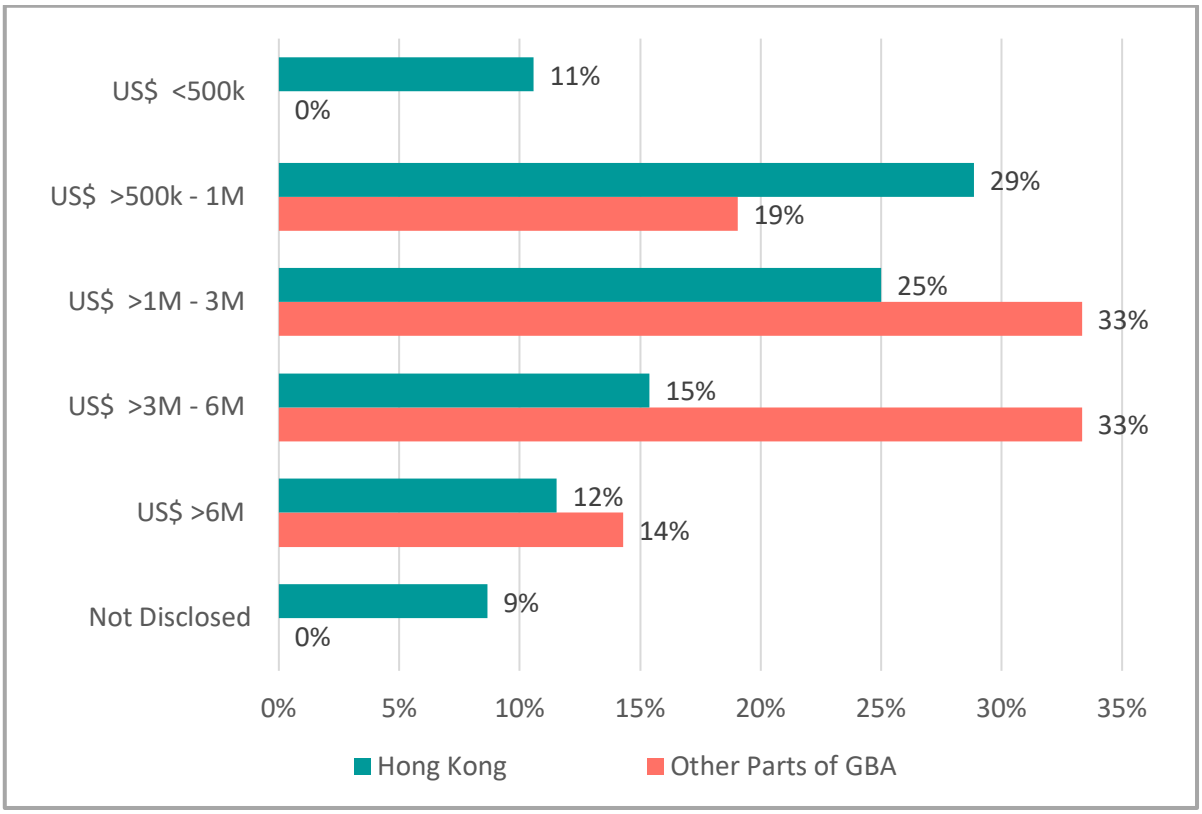


Figure 3.17b: Investment needed for enterprises to set up a new pilot production line in Hong Kong

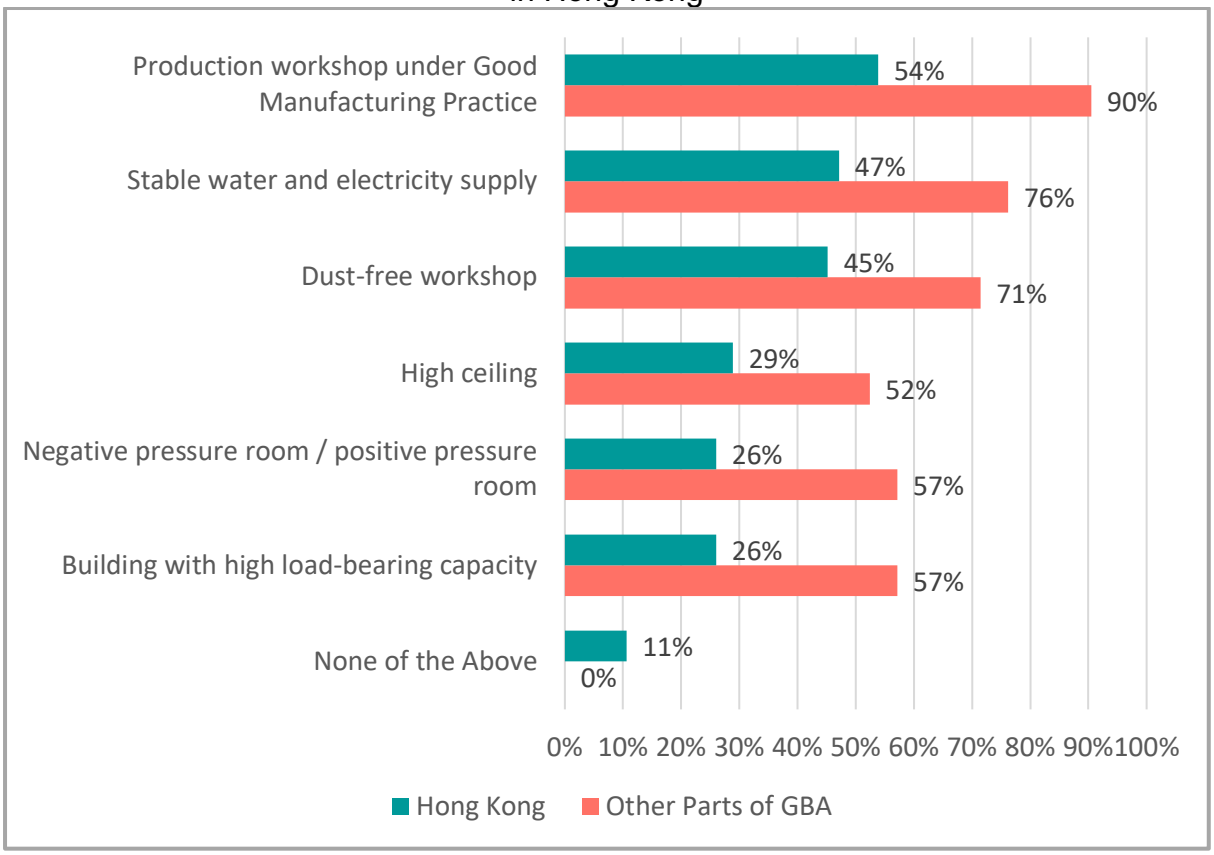


Figure 3.17c: Complementary facilities needed for enterprises to set up a new pilot production line in Hong Kong

The third part is the requirement for setting up a new production line. As shown in Figure 3.18a-c, 51% of Hong Kong enterprises surveyed need less than 10,000 square feet to set up a production line and 24% enterprises need 10,000-30,000 square feet. 42% expect that the investment is less than US$3 million. The most important complementary facilities are Production workshop under Good Manufacturing Practice, Stable water and electricity supply, Dust-free workshop. 34% of enterprises surveyed in other parts of the Bay Area require less than 10,000 square feet of area for production lines, and 24% enterprises surveyed need 10,000-30,000 square feet area, and 43% of enterprises surveyed need more than 30,000 square feet area. 29% of enterprises surveyed expect an investment of less than US$3 million, while most enterprises surveyed in other parts of the Bay Area estimate that an investment of US$3-6 million is required (33%). The most important complementary facilities are Production workshop under Good Manufacturing Practice, Stable water and electricity supply, Dust-free workshop.

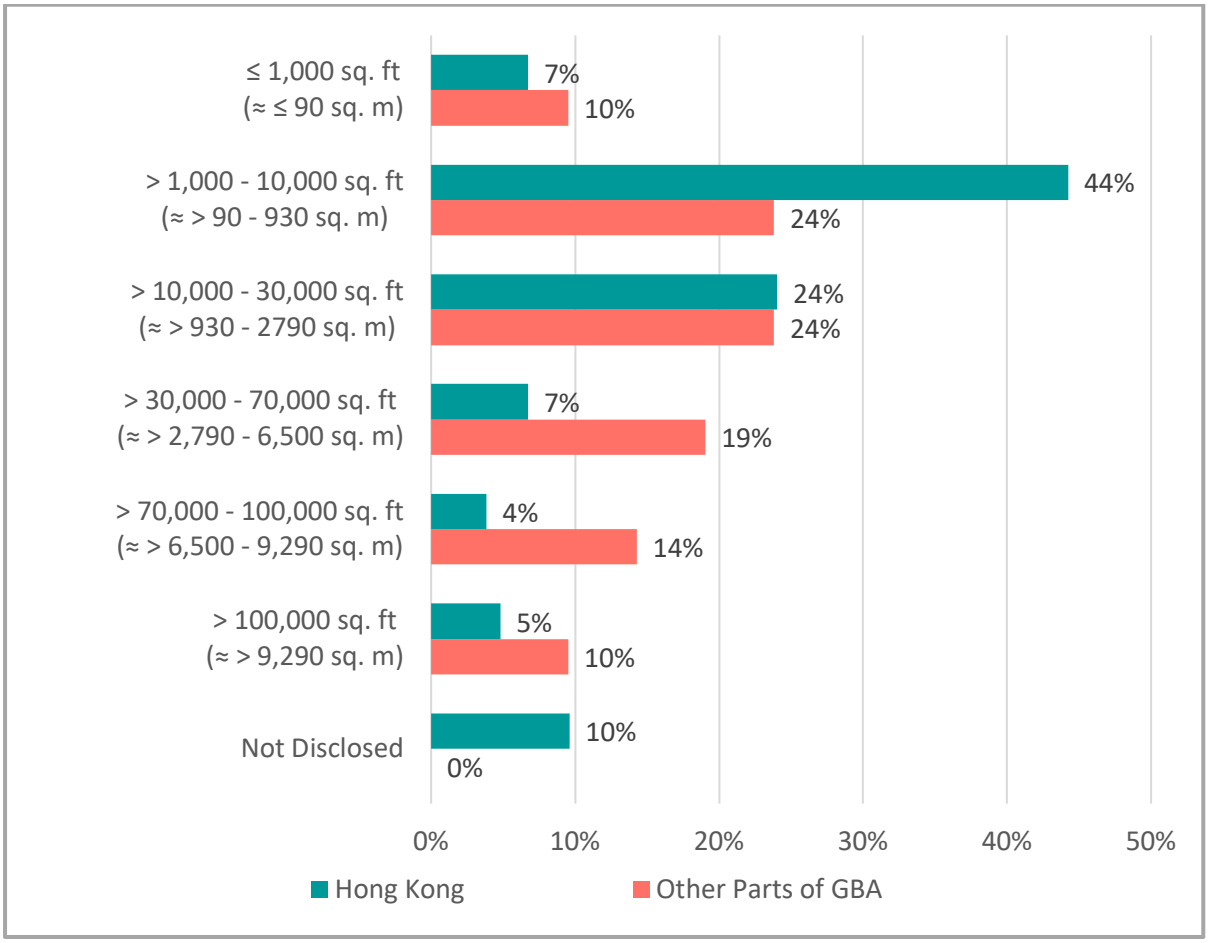


Figure 3.18a: Floor space needed for enterprises to set up a new production line in Hong Kong

