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# Introduction

The European Chamber of Commerce in Hong Kong (ECC) created the Information and Communication Technology Business Council (ICTBC) to assemble experts in the field of Information and Communication Technology (ICT) in the Hong Kong Special Administrative Region (Hong Kong) and the Macao Special Administrative Region (Macao). The ICTBC's main objective is to represent the interests of European businesses active in the ICT industry in Hong Kong and Macao. The Council also provides the Office of the European Union (EU) with timely market access information as input for bilateral ICT policy formulation and talks with the governments of Hong Kong and Macao.

Hong Kong has one of the world's most advanced ICT sectors and has consistently been voted the world's freest economy over the past couple of decades. A highly sophisticated ICT infrastructure, in combination with the rule of law, free movement of capital, access to funds and an agile business environment make Hong Kong an attractive place for European (ICT) businesses. Given its geographic location, Hong Kong can act as a gateway, not just to Mainland China, but also to the rest of Asia.

To ensure low barriers to trade, Hong Kong has traditionally closely aligned its ICT policies with the global community and international standards. This has enabled quick adoption of new technologies in the territory, which has, in turn, encouraged many ICT companies to establish a presence in Hong Kong.

The ICTBC believes that Hong Kong should deploy all means possible to support global targets of neutralizing global warming issues and to harness ICT at large through smart city concepts that amplify the impact.

## **Key recommendations**

- The ICTBC recommends that the Hong Kong government and the European Commission discuss projects focusing on smart city solutions that unite cities and industries under the Horizon 2020 funding stream.
- The ICTBC encourages the Hong Kong government to create an integrated platform that formulates standardised data-sharing protocols to encourage sharing across government departments, and integrate various governmental data to create comprehensive datasets.
- The ICTBC recommends that the EC have a dialogue with the Hong Kong government on European best practices and experiences in the field of Mobility-as-a-Service to help accelerate this market in Hong Kong.

- The ICTBC recommends that the Hong Kong government adopt innovation procurement principles aligned with EU policies on innovation procurement in the public sector. The aim is to boost demand for innovative goods and services and to implement measures, such as quota systems, that will make it easier for SMEs, start-ups and early stage companies, including EU companies, to be able to sell their innovations to public procurers in Hong Kong.
- The ICTBC encourages the Hong Kong Monetary Authority (HKMA) to support start-up companies in gaining access to basic banking services in Hong Kong, such as holding a bank account. This service offering is fundamental to all business activities. In addition, visa policies should be reviewed to attract more overseas talent to Hong Kong's start-up scene.

# 1

## Smart Cities

### 1.1. Background

A smart city is a place where traditional networks and services are made more efficient through digital and telecommunications technology. Per the strategic implementation plan prepared by the European Commission, smart cities may be regarded as systems of people interacting with each other and using flows of energy, materials, services and financing to catalyse sustainable economic development and a higher quality of life.<sup>1</sup>

In order to further accelerate development of Hong Kong as a smart city, ICTBC believes that more attention should be paid to cross-organisational ICT governance, adaptation of selected ICT infrastructure and ICT application concepts and technologies, as well as ramping up lasting mechanisms to on-board new talents, companies and technologies.

### 1.2. Hong Kong on Smart Cities

In Hong Kong, the 2016 Policy Address announced that the Innovation & Technology Bureau (ITB) would study how Hong Kong can develop into a smart city in collaboration with research institutions, public and private organisations. The Policy Address stated that ITB would then formulate a digital framework and standards underpinning such development. Currently, the Office of the Government Chief Information Officer Hong Kong is launching a consultancy study in order to create a smart city blueprint covering the digital framework and standards up until 2030. This consultancy study is scheduled to be completed by mid-2017. The study will focus on: the use of innovation and technology in addressing urban challenges, enhancing city management and improving quality of living; enhancing the city's

attractiveness to global businesses and talents, and inspiring continuous urban innovation and sustainable economic development.<sup>2</sup>

The Macau University of Science and Technology in Macao has established a Smart City Institute. The Smart City Institute aims to reinforce research and industrialisation of smart city concepts. A primary focus is placed on the development of key technologies, applied research and public platform research and services with the aim of advancing smart city research and applications in Macao.<sup>3</sup> Recently, the Macau Science and Technology Fund announced that it would launch a call for proposals to create the framework for the development of a smart city. The Science and Technology Committee will focus on coordination of the development of a smart city with government departments such as the Transport Bureau for Smart Transport development.<sup>4</sup>

### **1.2.1. Current Challenges in Hong Kong and Corresponding Solutions**

Hong Kong faces many future challenges, most of which are related to the city's high density and ageing population. Some of the following challenges have been identified in addition to Hong Kong government by consulting firms, Legislative Council Panel on Information Technology and Broadcasting and Central Policy Unit. It is vital for Hong Kong to continue developing and integrating its policies while enabling data sharing across government departments to increase access to data and to enable more efficient budgetary spending.<sup>5</sup>

Water consumption is a considerable challenge for Hong Kong. Hong Kong has one of the highest water consumption rates per capita as compared to other advanced cities. The Water Intelligent Network project aims to install sensors in Hong Kong's water supply networks.<sup>6</sup> By using these smart sensors to analyse sound differences made by water flowing through water pipes, tiny water pipe leaks may be detected early so that prompt remedial actions that minimise adverse impacts may be taken.<sup>7</sup> Project SWITCH ("Sustainable Water Management Improves Tomorrow's Cities' Health"), an action research programme funded by the EU that was implemented and co-funded by a cross-disciplinary team of 33 global partners-attempts to facilitate a paradigm shift in urban water management. In Zaragoza, Spain, the project focused on demonstrating zoning as a means of managing water demands in a city that prides itself on minimising its water consumption.<sup>8</sup>

Energy conservation and energy management also pose significant challenges to Hong Kong. The Housing Authority has implemented several green features on housing estates. For example, rooftop photovoltaic panels are installed to harness solar energy for communal facilities.<sup>9</sup> One of the products developed under the EU's Nobel project is a public lighting management system for smart cities directed to both public and private bodies. The solution enabled energy savings of 34% by applying traffic information to adapt the use of street LED lamps.

