

Hong Kong: The Digital Silk Road Super-Hub

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Hong Kong: The Digital Silk Road Super-Hub

(A Study Commissioned by the Hong Kong Trade Development Council)

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Executive Summary

This consultancy study – commissioned by the Hong Kong Trade Development Council and conducted by the project team formed from the three research centres, namely the University Research Facility in Big Data Analytics, The Smart City Lab and AMTD Fintech Centre of The Hong Kong Polytechnic University – aims to identify, from a macro perspective, Hong Kong’s strength and positioning in the Digital Silk Road Initiative to build a digital economy for the world.

Building of a Digital Economy for the World

The current era of digital transformation is not another dotcom bubble but a megatrend that brings fundamental changes to human society. Without overstating, it will be the name of the game in the future. The Digital Silk Road (DSR) Initiative aims to take the lead on this historic transformation for the betterment of the whole world. Through establishing a digital ecosystem for connection, inclusion, disintermediation and co-sharing along the Belt and Road countries, the DSR is set to reduce trade friction and increase efficiency, contributing tremendously to an inclusive growth of the global economy.

Prerequisites to the Success of the Digital Silk Road Initiative

A digital economy involves building a digital infrastructure including a cable network, satellite navigation and communication systems, 5G telecommunications, and digital technology such as artificial intelligence, big data analytics, etc.

Leading in many of these areas, