

Fact Sheet

Innovation and technology industry in Hong Kong

FSC21/16-17

1. Introduction

- 1.1 Innovation and technology ("I&T") have been two key drivers of economic growth. Yet, Hong Kong is a late starter in promoting the I&T industry, as compared with many other developed economies. It was not until 1998 that the then Chief Executive of the Hong Kong Special Administrative Region, Mr TUNG Chee-hwa, decided to explore the development of the I&T industry as new dynamics of economic growth¹, consequential to the worsening of Hong Kong's economy after the outbreak of the Asian financial crisis in 1997.² In his 1998 Policy Address, Mr TUNG mapped out a blueprint for I&T development with policy initiatives of establishing a HK\$5 billion Innovation and Technology Fund ("ITF") and Hong Kong Applied Science and Technology Research Institute ("ASTRI"). In July 2002, the Commerce, Industry and Technology Bureau was established to assume policy responsibilities for the formulation and implementation of policies and measures to promote I&T development in Hong Kong.³
- 1.2 In the ensuing years, various administrations have continued with the effort on investing in necessary infrastructure required, providing funding support, and reforming the government structure to drive forward I&T development. For example, the Government started to put more emphasis on technology transfer and commercialization in 2006, with the establishment of five Research and Development Centres to coordinate and undertake applied research and development ("R&D") in selected focus areas. In 2015,

Hong Kong has lagged behind many other developed economies. For example, the rise of Silicon Valley in the United States could be traced back to the 1950s. In Taiwan, the Industrial Technology Research Institute and the Hsinchu Science Park were established in the 1970s and 1980s respectively.

The Asian financial crisis began in July 1997, which subsequently induced a major speculative attack on the Hong Kong dollar and a severe setback in the local stock and property markets. As a result, the Hong Kong economy took a significant downturn towards the second half of 1997.

The Bureau was also responsible for other policy areas such as Hong Kong's external commercial relations, inward investment promotion, and development of the industrial and trade sectors.

it went further ahead to establish the Innovation and Technology Bureau with the responsibility of formulating and implementing holistic I&T policies. Before that, Hong Kong had not had such a high-level government bureau specifically responsible for formulating and implementing the I&T policy.

- 1.3 Amid the government's years of effort, Hong Kong has established a range of support infrastructure conducive to the growth of the I&T sector. These include the Hong Kong Science Park with a total gross area ("GFA") of 330 000 sq. m, ASTRI modelled after the successful Industrial Technology Research Institute of Taiwan, and Cyberport serving as a digital community for technology start-ups to nourish and thrive.
- 1.4 Reflecting the above, Hong Kong ranked fourth in infrastructure out of the 127 surveyed economies in the Global Innovation Index 2017. However, it achieved a much lower ranking in other areas, e.g. coming in 28th in "human capital and research" and 25th in both "knowledge and technology outputs ⁵" and "creative outputs ⁶". Likewise, Hong Kong ranked first in infrastructure for the seventh time in the Global Competitiveness Report 2016-2017. However, it ranked relatively lower in "innovation capacity" (27th) and "availability of scientists and engineers" (43rd).
- 1.5 This fact sheet aims to provide information on: (a) the development of the I&T industry in Hong Kong; (b) the Government's I&T policy with special reference to the measures implemented to support industrial-oriented R&D through various funding schemes, promote technological entrepreneurship and encourage private investment in I&T; and (c) technology transfer and academia-industry collaboration.

The Global Innovation Index is compiled by the Cornell University, graduate school INSEAD and the World Intellectual Property Organization. The index is a composite indicator that ranks the worldwide economies in terms of their enabling environment to innovation and their innovation outputs.

This pillar covers all those variables that are traditionally thought to be the fruits of inventions and/or innovations such as patent applications, increase in labour productivity, as well as intellectual property receipts as a percentage of total trade.

This pillar includes three pillars: (a) intangible assets (e.g. statistics on trademark applications); (b) creative goods and services (e.g. audio-visual and related services exports); and (c) online creativity (e.g. average monthly edits to Wikipedia and video uploads on YouTube).

The Global Competitiveness Report is published by the World Economic Forum, which is an independent international organization comprising about 1 000 top corporations and global enterprises. The Report assesses the competitiveness landscape of the worldwide economies to provide an indication on the drivers of their productivity and prosperity.