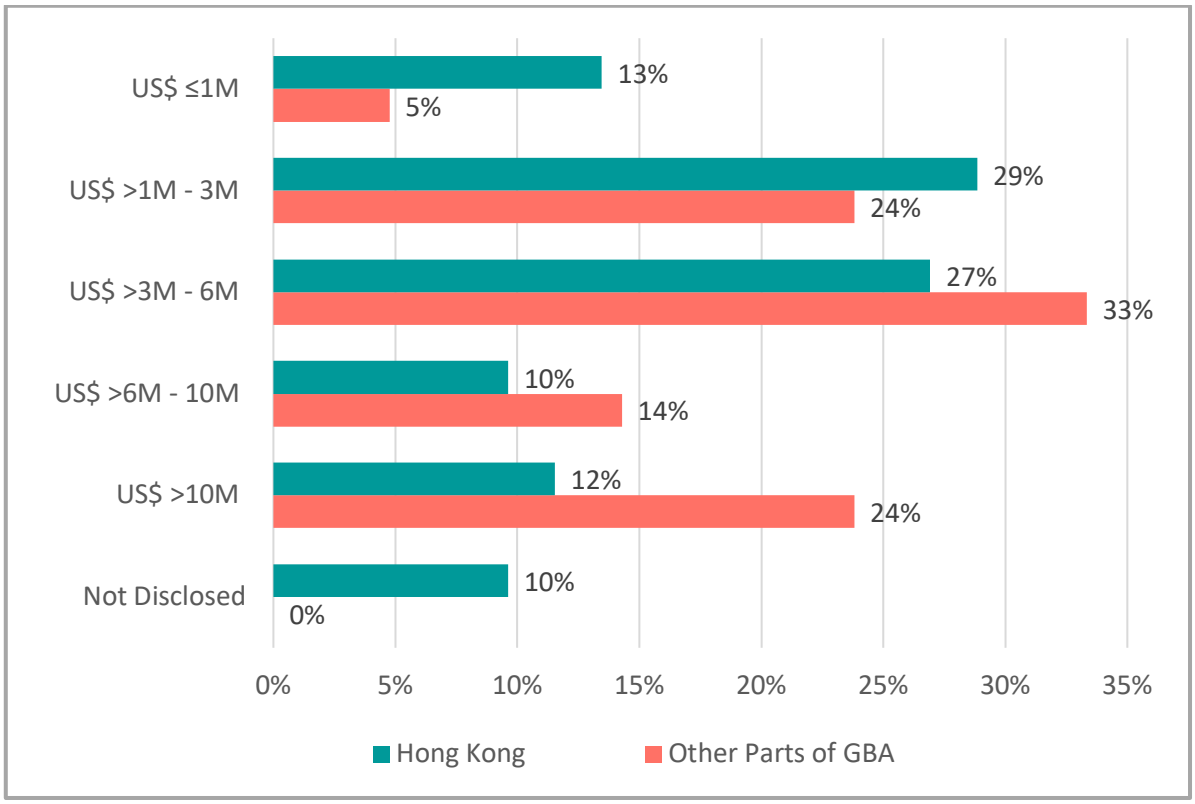


Figure 3.18b: Investment needed for enterprises to set up a new production line in Hong Kong

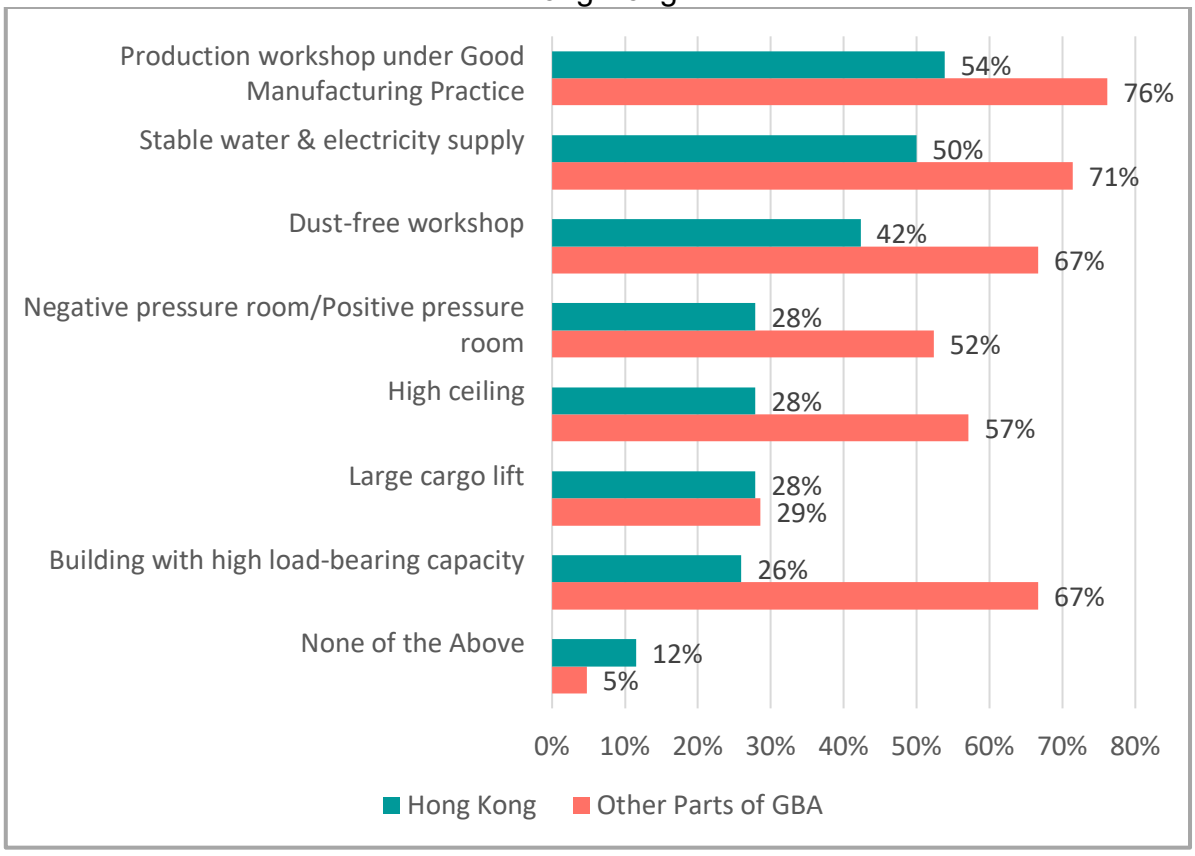


Figure 3.18c: Complementary facilities needed for enterprises to set up a new production line in Hong Kong

Chapter 4: Conclusions and Suggestions

4.1 Characteristics of Hong Kong's Life and Health Industry

According to the survey results in Chapter 3, the report summarises five characteristics of Hong Kong's life and health industry, including: high proportion of enterprises investing in research, high proportion of enterprises engaged in production, high output value, small staff size, and low land use.

High proportion of enterprises engaged in scientific research

R&D is the core of the development of innovation and technology enterprises. Taking the Mainland as an example, the enterprises on the Science and Technology Innovation Board of stock exchanges continued to increase their R&D efforts in the first half of 2021, with a total R&D investment of RMB25,403 million[42]. In particular, the biomedical industry is one of the industries with the high intensity of R&D investment. A quarter (25%) of Hong Kong enterprises surveyed are engaged in "R&D". The sectors with the highest proportion of R&D are "genetics and stem cells" and "artificial intelligence in healthcare", both of which account for 80%. At present, these two sectors are among the most cutting-edge scientific fields in life sciences.

High proportion of enterprises engaged in production

More than half (51%) of Hong Kong enterprises surveyed are engaged in production activities, including original brand manufacturer (OBM), original design manufacturer (ODM) and original equipment manufacturer (OEM). In particular, the sector with the highest proportion of enterprises engaged in production is "traditional Chinese medicine". More than 60% (63%) of enterprises engaged in traditional Chinese medicine carry out production. It is generally believed that considering factors such as costs and business environment, the production procedures of these Hong Kong enterprises will be set up in other regions, such as the Mainland or Southeast Asia. However, the survey shows that more than 20% (26%) of Hong Kong enterprises surveyed set up pilot production lines or mass production lines in Hong Kong, which is an encouraging surprise.

[42]http://www.sse.com.cn/aboutus/mediacenter/hotandd/c/c_20210831_5573935.shtml

High output value

The survey finds that 20% of Hong Kong enterprises surveyed have an annual revenue of more than US$10 million. In particular, the sector with the highest proportion of turnover is "genetics and stem cells", with 30% of enterprises engaged in "genetics and stem cells" having an annual revenue of more than US$10 million. It is worth mentioning that the life and health industry is characterised by high investment, high risk but high return. Once the product is successfully developed and launched into the market, it will get high profit return.

Small staff size

According to the survey results, 75% of Hong Kong enterprises surveyed have no more than 50 employees, which are small and medium-sized enterprises. Their number of employees is smaller than that of enterprises surveyed in other parts of the Bay Area. This may be due to the fact that some local enterprises in the life and health industry focus on R&D and take Hong Kong as their R&D base. Therefore, the number of employees is relatively small.

Low land use

More than 60% (63.2%) of R&D laboratories in Hong Kong cover less than 1,000 square feet. In addition, nearly 60% (57.1%) of enterprises' pilot production lines in Hong Kong cover less than 1,000 square feet. As for production lines with large area demand, more than 80% (84.1%) of enterprises' production lines cover less than 10,000 square feet. In terms of the current scale of local life and health enterprises, small factories (less than 10,000 square feet) can meet their current demand.

4.2 Suggestion on the Development of Hong Kong's Life and Health Industry

This research report puts forward four suggestions for the development of Hong Kong's life and health technology industry by grasping the current status and characteristics of Hong Kong's life and health industry through the questionnaire survey, synthesizing the foundation of industrial advantages, the challenges faced by the industry and the support needed, and integrating the analyses and insights of experts from the industry, local universities and other research institutes.

Suggestion 1: Focus on the top three sectors of medical and diagnostic equipment, traditional Chinese medicine, and health supplements

Suggestion 2: Accelerate the development of the emerging sector: genetics and stem cells

Suggestion 3: Nurture "Bio plus" multi-skilled talents

Suggestion 4: Enhance regulatory compatibility between the Mainland and Hong Kong

Suggestion 1: Focus on the top three sectors of medical and diagnostic equipment, traditional Chinese medicine, and health supplements.

Medical and diagnostic equipment

Medical and diagnostic equipment covers a wide range of sub-sectors. According to the Department of Health of Hong Kong[43], a medical device refers to any instrument, apparatus, implement, machine, appliance, implant, in vitro reagent or calibrator, software, material or other similar or related article (whether used alone or in combination) intended to be used for human beings for one or more of the following specified medical purposes:

a. Diagnosis, prevention, monitoring, treatment or alleviation of disease; or
b. Diagnosis, monitoring, treatment, alleviation of or compensation for an injury; or
c. Investigation, replacement, modification, or support of the anatomy or of a physiological process; or
d. Supporting or sustaining life; or
e. Control of conception (including contraception); or
f. Disinfection of medical devices; or
g. Providing information for medical purposes by means of in vitro examination of specimens derived from the human body.

These devices do not achieve their primary intended action in or on the human body by pharmacological, immunological or metabolic means, but they may be assisted in their intended functions by such means.

The diagnostic equipment is generally divided into medical imaging equipment, in vitro diagnostic equipment, electrophysiology equipment and physical diagnostic equipment. Medical imaging equipment can be divided into nuclear magnetic

[43]https://www.mdd.gov.hk/tc/mdacs/scope/index.html

resonance imaging (MR), X-ray computed tomography (CT), X-ray (XR), molecular imaging (MI), and ultrasound (US) according to different signals. In vitro diagnostic equipment obtains corresponding clinical diagnostic information by testing human samples (blood, body fluids, tissues, etc.). The product is mainly composed of diagnostic equipment (instrument) and diagnostic reagent. At present, in vitro diagnosis is mainly divided into biochemical diagnosis, immunodiagnosis, molecular diagnosis, and point-of-care testing (POCT). Electrophysiology diagnostic equipment, through a variety of forms of energy (electricity, sound, etc.), stimulates organisms, measures, records and analyses the electrical phenomena (bioelectricity) and electrical characteristics of organisms. It includes electrocardiography, electroencephalography, and electromyography.

In Hong Kong, there are two distinct markets for the medical and healthcare equipment sector, namely, the household consumer market, and the professional or institutional buyers (hospitals and clinics) market. Currently, Hong Kong's medical equipment sector is mainly targeting the household consumer market. Hong Kong's total exports of medical and healthcare equipment grew by 17.5% in 2020, and the increment slowed slightly to 7.5% in 2021. The Mainland is the largest market for medical and healthcare equipment in Hong Kong. In 2021, Hong Kong's exports to the Mainland accounted for 34.3% of the total exports, up 4.4%. During the same period, Hong Kong's exports to the European Union accounted for 14.1% of the total exports. Notably, the exports to India doubled (at an increment of 108.8%), and the exports to ASEAN grew by 47.1%.