A third challenge worth highlighting is urban management, including traffic congestion and energy consumption in Hong Kong. Traffic congestion affects various societal aspects, including travel times, emergency response times, increased carbon emissions, reduced quality of life and increased costs to business, as well as disruptive road works. Amsterdam has begun using GPS data from an Amsterdam-based navigation software and technology provider to help manage traffic flow in real time. Amsterdam's smart city initiative has created more than 80 pilot projects citywide that touch on many areas of urban life. In Vienna, public transport is highly developed and allows for efficient travel to nearly all parts of the city. Inexpensive fares and excellent reliability, as well as excellent quality, ensure high acceptance levels.<sup>10</sup>

A final important challenge for Hong Kong is access to Public Sector Data (PSD). Data sharing is a key component of smart city development. Such data is derived from datasets released by public and private organisations, sensors and other digital devices.<sup>11</sup> The city's geographic information systems (GIS) rely on data access to integrate relevant spatial data. GIS may be used to analyse data from various systems and departments to gain valuable context and greater understanding by turning a map into information that identifies patterns and assesses trends.<sup>12</sup> Barcelona developed an irrigation system based on data from their sensors flowing to three open software platforms, where it is collected and analysed for insight into how the city could be run more efficiently. Additionally, sensors in the ground offer live data on humidity, temperature, wind velocity, sunlight and atmospheric pressure.<sup>13</sup>

### 1.2.2. Overview: Six Smart City Examples in Hong Kong

As part of its smart living initiative, the government issued an internet learning support programme entitled "i Learn at Home" in order to provide an environment with accessible information and communications to enhance the quality of life in Hong Kong.<sup>14</sup>

**Smart Government:** The government launched GovHK (ESDlife website), an information portal and public service platform through which citizens may obtain information on various kinds of public services and activities. It also includes mobile applications such as Event HK, GovHK Notifications and other apps in order to facilitate public access to information concerning government services. The government has also launched the "Electronic Submission of Forms" project, which uses the Smart Identity Card and personal certificate to enable public access to a wide range of electronic public services.<sup>15</sup>

**Smart People:** The Hong Kong government will build Student IT Corners and the Enriched IT Programme in Secondary Schools in order to deliver intensive training to students interested in IT.

**Smart Environment:** The Housing Authority and Housing Department have introduced Building Information Modelling (BIM), which serves as the basis for digital representation of

building data throughout the life cycle of a building. It is intended to improve co-ordination and reduce construction waste.<sup>16</sup>

**Smart Economy:** The coverage and speed of Hong Kong's network infrastructure and the average speed of internet connection ranks among the best in the world. Hong Kong is one of the world's leading digital cities. In recent years we have witnessed rapid development in e-commerce, online consumption and mobile communications. Hong Kong is a leading digital economy, achieving top rankings in digital readiness and Internet access capabilities. The telecommunications infrastructure is one of the most sophisticated and advanced in the world. At 227.9%, the mobile penetration rate is also among the highest in the world. Meanwhile, the household broadband penetration rate is 84.6% and the average peak Internet connection speed (114.3 Mbps) is the second fastest in the world. Hong Kong strongly emphasises online security, and has established the Computer Emergency Response Team Coordination Centre (HKCERT) to coordinate responses to computer security incidents.<sup>17</sup>

**Smart Mobility:** Examples of Hong Kong's achievements include enhanced cargo clearance and logistics systems, increased mobile coverage, electronic public services and transport. In contrast, there are not yet comprehensive strategies or implementation plans for smart city development in this area, nor has there been large-scale publicity. For example, provision of consolidated real-time traffic information and route guidance to road users is still at a preliminary stage.<sup>18</sup> Although intelligent transport systems to deliver real-time bus information are being developed by privately owned enterprises like the franchised bus companies, they have yet to be put into service.<sup>19</sup> Hong Kong has laid the foundation for ICT applications in traffic management through the Trade and Industry Department programme. Under this programme, the Hong Kong government has taken initiatives for smart city development by making data in 18 categories available to the public through the launch of a Public Sector Information (PSI) portal.<sup>20</sup> Further, road sensors have also been installed by the Transport Department to record traffic conditions, and the drainage authorities have been using waterway sensors to monitor areas for flooding.

Several parties are actively involved in the smart city discussion. One of the most active players is the Hong Kong Science Technology Park (HKSTP), which encourages the development of ICT infrastructure, Big Data, the Cloud, Internet of Things, etc.<sup>21</sup> In September 2016, HKSTP organised a two-day flagship event – the APAC Innovation Summit – with over 1,000 participants. This event aimed to provide leading minds an opportunity for exchanges regarding technology and market trends.<sup>22</sup> Another active party is the Smart City Consortium (SCC), which was formed by a group of professionals from various corporations and organisations to provide opinions and suggestions to the government for formulating related policies and standards in the development of Hong Kong as a world-class smart city.<sup>23</sup> The HK Internet of Things Association (HKIOTA) is a non-profit organisation providing a platform for the IoT-related businesses to collaborate on facilitating industry development and growth, promoting IoT as a smart city tool, and providing and facilitating ideas and cultural exchanges among individuals and organisations from the private and public sectors.<sup>24</sup>

### 1.3. Smart Cities in the EU

The EU is investing in ICT research and innovation while developing policies to improve the quality of life of citizens to make cities more sustainable in view of Europe's 20-20-20 targets. To speed up the deployment of these solutions, the European Commission has initiated the European Innovation Partnership on Smart Cities and Communities that brings together European cities, industry leaders and representatives of civil society.<sup>25</sup>