2. Development of innovation and technology industry in Hong Kong

- 2.1 The Asian financial crisis erupted barely after the handover of Hong Kong on 1 July 1997. It first started with the speculative attack on the Thai baht on 2 July 1997, and the currency attacks soon swept through other Asian economies, including Hong Kong. Amid dire economic situations, the then Chief Executive TUNG Chee-hwa established the Commission on Innovation and Technology in March 1998 to advise him on policy measures required to drive forward I&T development in Hong Kong. The Commission delivered its first report in September 1998, and Mr TUNG had based on the report's recommendations to set out an I&T blueprint for Hong Kong.
- 2.2 The technology blueprint, as unveiled in TUNG's second Policy Address delivered in October 1998, has ushered in a new period of growth for the I&T sector in the immediate years thereafter. Of particular importance were the Government's I&T policy measures implemented in the following areas:
 - (a) setting up ITF in 1999 with a capital injection of HK\$5 billion. Under the Fund are various funding schemes to support projects that assist Hong Kong companies to upgrade their technological level and introduce innovative ideas to their businesses;
 - (b) founding the publicly-fund ASTRI in 2000 to perform high quality R&D for transferring to industry for commercialization, with a view to enhancing Hong Kong's competitiveness in technology-based industries through applied research;
 - (c) establishing the Hong Kong Science and Technology Parks Corporation in 2001 to enhance technological infrastructure. The Corporation offers a comprehensive range of services to cater for the needs of industry at various stages, ranging from incubation programmes to providing premises and services in its Hong Kong Science Park⁹ for applied R&D services; and

Amid speculative attacks on the Hong Kong dollar, overnight interbank interest rate shot up to a historic high of 280% on 23 October 1997 and the local stock market plunged by 10.4% a result.

The 22-hectare Hong Kong Science Park was developed in three phases with a GFA of 330 000 sq. m. Phase 1 (with a GFA of 120 000 sq. m), Phase 2 (with a GFA of 105 000 sq. m) and Phase 3 (with a GFA of 105 000 sq. m) were completed in 2004, 2011 and 2016 respectively.

- (d) opening Cyberport in 2003 to support its tenants' operations through the provision of state-of-the-art information technology infrastructure, thereby promoting information and communication technology ("ICT") in Hong Kong.
- In a further effort to nurture the I&T industry, the Government set up five Research and Development Centres in 2006 to drive and co-ordinate applied R&D in their respective focus areas and promote commercialization. As at May 2016, the five Research and Development Centres have conducted over 920 projects involving a funding amount of about HK\$4.1 billion. Most recently, the Government has established the Innovation and Technology Bureau with the responsibility of formulating and implementing holistic I&T policies, thereby fostering the development of I&T and related industries in Hong Kong. 11
- Amid the government's increased effort on promoting I&T, 1.4% or 3 885 of the business establishments had undertaken R&D activities in 2015, as evidenced by the survey conducted by the Census and Statistics Department¹². A total of HK\$8 billion was spent by these establishments on in-house R&D activities in 2015, representing an increase of 38.6% over 2010. Nevertheless, the I&T industry is still a relatively small sector in Hong Kong, accounting for only 0.7% of Gross Domestic Product ("GDP") and 0.9% of total employment in 2015. Added to this, Hong Kong's gross domestic expenditure on R&D (GERD) as a ratio of GDP has remained virtually unchanged in recent years, and the GERD/GDP ratio in 2015, at 0.76%, lagged behind many other developed economies (**Figure 1**). As another indicator of strength of R&D activities, researcher intensity¹³ in Hong Kong stood at 7.22 in 2015. The figure was among the lowest of developed economies.