In Hong Kong's exports of medical and healthcare equipment, diagnostic equipment accounts for a large proportion. According to the Census and Statistics Department of the HKSAR, in 2021, the total exports of "Miscellaneous Electro-Diagnostic Apparatus" accounted for nearly 30% in the medical and healthcare equipment, reaching HK$4.8 billion, an increase of 13.4%. Exports of this sector have increased for the fourth consecutive year since 2018.

	2019		2020		2021	
	HK$ Mn	Growth %	HK$ Mn	Growth %	HK$ Mn	Growth %
Domestic Exports	29	+162.4	19	-33.1	12	-39.1
Re-exports	12,750	-2.1	14,980	+17.6	16,120	+7.6
Total exports	12,770	-2.0	15,000	+17.5	16,130	+7.5

Table 4.1: Performance of Hong Kong's Exports of Medical and Healthcare Equipment[44]

	2019		2020		2021	
By market	Share %	Growth %	Share %	Growth %	Share %	Growth %
The Mainland	34.3	-2.7	28.1	-3.7	27.3	+4.4
European Union	14.1	-11.5	16.6	+38.5	15.6	+0.6
United States	11	-31.0	11.1	+18.5	10.8	+4.4
ASEAN	7.2	+11.2	5.4	-11.9	7.4	+47.1
Japan	6.0	-3.8	5.2	+1.2	6.0	+24.0
India	3.6	-14.6	3.1	-1.1	5.9	+108.8

Table 4.2: Performance of Hong Kong's Exports of Medical and Healthcare Equipment - by Market [44]

[44] 香港生物科技與醫療健康業概況（HKTDC, published on 04/04/2022）

By category	2019		2020		2021	
	Share %	Growth %	Share %	Growth %	Share %	Growth %
Miscellaneous Electro-Diagnostic Apparatus	32.0	+6.8	28.4	+4.2	29.9	+13.4
Miscellaneous Medical Instruments and Appliances	24.2	-7.3	21.4	+3.6	2.07	+4.3
Syringes/Needles, etc. for Medical/Surgical	17.4	+26.7	14.3	-3.9	13.7	+3.3

Table 4.3: Performance of Hong Kong's Exports of Medical and Healthcare Equipment - by Category [44]

More than half (51%) of Hong Kong enterprises surveyed are engaged in production activities, including original brand manufacturer (OBM), original design manufacturer (ODM) and original equipment manufacturer (OEM). Hong Kong's manufacturing industry, which has developed since the 1950s and- 1960s, has laid a solid foundation and accumulated extensive experience and ability in processing and manufacturing of plastics, metals and electronics. In addition to the adoption of overseas advanced technologies and the introduction of modern business management models and industry norms, Hong Kong's manufacturing industry is constantly innovating, upgrading from light industrial products such as toys and small household appliances to automobiles, aircraft parts and medical equipment.

In the past, many medical and diagnostic products in Hong Kong were exported under OEM arrangement, that is, the buyer provides the product specifications and designs and the seller carries out the production. However, facing competition from cheap labor in many countries and regions, and the increasing competitiveness of enterprises in the Mainland, pressure on Hong Kong enterprises increases. Many manufacturers in Hong Kong began to participate in product design and development, engineering design, and sample production, developing into an ODM. Some manufacturers in Hong Kong also set up R&D departments to develop new models and produce their

own brand products, further developing into an OBM. To distinguish them from low-end products, many manufacturers in Hong Kong also apply for international certifications for their products.

The World Health Organisation estimates that total global spending on health currently exceeds US$7.5 trillion per year. There is a continuous rise in the percentage of health spending over GDP of major economies (including the Mainland). In some developing countries, medical and healthcare services account for an increasing share of household spending, bringing more opportunities for Hong Kong exporters of medical and healthcare products. Meanwhile, the growth of public health spending in industrialised countries and regions has slowed down, which means that there are business opportunities for household medical equipment for rehabilitation and treatment.

Modern technology plays an extremely important role in medical and diagnostic equipment. Many innovation achievements, such as microscopic and remote surgery, genetic diagnostics, tissue engineering, and advanced information technology, have provided solutions for some intractable diseases, and have also increased the demand for new equipment in the medical sector. In recent years, overseas manufacturers of medical and healthcare equipment have increased the outsourcing activities. Hong Kong enterprises have advantages in quality assurance and intellectual property protection, and are well qualified to become their contract manufacturers or sourcing partners. Although the cost of regulatory compliance in Hong Kong is higher than that in the Mainland, it helps Hong Kong companies differentiate from other low-cost competitors, and become an ideal partner for providing quality products and services. Their role in the global medical industry is strengthening.

In Hong Kong, one of the keys to the continuous expansion of the exports of the diagnostic equipment industry is the research and development related to local medical diagnostics. According to the Innovation and Technology Commission, there are 349 projects classified as "biotechnology" under the Innovation and Technology Support Programme so far, of which 46 projects are directly related to "diagnosis".

In the field of diagnostic technology, Hong Kong has world-class research teams, which have not only successfully developed the technologies such as mother-cell nucleic acid diagnosis, but more importantly, can successfully transform the research results into commodities (such as non-invasive prenatal testing), and successfully promote the commodities overseas, making Hong Kong's diagnostic technology development famous in the international life science and technology sector. Therefore, we should make good use of this momentum, encourage and promote the R&D of other diagnostic technologies, and use the manufacturing capabilities and experience of local equipment manufacturers to transform research results into practical applications, so that the two work in synergy and make greater achievements.

To support the development of local diagnostic technologies, the HKSAR government has developed two InnoHK research clusters at the Hong Kong Science Park, and admitted 28 R&D laboratories comprising world-class research teams to the InnoHK research cluster, including the Centre for Novostics of the Chinese University of Hong Kong. The Centre for Novostics, using cutting-edge molecular diagnostic technology, is committed to developing new diagnostic technologies based on cell-free nucleic acid diagnosis in blood and other body fluids, especially prenatal diagnosis and cancer-related diagnostic technologies. In addition to the non-invasive prenatal diagnosis technology that has been adopted in dozens of countries and regions around the world, the centre also performs a DNA test for herpesvirus 4 (EBV) to screen for nasopharyngeal carcinoma, a condition quite common in Hong Kong and other parts of South China, in a non-invasive way, which can detect whether a patient has cancer within a few weeks without any symptoms of nasopharyngeal carcinoma. The team has also developed a technology that can test 50 types of cancer. In addition, the centre is equipped with several advanced gene sequencing facilities for different experiments and studies. While these studies are continuously advancing, the subsequent transformation of research achievements can also drive the R&D and manufacturing of related medical equipment.

The world-class status of Hong Kong's diagnostic technologies is beyond doubt. In this survey, we also found that among Hong Kong enterprises surveyed, enterprises involved in "medical and diagnostic equipment" occupy the second place (26%), indicating that this sector has a solid foundation and scale in Hong Kong. Therefore, we should make good use of this momentum, encourage and promote the R&D of other diagnostic technologies, and use the manufacturing capabilities and experience of local equipment manufacturers to continuously improve the transformation of research achievements in this field, so that the two work in synergy and make greater achievements to jointly promote the development of diagnostic technologies in Hong Kong.

Traditional Chinese medicine

According to the measures of drug registration adopted by the State Administration for Market Regulation, "traditional Chinese medicine" refers to medicinal substances and preparations used under the guidance of the theory of traditional Chinese medicine". In Hong Kong, the Chinese Medicine Ordinance, classifies the traditional Chinese medicine industry into proprietary Chinese medicine, Chinese herbal medicine and trade of Chinese medicine. Proprietary Chinese medicine refers to any proprietary product that is: (1) consisting solely of any Chinese herbal medicine or any material derived from plant, animal or mineral habitually used by the Chinese or any medicinal herb and material referred to separately in the above two items as active ingredients, (2) formulated in a finished dose form; and (3) is known or purported to be used to diagnose, treat, prevent or alleviate a person's disease or symptoms, or to regulate a person's functional state. Chinese herbal medicine refers to any substance specified in Schedule 1 or 2 of Hong Kong's Chinese Medicine Ordinance.

Traditional Chinese medicine has a long history of development in Hong Kong. In recent years, the industry has been developing steadily. According to the Census and Statistics Department of the HKSAR, the sales and other revenues of Hong Kong's TCM industry (including the manufacturing of traditional Chinese medicine,

import/export of traditional Chinese medicine, wholesale of traditional Chinese medicine, and retail of traditional Chinese medicine) reached HK$27 billion in 2019. In particular, the manufacture of traditional Chinese medicines accounted for approximately HK$4.8 billion[45] (see Table 4.4).

(HK$ million)

Industry	Year	Sales and other receipts	Industry value added		
			Compensation of employees	Gross operating surplus	Total
Manufacture of Chinese Medicine	2017	4,382.0	623.5	1,691.5	2,315.0
	2018	4,977.0	540.0	1,574.8	2,114.8
	2019	4,789.3	569.6	1,386.7	1,956.3
Import/export of Chinese medicines	2017	11,073.2	360.3	625.6	1,013.0
	2018	11,943.8	394.0	590.6	984.6
	2019	10,761.0	370.9	500.1	871.1
Wholesales of Chinese medicines	2017	5,643.2	270.4	401.7	672.1
	2018	5,881.5	291.0	437.1	728.1
	2019	5,236.5	307.8	362.7	670.4
Retail of Chinese medicines	2017	7,457.9	706.6	551.0	1,257.6
	2018	7,270.7	698.2	506.3	1,204.5
	2019	6,245.8	740.1	375.3	1,115.4
All industries above	2017	28,556.3	1,960.8	3,296.8	5,257.6
	2018	30,072.9	1,923.3	3,108.8	5,032.1
	2019	27,032.6	1,988.4	2,624.8	4,613.2

Table 4.4: Principal Statistics on the Manufacturing and Distribution of Traditional Chinese Medicine by Industry from 2017 to 2019

[45] https://www.censtatd.gov.hk/en/data/stat_report/product/FA100089/att/B72111FB2021XXXXB0100.pdf

Since the 1980s, the community has paid more and more attention to traditional Chinese medicine. In 1999, the HKSAR passed the Chinese Medicine Ordinance, which established the professional status of traditional Chinese medicine through legislative regulation and registration system. As at the end of 2020, there were 10,422 traditional Chinese medicine practitioners in Hong Kong. In recent years, many Hong Kong students have pursued undergraduate degree programmes in traditional Chinese medicine in the Mainland. Now, there are sufficient local traditional Chinese medicine practitioners.

In the 2015 Policy Address, the HKSAR Chief Executive decided to establish the "Government Chinese Medicines Testing Institute" under the Department of Health to conduct research on the testing of traditional Chinese medicine and establish internationally recognised reference standards for the safety, quality and testing methods of traditional Chinese medicine, with a view to further promoting the standardisation, modernisation and internationalisation of traditional Chinese medicine. The 2018 Policy Address clarified the positioning of traditional Chinese medicine in Hong Kong's medical development, and integrated traditional Chinese medicine into Hong Kong's healthcare system formally, so as to coordinate and promote the development of Hong Kong's traditional Chinese medicine industry from the policy and system level. To enhance the overall level of the traditional Chinese medicine industry, the Hong Kong government launched the HK$500-million "Chinese Medicine Development Fund", which was established in June 2019, to provide financial support to the industry, including nurturing the talent needed by the traditional Chinese medicine industry and traditional Chinese medicine hospitals, promoting research related to traditional Chinese medicine, and enhancing the public understanding of traditional Chinese medicine. In addition to performing the training and research functions of "teaching" and "research", the Chinese Medicine Clinic cum Training and Research Centre in 18 districts of Hong Kong also provide new traditional Chinese medicine outpatient services subsidised by the HKSAR government to residents[46]. In recent years, the Central Government and the Guangdong Province

[46] http://hm.people.com.cn/n1/2022/0517/c42272-32423603.html

have introduced policies to facilitate the development of the traditional Chinese medicine industry, and promote the development of the Guangdong-Hong Kong-Macao Greater Bay Area into a traditional Chinese medicine highland. The HKSAR government should also speed up the approval procedure for traditional Chinese medicine and increase relevant resources to vigorously support the development of the industry, so that the traditional Chinese medicine industry can demonstrate extraordinary performance.