Under the Horizon 2020 funding stream, the European Commission announced a call for proposals to provide funding opportunities for smart cities and communities. The Grow Smarter project was one of three projects chosen from over 19 submissions to receive support from the European Commission in the first call for smart cities and communities under the Horizon 2020 funding stream. The project brings together cities and industries to integrate and demonstrate 12 smart city solutions in energy, infrastructure and transport. It also provides other cities with valuable insights on how such solutions work in practice, as well as serving to open opportunities for replication. Stockholm, Cologne and Barcelona have each selected a site in their respective city where the 12 smart solutions will be rolled out over the next five years. In Barcelona, for example, solutions being implemented in the 22<sup>nd</sup> District include introducing electric vehicles and installing a charging infrastructure, refurbishing current buildings to create zero energy blocks, and installing district heating and cooling.<sup>26</sup>

Horizon 2020 is fully open to international participation. Under Horizon 2020, researchers, enterprises, research institutions and universities from Hong Kong and Macao can team up with their European partners to participate in projects and make the best use of Europe's excellent opportunities in research and innovation.<sup>27</sup>

In 2015, a forum consisting of participants from Austria, France, Germany, the Netherlands, Spain and the UK developed a blueprint for national smart cities strategies based on their collective experience. They explored and compared their approaches at the national level with respect to strategy, governance, funds and networks, and are preparing a blueprint intended to enhance their national strategies that can be used by any nation to support the development of their smart cities market.<sup>28</sup>

The Amsterdam smart city initiative encompasses projects across eight categories: smart mobility, smart living, smart society, smart areas, smart economy, big data and PSD, infrastructure, and living labs. Many of these projects involve extra-governmental stakeholders.<sup>29</sup> Information is shared via the Knowledge Centre, which includes publications, figures and useful links, related to sustainability, living, working, mobility, public facilities and open data. Barcelona's initiative covers 22 fields, ranging from telecommunications to smart mobility, including smart traffic light systems. Its smart city projects harness technology driven by changes (e.g. the effect of flexible work arrangements on workplace behaviour and

mobility, social networking, education and technology.)<sup>30</sup> Moreover, Barcelona annually hosts the Smart City Expo World Congress.

Vienna has a well-established research infrastructure and collaborates with the universities involved in the pilot factory where technology is tested. They also have regional support to foster research capabilities.<sup>31</sup> The Smart City Wien Framework Strategy is a long-term umbrella strategy that establishes a conducive and structural framework until 2050. Through a programme of comprehensive innovations, the priority is to improve quality of living combined with the highest resource preservation for all citizens.<sup>32</sup>

An objective of Stockholm's smart city vision is to build an infrastructure that is capable of meeting future communication needs while boosting economic activity, diversity and freedom of choice, as well as minimising disruption to the city's streets.<sup>33</sup> Currently, Stockholm is investing heavily in IT and e-services. A priority focus is on growing the range of e-services that makes life easier for all Stockholm residents.<sup>34</sup>

Paris' vision is to become a smart city in 2020 by merging three models. Firstly, the city needs to be connected to the infrastructure, digital services and e-inclusion in order to develop its infrastructure. Secondly, there is a plan to transform the city using open innovation and transparency of data to stimulate participation and citizen mobilisation. Finally, Paris looks to leverage the latest urban trends to increase mobility, energy and networks in order to make the city more resilient.<sup>35</sup>

#### **1.4. Recommendations**

While some progress has been made – for example, the creation of the ITB – the core recommendations contained in the ECC ICT Council 2016 position paper remain valid today.<sup>36</sup> The new priorities should focus on clear coordination of strategy, communication of vision and the organisation of a flagship conference on smart city initiatives in Hong Kong:

- The ICTBC recommends that the Hong Kong government, in cooperation with European stakeholders, take further steps toward becoming a smart city, mainly by adopting a more people-centric approach.
- The ICTBC emphasises the need of the EU to continue to share their experiences with Hong Kong regarding the benefits of harnessing public sector information for the creation of business opportunities in the ICT sector, as well as other business sectors.
- The ICTBC suggests that the Hong Kong government further involve the public in the discussion on Hong Kong as a smart city by hosting an annual conference. Hong Kong has an opportunity to become a pioneer in the South-East Asia region.

- The ICTBC recommends that Hong Kong and the European Commission discuss projects that focus on smart city solutions and which bring together cities and industries, under the Horizon 2020 funding stream.

# 2

## ICT Infrastructure Initiatives – Public Sector Data

### 2.1. Background

According to the European Data Portal, having access to PSD or PSI would result in three main advantages in developing public services. Firstly, this could enhance the performance of public services, since cross-sector sharing of data makes the processing and delivery of public services more efficient.<sup>37</sup> Secondly, the development of innovative services and the creation of new business models could benefit from easier access to data and relevant information. Thirdly, increased transparency and accessible information enhance collaboration, participation and social innovation, and thus can improve social welfare.<sup>38</sup>

As the European Commission suggests, supporting PSD would represent an overall benefit to society, as well as to the economy, in at least four ways. PSD has significant potential for re-use in new products and services. Having more data openly available would help the European Commission discover innovative solutions that address social challenges. Efficiency gains would be achieved through sharing data between public administrations. Finally, supporting PSD fosters participation of citizens in political and social life, while increasing government transparency.<sup>39</sup>