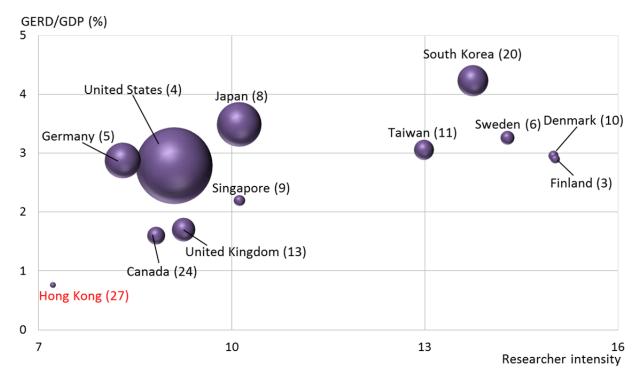
The five focus areas are (a) automotive parts and accessory systems; (b) information and communications technologies; (c) logistics and supply chain management enabling technologies; (d) nanotechnology and advanced materials; and (e) textiles and clothing.

The Government provides a strategic environment for I&T development through five core strategies. They include (a) providing world-class technology infrastructure for enterprises, research institutions and universities; (b) offering financial support to stakeholders in the industry, academia and research sector to develop and commercialize their R&D results; (c) nurturing talent; (d) strengthening science and technology collaboration with the Mainland and other economies; and (e) fostering a vibrant culture of innovation.

¹² Census and Statistics Department (2016b).

Research intensity refers to the number of full-time equivalent number of researchers per 1 000 labour force.

Figure 1 — R&D investment and researcher intensity of selected economies, 2015 or nearest year



Notes: (1) The figure in the parenthesis represents the ranking in the Global Innovation Index as published in the Global Competitiveness Report 2016-2017.

(2) Bubble size indicates GERD in 2015 or nearest year.

Sources: Census and Statistics Department, Organisation for Economic Co-operation and Development and World Economic Forum.

3. Government's innovation and technology policy

3.1 The Government has adopted an array of policy measures to facilitate the multi-faceted development of the I&T industry. This includes establishing specific government authorities to promote the industry, setting up funding schemes to support industry-oriented R&D, nurturing technological entrepreneurship, and engaging private sector participation.

Specific government authorities

3.2 In 2015, the Government established the Innovation and Technology Bureau to formulate and implement holistic I&T policy, through a higher level of leadership and better coordination across the I&T industry. The Bureau has set out its work priorities on areas including: (a) fostering R&D collaboration; (b) promoting investment on technology start-ups and the use

of local technology products and services; (c) studying the Smart City initiative; (d) building Hong Kong into a connected Wi-Fi city; and (e) augmenting the pool of I&T talents.¹⁴

- 3.3 The Innovation and Technology Bureau has two executive arms to assist it in implementing the I&T policy, namely the Innovation and Technology Commission and the Office of the Government Chief Information Officer. The former implements policies and measures to promote I&T development, and the latter provides leadership for the development of ICT and oversees the implementation of the ICT policy within and outside the Government.
- 3.4 In addition, the Commerce and Economic Development Bureau has entrusted its department, InvestHK, with the responsibility of providing free advice and services to overseas and Mainland I&T companies which plan to set up an office or expand their existing business in Hong Kong. InvestHK also implements a StartmeupHK initiative with an aim to attract global start-ups to set up business in Hong Kong. The initiative includes the operation www.startmeup.hk as a one-stop portal to the start-up community in Hong Kong, which lists the latest start-up events and various resources including government incentive and incubation schemes, accelerators, angels and venture capitals.¹⁵ The portal is also a platform for local and overseas start-ups to share their success stories.

Government's funding schemes to support industry-oriented R&D

3.5 In Hong Kong, the Innovation and Technology Commission manages ITF, which was initially set up in 1999 with a funding of HK\$5 billion. ¹⁶ As at April 2017, ITF had supported 6 229 projects involving a total funding of about HK\$12.4 billion. Most of the funded R&D projects were related to

See Innovation and Technology Bureau (2015).

For start-ups, accelerators and incubators offer great ways to develop and grow their businesses. An incubator programme helps new companies to survive through the start-up phase. In general, an incubator is physically locating a start-up company in one central work space with many other start-up companies. Supports might include but not limited to financial incentives, management training, office space and contacts/networking. The start-up can stay in the work space as long as it has grown to the scale it needs to relocate to its own space. In contrast, the emphasis of an accelerator programme is to "accelerate" growth of an existing company through months-long mentorship and other support services. The graduation of the company from the programme might improve its chances of raising venture capital from a third party entity.

