

Chapter 6

Innovation and Technology

Hong Kong attracts top research institutions with its strong research capability, robust intellectual property protection regime, world-class technological infrastructure and close cooperation with the Mainland. The city is developing into an international innovation and technology hub through a comprehensive I&T agenda, including a smart city blueprint.

The Innovation and Technology Bureau formulates innovation and technology (I&T) policies in Hong Kong. The bureau is supported by the Innovation and Technology Commission, the Office of the Government Chief Information Officer and the Efficiency Office.

The Innovation and Technology Commission promotes and supports applied research and development (R&D) and technology transfer and applications. It also promotes internationally accepted standards and conformity assessment services to underpin technological development and international trade in Hong Kong.

The Office of the Government Chief Information Officer provides information technology (IT) services, governance and support within the government, and promotes the wider adoption of IT in the community. It also seeks to develop a vibrant information and communications technology (ICT) industry and promote high-tier data centres, smart city development and cyber security awareness in Hong Kong.

The Efficiency Office, through its role as internal management consultant, supports government agencies in taking forward transformation projects which include the application of technology and innovation in business processes. It accelerates innovation to improve services and operations across the government and promotes cross-sectoral collaboration between civil servants and stakeholders to design and implement better services with the community.

Infrastructure

Hong Kong Science and Technology Parks Corporation

The Hong Kong Science and Technology Parks Corporation (HKSTPC) provides infrastructural and one-stop support for technology-based companies. It manages the Hong Kong Science

Park and the InnoCentre. The Science Park provides around 400,000 square metres of gross floor area for R&D activities. As at end-2020, it was home to about 900 companies.

The corporation also manages three industrial estates in Tai Po, Yuen Long and Tseung Kwan O, which together provide 217 hectares of serviced land for I&T and manufacturing setups.

Hong Kong-Shenzhen Innovation and Technology Park Limited

The Hong Kong-Shenzhen Innovation and Technology Park Limited is a wholly owned subsidiary of the HKSTPC vested with the responsibility to build, operate, maintain and manage the superstructure of the Hong Kong-Shenzhen Innovation and Technology Park.

Cyberport

As the city's ICT flagship institution, Cyberport provides basic infrastructure and technical know-how to foster the growth of digital technology enterprises and strengthen overall development of the ICT ecosystem. It has a community of 1,600 local, Mainland and overseas ICT companies. Its campus provides 98,000 sq m of rental office area, of which 12.2 per cent is used as Smart-Space co-working space for some 100 start-ups. To support ICT start-ups, Cyberport offers incubation programmes, funding support for market development and accelerator programmes, as well as early-stage venture capital investment support.

Cyberport operates a Smart-Space 8 co-working space in Tsuen Wan to accommodate some 100 start-ups, offering entrepreneurial training and support to young entrepreneurs involved in innovation.

Hong Kong Productivity Council

The Hong Kong Productivity Council aims to increase Hong Kong enterprises' productivity by helping them to adopt advanced technologies and production processes. It provides integrated support for their business operations in Hong Kong and in the Mainland, in particular small and medium-sized enterprises and start-ups focused on four areas: manufacturing technologies, IT, environmental technologies and management systems. In recent years, the Productivity Council has focused on developing and introducing advanced solutions and innovative services to promote re-industrialisation and smart city development.

Research and Development Centres

The government has five R&D centres to drive and coordinate applied R&D and to promote the commercialisation of R&D results and technology transfer: the Automotive Platforms and Application Systems R&D Centre, Hong Kong Applied Science and Technology Research Institute, Hong Kong Research Institute of Textiles and Apparel, Logistics and Supply Chain MultiTech R&D Centre, and Nano and Advanced Materials Institute.

Hong Kong Council for Testing and Certification

The council advises the government on the overall development strategy of the testing and certification sector.

The Mainland has been opening up its market to Hong Kong's testing and certification sector through the Mainland and Hong Kong Closer Economic Partnership Arrangement (CEPA). The amended Agreement on Trade in Services under CEPA took effect on 1 June, enabling Hong Kong testing organisations to collaborate with designated Mainland bodies and test products processed or manufactured anywhere in the world requiring China Compulsory Certification.

Hong Kong Accreditation Service

The accreditation service operates according to international standards and is active in international and regional accreditation communities. It has mutual recognition arrangements with accreditation bodies in 104 economies, allowing the results of tests, calibrations, certifications, inspections, validations and verifications provided by its accredited organisations to be recognised globally, thus facilitating cross-border business.

