

**Legislative Council
Panel on Commerce and Industry**

**Discussing the Innovation and Technology
Development and Re-Industrialization Policy in
Hong Kong**

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**Organization: Hong Kong Biotechnology
Organization**

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1.0 - Introduction

1.1 - The Importance of Re-industrialization

- At present, we are at the beginning of the next industrial revolution, the 4th industrial revolution. This describes an era of digitalization, merging the physical, digital and biological systems and application of information and communication technology (ICT), forming an ecosystem of smart products, factories and services. Such development, as proven in the past with previous industrial revolutions will be distinguished by new and innovative technology working in synergism to increase our efficiency. This will bring a disruptive effect towards production, management economic development, social norms and governance
- Industry 4.0 is a main component of the 4th industrial revolution. It describes the trend towards automation and data exchange of manufacturing systems, creating smart factories able to upgrade and transform manufacturing technology without human interference using platforms such as, cyber physical systems (CPS), Internet of Things (IoT), cloud computing and big data analysis
- Integrating Industry 4.0 brings about promises of optimizing all processes, achieving efficiency and productivity of exceptional levels, accomplishing seamless interoperability to facilitate data exchange and communications across all industries and supply chains in an automated way. These technologies will further provide integrated approaches towards maintenance across smart production lines e.g. systems that detect, anticipate or even resolve problems without human interference
- It is imperative we actively upgrade our capabilities in order to stay current and remain competitive as we enter the 4th industrial revolution. Biotechnology is the center of this, already we integrate advanced technology into improving the precision and efficiency of our projects. With 4.0 Industry technology biotechnology empowers individuals to be better at their jobs, enabling us to make smarter decisions, innovative and efficient solutions applicable to all sectors. This will bring about an era of immense innovation development and further not only maintain but promote our economic status globally

1.2 - The Biotechnology Sector

- Biotechnology is the application of living organisms and its components, integrating biochemistry, microbiology and chemical engineering in order to produce a variety of products, gearing towards improving man's quality of life. Biotechnology makes gentler and more effective individualized therapies possible. It can also contribute to optimizing industrial processes and helping agriculture adapt to climate change. Biotechnology has grown to encompass extremely broad and various industrial sectors, and can be broadly classified into areas of medical, agricultural and industrial biotechnology and affects the everyday lives of the global population. To name a few, biotechnology is dedicated to areas such as improvement of the development of drugs and therapeutics, antibiotics, vaccinations, synthetic production of biofuels and chemicals, treatment of wastes and mineral extraction

2.0 - Background

2.1 - Hong Kong as a biotech innovation hub

- A crucial edge that Hong Kong has is a conducive intellectual property (IP), with legal and communication systems to develop high value and research intensive products. This infrastructure makes Hong Kong a robust and trustworthy partner in providing high quality products and services, in which the biotechnology R&D industry can develop
- The new listing rules adopted by the Stock Exchange of Hong Kong (HKex), allowing pre-revenue biotech companies to be listed on 30 April 2018, played a keystone moment in strengthening Hong Kong's strategic position in the biotechnology field. As of 30 April 2020 involved biotech companies have raised HK\$ 82.5 billion through IPOs. HKex continues to support and publish updates and guidance for pre-revenue biotech companies, simplifying and providing clarity on listing requirements. This enables Hong Kong to continue its success and further develop its biotech ecosystem
- Hong Kong withholds corporations such as the Hong Kong Science Park (HKSTP) and Cyberport to foster and support tech innovations, SMEs and startups. Additionally, the government is developing two InnoHK research clusters at HKSTP, one focusing on healthcare technologies and the other on artificial intelligence and robotics technologies. The expansion of HKSTP and Cyberport will further attract young talents and companies.
- Housing top ranking Universities, world leading medical schools and state of the Art Science and Technologies, Hong Kong is an attractive place to welcome international talent. Furthermore, our healthcare system has been ranked as the most efficient in the world, providing exemplary services among 56 economies covered by Bloomberg Healthcare efficiency index in 2018. With the facilities and professional knowledge available, Hong Kong is an ideal place for industrialists to engage in the field
- Hong Kong's influence and role in promoting collaboration and sharing information within the biotech ecosystem has been demonstrated by support from the Chinese Academy of Sciences (CAS) as well as Sweden's renowned medical university, Karolinska Institutet. This is proven by CAS's establishment of an affiliated institution in Hong Kong, sharing information and promoting collaboration, to boost both theirs and Hong Kong's position in the biotech community. Furthermore, the establishment of the first overseas research base of the Karolinska Institutet, home of the Nobel Assembly further accentuates how international biotech communities recognize Hong Kong's potential in leading innovation and research in the future. Additionally, MIT's Hong Kong Innovation Node corroborates Hong Kong's renowned reputation and attractiveness as a place facilitating an ideal environment for young talent to further develop and build their skills.