Since 1999, the following injections to the Fund have been made: (a) HK\$5 billion in February 2015; (b) HK\$2 billion as endowment capital to generate investment income to finance projects under the Midstream Research Programme for Universities in June 2016; and (c) HK\$2 billion for financing the Innovation and Technology Venture Fund in July 2016.

information technology, electrical and electronics engineering technology, and manufacturing technology, which together accounted for 66% of the total approved funding since the inception of ITF.

- Under ITF, the Innovation and Technology Support Programme ("ITSP") and the Enterprise Support Scheme ("ESS") are two major funding schemes for supporting R&D activities. ITSP supports midstream/downstream R&D projects undertaken mainly by universities, the five Research and Development Centres, industry support organizations, professional bodies and trade and industry associations. As to ESS, it is designed to encourage the private sector to invest in R&D. Funding support of each approved project is up to HK\$10 million and will be provided on a dollar-for-dollar matching basis. Project period should not be longer than two years.
- 3.7 There are other funding schemes under ITF to cater for different needs. For example, private companies which carry out or sponsor R&D activities may apply for cash rebate under the Research and Development Cash Rebate Scheme. Meanwhile, the Midstream Research Programme for Universities and the Technology Start-up Support Scheme for Universities support R&D activities in universities, whereas the Public Sector Trial Scheme promotes realization or application of the R&D results in the public sector.¹⁷
- 3.8 In addition to ITF, the Cyberport Creative Micro Fund has also been established to encourage innovation and creativity. A grant of \$100,000 in cash will be awarded to the successful applicants in a 6-month project period for proof of concepts and developing prototype products. There is also the Innovation and Technology Fund for Better Living to develop I&T products and services that can improve people's daily life. ¹⁸

Promoting technological entrepreneurship

3.9 Nurturing start-ups has been among the top agendas of the Government's I&T policy, with the Hong Kong Science and Technology Parks Corporation and the government wholly-owned Hong Kong Cyberport

The Public Sector Trial Scheme provides funding support for production of prototypes/samples and conducting of trial schemes in the public sector to facilitate and promote the realization and commercialization of R&D results under ITF projects. The maximum ITF grant is HK\$1 million for each application.

Under the Innovation and Technology Fund for Better Living, an approved project will receive a grant up to 90% of the total eligible costs of the project or HK\$5 million, whichever is the less.

Management Company Limited ("the Cyberport Management Company") administering their respective publicly-funded incubation programmes to foster technological entrepreneurship. Added to this, the Innovation and Technology Commission has launched the Technology Start-up Support Scheme for Universities under ITF to support technology start-ups in local universities.

Publicly-funded incubation programmes

- 3.10 The Hong Kong Science and Technology Parks Corporation operates Incu-App, Incu-Tech, and Incu-Bio as incubation programmes to groom start-ups with R&D activities in mobile application, electronics and engineering, and biotechnology respectively. The maximum incubation periods range from 18 months to 48 months. During the incubation period, incubatees are provided with office space at subsidized rent, the access to university resources and a financial aid of between HK\$60,000 and HK\$240,000.
- 3.11 To further support the development of its incubates and current Science Park tenants, the Hong Kong Science and Technology Parks Corporation runs the Leading Enterprises Acceleration Programme to nurture start-ups working on innovative technologies with high market potential into regional or global companies. The programme's participants are provided with financial support¹⁹, quality professional services, fundraising and business opportunities, mentorship and other support services.
- 3.12 Meanwhile, the Cyberport Management Company administers the Cyberport Incubation Programme to support the development of ICT industry in Hong Kong. Incubated companies are provided with rent-free working space and a financial support up to HK\$330,000 over the 24-month incubation period. The Cyberport Management Company also operates the Cyberport Accelerator Support Programme to prepare Cyberport incubatees and alumni for international markets and investors. Each successful applicant are entitled to financial assistance up to HK\$300,000.

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The maximum assistance is HK\$400,000 for the App-track programme, HK\$680,000 for the Tech-track programme, and HK\$950,000 for the Bio-track programme.

Technology Start-up Support Scheme for Universities

3.13 In his 2016-2017 Budget, the Financial Secretary announced that the Government would continue the Technology Start-up Support Scheme for Universities²⁰ to assist technology start-ups established by university teams²¹ in commercialising their R&D results. An annual funding of up to HK\$4 million is provided to each of the six local universities. Each funded technology start-up may receive up to HK\$1.2 million each year for no more than three years.