Standards and Calibration Laboratory

The laboratory is the Hong Kong Special Administrative Region's (HKSAR) official custodian of physical measurement reference standards and provides a calibration service traceable to the International System of Units. It represents the HKSAR as a signatory to the Mutual Recognition Arrangement of the International Committee for Weights and Measures, and its calibration certificates are recognised internationally.

Product Standards Information Bureau

The bureau sells standards documents and offers free technical advice on standards-related matters. It also represents the HKSAR in major forums relating to standards and conformance issues and acts as Hong Kong, China's Enquiry and Notification Point under the World Trade Organisation Agreement on Technical Barriers to Trade.

Innovation and Technology Development

The government promotes I&T development in eight major areas: increasing resources for R&D, pooling technology talent, providing funding investments, providing technological research infrastructure, reviewing legislation and regulations, opening up government data, leading changes to procurement arrangements, and promoting popular science education.

The government's Steering Committee on Innovation and Technology, chaired by the Chief Executive and with most principal officials as members, examines and steers measures in these eight areas, as well as initiatives under the smart city blueprint.

Hong Kong's I&T development has been internationally recognised. In the International Institute for Management Development's World Competitiveness Ranking 2020, Hong Kong rose from 18th to seventh and from 11th to fifth in terms of technological infrastructure and digital competitiveness respectively. In the *Digital Intelligence Index* report jointly published by Mastercard and Tufts University in 2020, Hong Kong was recognised as one of the most advanced digital economies worldwide, ranking second and third in the Asia Pacific region and the world respectively.

R&D and Technology Transfer

The government aims to increase gross domestic expenditure on R&D (GERD) to 1.5 per cent of Gross Domestic Product by 2022. Hong Kong's GERD amounted to \$26.3 billion in 2019.

To encourage enterprises to conduct more R&D activities, the government allows tax deductions for qualifying R&D expenditure: 300 per cent for the first \$2 million of such expenditure and 200 per cent for the remaining balance.

Sixteen State Key Laboratories and six branches of the Chinese National Engineering Research Centre in Hong Kong are recognised by the Ministry of Science and Technology. The government provides maximum annual funding of \$10 million for each of these facilities, and up to \$8 million a year for the Technology Transfer Office of each of seven designated universities¹.

The Innovation and Technology Fund assists in upgrading technology and promoting innovation in manufacturing and services. It has committed more than \$3 billion to supporting over 4,100 projects undertaken by research institutions and the industry in 2020, over 320 of which were R&D projects with total funding exceeding \$1 billion. Research funding also comes from the University Grants Committee and Research Grants Council, which provided \$5.41 billion in 2019-20.

InnoHK Research Clusters

The government is establishing two InnoHK research clusters in the Science Park to encourage more collaborative research with non-local institutions. They are Health@InnoHK, focusing on healthcare technologies, and AIR@InnoHK, focusing on artificial intelligence and robotics technologies. Non-profit-making R&D centres that are set up in the research clusters will receive financial support from \$10 billion approved for the purpose.

Start-ups

Hong Kong has one of the fastest-growing start-up ecosystems. According to an Invest Hong Kong survey, the number of start-up companies increased 51 per cent to 3,360 this year, when compared to 2017.

The government's \$2 billion Innovation and Technology Venture Fund encourages venture capital funds to co-invest with the government in local I&T start-ups. As at end-2020, the fund had invested around \$100 million in 19 local I&T start-ups and increased the number of co-investment partners from six to nine.

Each of six local universities² gets up to \$8 million government funding a year through the Technology Start-up Support Scheme for Universities to support their teams in starting

¹ The City University of Hong Kong, Hong Kong Baptist University, Chinese University of Hong Kong, Education University of Hong Kong, Hong Kong Polytechnic University, Hong Kong University of Science and Technology, and University of Hong Kong

² The City University of Hong Kong, Hong Kong Baptist University, Chinese University of Hong Kong, Hong Kong Polytechnic University, Hong Kong University of Science and Technology, and University of Hong Kong

technology businesses and commercialising their R&D results. As at end-2020, over \$200 million had been provided for 293 start-ups.

Since 2018-19, the HKSTPC has been receiving government funding, which will total \$10 billion over the next few years, about \$7 billion of which is for supporting its tenants and incubatees.

Pooling and Nurturing Talent

The government aims to expand Hong Kong's I&T talent pool by nurturing, retaining and attracting talent. The Research Talent Hub funds each eligible organisation or R&D project to engage up to four graduates for R&D work. As at end-2020, about \$2.37 billion had been used to fund about 6,800 positions.