2.2 - China's role in biotechnology development

- President Xi Jin Ping has shown full support by pledging to make Hong Kong an international innovation and technology hub. Further aiming to promote science and technology cooperation between Hong Kong and the Mainland
- In May 2018, a new policy announced under direction of President Xi by China's Ministry of Science and Technology that allows cross-boundary remittance of research funding has been a form of motivation in the biotech sector, and holds a promise to encourage local young talent to work in collaboration with the Mainland. Reinforcing this support, in 2018, 22 laboratories in Hong Kong received HK\$ 1.23 million each by the central government. Continuing to develop such policies enables us to further bring together both the (1) innovation efforts and resources the GBA has to offer as well as the (2) foundations and strengths in science and technology Hong Kong withholds, leveraging Hong Kong's internationalized position, and boosting the GBA's development
- The China Securities Regulatory Commission (CSRC) further offers green channel (fast track approval processes) for IPOs of innovative companies in biotechnology, cloud computing, artificial intelligence and advanced manufacturing sectors. This facilitates the development of the sector and allows R&D sectors to grow at an exponential rate. Consideration of re-evaluating policies for IPOs is something we can emulate for listing requirements.
- At present, China is undergoing numerous efforts to prioritize reducing China's dependence on foreign technology imports and instead heavily invest in improving its own industrial capability in the form of innovation and technology development. Consequently, this will lead to smart factories and will positively affect key industries such as healthcare, drug development, medical devices, robotics, agricultural equipment and modern transport equipment. The re-industrialization policy of Hong Kong aligns with this, and working together will accelerate successful integration of Industry 4.0 technologies to drive manufacturing efficiency, flexibility and product quality across all industries

2.3 - Hong Kong as a gateway to China

- In taking advantage of Hong Kong's practice of "One Country, Two Systems", prime geographical location and position as an international business hub for global enterprises to reach the Asian Market, the Guangdong-Hong Kong-Macao Greater Bay Area (GBA) Development plan will be able to integrate and strengthen cooperation in innovation and technology between the different regions. This will provide better conditions for the next generation, bringing in talent and providing a plethora of employment opportunities. Furthermore, it will enhance basic innovation capacity, opening up major national R&D infrastructure facilities and equipment based in Guangdong to Hong Kong. Increased collaboration between major institutes and research facilities in the multiple regions fosters information flow and connectivity establishing innovation alliance of industries, academia and research in Guangdong, Hong Kong and Macao

3.0 - Learning from COVID-19

- As a result of the current COVID-19 pandemic, it has been made clear that the biotechnology sector plays a crucial role in developing the city as a whole and highlights the need to accelerating R&D efforts in efficiently finding solutions towards global crisis situations and ultimately developing Hong Kong as a biotechnology innovation hub
- Furthermore, COVID-19 has highlighted the barriers we need to overcome in order to elevate Hong Kong position in the global biotech industry

3.1 - Lessons learnt from COVID-19

- Despite biotechnology being an integral part in finding solutions against COVID-19, inclusive of, antiviral, vaccine and diagnostic technology development it appeared that information regarding clinical samples were difficult to access, and remained open only to specific Hong Kong educational institutions. Without this kind of information readily available to such big players in the industry, Hong Kong is unable to utilize all the available resources it has to offer to find solutions. This hinders the ability to accelerate the development of Hong Kong as a biotechnology innovation hub
- The time pressure and fast changing nature of the SARs-CoV-2 emphasized the need to accelerate registration and regulatory review processing times for clinical trials. With only two major clinical trial centres in Hong Kong at present, this is insufficient to meet the increasing demand of the biotech sector. It is worth considering revisiting policies and regulations for clinical trials within Hong Kong, especially during such global crisis situations. Simplifying regulation & policies may help speed up and boost the development of innovation and technology in Hong Kong
- Facilitating and promoting national and international collaboration is a priority in advancing innovation and technology developments. Despite the access Hong Kong has to Mainland China in particular the GBA as well as its international connections, collaboration between such scientific communities is hardly utilized during critical periods. It is important that in the future we promote national and international collaboration inclusive of free data exchange, further welcoming global talent. With the current exponential growth of the biotechnology industry, innovation inevitably will drive the development of policies for talent recruitment and clinical trial standards in Hong Kong, driving the success of re-launching Hong Kong