Encouraging private investment in innovation and technology

- 3.14 The opportunity to access funding is crucial for most start-ups. Over the years, the Government has launched various programmes to encourage private sector investment in I&T enterprises. These include the Corporate Venture Fund, the Cyberport Macro Fund and the Innovation and Technology Venture Fund.
- 3.15 In 2015, the Hong Kong Science and Technology Parks Corporation launched the Corporate Venture Fund that co-invests in start-ups with private funds on a matching basis. The Corporation has earmarked HK\$50 million for the Corporate Venture Fund, with the objectives of (a) filling the funding gap encountered by local technology start-ups during their early investment stage and (b) encouraging more angel/venture capital investment in the local I&T industry. The Corporate Venture Fund targets start-ups that are located in the Hong Kong Science Park or have participated in its incubation programmes.
- 3.16 In addition to the Corporate Venture Fund, two funding schemes have also been set out in the 2016 Policy Address to encourage private investment in the I&T sector. One is the setting up of a HK\$200 million Cyberport Macro Fund by the Cyberport Management Company as an investment fund which targets to co-invest with other private and public investors in the Cyberport digital entrepreneurs. The other is the establishment of a HK\$2 billion Innovation and Technology Venture Fund for co-investing with private venture capital funds on a matching basis.

In 2014, the Government set up the Technology Start-up Support Scheme for Universities under ITF initially for three years from 2014-2015 with an annual funding of HK\$4 million provided to each of the six local universities.

The teams should be associated with the six local universities, namely The University of Hong Kong, The Chinese University of Hong Kong, City University of Hong Kong, The Hong Kong University of Science and Technology, Hong Kong Baptist University, and The Hong Kong Polytechnic University.

4. Technology transfer and academia-industry collaboration

- 4.1 In Hong Kong, local universities conduct their scientific research and then pursue subsequent transfer to the industry and commercial sectors. The commercialization of academic research results is usually managed by a technology transfer office ("TTO") associated with its respective university. For example, the Technology Transfer Office of The University of Hong Kong and its commercial arm, Versitech Limited, have been active in bringing the university's research results to the wider world²². The Technology Transfer Office provides services and support to all academic staff on matters relating to technology transfer, whereas Versitech is responsible for contract negotiations.
- 4.2 To enhance the capabilities of TTOs of six local universities, the Government provided an annual funding of up to HK\$4 million for three years from 2013-2014 to 2015-2016. In 2016, the Panel on Commerce and Industry of the Legislative Council supported the Government to continue the funding support to TTOs of local universities for another three years up to 2018-2019.
- 4.3 Local universities also collaborate with private companies in conducting R&D, and academia-industry collaboration plays a vital role in promoting I&T development in Hong Kong. In this connection, the Government has established the University-Industry Collaboration Programme ("UICP") under ITF to stimulate private-sector interest in R&D through leveraging the knowledge and resources of universities. The emphasis is on close collaboration between private companies and universities in Hong Kong.

Hong Kong Baptist University.

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These TTOs are known as the Technology Transfer Centre in The Hong Kong University of Science and Technology, the Office of Research and Knowledge Transfer Services in The Chinese University of Hong Kong, the Innovation and Technology Development Office in The Hong Kong Polytechnic University, the Knowledge Transfer Office in City University of Hong Kong, and the Knowledge Transfer Office in

4.4 UICP provides funding support to collaborative projects conducted by local companies in partnership with local universities.²³ The support is given as a grant, subject to cash contribution by the company amounting to no less than 50% of the project cost. In order to encourage private companies to undertake more R&D projects, all intellectual property rights arising from the project will be solely owned by the participating company.

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There are three schemes under UICP, namely the Teaching Company Scheme, the Matching Grant for Joint Research and the Industrial Research Chair Scheme. The Teaching Company Scheme aims to foster university-industry partnership by supporting local companies to take on graduate students from local universities to assist in proprietary R&D work. Meanwhile, the Matching Grant for Joint Research aims to foster university-industry collaboration in R&D projects. As to the Industrial Research Chair Scheme, it supports research efforts of universities and industry in technology fields that are not yet developed in Hong Kong but for which there would be good development potential.

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