The Re-industrialisation and Technology Training Programme subsidises local employees on a government-enterprise matching basis of 2:1 to receive training in advanced technologies, particularly Industry 4.0. By end-2020, it had provided over \$25.5 million in funding for the training of over 3,400 people.

In June, the government launched a pilot internship scheme for students of science, technology, engineering and mathematics (STEM) at local universities to encourage them to undertake short-term full-time internships related to I&T. As at end-2020, more than 1,600 students had joined the scheme.

The Technology Talent Admission Scheme provides fast-track admission to Hong Kong for R&D talent. In January, the scope of the scheme was extended to all companies undertaking R&D activities in 13 technology areas in Hong Kong.

Launched in December, the inaugural City I&T Grand Challenge invites anyone to propose innovative solutions to tackle livelihood issues. The winning proposals may be selected for trials in public sector organisations or specific communities with government support.

To promote science education and students' interest in I&T, the government launched a three-year IT Innovation Lab in Secondary Schools programme in the 2020-21 academic year. Each publicly funded secondary school will receive up to \$1 million for organising IT-related extra-curricular activities, as well as procuring necessary IT equipment and related professional services.

Smart City Development

The Smart City Blueprint for Hong Kong focuses on six areas: 'Smart Mobility', 'Smart Living', 'Smart Environment', 'Smart People', 'Smart Government' and 'Smart Economy'. Initiatives implemented in 2020 include further expansion of free public Wi-Fi services and the launch of the 'iAM Smart' platform to provide a single digital identity for all residents to login and access some 20 online government and public utilities services.

The Smart City Blueprint for Hong Kong 2.0 was released in December, with over 130 initiatives to bring benefits and convenience to the public.

Re-industrialisation

The Productivity Council helps local industries adopt technologies relating to Industry 4.0 and Enterprise 4.0. The INC Invention Centre, set up jointly with Germany's Fraunhofer Institute for Production Technology, fosters Industry 4.0 upgrade and smart manufacturing. The Productivity Council's Inno Space provides STEM education.

The HKSTPC constructed the Data Technology Hub at Tseung Kwan O Industrial Estate this year, and the Advanced Manufacturing Centre will be completed in 2022. The HKSTPC is also developing the Microelectronics Centre at Yuen Long Industrial Estate and studying a 56-hectare site near the Liantang/Heung Yuen Wai Boundary Control Point for the development of an industrial estate.

In July, the government launched the \$2 billion Re-industrialisation Funding Scheme, which subsidises manufacturers on a government-enterprise matching basis of 1:2 to set up new smart production lines in Hong Kong. The scheme funds one-third of the total project cost, or \$15 million, whichever is lower.

Use of I&T in Government, Business and Community

Government bureaus and departments are releasing their data in machine-readable format on the data.gov.hk portal for free use as raw material for research and innovative applications. As at the end of 2020, there were about 4,250 open datasets on the portal. More than 20 new datasets on information relating to COVID-19 were opened in 2020, including details of probable/confirmed cases, buildings with COVID-19 connections and flights/trains taken by confirmed cases.

Application forms for government services are digitised for online submission. As at end-2020, around 2,020 government forms are electronically submittable.

Technology is also critical to the operation of the 1823 contact centre, a one-stop service for the public to lodge enquiries and complaints about government services. The contact centre deploys chatbots, speech recognition, voice analytics and robotic process automation, and provides data analytics to improve departments' services.

The Youth Portal is a citizen-centric, one-stop platform providing information on youth-related public services. Through social media and multimedia content, the government connects with young people on matters such as entrepreneurship, career pursuit, and cultural and creative activities.

Under the Smart Government Innovation Lab, the 'Catch the Innovation' campaign was conducted in mid-2020, featuring seminars, workshops, case sharing and a competition to increase government departments' awareness of robotics technologies and foster innovative ideas to enhance public services and city management.

The government maintains a secured cyber environment by training professionals and fostering international cooperation in combating cyber attacks and protecting government information systems. The Government Computer Emergency Response Team Hong Kong works with the

police, the Hong Kong Computer Emergency Response Team Coordination Centre and the Hong Kong Internet Registration Corporation Limited to deepen the community's understanding of cyber security.

The government supports I&T projects that benefit the public or specific groups through the \$500 million Innovation and Technology Fund for Better Living. The 33 projects approved so far cover health, education, safety and transport, with a wide range of target beneficiaries.

The Social Innovation and Entrepreneurship Development Fund encourages social entrepreneurs to develop innovative ideas, products and services to address poverty and social exclusion as well as foster society's well-being and cohesion. By supporting cross-sectoral collaboration, the fund aims to enable social entrepreneurs to thrive. As at end-2020, it had funded 262 projects benefiting over 250,000 people.