### 2.2. Public Sector Data in Hong Kong

In 1995, the Hong Kong government introduced the Code on Access to Information, which was divided into two parts. Addressed to all government departments, the first part outlined application procedures with target response times, while the second part covered 16 categories on the subjects of defence and security, economic management and consular matters. However, as a working code, it provides no legal protection of the right to public information. Since its introduction, this code has remained unchanged.<sup>40</sup> The Legislative Council in Hong Kong has established a specific panel focused on Information, Technology and Broadcasting. Its main task is to monitor and examine government policies related to information technology, telecommunications and broadcasting, while providing a forum for the exchange of views, briefings and the formulation of views on major legislative or financial proposals. In 2013, a sub-committee of the Law Reform Commission of Hong Kong was formed to work on Archives Law reform.<sup>41</sup> No update on this reform has yet been published.<sup>42</sup>

Expanding data access is not a straightforward task. However, the Hong Kong government has made progress in embracing PSD.<sup>43</sup> For example, it has established a PSI portal containing over 6,000 datasets in 18 categories. Hong Kong has also improved its ranking in the Global Open Data Index, going from being ranked 54th in 2014 to 37th in 2015. Despite 42% of its government datasets being open to the public, Hong Kong's ranking still lags behind other Asian economies.<sup>44</sup>

Founded in March 2013, the platform focusing on open data is an open, participative, volunteer-run group of Hong Kong citizens who support PSD. Its goal is to raise awareness and share knowledge about PSD and its benefits, and to facilitate collaboration between PSD supporters. This group also advocates for increased availability and quality of PSD. It accomplishes this by collecting and providing resources about Hong Kong's PSD, and by organising events for the community to connect, collaborate, share and learn. They also liaise with the Hong Kong government and other sectors to facilitate the release and improved quality of PSD.<sup>45</sup>

### 2.3. Public Sector Data in the EU

For 2016, the direct market size of PSD in the EU is expected to be valued at 55.3 billion EUR. From 2016 to 2020, its market size is expected to increase by 36,9%. Over the 2016-2020 period, its cumulative direct market size is estimated at 325 billion EUR. Per current estimates, nearly 100,000 new jobs will be created between 2016 and 2020 due to higher demand for employees with relevant data skills. Public sector performance can be enhanced by PSD and the accumulated public administration cost savings for the EU member states are estimated at 1.7 billion EUR by 2020. According to the European Commission, PSD also has the potential to save 7,000 lives each year by providing resuscitation earlier than current means allow. Furthermore, applying data to traffic flow algorithms could save 629 million hours of unnecessary waiting time on EU roadways.<sup>46</sup>

With the Digital Single Market Strategy, the Commission will improve the framework conditions for a thriving data economy in Europe, in which companies of all sectors can build on the opportunities of data-driven innovation. Within this strategy, free flow of data initiatives are established with the aim of tackling restrictions to the free flow of data among EU member states, specifically the unjustified restrictions on the location of data for storage and processing purposes. The European Commission's initiative, *Building the European Data Economy*, is expected to be completed by 2017. This initiative plans to boost Europe's data economy by addressing existing barriers to the free flow of data across borders and sectors. It will tackle the restrictions on the free flow of data, including legal barriers on the location of data for storage and/or processing purposes. The initiative will also address legal uncertainties surrounding the emerging issues of data ownership and access, reuse, portability and liability.<sup>47</sup>

In the EU, data controllers and management practices control data at the national level. Some differences exist at the national level that could be potential obstacles for the flow of information. The General Data Protection Regulation has been harmonised throughout the EU with respect to the rules on personal data protection. As from 2018, the same level of data protection will apply in all European member states. This is an important first step in achieving a European data economy.

### 2.3.1. Examples of Public Sector Data in the EU

Drafting of an action plan is needed to plan the implementation of a city-level PSD programme. Cities do not necessarily need to prepare separate documents in addition to the national PSD strategy and policies that already exist. In the EU, data portals are available for people to assess PSD and it is beneficial to the development of smart cities.

Amsterdam has recently opened a Data Lab that serves as a meeting point for the municipality of Amsterdam to gather and share data in collaboration with universities, schools, organisations and companies. Amsterdam is now releasing all its data on traffic and transport to interested parties. Data about parking, taxi stands, cycle paths, stops for touring cars and real-time information on traffic jams is accessible to the public.

Copenhagen is very active in the field of PSD-related initiatives. The city has its own Solutions Lab, which is a new governing body for smart city projects across all sectors in the city that create triple helix partnerships. Triple helix partnerships are collaborations between the academic, industrial and public sectors. One of the initiatives that was introduced is the Smart Citizen Borger panel, which enables citizens to participate in testing and developing new innovative solutions and digital technologies. Copenhagen also has its own area in the city called Street Lab to test smart city solutions in a dedicated urban space. Another recently-launched initiative is *Copenhagen Connecting*. The aim of this programme is to deliver better and faster solutions through the intelligent use of data.

Barcelona has launched 22@Barcelona, one of the largest urban regeneration schemes harnessing the use of open data, sophisticated infrastructure, Wi-Fi and public-private collaborations. The project has already supported more than 4,000 units of housing, a number of leisure activities, 55,000 jobs and 1,500 new companies. One of the goals of the 2017-2020 Barcelona Digital City plan is to have an open, distributed and public data infrastructure. The project includes platforms focusing on analysis of the city's data, a group of producers and users of open city data that will be promoted to enhance the analysis, the use of new sets of data and the creation of storage infrastructures and support tools.<sup>48</sup>

Berlin has a general eGovernment strategy for the years 2015-2017 that includes PSD. The strategy includes publishing datasets in machine-readable formats and improving existing datasets. The results from the survey of Open Data held in Berlin in 2016 demonstrated that,

while Berlin has over 900 datasets available, there were still identifiable gaps in data supply. The Berlin results highlight the city's need for expanded data provision, improved data accessibility and strengthened PSD networks.<sup>49</sup>

## 2.4. Recommendations

- The ICTBC recommends that the Hong Kong government create an integrated platform that formulates standardised data-sharing protocols to encourage sharing across government departments, and integrate the various governmental data in order to create comprehensive datasets.
- Given Hong Kong's lower level of PSD transparency relative to the EU, the ICTBC recommends that the European Commission and the Sub-Committee of the Law Reform Commission of Hong Kong collaborate on enforcing legislation on Access to Information such that the government and the public have standardised sets of data.
- The ICTBC encourages the European Commission, in conjunction with the Sub-Committee of the Law Reform Commission of Hong Kong, to establish a timeline or roadmap for systematic data collection and the provision of access to data, and to initiate a study in collaboration with universities to demonstrate the potential value and benefits of public data in Hong Kong.