With its deep roots, Hong Kong's traditional Chinese medicine sector strives to preserve the legacies and at the same time pursue innovation. In addition, Hong Kong's strict regulation of Chinese herbal medicine and proprietary Chinese medicine, high level of testing and certification, and the good reputation of Hong Kong pharmaceutical manufacturers make Hong Kong a reliable market for Chinese herbal medicine and proprietary Chinese medicine. These also make Hong Kong a "super connector" for promoting traditional Chinese medicine to go global.

There are many long-established proprietary Chinese medicine brands in Hong Kong, which are not only popular in the Mainland but also marketed overseas, demonstrating the brand competitiveness of Hong Kong's traditional Chinese medicine industry. In addition to recognising the stringent production process and excellent quality of Hong Kong's medicine, consumers also have trust in the city brand of "Hong Kong". It is the two characteristics of “medicine” and “city” that give Hong Kong's traditional Chinese medicine an unparalleled uniqueness.

In terms of quality standards for traditional Chinese medicine, the Department of Health of Hong Kong has been striving to establish common standards for traditional Chinese medicine that are close to the international standards to ensure the quality of the medicine from its source. First, the standards in the Chinese Medicine Ordinance is stricter than that of Chinese herbal medicine in the Mainland, Korean medicine in South Korea, and Kampo medicine in Japan in terms of heavy metal content, origin of Chinese herbal medicine and medicine processing. According to the statistics from the Department of Health, as of February 2019, the standards for 299 types of Chinese herbal medicine had been established after the "Hong Kong Chinese Materia Medica Standards" ("HKCMMS") project was launched. Taking the maximum limit for heavy

metals in traditional Chinese medicine as an example, the maximum limit for mercury in Chinese herbal medicine in the Chinese Pharmacopoeia of the Mainland is 0.2mg/kg, while that of Hong Kong is 0.036mg/kg, which is stricter than the Mainland. Secondly, Hong Kong has strict requirements on the clarity of the pharmaceutical ingredients, efficacy and toxic side effects of traditional Chinese medicine in circulation. For example, the specification of proprietary Chinese medicine sold must specify the types of more than half of active ingredients, the dosage of ingredients, functions and pharmacological effects, toxic side effects and contraindications, and precautions to be taken in the use of the proprietary Chinese medicine.

The Hong Kong Council for Testing and Certification (HKCTC) has set up the "Panel on Promoting Testing and Certification Services in Chinese Medicine Trade" to specially establish an objective evaluation system for traditional Chinese medicine, and issue qualification certificates for products after testing and certification. The institution has detailed the traits and identification methods for Chinese herbal medicine, including many microscopic pictures and details of the method for determining the ingredients.

The Mainland has always attached great importance to the development of the traditional Chinese medicine industry. A series of strategic policies, such as the Outline of the Strategic Plan for the Development of Traditional Chinese Medicine (2016-2030), the Outline of the Healthy China Plan (2016-2030), the Law of the People's Republic of China on Traditional Chinese Medicine, the Opinions on Promoting the Inheritance, Innovation and Development of Traditional Chinese Medicine, the Several Policies and Measures for Accelerating the Characteristic Development of Traditional Chinese Medicine, the Guiding Opinions on Medical Insurance to Support the Inheritance, Innovation and Development of Traditional Chinese Medicine, and the 14th Five-Year Plan for the Development of Traditional Chinese Medicine, have increased policy support and investment in traditional Chinese medicine, pointing out the direction for the standardisation and internationalisation of traditional Chinese medicine, and laying a sound foundation for the sustainable development of the traditional Chinese medicine industry. It is worth noting that in the prevention and control of the COVID-19 pandemic, traditional Chinese medicine has played a huge

role, and has gained more attention and recognition. Amid the Mainland's vigorous support for the cultural inheritance and innovation of traditional Chinese medicine, the traditional Chinese medicine industry may usher in a higher-quality development for some time in the future.

The Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area, and the Construction Plan for the Chinese Medicine Highlands in the Guangdong-Hong Kong-Macao Greater Bay Area (2020-2025) fully demonstrate the Mainland's strong support for the development of traditional Chinese medicine in Hong Kong and provide greater development space for Hong Kong's traditional Chinese medicine industry. In particular, there are two key policy measures to benefit Hong Kong, including the recruitment of Hong Kong traditional Chinese medicine practitioners by public medical institutions in the Greater Bay Area cities in the Mainland, and the simplification of the approval procedure for the registration of Hong Kong's registered traditional Chinese medicine for external use in the Mainland.

- Recruitment of Hong Kong traditional Chinese medicine practitioners by public medical institutions in the Guangdong Province. The Traditional Chinese Medicine Bureau of Guangdong Province on 30 August 2021 announced a pilot recruitment of 10 Hong Kong TCM practitioners on a contract basis by seven public traditional Chinese medicine medical institutions in Guangzhou, Shenzhen and Zhuhai. The relevant measures enable Hong Kong traditional Chinese medicine practitioners to further work within the national medical system, thereby facilitating exchanges on traditional Chinese medicine, and giving Hong Kong traditional Chinese medicine practitioners, especially the younger generation, the opportunity to develop in the Greater Bay Area.

- On 27 August 2021, the Guangdong Medical Products Administration announced arrangements to simplify the approval procedure for the registration and sale of Hong Kong's registered traditional Chinese medicine for external use in the Greater Bay Area. Holders of registered traditional Chinese medicine for external use that have been registered with the Chinese Medicine Council of Hong Kong and used in Hong Kong for more than five years can submit a registration application to the

Guangdong Medical Products Administration through the simplified procedure. The successfully approved traditional Chinese medicine can be sold in the Greater Bay Area cities in the Mainland. The relevant measures can facilitate Hong Kong's traditional Chinese medicine manufacturers to explore the market, and create favorable conditions for Hong Kong's traditional Chinese medicine to "go global" in the long run.

In addition, traditional Chinese medicine pays attention to body conditioning, disease prevention and healthcare, which is an effective complement to local treatments used in Western medicine, and can reduce the pressure on Hong Kong's healthcare system. According to the Census and Statistics Department of Hong Kong, the population aged 65 and above in Hong Kong has grown year by year, reaching over 1.35 million as at 2019. This indicates that the population continues to age, and the demand for medical services has surged. On the other hand, Hong Kong is short of medical resources, healthcare workers and medical beds. According to statistics, the public health system, which employs approximately 50% of local healthcare workers, needs to take care of nearly 90% of the patients in Hong Kong, indicating that the capacity of the public health system needs to be improved. The Hong Kong government has incorporated traditional Chinese medicine into Hong Kong's healthcare system, allowed "registered traditional Chinese medicine practitioners" to practice , set up traditional Chinese hospitals and outpatient clinics, and subsidised tertiary institutions to set up professional courses to train traditional Chinese medicine practitioners, so that traditional Chinese medicine becomes the first point of contact between the public and the healthcare system, which is also part of primary healthcare system. This will help reduce the pressure on Hong Kong's healthcare system, improve Hong Kong's public health system, and increase the demand on related medicine and medical equipment, facilitating the development and expansion of the traditional Chinese medicine industry.

In this survey, the number of enterprises related to "traditional Chinese medicine" ranked third (11%), indicating that this sector has a certain scale in Hong Kong and is worthy of development on the existing basis. In addition to its traditional advantages, Hong Kong's traditional Chinese medicine industry has a strong development

momentum with the national and regional support and the promotion of the Hong Kong government, which is bound to create higher value for Hong Kong.

Health supplements

The definition of foods/supplements that benefit the body varies around the world. The relevant regulations are also different. The examples include special nutrition foods (products that meet the special physiological needs), dietary supplements (supplementary nutrients or products that regulate the special physiological functions), health foods (foods that can provide special nutrients or have specific health effects), functional foods (foods that claim to have specific health functions or are for the purpose of supplementing vitamins and minerals, which regulate the body functions and are not for the purpose of treating diseases), and nutritional supplements (products that supplement the nutrients required for the human body).

According to the definition by the Mainland's National Food Safety Standards - Health Supplements, health supplements are foods that have specific health functions or are for the purpose of supplementing vitamins and minerals, suitable for specific groups of people, can regulate the body functions, and which are not for the purpose of treating diseases. In addition, they do not create any acute, subacute or chronic harm to the human body. Food with specific health functions has the commonality of general food, and can regulate the body functions, which is suitable for specific groups of people, but not for the purpose of treatment. It covers nutrient supplements, that is, products with vitamins and minerals as the main raw materials, which are for the purpose of supplementing the body nutrients. Nutrient supplements are divided into single nutrient supplements and compound nutrient supplements.

There is no health supplement ordinance in Hong Kong. Therefore, there is no clear official definition. Health supplements are generally regarded as non-traditional foods used to maintain or promote health. Health supplements may include the following ingredients or any combination of the following ingredients: vitamins, minerals, herbs,

herbal plants, amino acids, food supplements, concentrates or extracts and metabolites.

The continuous impact of the COVID-19 pandemic has made the demand of the global health and nutrition market heat up sharply. For example, health supplements for nutrition enhancement, stress relief and healing continue to attract public attention. According to The Business Research Company, the global functional foods market is expected to reach US$228.8 billion by 2025, with a CAGR of 8%.[47]

As people in Hong Kong live longer and the population ages, people are becoming more concerned about their own health, and the demand for health supplements is increasing. According to a market survey conducted by the Hong Kong Health Food Association in 2019, the report estimates that Hong Kong people spent approximately HK$25 billion on health supplements in 2018, an increase of approximately 32% from approximately HK$19 billion in 2014[48]. The vitamins and minerals market in Hong Kong is expected to grow by 4.63% (from 2022 to 2027) and reach US$266 million by 2027[49]. In the post-pandemic era, people's awareness of preventive healthcare has increased significantly, further boosting the demand for health supplements. According to a survey conducted by the Hong Kong Health Food Association in 2020, 90% of respondents had purchased health supplements in the past six months, spending an average of HK$1,120 per month, a year-on-year increase of 72% [50].

[47]https://finance.ettoday.net/news/2284524#ixzz7mCl2lZsq

[48] https://hkhfa.org/2019/05/15/%E9%A6%99%E6%B8%AF%E4%BF%9D%E5%81%A5%E9%A3%9F%E5%93%81%E5%8D%94%E6%9C%83%E8%88%87%E9%A6%99%E6%B8%AF%E5%A4%A7%E5%AD%B8%E7%A4%BE%E6%9C%83%E7%A7%91%E5%AD%B8%E7%A0%94%E7%A9%B6%E4%B8%AD%E5%BF%83%E7%99%BC/

[49] https://www.statista.com/outlook/cmo/otc-pharmaceuticals/vitamins-minerals/hong-kong

[50]https://www.capital-hk.com/greaterbayarea/%E5%B0%88%E6%A5%AD%E5%89%B5%E6%A5%AD%EF%BC%9A%E9%A6%99%E8%96%B0%E6%B2%BB%E7%99%82%E5%B8%AB%E7%96%AB%E5%BE%8C%E5%BC%95%E4%BF%9D%E5%81%A5%E5%93%81%E6%94%BB%E5%B8%82%E5%A0%B4/

Like traditional Chinese medicine products of Hong Kong brands, Hong Kong's health supplements have advantages due to the enterprises' stringent production process, excellent quality and outstanding efficacy of the product, giving confidence to customers. Meanwhile, consumers have more trust in the brand label "Made in Hong Kong", which enables Hong Kong's health supplements brands to win the favour of consumers in both Hong Kong and the Mainland. Health supplements enterprises in Hong Kong will collaborate with local universities or research institutions to verify the product effectiveness by scientific methods through tests and evaluations, to provide consumers with more comprehensive product information.

According to Nielsen's survey data, 80% of respondents said they will pay continuous attention to healthy eating after the pandemic[51]. In addition to the demand for immunity enhancement, emotion and sleep, eye care, beauty care, and elderly healthcare have become consumers' key concerns in health issues, and have promoted the development of related health supplements and raw material markets.

In addition, the health supplements industry in the Mainland has huge market potential and development opportunities. With the improvement of the living standards of the people in the Mainland, their requirements for quality of life are getting higher and higher, and their health awareness is enhancing. Health supplements are gradually changing from high-end consumer goods and gifts to a must-have dietary supplements. In 2021, the health supplements market in the Mainland reached RMB270.8 billion, a year-on-year increase of 8.2%, and is expected to reach RMB328.3 billion in 2023[52]. In 2021, the Mainland's health supplements market ranked second in the world (accounting for 17.8% of the global market), following the United States (accounting for 31.2% of the global market). It is expected that from 2021 to 2025, health supplements sales of the Mainland will increase by 6% year-on-year[53].

The entry threshold for health supplements is relatively low. Compared with medicine, the approval time for the registration of health supplements is relatively short, and the

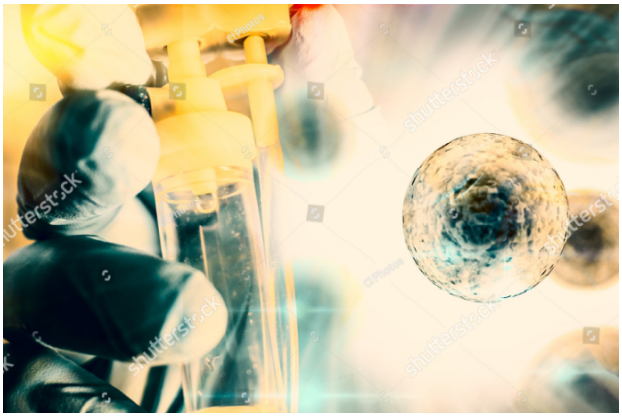
[51]https://www.fuelife.com/2022-health-food-market-trend/
[52]https://www.chyxx.com/industry/1108738.html
[53]https://research.hktdc.com/tc/article/MzA4NzQ3NzUw

difficulty of clinical trials is also relatively low. However, the profit margin of health supplements is high, which is very attractive to enterprises.

In this survey, the number of enterprises related to "health supplements" ranked third (11%), indicating that this sector has a certain scale in Hong Kong. At present, only 30% of them set up production lines in Hong Kong. However, more than 40% of "health supplements" enterprises intend to enter Hong Kong, develop business or set up production lines in Hong Kong. Therefore, if such enterprises can be attracted and assisted in developing their business in Hong Kong, it will help generate an effect of agglomeration, thereby promoting the development of the health supplements industry. At present, these health supplements enterprises surveyed mainly regard Hong Kong as their sales market, less than half of which have entered the Mainland market. If the Mainland enterprises can be attracted to set up production lines in Hong Kong, the brand effect of "Made in Hong Kong" will be given full play, which will not only help attract the attention of stakeholders in both domestic and overseas markets, but also help Mainland enterprises develop overseas markets, realising the "go global" strategy.

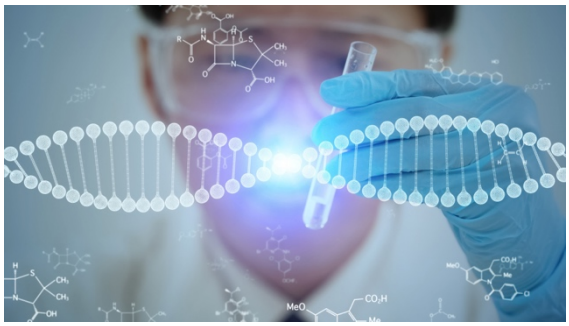
Suggestion 2: Accelerate the development of the emerging sector: genetics and stem cells

With the rapid development of medical technology, regenerative medicine is a hot research area in the medical field today. Regenerative medicine is a medical technology that uses the regeneration ability of cells to regenerate cells to repair damaged tissues and organs, which is considered a new medical area with a wide range of applications. In particular, stem cell therapy and genetics therapy are the segments with the highest attention, the widest application and the largest market space in the field of regenerative medicine.



Stem cells are a class of pluripotent cells with the ability to self-renew. Under certain conditions, they can differentiate into a variety of functional cells, with the potential function of regenerating various tissues and organs and the human body, which is called "universal cell" in medical sector. According to the development stage, stem cells are divided into embryonic stem cells (ESCs) and somatic stem cells (SSCs). According to the developmental potential, stem cells are divided into three types: totipotent stem cells (TSCs), pluripotent stem cells (PSCs), and unipotent stem cells (USCs). Scientists have summarised the five major tasks of stem cells (referred to as the 5Rs), including: replace, repair and regenerate tissues and organs, restore life functions, and regress cancer cells.

The importance and value of stem cells in the treatment of human diseases have begun to be recognised. In the area of regenerative medicine for major chronic diseases and severe trauma repair, stem cell therapy has become an effective treatment plan to make up for the shortcomings of traditional treatment. At present, the application of regenerative medicine products based on stem cell repair includes spinal cord injury, type I diabetes, Alzheimer's disease, Parkinson's disease, cancer, heart disease, and stroke.



Genes (mendelian factors) are all the nucleotide sequences needed to produce a polypeptide chain or functional RNA, which governs the basic structure and performance of life. Genomics is the discipline of genetic research. As the human genome is gradually deciphered and human beings understand themselves more deeply, the causes of many diseases will be revealed, and the design of medicine and treatment plans can be targeted and more

precise. By controlling the biochemical properties of the human body, humans will be able to restore or repair the function of body cells and organs.

The research on genetic medicine is to study how the function and information of DNA sequences stored in cells affect organisms, including genetic testing, gene editing, and genetic therapy. As an emerging therapeutic technology, genetic testing refers to a method of using recombinant DNA technology to detect human genetic defects to diagnose genetic diseases at the molecular level. Gene editing is to modify human DNA by finding the wrong DNA fragment and cutting it with a pair of molecular "scissors" to remove the wrong gene, or "pasting" the correct DNA fragment at the gap to treat diseases caused by genetic mutations. Genetic therapy is mainly to replace defective genes or add new genes to achieve the purpose of curing diseases or improving disease resistance, and mostly acts on the treatment of tumors and autoimmune diseases.

The global genetic therapy market, including the Mainland's, continues to expand, with an estimated global market size of US$30.54 billion in 2025, and a CAGR of 71% from 2020 to 2025[54]. The Mainland's genetic therapy market is expected to reach US$2.59 billion by 2025. According to the data, the global stem cell market was expected to reach US$11.73 billion in 2021, which is expected to reach US$25.68 billion by 2028, with a CAGR of 10.4% from 2022 to 2028[55]. In the Mainland, the overall market of the stem cell industry continues to expand. The market size was expected to reach RMB18.9 billion in 2022 and approximately RMB32.5 billion by 2026.

[54] http://legacy.frostchina.com/wp-content/uploads/2021/06/1-3.pdf
[55]https://www.researchandmarkets.com/reports/5568080/stem-cells-market-global-industry-analysis?gclid=Cj0KCQiAvqGcBhCJARIsAFQ5ke4KTtE4OOAxWgGHOKpq-d0QNqKmDzvCAV-FYFtBmMIRs-JD3w03tL8aAskBEALw_wcB

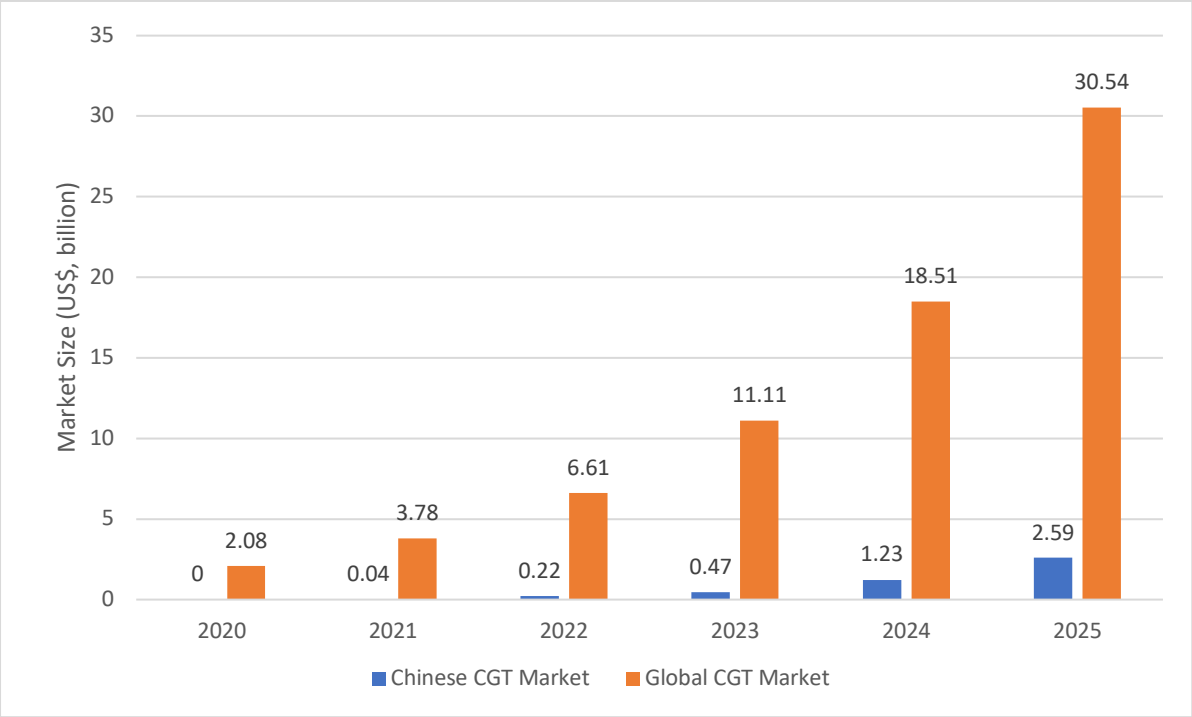
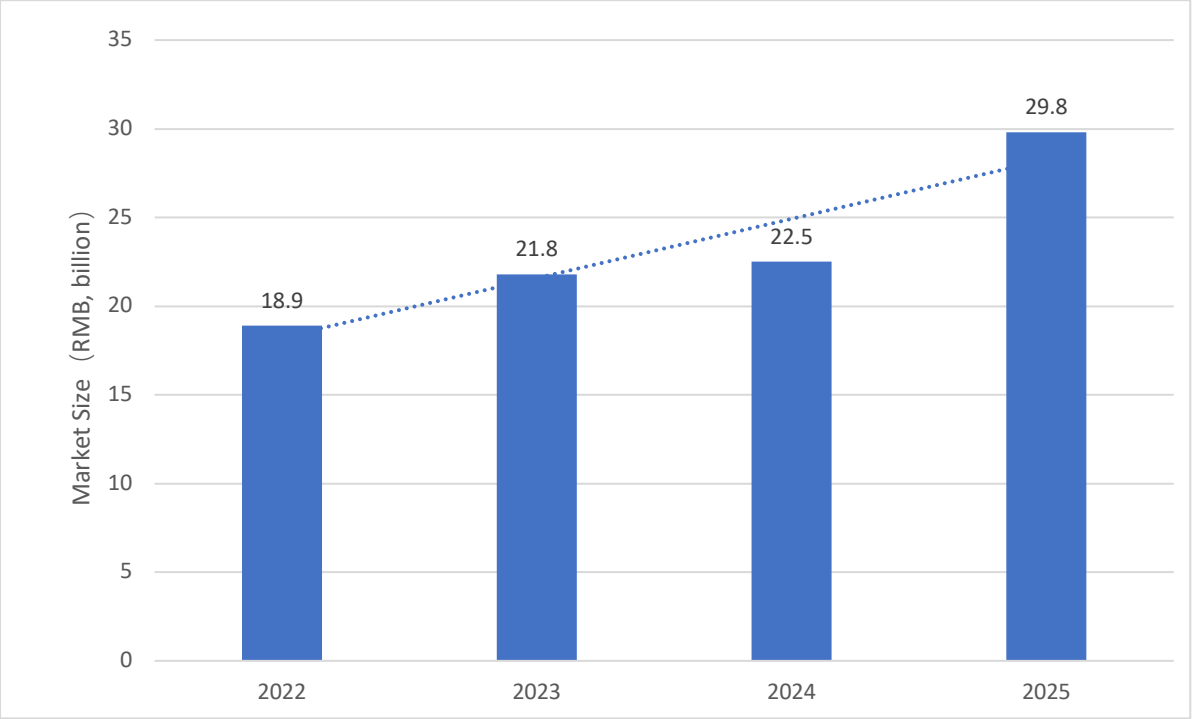


Figure 4.1: Forecast for Market Size of Global and the Mainland's Cell and Gene



2

In Hong Kong, there are many well-known scholars who are committed to the research on stem cell technology. The local stem cell technology is becoming more established. For example, in 2013, a team of Hong Kong experts successfully manufactured the world's first "mini heart" using top-notch stem cell technology, which greatly promoted the development of heart disease treatment. In 2016, the world-renowned Karolinska Institutet in Sweden established the Ming Wai Lau Centre for Reparative Medicine in Hong Kong, focusing on the research on three major research areas related to stem cells and regenerative medicine, including the heart, liver and nervous system. Several Hong Kong researchers and scholars in stem cell technology expressed their support, believing that it can enhance Hong Kong's research competitiveness and attract more researchers to participate in the research.