On digital inclusion, the government has put in place a web-based learning portal, enriched ICT training and an outreach programme to encourage the elderly in applying ICT in daily life. The government also promotes adoption of accessible website and mobile application designs to facilitate use by the disabled.

In May, the Innovation and Technology Commission launched the Distance Business Programme to support enterprises to adopt IT solutions to continue their business and services during the pandemic. Over 38,000 applications were received during the application period from May to October.

Cooperation with Mainland

The government participates in the development of the Guangdong-Hong Kong-Macao Greater Bay Area into an international I&T hub.

Following the announcement of the Central People's Government in 2019 to relax the limitation on exporting human genetic resources from the Mainland to Hong Kong, three Mainland branches established by Hong Kong's universities were approved in 2020 by the Ministry of Science and Technology to apply to export human genetic resources to Hong Kong for research. The new policy will promote the development of healthcare technologies in Hong Kong. In addition, the Ministry of Science and Technology agreed in September to expand from 10 to 19 the number of local R&D institutions eligible for lodging applications for the National Key R&D Programme.

The HKSAR Government also promotes technological cooperation with the Mainland through regular mechanisms, including the Mainland-Hong Kong Science and Technology Cooperation Committee, and the Guangdong-Hong Kong Expert Group on Cooperation in Technology and Innovation.

Applying Local R&D to Combat COVID-19

A range of Hong Kong R&D solutions were used in the fight against COVID-19. They included:

- The reusable CuMask+™, produced using local R&D results, which the government distributed to all Hong Kong residents for free in May.
- The development of the world's first nanofiber N99 mask by Hong Kong's Nano and Advanced Materials Institute. It is a super breathable facemask with bacteria killing property and effective in removing most airborne contaminants.
- The Innovation and Technology Commission provided funding exceeding \$102 million to support local product development and application of technologies related to COVID-19.
- Electronic wristbands and a monitoring system developed by the Logistics and Supply Chain MultiTech R&D Centre, complemented by the 'StayHomeSafe' mobile app developed by a local start-up, were used to monitor persons under quarantine. About 400,000 persons under quarantine had used the wristbands.
- A number of IT systems were developed for the Universal Community Testing Programme, including an online booking and registration system, and a tracking system for delivery and collection of specimen tubes and samples between testing centres and laboratories.
- The Hong Kong Health Code system enables persons eligible for exemption from compulsory quarantine to input valid nucleic acid COVID-19 test results directly to Hong Kong's electronic Health Declaration Form.
- The COVID-19 Electronic Testing Record System enables the public to download electronic records of their test results and vaccination records.
- The 'LeaveHomeSafe' mobile app enables users to record the time of their visits to different venues and taxi rides. The app will notify users if they have been to a venue visited by a confirmed patient at about the same time, or taken a taxi on the same day as a confirmed patient. By year end, there were over 420,000 downloads, and more than 67,000 venues displayed the venue QR code.

Websites

Cyberport: www.cyberport.com.hk

Government Computer Emergency Response Team Hong Kong: www.govcert.gov.hk

GovHK one-stop portal: www.gov.hk

Hong Kong Applied Science and Technology Research Institute: www.astri.org

Hong Kong Automotive Platforms and Application Systems R&D Centre: www.apas.hk

Hong Kong Council for Testing and Certification: www.hkctc.gov.hk

Hong Kong Productivity Council: www.hkpc.org

Hong Kong Research Institute of Textiles and Apparel: www.hkrita.com

Hong Kong Science and Technology Parks Corporation: www.hkstp.org

iAM Smart: www.iamsmart.gov.hk

Innovation and Technology Bureau: www.itb.gov.hk

Innovation and Technology Commission: www.itc.gov.hk
IT Innovation Lab in Secondary Schools programme: www.it-lab.gov.hk
LeaveHomeSafe: www.leavehomesafe.gov.hk
Logistics and Supply Chain MultiTech R&D Centre: www.lscm.hk
Nano and Advanced Materials Institute: www.nami.org.hk
Office of the Government Chief Information Officer: www.ogcio.gov.hk
Partnership Programme for Cyber Security Information Sharing: www.cybersechub.hk
Public-sector information portal: www.data.gov.hk
Smart City Blueprint for Hong Kong: www.smartcity.gov.hk
Smart Government Innovation Lab: www.smartlab.gov.hk
Youth Portal: www.youth.gov.hk