# 3

## ICT Application Initiatives – Mobility-as-a-Service

### 3.1. Background

Mobility-as-a-Service is a type of service application installed in smart devices that places transport users at the core of transport services. This offers consumers tailor-made mobility solutions based on their individual needs.<sup>50</sup> Mobility-as-a-Service allows users to avoid the inconvenience of having to make plans for trips, and offers the option of one-off payments. The aim of service innovations in Mobility-as-a-Service is to have a single platform combining versatile payment methods/plans, mobile ticketing and mobile apps, as well as communications that enable expanded mobility networks. In addition, it is important to have support from city or regional organisations and private operators (taxi services, rental agencies, bus companies).<sup>51</sup>

Mobility-as-a-Service may also be seen as a holistic approach toward the overall mobility strategy in cities, which includes walkability and cycling in addition to other transport modes. However, to allow users to utilise Mobility-as-a-Service's full potential, the applica-

tion must provide accurate information and instructions. Access to open data is a crucial factor in Mobility-as-a-Service's success. Application developers need access to data to ensure the accuracy of features such as travelling route and duration.

### **3.2. Mobility-as-a-Service in Hong Kong**

Hong Kong scores highly in terms of transport smart card penetration. These cards allow consumers to use one contactless payment card across transport modes. With 2.9 smart cards per citizen, Hong Kong's multimodal mobility card enjoys the highest penetration rate of any product of its kind in the world.<sup>52</sup>

Smart mobility in Hong Kong covers only three main areas and lacks a centralised Mobility-as-a-Service solution as discussed above. The first is a city-wide, real-time traffic information monitoring system. The transport information system acts as Hong Kong's central database to collect, process and disseminate comprehensive transport information. The second is comprehensive and efficient tracking and management of freight logistics. The third is diversified and highly effective modes of public transport including the development of intelligent transport systems, vehicle access control, on-board staff attendance system and fleet management. Moreover, the Transport Department has developed the Transport Information System, which is a central database to collect, process and disseminate transport information, and to provide road users major services.<sup>53</sup>

Improving walkability in Hong Kong aligns with global trends and local aspirations, providing social and economic benefits while enhancing quality of life.<sup>54</sup> However, Hong Kong still lags behind European cities in some areas. Several priorities in Hong Kong's Strategy 2030+ include enhancing walkability, inclusive pedestrian spaces, easily accessible daily necessities and direct links to transport nodes, in addition to promoting an integrated walking, cycling and public transport system.<sup>55</sup>

### **3.3. Mobility-as-a-Service in the EU**

The emergence of the new urban mobility paradigm is shaped by three factors. The first factor is ICT and the challenge it poses to existing structures and business models. The second is vehicle technology and the development of new business models to cope with gas emissions; the third is road infrastructure and developing the use of streets and roads.<sup>56</sup> In terms of Mobility-as-a-Service, innovations should focus on a single platform which combines payment and communications to enable expanding mobility networks utilising Big Data, bike and car sharing and the integration of taxis and rail with public metro services.

Intelligent traffic systems involving vehicles and infrastructure is an emerging trend that is currently progressing and gaining research interest. However, a series of regulatory hurdles

would need to be resolved before Mobility-as-a-Service can be applied, including data protection provisions, traffic permissions, de-regulation and money flow. In practice, all productivity-enhancing project delivery (for example, building the required infrastructure) should be transparent. Expected end results would be reduced disruptions of traffic and transport flows, more intelligent traffic management, increased efficiency in resource management and smart governance.<sup>57</sup>

Finland aims to be the leading experimental platform on intelligent transport services and systems in Europe by 2020. To achieve this, it hopes to facilitate movement by providing transport services and a single payment platform. In 2016, Finland launched the concept of Mobility-as-a-Service. One of the three Finnish pilots to test projects aims to become the leading experimental platform on intelligent transport services and systems in Europe by 2020. Moreover, Finland's *Journey Planner* is a route and timetable service for users of public transport in Helsinki and other cities that includes a transport route planner. The service is available online and on mobile devices, and provides the fastest public transport links between two addresses.<sup>58</sup>

Barcelona launched the new bus network to redesign the network based on the criteria of ease of use, efficiency and resource management. Passengers will benefit from a more intelligible bus network with shorter waiting and journey times and improved links between modes of transport, all of which make for a more attractive and sustainable public transport system. Once fully operational, the new bus network will comprise 28 high-performance lines.<sup>59</sup>

Most European cities focus on the development of walking and cycling routes and related services as the main components of their transport strategy. Vienna, for example, provides a high-quality service in the transport of pedestrian and bicycle traffic. Recently, the city launched an Austrian pedestrian strategy and implemented new traffic regulations, such as pedestrian zones, the extension of speed limit zones, as well as outlining the need for traffic lights and construction measures in cooperation with public transport. The challenge for Vienna is to maintain the compact nature of the city while supporting short-distance walks for everyday mobility.<sup>60</sup> In Copenhagen, cycling is a very popular mode of transport. Copenhagen's goal for 2025 is to reduce cyclists' travel times by 15% and reduce accident rates by 70% as compared to 2005. Activities are evaluated bi-annually to compare Copenhagen's achievements against its cycling objectives. The results of these evaluations shape cycling infrastructure improvements and investments intended to meet citizens' needs.<sup>61</sup>