As mentioned in the previous paragraph, the world-class status of Hong Kong's diagnostic technologies is beyond doubt. In recent years, frontrunners in this field have emerged. Such enterprises have become a new "name card" of promoting Hong Kong's life sciences to go global through their unremitting efforts and pioneering research. Technologies such as mother-cell nucleic acid diagnosis and cell-free nucleic acid diagnosis in blood and other body fluids have brought breakthroughs to the global medical community.

In the Outline of the Healthy China 2030 Plan" released in 2016, stem cells and regenerative medicine are listed as important fields for the development of cutting-edge medical technologies. In the "14th Five-Year Plan" for Bioeconomic Development released in 2021, new technologies such as gene diagnosis and treatment, stem cell therapy, and immune cell therapy have become important field to develop the new treatment models of regenerative medicine and precision medicine. In line with the overall development of the Mainland, Guangdong Province has listed the research on stem cell therapy as an important development direction for the

cultivation and development of strategic emerging industries. Meanwhile, Guangdong Province has accelerated the strategic planning of the genetic therapy sector.

At present, only 3% of the enterprises surveyed are related to "genetics and stem cells". This sector is in its infancy and needs to be developed. This sector has the highest proportion of enterprises engaged in research, reaching 80%. In addition, the sector with the highest proportion of enterprises with a total annual turnover of more than US$10 million is also "genetics and stem cells". It can be seen that this sector has a high output value. By taking R&D as the core, the industrialisation of R&D results of the "genetics and stem cells" industry can also drive the development of other related industries (such as medical and diagnostic equipment and reagents).

Suggestion 3: Nurture “Bio plus” multi-skilled talents

One of the focuses of this survey is on the talent needs of Hong Kong's life and health industry. According to the survey results, the five types of talent most needed by enterprises in both Hong Kong and other parts of the Bay Area in the next 12 months are "marketing", "information technology/statistics/data analysis", "product testing and certification", "business management" and "manufacturing/industrial engineering". It is worth mentioning that although the survey includes biotechnology-related options, such as traditional Chinese medicine, diagnostics, and pharmacy, the talent needs put forward by enterprises are professionals in fields other than biotechnology. Another focus of this survey is to understand the challenges that enterprises face in commercialising their research results. The results show that "lack of multi-skilled talent" is the biggest challenge faced by enterprises (enterprises in Hong Kong and other parts of the Bay Area). Multi-skilled talent herein generally refer to interdisciplinary and cross-field talent who not only master the knowledge about life science and technology, but are proficient in diverse fields such as business management, sales and marketing, information technology, and industrial engineering.

The above analysis results are consistent with the opinions of industry experts interviewed. Industry experts believe that relying on several internationally renowned universities, Hong Kong has relatively abundant research talent, and world-class basic research capability in the life science and technology. However, the transformation of research achievements has not reached the general expectation. The lack of multi-skilled talent is one of the key reasons. Many research projects related to life and health technology lack multi-skilled talent related to marketing and promotion, manufacturing and production, business operations, which hinders the successful transformation of research results to a certain extent.

Therefore, it is suggested in the report that Hong Kong should nurture "Bio plus" multi-skilled talent to meet the needs of the industry and coordinate the long-term development of the industry.

Suggestion 4: Enhance regulatory compatibility between the Mainland and Hong Kong

With the continuous improvement of medical care levels and living standards, the average life expectancy of the 1.4 billion people in the Mainland has been increasing. The proportion of people's consumption costs for health is rising. At the same time, the consumption of “big health” in response to the aging of the population is also increasing. All of these are bringing unprecedented opportunities for the development of biotechnology. The Central Government is supporting and improving the local life and health industry through a series of measures such as capital allocation, expanding related supporting infrastructure, streamlining regulatory procedures, and incorporating qualified new medicines into the medical insurance system. The market has great potential for development.

According to the survey results, the Mainland is the second largest target market for life and health enterprises in Hong Kong. While developing the Hong Kong market, many local enterprises are also looking to the Mainland market. After all, for consumers in the Mainland, "Hong Kong brand" and "Made in Hong Kong" mean "guarantee of quality", which is attractive to them. At the same time, Hong Kong is an

effective channel for Chinese products to go global. Limited by the differences in the regulations of the Mainland and Hong Kong, there are different degrees of obstacles in the R&D of new technologies, clinical trial planning, production, testing and certification, as well as the launch of new medicines and medical devices, which seriously affect the cooperation, exchange and development of the life and health industry between the two places.

Since the life and health industry is related to people's life, health and safety, if Hong Kong's life and health products want to enter the Mainland, enterprises must re-apply for approval from the relevant authorities in the Mainland to comply with the relevant laws and regulations even if they have already obtained certification in Hong Kong or even other overseas countries or regions such as the United States and the European Union. The same is true for products from the Mainland that enter the Hong Kong market. The approval procedures and operations of the two places are relatively cumbersome, which is not conducive to the development of the life and health industry. The Mainland has continuously introduced policies to simplify the procedures in recent years to greatly shorten the period for Hong Kong's pharmaceutical devices to enter the Mainland, but the differences and incompatibility in the regulations still cause certain obstacles.

Take medicine registration as an example. There is currently no authority in Hong Kong to approve medicines and medical devices. Hong Kong's medicine registration system mainly adopts "tier-2 approval", that is, a new medicine, before the application for registration in Hong Kong, must obtain two or more certificates of pharmaceutical product (CPP) in the 32 countries or regions on the list. After obtaining double guarantees, it can be registered and launched in Hong Kong. However, the Mainland is not included in the list. In other words, new medicines developed and approved in the Mainland are excluded from the entering Hong Kong market.

In recent years, the rapid growth of biotechnology research involving human genetic resources and the increasing demand for medical data and biological samples such as blood in research projects have created a series of new challenges. On one hand, with the rapid development of science and technology, regulatory issues such as long

management chain, wide scope, and concealment of illegal operations exist, as well as scientific and technological ethics, privacy protection, and intellectual property rights are involved. On the other hand, there is a need to balance the conservation and appropriate use of human genetic resources. At present, genetic samples between the two places are generally not allowed to be exported across the border. Only branch campuses, hospitals or subsidiaries established by Hong Kong universities and research institutions in the Mainland may be listed as pilot units and can independently apply for the entry and export of human genetic resources between the two places if they meet certain conditions. Restrictions on the sharing of medical data and biological samples such as blood between the two places have hindered the development of innovation and technology enterprises in related fields. The industry generally expects that restrictions on biological samples will be relaxed to promote the development and collaboration of research.

In terms of the patent system, there are two systems of standard patents in Hong Kong: the "original grant patent" system and the "re-registration" system. Under the "original grant patent" system, an applicant may directly apply for an "original grant by standard patent" in Hong Kong, so that it is novel, inventive, and capable of industrial application. Besides, it is not any excluded invention (For example, discovery of new plant and animal varieties is not eligible for patent application), and is subject to patent protection in Hong Kong. Under the "re-registration" system, an applicant must obtain a patent granted from one of the three designated patent authorities before filing a standard patent application with the Hong Kong Patents Registry for the registration of a patent granted by the designated patent authority. However, to sell the products overseas or to the Mainland and obtain local patent protection, the applicants always need to apply for a patent locally. At present, there is no two-way patent registration system between the Mainland and Hong Kong. The R&D patent rights cannot automatically be mutually recognised and registered in the two places.

In November 2020, the National Medical Products Administration announced the Work Plan for Regulatory Innovation and Development of Pharmaceutical and Medical Device in the Guangdong-Hong Kong-Macao Greater Bay Area, which allows designated medical institutions in the Guangdong-Hong Kong-Macao Greater Bay

Area to use pharmaceutical products that are urgently needed in clinical settings and registered in Hong Kong, and use medical devices that are urgently needed in clinical settings and procured by public hospitals in Hong Kong upon approval by the Guangdong Province. The first batch of five medical institutions was approved. As at September 2022, 20 drugs and 13 medical devices have been approved.[56]

In addition, four hospitals in Hong Kong, including Queen Mary Hospital, Prince of Wales Hospital, Hong Kong Eye Hospital and Hong Kong Sanatorium & Hospital, with a total of 32 specialties, have been approved for medicine clinical trials by the National Medical Products Administration, which can undertake medicine clinical trials approved by the National Medical Products Administration. Their clinical trial data can be submitted to the National Medical Products Administration for applying for medicine registration in the Mainland, providing convenience for local enterprises.[57]

Therefore, it is suggested in the report that the regulatory compatibility between the Mainland and Hong Kong should be strengthened on the existing basis, to achieve mutual recognition of medicines, medical devices, patents and clinical data, as well as the exchange of biological research samples, experimental reagents and genetic resources between the two places as soon as possible.

[56]https://www.mdd.gov.hk/tc/whats-new/measure-of-using-hk-registered-drugs/index.html
[57]https://www.nmpa.gov.cn/xxgk/ggtg/qtggtg/20190430150901247.html?type=pc&m=

In response to the above four suggestions, the report proposes seven measures to further implement and promote the development of Hong Kong's life and health industry.

Measure 1: Proactively attract top-notch enterprises to Hong Kong
Measure 2: Leverage unique strengths of "Made in Hong Kong" as a gateway for the Mainland enterprises to go global
Measure 3: Strengthen the awareness of Chapter 18A to attract overseas funds and potential startups to Hong Kong
Measure 4: Call on universities in Hong Kong to offer more interdisciplinary programmes to nurture multi-skilled talents
Measure 5: Encourage enterprises to provide internships and on-the-job training with government funding
Measure 6: Establish a direct dialogue and communication mechanism for between Hong Kong and the local governments and relevant departments in the Mainland, add more accredited clinical trial sites in Hong Kong that are s recognised by the National Medical Products Administration and strive for compatibility with regulations between the Mainland and Hong Kong
Measure 7: Accelerate the improvement of the infrastructure and supporting facilities of the life and health industry

Measure 1: Proactively attract top-notch enterprises to Hong Kong

To promote the development of innovation and technology, the most important thing is to cultivate a complete industrial ecosystem and build a science and technology industry cluster. It is suggested in the report that top-notch enterprises in the Mainland and overseas should be attracted to Hong Kong. Notch-top enterprises are located upstream of the innovation and technology industry chain and are also the most critical part. With the entry of large upstream enterprises, small and medium-sized enterprises can be attracted to their vicinity to undertake relevant upstream and downstream business,

form supporting facilities, and generate cluster effects, and thus build a complete industrial supply chain. These large enterprises are very important for industrial development. Driving upstream and downstream industries can often generate many job opportunities. It is suggested in the report that the government should refer to Singapore's experience and start with tax incentives and talent supply to achieve the goal of attracting more foreign-funded technology enterprises to Hong Kong. Singapore has been aiming to attract biotechnology enterprises as early as 2003. Today, eight of the world's top 10 pharmaceutical enterprises have settled down in Singapore. In terms of corporate tax exemption, Singapore offers tailor-made incentives to these enterprises. High-tech enterprises are provided with a tax exemption for 5-15 years, and a 250% tax deduction on research expenses. For startups, the government provides a certain percentage of tax allowance for the first SG$200,000 of their taxable income.

Measure 2: Leverage unique strengths of "Made in Hong Kong" as a gateway for Mainland enterprises to go global

In addition to attracting notch-top enterprises to Hong Kong, it is suggested in the report that Hong Kong should leverage the unique brand advantage of "Made in Hong Kong" to attract outstanding startups which have the potential to become unicorns to develop in Hong Kong. Through Hong Kong's unique role in global trade and consumers' confidence in the "Made in Hong Kong" brand, enterprises can use Hong Kong as a springboard to enter the international market. Mainland enterprises can leverage Hong Kong as a platform to expand their business and develop the international market by learning and introducing advanced management systems from abroad, and obtaining international market information through Hong Kong.