4.0 - Proposals to consider

4.1 - Nurturing Talent

- Implement measures to simplify and provide easier qualifying hurdles to encourage recruitment and retain top young talents both local and overseas. At present there is prominent shortage of skilled talent in Hong Kong. With the created tensions among ethnic groups presently seen (evidenced prominently in the USA), resulting from various dilemmas inclusive of COVID-19 as well as the China-US trade war, it is a golden opportunity to attract scientists and biotech-stakeholders of Chinese ethnicity who feel unsafe to continue their career or raise a family overseas during these global crisis situations, welcoming them home to Hong Kong and the GBA.

Tactics would include accelerating recruitment processes, relaxing requirement, regulations and policies. This would attract various scientists and biotech-stakeholders with tremendous amounts of working experience in the field of biotechnology, to either work for various biotechnology companies or start-up their own businesses in Hong Kong and the GBA. An example of such schemes that proved successful in the past is the “Postdoctoral Hub” programme set-up by the Innovation and Technology Commission of Hong Kong. The programme provided eligible organizations in the biotechnology sector funding support to recruit postdoctoral talent to conduct R&D work. This provided incentive to mobilize talents from academic both local and overseas to return to Hong Kong and GBA, and further encouraged organizations to recruit top young talents in the field. Continuing to develop such programmes and schemes will be integral in recruiting and attracting talent

- Broadening criteria for start-ups wanting to set up in Hong Kong and expanding the targeted fields in innovation and technology for recruiting talent from beyond the specific fields of technology within HKSTP and Cyberport
- Setting-up and offering various scholarships, internships and young talent recruitment schemes in order to foster and cultivate young talents, further accessing national and international talent. The MIT Hong Kong Innovation Node is a perfect example of this, which gathers and provides opportunities for MIT students, faculty and researches to work on various entrepreneurial and research projects within Hong Kong and alongside their peers based in Hong Kong. Importantly this further fosters international data exchange, collaboration and welcomes international talent to Hong Kong

4.2 - International collaboration and promoting Hong Kong as a biotech innovation hub

- Promote the facilities, talents and fundamental scientific backgrounds that Hong Kong has to offer. In order to do so, it is important to host multiple international biotech events annually in Hong Kong. This would include showcasing the most current and recent developments in the biotech industry in the forms of seminars, workshops and conventions allowing international industry leaders to convene in Hong Kong to foster innovation development and collaboration within our biotech community

- Events as such would include:
 - The upcoming annual international biotech convention, BIOHK, hosted by the Hong Kong Biotechnology Organization. BIOHK comprises of three major elements, namely an Exhibition, Conference and One2One Partnering, serving the needs of all the relevant stakeholders in the industry. Acting as a Biotechnology Kaleidoscope, BIOHK will attract and promote exchanges between innovative stakeholders in biotech, healthcare and investment, converging in Hong Kong for the future of biotech worldwide.
 - Talent recruitment seminars and workshops
 - IP Protection events (i.e. panel discussions, seminars, workshops)
 - Financial events, inclusive of keeping up to date on listing requirements in Hong Kong, keeping current and up to date on financial trends and pharma & biotech financial outlook
 - Start-up connecting events, much like BIOHK's one-to-one partnering. This would help investors and start-ups convene in one place in order to foster successful collaborations and support start-ups to promote their brand. Additionally, setting up workshops would help guide start-ups to showcase and present their company to investors
 - Seminars to help investors understand the benefits and opportunities in investing in biotech
- Set-up a sample bank available for the biotech community to access. At present the biotechnology rarely have access to clinical samples essential to conduct clinical trials. A crucial step has to be made in providing the resources the biotechnology industry needs to further flourish and accelerate its R&D efforts. Despite the clinical samples available to state-of-the-art healthcare facilities and educational institutions, such samples are not provided to the biotech community.