### **3.4. Recommendations**

- The ICTBC recommends that the EC engage in a dialogue with the Hong Kong government on the topic of European best practices and experiences in the field of mobility as a service to help accelerate this market in Hong Kong

- The ICTBC recommends considering smart procurement practices, as well opening up traffic and transport data in order to accelerate new businesses in this field and attract European companies to Hong Kong

# 4

## Ramping up Mechanisms for Attracting Competences, Companies and New Technologies: Innovation Procurement

### 4.1. Background

Public procurement refers to the process through which public authorities, such as government departments or local authorities, purchase work, goods or services from private-sector companies that they have selected for this purpose.<sup>62</sup> Public procurement is a significant part of the European economy, as approximately 14% of the EU's GDP derives from public expenditure on goods, works and services.<sup>63</sup> This section will focus on the significance of innovative procurement, which this paper argues is an important tool at the disposal of policy-makers.<sup>64</sup>

Pre-commercial procurement is the procurement of research and development of innovative products and services before they are commercially available to the public. Such procurement methods can be employed when near-to-the-market solutions are available and new research and development (R&D) is needed. Pre-commercial procurement may include the acquisition of limited prototypes or test products under development. However, it does not include large volume acquisitions on a commercial scale and must not constitute state aid.<sup>65</sup>

### 4.2. Innovation Procurement in Hong Kong

The procurement process in Hong Kong is based on four principles: (i) public accountability (the government must be accountable to the public for the use of taxpayers' money), (ii) value for money (focus on both price and performance, such as reliability and meeting user's requirements), (iii) transparency (ensuring that procedures and practices of procurement are clear so as to facilitate improved understanding on the part of suppliers and contractors), and (iv) open and fair competition (whereby all tenderers are treated equally and provided the same information, with no discrimination based on the country of origin).<sup>66</sup> While these principles do achieve good value for money and fair competition, they do not focus on the products' innovation component and as such may constitute a barrier to innovative procurement in Hong Kong.

There are several governmental organisations that aim to innovate public procurement in Hong Kong. First is the Office of the Government Chief Information Officer (OGCIO). The OGCIO provides leadership for the development of ICT internally and externally to the government. The OGCIO facilitates the government's adoption of an outsourcing policy for its IT projects through the establishment and management of procurement arrangements. Furthermore, the OGCIO ensures that the government provides the public with required information and services in an efficient and convenient manner through the appropriate use of ICT.<sup>67</sup> The Digital 21 Strategy is a programme specifically established to enhance Hong Kong's development on the ICT front, catering to the evolving needs of the government, businesses and the general public, while preserving Hong Kong's status as one of the world's most competitive economies. The procurement of ICT services by the government is part of an overall initiative intended to enhance the development of cyber services.<sup>68</sup> The second governmental organisation is the Innovation and Technology Bureau. This Bureau is responsible for formulating policies related to innovation and technology through strengthening coordination between the government, industry and academia. The Bureau also promotes the development of innovation, technology and related industries in Hong Kong.<sup>69</sup>

There are factors that can facilitate the development of public procurement policies in Hong Kong. On March 29, 2010, Hong Kong and New Zealand signed the Closer Economic Partnership Agreement. Agreements of this kind can further open up the public procurement market for both Hong Kong and New Zealand and support public procurement for innovation in Hong Kong. The agreement sets out Hong Kong's government procurement commitments, which are generally consistent with those under the WTO GPA.<sup>70</sup> Another facilitator of public procurement in Hong Kong is the Independent Commission Against Corruption (ICAC). The ICAC conducts detailed studies of the practices and procedures of public sector organisations and assists them to effectively implement corruption prevention measures that can also support innovation. The ICAC's effect on integrating innovation in public procurement is to facilitate public procurement by ensuring that procurement is conducted in accordance with standard procedures.<sup>71</sup>

Hong Kong follows WTO procurement rules, under which tenders are open to bidders from other jurisdictions. This means that the tenders related to the development of smart cities in terms of technology and other areas are open to European companies.

The Hong Kong government has adopted innovation-oriented procurement policies for SMEs with a view to supporting industry-led innovation and the growth of start-ups based on innovation. The procurement policies are comprised of a series of measures. The first measure mandates the procurement of innovative products and their proportions -- this target, which was set by the Small and Medium Business Administration, is 10% of all SME products procured by public entities for the purpose of becoming new-technology products. The second policy stipulates bid price preferences, which refer to the government's provision of discounts to SME bids to make them more competitive. The third policy refers to set-asides, i.e. the governmental practice of earmarking a certain amount of the contracts to be reserved for bidding by eligible SMEs.<sup>72</sup>

#### 4.2.1. Example of Innovation Procurement in Hong Kong

One successful example of innovation procurement in Hong Kong is the Octopus contactless smart card. Ninety-five percent 95% of the population uses this card, which may be used throughout the public transport network, including the subway, buses, trams, ferries and parking, as well as high-speed and long-distance trains. The card may also be used in some public institutions such as schools, hospitals and libraries. The development of the Octopus card was initiated by the MTRC in 1992. In 1994, in order to implement the development and procurement of the new smart card, the MTRC persuaded a range of public and private transport operators to form a joint-venture company which was first responsible for awarding development contracts and then for the operation of the Octopus system. The company, which in 2002 was renamed Octopus Card Limited, issued a contract for the development of the system to the Australian firm that designs and implements integrated automated fare collection systems.<sup>73</sup>

#### 4.3. Public Procurement Reform in the EU

Public procurement of innovative solutions plays a crucial role in increasing the efficiency and quality of public services. The aim of the Procurement of Innovation Platform, organised by the European Commission, is to promote widespread innovative solutions across Europe. It aids public authorities, procurers, policy-makers, researchers and other stakeholders in using innovation procurement. For example, the Finnish government's programme includes an objective whereby 5% of all public procurements are to be innovative; for its part, the Ministry of Transport and Communications has a 10% objective.<sup>74</sup>