Measure 3: Strengthen the awareness of Chapter 18A to attract overseas funds and potential startups to Hong Kong

Compared with traditional industries, the life and health industry presents the characteristics of high investment, high output, high risk, and high technology-intensiveness. Their start-up and growth are inseparable from the support of the financial industry. Therefore, financing is one of the key driving forces for the growth of biopharmaceutical enterprises. Since the amendment of Chapter 18A of the Listing Rules in 2018 to allow biotechnology enterprises with no revenues or profits to apply for listing in Hong Kong after their core products have passed phase I clinical trials and meet other conditions, many outstanding biotechnology enterprises in the Mainland and overseas, mainly in pharmaceuticals, medical devices and cutting-edge medical technologies, have chosen to list in Hong Kong, making Hong Kong the world's second largest fundraising hub for biotechnology. It is suggested in the report that the awareness of Chapter 18A of the Listing Rules should be strengthened to attract potential research projects or startups to Hong Kong for financing and business development. On the other hand, the presence of these enterprises in Hong Kong can also bring new technologies and specialised talent to Hong Kong, which will help promote the development of Hong Kong's life and health industry to a certain extent.

Measure 4: Call on universities in Hong Kong to offer more interdisciplinary programmes to nurture multi-skilled talent

To meet the industry's strong demand for interdisciplinary talent (namely, "Bio plus" multi-skilled talents), it is suggested in the report that universities in Hong Kong consider setting up more interdisciplinary programmes. Local universities will review their programme content as appropriate to keep pace with technological developments. At present, some local universities have offered bioinformatics courses, using methods such as applied mathematics, informatics, statistics and

computer science to study biological issues. Some biotechnology-related disciplines also include interdisciplinary content, such as statistics, management and other courses in bioengineering. It is suggested in the report that more interdisciplinary courses proposed by the industry should be added with reference to the results of the survey, such as business management, marketing and sales, testing and certification, manufacturing, to make better preparation for students to enter the workplace after graduation and cultivate talent in need for the industry.

Measure 5: Encourage enterprises to provide internships and on-the-job training with government funding

In the report, enterprises are also encouraged to provide more internship opportunities for graduates and engage students with different majors other than life science and technology, so that they can fully and comprehensively learn more about the life and health industry. This enhances the appeal of the life and health industry, attracts the interest of the young generation to join the industry and strengthen the talent pool for the industry. For example, the Hong Kong Productivity Council's summer and winter "internship programmes" can create practical workplace opportunities for university students, help Hong Kong nurture "Bio plus" multi-skilled talents, and drive the development of the life and health industry. It is also suggested in the report that training institutions can develop appropriate on-the-job training courses for employees in the life and health industry based on the survey results (such as enhancing knowledge in the fields of marketing, information technology, statistics, and business management, etc. as mentioned in this report) to enrich the quality of talents. In the report, enterprises and employees are also encouraged to make good use of government subsidies and strengthen their competitiveness through on-the-job training.

Measure 6: Establish a direct dialogue and communication mechanism between Hong Kong and the local governments and relevant departments in the Mainland, add more accredited clinical trial sites in Hong Kong that are recognised by the National Medical Products Administration and strive for compatibility with the regulations between the Mainland and Hong Kong

Under "One Country, Two Systems", there are big differences in the formulation and implementation of policies between the two places. Therefore, it is suggested in the report that the Hong Kong government and relevant departments should establish a direct dialogue mechanism with the local governments of other cities of the Guangdong-Hong Kong-Macao Greater Bay Area to fully promote the industrial cooperation. The two places should follow a top-down approach and formulate policies, to accelerate the coordinated development of the life and health industry in the Guangdong-Hong Kong-Macao Greater Bay Area.

As mentioned earlier, four medical institutions in Hong Kong, with a total of 32 specialties, have been approved for medicine clinical trials by the National Medical Products Administration. Based on the existing pilot work, the government may consider actively striving to include more local medical institutions or scientific research centres in the list of accredited clinical trial institutions in the Mainland, so that their clinical trial data can be used to apply for medicine registration in the Mainland, and to promote Hong Kong to become an important platform for local and international pharmaceutical enterprises to enter the Mainland market. At the same time, there are various relaxation policies and pilot plans to promote the development of the life and health industry in Hong Kong and the Mainland, which have achieved satisfactory results and can be further strengthened. Taking the "Work Plan for Regulatory Innovation and Development of Pharmaceutical and Medical Device in the Guangdong-Hong Kong-Macao Greater Bay Area" as an example, designated medical institutions in the Guangdong-Hong Kong-Macao Greater Bay Area are allowed to use pharmaceutical products and medical devices that are urgently needed in clinical settings upon approval by the Guangdong Province, bringing new opportunities to Hong Kong's life and health industry. The Hong Kong government may seek to expand the scope of implementation of the "Work Plan for Regulatory

Innovation and Development of Pharmaceutical and Medical Device in the Guangdong-Hong Kong-Macao Greater Bay Area", including expanding the catalogue of applicable pharmaceutical products and medical devices, and gradually expanding the arrangement to include more medical institutions in other cities of the Bay Area and even other cities in the Mainland.

It is suggested in the report that the regulatory compatibility between the Mainland and Hong Kong should be strengthened on the existing basis, so that medicines, medical devices, patents and clinical data can be mutually recognised, and the biological research samples, experimental reagents and genetic resources can be exchanged between the two places. This aims at promoting the deeper integration of the life and health industry between Hong Kong and the Mainland, fully releasing the industrial potential, giving full play to Hong Kong's distinctive advantages of enjoying strong support of the Motherland and being closely connected the world It will add new impetus to the establishment of Hong Kong as an International Innovative and Technology Hub and the development of the Greater Bay Area.

Measure 7: Accelerate the improvement of the infrastructure and supporting facilities of the life and health industry

To respond to the development strategy put forward by the Mainland with life and health technology as a key frontier technology area , and to better leverage Hong Kong's advantages in life and health technology, the Hong Kong government proposed in the 2022 Policy Address to improve the infrastructure to support the development of the life and health industry, including the implementation of the construction project of the Hong Kong-Shenzhen Innovation and Technology Park, the development of the San Tin Technopole in the Northern Metropolis, and the establishment of the InnoLife Healthtech Hub. It is suggested in the research report that the government can speed up the development of the infrastructure and supporting facilities to attract outstanding enterprises and talent to Hong Kong.

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Appendix

Introduction:

This survey aims to collect opinions from the representative of Hong Kong's life and health industrial sector on their industry development in Hong Kong.

The results of the survey will be used for the research report jointly published by the Hong Kong Productivity Council ("HKPC") and the HK Bio-Med Innotech Association. The report is scheduled to be published in 2022. The objective of the report is to analyse the current situation, advantages, and pain points of life and health industry in Hong Kong, and to provide suggestions for the future development of the industry.

Data disclaimer:
The responses collected from this survey will be used strictly for the research report jointly published between the Hong Kong Productivity Council ("HKPC") and the HK Bio-Med Innotech Association. All data would not be released and would not be used for non-research purposes.

Data storage:
All Data will be deleted by Dec 31, 2022 once the results are used in the report.

A: Contact Information

Company Name: _____

Contact Person: _____ Position: _____

Phone Number: _____ Email: _____

Would your company be willing to participate in the focus group discussion? The discussion will be held from July to Aug, 2022 in the form of online meeting.

☐ Yes ☐ No

B: Business Information

B-1: Which industry does your company belong to? (You may choose multiple options)

☐ Medical equipment	☐ Healthcare equipment	☐ Diagnostic equipment
☐ Regenerative medicine	☐ Health supplement	☐ Chinese medicine
☐ AI in medical field	☐ Medicine	☐ Diagnostic service
☐ Genetic and stem cell	☐ Cosmetic and skincare	☐ Chemical feedstock

☐ Other: _____

B-2: What is the business nature of your company? (You may choose multiple options)

☐ OBM (Original Brand Manufacturer)
☐ ODM (Original Design Manufacturer)
☐ OBM (Original Equipment Manufacturer)
☐ Research-based
☐ Trading
☐ Other: _____

B-3: Where is the headquarter of your company?

☐ Hong Kong ☐ Mainland China ☐ Southeast Asia ☐ Other Asian regions or countries
☐ Europe ☐ United States ☐ Other American countries
☐ Australia ☐ Other: _____

B-4: Where is the main sales market of your company? (You may choose multiple options)

☐ Hong Kong ☐ Mainland China ☐ Southeast Asia ☐ Other Asian regions or countries
☐ Europe ☐ United States ☐ Other American countries
☐ Australia ☐ Other: _____

B-5: What is the approximate annual revenue of your company? (Including headquarter and other regions)

☐ USD ≤ 1M
☐ USD > 1M - 5M
☐ USD > 5M - 10M
☐ USD > 10M - 50M
☐ USD > 50M

B-6: What is the approximate number of employees in your company? (Including headquarter and other regions) :

☐ ≤ 10 people
☐ 11 - 50 people
☐ 51 - 100 people
☐ 101 - 1000 people
☐ ≥ 1000 people

C: Current situation

C-1: Where does your company conduct **R&D activities**? What is the size of the R&D laboratory? (You may choose multiple options)

(a) Region/ Country	(b) Area
☐ Hong Kong	☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 5,000 sq. ft (≈ > 90 - 470 sq. m) ☐ > 5,000 - 10,000 sq. ft (≈ > 470 - 930 sq. m) ☐ > 10,000 sq. ft (≈ > 930 sq. m)
☐ Mainland China, Macau, Taiwan	☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 5,000 sq. ft (≈ > 90 - 470 sq. m) ☐ > 5,000 - 10,000 sq. ft (≈ > 470 - 930 sq. m) ☐ > 10,000 sq. ft (≈ > 930 sq. m)
☐ Southeast Asia	☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 5,000 sq. ft (≈ > 90 - 470 sq. m) ☐ > 5,000 - 10,000 sq. ft (≈ > 470 - 930 sq. m) ☐ > 10,000 sq. ft (≈ > 930 sq. m)
☐ Other (please specify_____)	☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 5,000 sq. ft (≈ > 90 - 470 sq. m) ☐ > 5,000 - 10,000 sq. ft (≈ > 470 - 930 sq. m) ☐ > 10,000 sq. ft (≈ > 930 sq. m)
☐ No R&D laboratory	

C-2: Where does your company conduct **trial production activities**? What is the size of the trial production line? (You may choose multiple options)

(a) Region/ Country	(b) Area
☐ Hong Kong	☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 5,000 sq. ft (≈ > 90 - 470 sq. m) ☐ > 5,000 - 10,000 sq. ft (≈ > 470 - 930 sq. m) ☐ > 10,000 sq. ft (≈ > 930 sq. m)
☐ Mainland China, Macau, Taiwan	☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 5,000 sq. ft (≈ > 90 - 470 sq. m) ☐ > 5,000 - 10,000 sq. ft (≈ > 470 - 930 sq. m) ☐ > 10,000 sq. ft (≈ > 930 sq. m)
☐ Southeast Asia	☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 5,000 sq. ft (≈ > 90 - 470 sq. m) ☐ > 5,000 - 10,000 sq. ft (≈ > 470 - 930 sq. m) ☐ > 10,000 sq. ft (≈ > 930 sq. m)
☐ Other (please specify_____)	☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 5,000 sq. ft (≈ > 90 - 470 sq. m) ☐ > 5,000 - 10,000 sq. ft (≈ > 470 - 930 sq. m) ☐ > 10,000 sq. ft (≈ > 930 sq. m)
☐ No trial production line	

C-3: Where does your company conduct **production activities**? What is the size of the production plant? (You may choose multiple options)

(a) Region/ Country	(b) Area
☐ Hong Kong	☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 10,000 sq. ft (≈ > 90 - 930 sq. m) ☐ > 10,000 - 30,000 sq. ft (≈ > 930 - 2790 sq. m) ☐ > 30,000 - 70,000 sq. ft (≈ > 2790 - 6500 sq. m) ☐ > 70,000 - 100,000 sq. ft (≈ > 6500 - 9290 sq. m) ☐ > 100,000 sq. ft (≈ > 9290 sq. m)
☐ Mainland China, Macau, Taiwan	☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 10,000 sq. ft (≈ > 90 - 930 sq. m) ☐ > 10,000 - 30,000 sq. ft (≈ > 930 - 2790 sq. m) ☐ > 30,000 - 70,000 sq. ft (≈ > 2790 - 6500 sq. m) ☐ > 70,000 - 100,000 sq. ft (≈ > 6500 - 9290 sq. m) ☐ > 100,000 sq. ft (≈ > 9290 sq. m)
☐ Southeast Asia	☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 10,000 sq. ft (≈ > 90 - 930 sq. m) ☐ > 10,000 - 30,000 sq. ft (≈ > 930 - 2790 sq. m) ☐ > 30,000 - 70,000 sq. ft (≈ > 2790 - 6500 sq. m) ☐ > 70,000 - 100,000 sq. ft (≈ > 6500 - 9290 sq. m) ☐ > 100,000 sq. ft (≈ > 9290 sq. m)
☐ Other (please specify_____)	☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 10,000 sq. ft (≈ > 90 - 930 sq. m) ☐ > 10,000 - 30,000 sq. ft (≈ > 930 - 2790 sq. m) ☐ > 30,000 - 70,000 sq. ft (≈ > 2790 - 6500 sq. m) ☐ > 70,000 - 100,000 sq. ft (≈ > 6500 - 9290 sq. m) ☐ > 100,000 sq. ft (≈ > 9290 sq. m)
☐ No production activities	

C-4: Which of the following talents does your company need to recruit in the next 12 months? If it is necessary to recruit talents, do you think the talent supply in Hong Kong is sufficient?