As a way to further develop R&D efforts in accelerating solutions in e.g. healthcare and pharma, it is vital to set up a clinical sample bank. Stored in HKSTP, this clinical sample bank would be available and in close proximity to numerous biotech communities that require fundamental clinical samples for their research. However, we understand that privacy regarding the distribution and sharing of such clinical samples can be controversial. In this case, a platform should be set up to allow research groups withholding such clinical samples to provide or donate samples to the biotech community. This would help foster collaboration and unity between research groups within Hong Kong, to facilitate biotech development and in global crisis situation help control pandemics like COVID-19

- Establish a green channel to facilitate exchange of clinical samples across the Hong Kong and Mainland border. In order to enable this exchange, it is imperative we have a sample bank to set-up such a channel. Without our own store of clinical samples available to provide to others, we cannot expect not only the Mainland but international research communities to be willing to give us access to their resources. Establishing

green channels for the exchange of clinical samples across the border would create tremendous opportunities for the R&D sector to obtain clinical samples not currently available in Hong Kong, and widen the range of samples to select from. This would broaden the scope of biotechnology research, allowing the R&D sector to achieve beyond its current capabilities.

- Accelerating implementation of initiatives much like Guangdong-Hong Kong-Macao, GBA Development plan. This is integral in elevating both Hong Kong's and the Mainland's competitive stand, not only in this industry but across all sectors.

Despite the renowned and state of the art medical and healthcare facilities Hong Kong has to offer, Hong Kong can benefit from further resources in order to boost the under-developed R&D sector, available in the Mainland and the Mainland can benefit from Hong Kong's international position and status. The recent developments of China's GBA that are underway justifies this need for co-operation. A key example of such development is Shen Zhen's establishment of the National Biological Industry Base in Pingshan district. Pingshan is now dedicated to fostering biomedical innovation and accelerating R&D efforts in translational biomedical research. Additionally, development of the Lok Ma Chau Loop will provide further opportunities for young talents and start-ups to expand.

With the accessible talent and facilities that both Hong Kong and the Mainland has to offer, continuing initiatives like the GBA development plan enables us to create ground-breaking progress to encourage integration of all available resources and foster an open community for coordinated innovation between the multiple regions, furthering the development of cutting edge technologies in key sectors and accumulating IP. This enables us to gain further access to international markets, helping bridge biotechnology and investment industries to bring about the success of Hong Kong's re-industrialization

4.3 - Financial Support

- Encourage investing in the biotech sector by helping investors better understand the vast market of investment opportunities the biotech industry has to offer. According to the Pharmaceutical Association Committee under the China Association of Enterprises with Foreign Investment, an average biomedical company typically requires an investment of US\$250 million; and it could take up to 10 years for a product to be ready for launch. Biotech companies are furthermore characterized as risky, time consuming and technology intensive. Without in depth understanding, investors can be uncertain and deterred by the long-term commitment in investing in a biotech company

In order to help provide the specialized knowledge required for investors to determine the potential of research projects, more events such as trade fairs, one-to-one partnering, biotech investor seminars need to take place. HKex Biotech Week and upcoming BIOHK is a perfect example of such. This will further help promote private sector investments (e.g. private equity financing), helping the biotech sector shift away from unsustainable growth supported only by public funding

- Providing support for transitions from incubator to IPO. Funding and financial support becomes less of an issue after public listing, the HKex most recent listing rules have

been a huge milestone in overcoming this hurdle for biotech companies. Continuous evaluation and updates for listing requirements are needed in order to maintain this progress and remain competitive with competitor economies. Already HKex have stated to continue doing so, as stated above

- Set-up special lending schemes. This would include discussion with banks to offer special lending schemes and banking services focused exclusively on the start-ups in the biotech sector.
- Build on fostering collaboration between the private sector and universities. In comparison with other well-developed countries, Hong Kong's collaboration model is much weaker. In doing so companies will be able to reduce their spending on early stage research as universities are able to assist in this regard, further accessing talented youths and academicians in the field. In forging these long-term collaboration relationships both sides are able to develop and accumulate IP