The public procurement reform, in effect since April 18, 2016, simplifies the rules governing public procurement procedures and makes them more flexible, which benefits both consumers and businesses. Current European rules on public procurement date from 2004 and implement the principles and freedoms established by the EU treaties. The parties aim to make the procedures for awarding public procurement contracts transparent and open to all European companies. These firms can therefore offer their services and products throughout the EU.<sup>75</sup>

This simplification of the rules could significantly diminish the administrative burdens for bidders. For example, bidders are required to demonstrate their suitability, financial status and abilities by completing a European Single Procurement Document, which is a standard self-declaration form. This process is more efficient relative to the process of having to provide full documentary evidence, as now only the winning bidder must provide full documentary evidence or link to national databases. Apart from reducing administrative burdens, another improvement would be in having SMEs benefit from enhanced access to public procurement.<sup>76</sup> In conclusion, the new rules simplify public procurement procedures through smarter rules and the wider use of eProcurement. Moreover, in making the procedures more efficient, they help save billions while making it easier for SMEs to participate in public ten-

ders. Thus, the new rules on concessions are expected to increase competition and allow EU countries to achieve better value for money when mobilising private capital and know-how to complement public resources and enable new investment in public infrastructure.

#### **4.4. Examples of Innovation Procurement in the EU**

The city of Detmold, Germany, is undertaking a photocatalytic concrete project, involving an innovative technology that self-cleans and filters pollutants from the air. Titanium oxides inside the concrete use solar energy to break down the dirt into molecules such as oxygen, water, carbon dioxide, nitrates and sulphates. The expected result is a 40% reduction of nitrogen oxide levels.<sup>77</sup>

In the Netherlands, the original bed-cleaning machine used by the Erasmus University Medical Centre was labour intensive and its energy consumption was inefficient. In order to achieve the target of reducing its carbon footprint and energy consumption by 2020, the medical centre implemented an automated bed-cleaning machine, which resulted in a significant reduction of resource consumption.<sup>78</sup>

In 2011, the Technical Research Centre of Finland surveyed approximately 350 companies. The most important aspects of public sector innovative procurement were determined to be: early communication, market dialogue, not publishing a tender document, and performance based on requirements, benefits and an emphasis on outcomes.

The city of Tampere, Finland, is promoting the development and adoption of intelligent transport services. It launched a procurement process to improve transport services and the availability of traffic data. Data including traffic volume, transport modes, congestion, travel time and incidents support traffic situation awareness, while the collected data may be used in city traffic management and transport system planning. Six companies were awarded R&D contracts during the procurement process to improve availability of real-time data on urban traffic. One of the awarded companies integrates data from moving vehicle fleets with data collected from fixed roadside measurement devices to generate more extensive real-time information services. The aim is to increase the coverage and reliability of new urban transport information analysis and distribution methods by utilising floating car data.<sup>79</sup>

#### **4.5. Recommendations**

- The ICTBC recommend that the Hong Kong government adopt innovation procurement principles aligned with EU policies on innovation procurement in the public sector. The aim is to boost demand for innovative goods and services and to implement measures, such as quota systems, that will make it easier for SMEs, start-ups and early stage companies, including EU companies, to be able to sell their innovations to public procurers in Hong Kong.

- The ICTBC encourages the European Commission to seek cooperation with the Hong Kong government to discuss and share information on simplifying the rules for bidders, alleviating administrative burdens and sharing information regarding procurement policies and principles.

# 5

## Tech Start-Up Ecosystems

### 5.1. Background

The term “tech start-up ecosystem” refers to a system used to help create new start-up companies, specifically in the information technology category. Examples may include universities, funding organisations or even large corporations. These start-up systems perform a variety of functions, ranging from assisting communities with strategic planning and economic growth to support the development of entrepreneurial business ecosystems, and providing market research and analysis for launching and developing start-ups or foreign entrepreneurs, to developing methods for measuring and assessing innovation in emerging technology areas.

### 5.2. Tech Start-Up Ecosystems in Hong Kong

Despite great progress over the past three years, the start-up scene in Hong Kong, relative to that in the EU, is still in its infancy. According to Compass, a San Francisco-based research firm, Hong Kong currently ranks 25th in the world amongst start-up ecosystems. Per the InvestHK 2016 Start-Up Profiling Survey, there were a total of 1,926 registered start-ups in Hong Kong in 2016. Hong Kong has one of the top financial industries in the world. Its proximity to the Pearl River Delta and One Belt One Road creates ample opportunities for the tech sector to develop.<sup>80</sup>

Hong Kong’s start-up ecosystem enjoys great diversity, with well-developed technological infrastructure and an ultra-connected population. As one of the world’s leading international financial centres, Hong Kong’s economy is characterised by low taxation, nearly free port trade, and a well-established international financial market, all of which are built on a long history of trade and commerce. Start-ups are disrupting a wide variety of industries and sectors. While Internet of Things and FinTech start-ups are notable (11% and 8% respectively), E-commerce dominates the start-up sector (25%), followed by SaaS (Software-as-a-Service) at 13%.<sup>81</sup> Hong Kong has demonstrated a high adoption rate for FinTech services. In 2015, 29.1% of Hong Kong citizens used at least two FinTech services products.<sup>82</sup>

Hong Kong's legal system is one of the advantages of doing business in Hong Kong. Its laws protect civil rights and private ownership of property. At the same time, intellectual property rights are protected by the Copyright Ordinance and are rigorously enforced, while the Personal Data Ordinance ensures the protection of personal data with respect to their collection, use and transfer. This encourages innovation and creativity, which is crucial to ICT-related business, including media, content, games and application development. Another advantage in the Hong Kong start-up ecosystem is a high level of education and language skills, as English is increasingly a main language of business in addition to Cantonese and Putonghua (Mandarin).<sup>83</sup>