(a) Chinese medicine
☐ Necessary ..... ☐ Unnecessary
→ ☐ Sufficient ..... ☐ Not sufficient

(b) Pharmacy
☐ Necessary ..... ☐ Unnecessary
→ ☐ Sufficient ..... ☐ Not sufficient

(c) Chemistry
☐ Necessary ..... ☐ Unnecessary
→ ☐ Sufficient ..... ☐ Not sufficient

(d) Genetic and stem cell
☐ Necessary ..... ☐ Unnecessary
→ ☐ Sufficient ..... ☐ Not sufficient

(e) Diagnostics
☐ Necessary ..... ☐ Unnecessary
→ ☐ Sufficient ..... ☐ Not sufficient

(f) Manufacturing/Industrial engineering
☐ Necessary ..... ☐ Unnecessary
→ ☐ Sufficient ..... ☐ Not sufficient

(g) Mechanical engineering/ Electrical and electronic engineering
☐ Necessary ..... ☐ Unnecessary
→ ☐ Sufficient ..... ☐ Not sufficient

(h) Information technology/Statistics/Data analysis
☐ Necessary ..... ☐ Unnecessary
→ ☐ Sufficient ..... ☐ Not sufficient

(i) Product testing and certification
☐ Necessary ..... ☐ Unnecessary
→ ☐ Sufficient ..... ☐ Not sufficient

(j) Corporate management
☐ Necessary ..... ☐ Unnecessary
→ ☐ Sufficient ..... ☐ Not sufficient

(k) Marketing
☐ Necessary ..... ☐ Unnecessary
→ ☐ Sufficient ..... ☐ Not sufficient

(l) Other (please specify_____)
☐ Necessary ..... ☐ Unnecessary
→ ☐ Sufficient ..... ☐ Not sufficient

D: Commercialization of research findings

D-1: What is your company's biggest challenge in the commercialization of research findings ?
(Please choose the three biggest challenges)

☐ Lack of all-rounded talents (Familiar with biotechnology, engineering, business management, marketing, etc.)
☐ Unable to implement large-scale production due to lack of relevant knowledge of production technology
☐ Difficulty in finding suitable plant sites for production in the surrounding areas of the company
☐ Difficulty in finding required equipment for production in the surrounding areas of the company (Especially equipment for special processing procedures)
☐ Unfamiliar with product certification requirements
☐ Difficulty in finding required testing services in the surrounding areas of the company
☐ Difficulty in finding required clinical testing services in the surrounding areas of the company
☐ Immature development of the industry chain in the surrounding areas of the company
☐ Unable to develop products that are attractive to consumers due to insufficient understanding of market needs
☐ Insufficient funds; lack of investors
☐ Insufficient local supporting facilities
☐ Other (Please specify: _____)

D-2: Which of the following support would be most helpful for your company to commercialize research findings in Hong Kong?
(Please choose the three most helpful supports)

☐ Strengthening the training of all-rounded talents (e.g. provide various types of diversified training opportunities)
☐ Increasing the supply of plant sites
☐ Providing technical support for production
☐ Providing support for upgrading general production equipment (e.g. automation, customization)
☐ Providing support on Hong Kong product certification
☐ Simplifying the procedures for certification application in Hong Kong
☐ Sharing biomedical data
☐ Providing business matching service for companies to find suitable suppliers
☐ Implementing various funding schemes (e.g. HKSTP's Incu-bio program, Innovation and Technology Fund)
☐ Promoting the development of a complete local industry chain
☐ Improving overall local supporting facilities
☐ Other (Please specify: _____)

D-3: How much do you expect the following measures for the development of **the Greater Bay Area*** would benefit your company in the commercialization of research findings in Hong Kong?

***Only read when the interviewee requests an explanation**
The Guangdong-Hong Kong-Macao Greater Bay Area (Greater Bay Area) includes two special administrative regions, Hong Kong and Macau, and nine cities in Guangdong Province including Guangzhou, Shenzhen, Zhuhai, Foshan, Huizhou, Dongguan, Zhongshan, Jiangmen, and Zhaoqing. The establishment of the Guangdong-Hong Kong-Macao Greater Bay Area is a major development strategy under the national reform and opening-up. The goal is to further deepen the cooperation between Guangdong, Hong Kong and Macao, to play to their strengths, allowing the regions to be highly-integrated, promoting a coordinated development of the region's economy, and build a world-class bay area suitable for living, working and traveling.

	Very beneficial	Beneficial	A bit beneficial	Not beneficial	Not sure
Developing 'Hong Kong- Shenzhen Innovation and Technology Park', providing scientific research resources, funds, etc.					
Work Plan for Regulatory Innovation and Development of Pharmaceutical and Medical Device in the Guangdong-Hong Kong-Macao Greater Bay Area (Work Plan): Loosen the restrictions such that some of the medical equipment opted by Hong Kong public hospitals and drugs registered in Hong Kong can be used in designated healthcare facilities in 9 mainland cities in the Greater Bay Area					
Simplifying the approval process of Hong Kong registered traditional Chinese medicine for external use to be registered and sold in mainland China.					
Allowing easier transfer of scientific research samples, experimental reagents, and genetic resources between mainland China and Hong Kong					
Clinical test data in Hong Kong can be recognized by the National Medical Products Administration (NMPA) for drug registration purposes					
Products originated in Hong Kong can be imported to mainland China with zero tariff					

E. Considerations for enterprises investing in Hong Kong

E-1 : Has your company considered relocating/expanding the following businesses to/in Hong Kong?

	Yes	No
R&D	☐	☐
Trial production process	☐	☐
Production process	☐	☐

E-2 : Which of the following factors will influence your decision to relocate or expand the above businesses to Hong Kong? Please rate each of the following factors in order of importance (1: least important; 5: most important)

	1	2	3	4	5
Outstanding local scientific research achievements (e.g. Chinese medicine, diagnosis)					
Supply of scientific research talents					
Supply of industrial technological talents					
R&D facility support (e.g. accredited laboratories, rental of testing equipment, etc.)					
Suitable laboratory sites and plant sites					
Local clinical test data can be recognized by other countries					
Raw material supply in local or surrounding areas					
Support from manufacturers in local or surrounding areas					
Testing and certification services in local or surrounding areas					
Mature industry chain in local or surrounding areas					
Business environment (e.g. tax rate and tax system; free movement of capital, goods, information; laws and regulation)					
Government support and industry-related preferential policies (e.g. various funding schemes)					
Operating costs (e.g. rent, wages, raw materials costs, production costs, logistics costs, etc.)					
Convenience of expanding into the mainland China market					
Convenience of expanding into other overseas markets					
Other (Please specify: _____)					

E-3 : Following the above question, please rate Hong Kong's performance in the following areas. (1: worst performance; 5: best performance)

	1	2	3	4	5
Outstanding local scientific research achievements (e.g. Chinese medicine, diagnosis)					
Supply of scientific research talents					
Supply of industrial technological talents					
R&D facility support (e.g. accredited laboratories, rental of testing equipment, etc.)					
Suitable laboratory sites and plant sites					
Local clinical test data can be recognized by other countries					

Raw material supply in local or surrounding areas					
Support from manufacturers in local or surrounding areas					
Testing and certification services in local or surrounding areas					
Mature industry chain in local or surrounding areas					
Business environment (e.g. tax rate and tax system; free movement of capital, goods, information; laws and regulation)					
Government support and industry-related preferential policies (e.g. various funding schemes)					
Operating costs (e.g. rent, wages, raw materials costs, production costs, logistics costs, etc.)					
Convenience of expanding into the mainland China market					
Convenience of expanding into other overseas markets					
Other (Please specify: _____)					

E-4: Suppose your company wants to set up a new **R&D laboratory** in Hong Kong, how much area, investment and what complementary facilities do you need?

(a) Required area	(b) Required investment	(c) Required facilities
☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 5,000 sq. ft (≈ > 90 - 470 sq. m) ☐ > 5,000 - 10,000 sq. ft (≈ > 470 - 930 sq. m) ☐ > 10,000 sq. ft (≈ > 930 sq. m)	☐ USD ≤ 500k ☐ USD > 500k - 1M ☐ USD > 1M - 3M ☐ USD > 3M - 6M ☐ USD > 6M	☐ Cleanroom ☐ Cell Culture Laboratory ☐ Freezer ☐ Animal Laboratory ☐ Laboratory under Good Laboratory Practice (GLP) for Non-Clinical Studies ☐ Laboratory under Good Clinical Practice (GCP) for Clinical Trial Studies ☐ Other: _____

E-5: Suppose your company wants to set up a new **trial production line** in Hong Kong, how much area, investment and what complementary facilities do you need?

(a) Required area	(b) Required investment	(c) Required facilities
☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 5,000 sq. ft (≈ > 90 - 470 sq. m) ☐ > 5,000 - 10,000 sq. ft (≈ > 470 - 930 sq. m) ☐ > 10,000 sq. ft (≈ > 930 sq. m)	☐ USD ≤ 500k ☐ USD > 500k - 1M ☐ USD > 1M - 3M ☐ USD > 3M - 6M ☐ USD > 6M	☐Dust-free workshop ☐Stable water and electricity supply ☐Building with high load-bearing capacity ☐High ceiling ☐Negative pressure room / positive pressure room

		☐Production workshop under Good Manufacturing Practice ☐Other: _____

E-6: Suppose your company wants to set up a new **production line** in Hong Kong, how much area, investment and what complementary facilities do you need?

(a) Required area	(b) Required investment	(c) Required facilities
☐ ≤ 1,000 sq. ft (≈ ≤ 90 sq. m) ☐ > 1,000 - 10,000 sq. ft (≈ > 90 - 930 sq. m) ☐ > 10,000 - 30,000 sq. ft (≈ > 930 - 2790 sq. m) ☐ > 30,000 - 70,000 sq. ft (≈ > 2790 - 6500 sq. m) ☐ > 70,000 - 100,000 sq. ft (≈ > 6500 - 9290 sq. m) ☐ > 100,000 sq. ft (≈ > 9290 sq. m)	☐ USD ≤ 1M ☐ USD > 1M - 3M ☐ USD > 3M - 6M ☐ USD > 6M - 10M ☐ USD > 10M	☐Dust-free workshop ☐Stable water and electricity supply ☐Building with high load-bearing capacity ☐High ceiling ☐Negative pressure room / positive pressure room ☐Production workshop under Good Manufacturing Practice ☐ Large cargo lift ☐ Other: _____

Any other opinions on the development of life and health industry in Hong Kong?

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*** END***

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