Despite Hong Kong's top ranking and strengths, tech start-ups do not seem to be able to take full advantage of Hong Kong as a start-up hub. The start-up ecosystem in Hong Kong is subject to issues such as a lack of high-quality talents from the tech sector as well as non-active interaction between start-ups and other stakeholders in both local and global start-up ecosystems. According to a survey, common barriers for young entrepreneurs in Hong Kong are: lack of funding (62.9%), fear of acute competition (43.4%), and high rents (38.2%). The barriers to opening a bank account in Hong Kong are extremely detrimental to potential start-ups. In addition, visa requirements should be relaxed to attract more overseas talent to compensate for the shortage of local tech talent.<sup>84</sup>

The Hong Kong government's support for start-ups includes several government funding schemes available to support businesses. Invest Hong Kong works with overseas and Mainland entrepreneurs, SMEs and multinationals seeking to establish an office or expand their existing business in Hong Kong. It offers free advice and services to support companies from the planning stage through to the launch and expansion of their business. Meanwhile, the Hong Kong Science & Technology Parks incubator scheme provides subsidised office space, consultancy services, investment matching and a small financial aid package to support R&D. The Design Incubation Programme provides office space and other technical support for design tenants. The incubation programmes run by Hong Kong's Cyberport help creative digital media SMEs and start-ups realise their ideas and build their business. The Innovation and Technology Fund supports companies with technology upgrades and by injecting innovative ideas into their business. Apart from government support, there are private accelerators that collaborate with start-ups and help them grow. Moreover, there are government-run and privately-run co-working spaces for start-ups that allow for more flexible renting schedules in response to start-ups' special needs.<sup>85</sup>

### **5.3. Tech Start-Up Ecosystems in the EU**

The start-up ecosystem in Europe is challenged by the need to recruit and retain the right talent, and to gain access to financing at various stages of growth. The market for capital and talent is very fragmented, as are the regulatory regimes. This makes it hard to set up a company in a different EU country, with people originating from multiple EU countries, or from

beyond the EU. Furthermore, there is an evident problem of scaling-up, especially across borders, and improving access to a larger customer base. Poor access to partnerships and funding leads many European start-ups to look for development in other markets like the United States and Asia. The European tech start-up ecosystem has a dynamic funding scene, closer cooperation with investors, big firms and talented human resources and in recent years, the number of start-ups is rapidly increasing. Through the creation of Digital Single Market and Start-Up Europe, connections and networks in the start-up ecosystem have been improved.<sup>86</sup>

One of the challenges for European companies in Hong Kong is that the government treats companies founded by expatriates very differently from those founded by locals in terms of funding, opportunities and other financial supports and regulations, such as the ability to open bank accounts.

Start-Up Europe is an initiative that enhances entrepreneurial connections within the European ecosystem, so that talent, investment and education can be easily captured. The aim of Start-Up Europe is to create start-up ecosystems and provide information about EU funding, regulations, investors and accelerators.<sup>87</sup> Start-Up Europe has made significant contribution to the Entrepreneurship 2020 action plan, and the team has direct support from the European Commission.<sup>88</sup> The action plan aims to achieve its objectives by unleashing Europe's entrepreneurial potential, removing existing administrative barriers and revolutionising the culture of entrepreneurship within the EU. It consists of three action pillars: entrepreneurial education and training to support growth and business creation; creating an environment where entrepreneurs can flourish and grow; and introducing new perspectives through the presentation of existing entrepreneurs as role models.<sup>89</sup>

The Digital Single Market aims to create new business opportunities for European and non-European start-ups. The DSM addresses common problems that start-ups encounter by enhancing access to data, promoting free flow of data initiatives, improving access to finance, simplifying corporate law, simplifying burdens when dealing with public administration, and lowering costs associated with growth across borders.<sup>90</sup>

#### **5.4. Recommendations**

- The ICTBC invites the European Commission to discuss exchange entrepreneurship programmes with Hong Kong universities to support tech talents.
- The ICTBC encourages the Hong Kong government to establish public investment programmes that help entrepreneurs and start-ups in the tech field, which would bring positive impacts such as attracting tech talents. In addition, the ICTBC also recommends that the Hong Kong government make investments intended to attract global accelerators. The ICTBC further recommends that the Hong Kong government develop special access for

local start-ups to accelerator programmes to fully realise Hong Kong's potential as a start-up hub.

- The ICTBC encourages the Hong Kong government to support start-up companies' ability to access basic bank services in Hong Kong, such as holding a bank account. This kind of service is fundamental to all business activities. In addition, visa policies should be reviewed to attract more overseas talent to Hong Kong's start-up scene.

# Abbreviations

<b>DSM</b>	Digital Single Market
<b>EU</b>	European Union
<b>EUBIP</b>	European Union Business Information Programme
<b>HKCERT</b>	Computer Emergency Response Team Coordination Centre
<b>HKIOTA</b>	HK Internet of Things Association
<b>HKSTP</b>	Hong Kong Science Technology Park
<b>Hong Kong</b>	Hong Kong Special Administrative Region
<b>ICAC</b>	Independent Commission Against Corruption
<b>ICT</b>	Information and Communication Technology
<b>ITB</b>	Innovation & Technology Bureau
<b>Macau</b>	Macau Special Administrative Region
<b>OGCIO</b>	Office of the Government Chief Information Officer
<b>PSD</b>	Public Sector Data
<b>PSI</b>	Public Sector Information
<b>R&amp;D</b>	Research and development
<b>SCC</b>	Smart City Consortium
<b>SMEs</b>	Small and Medium enterprises
<b>SWITCH</b>	Sustainable Water Management Improves Tomorrow's Cities' Health

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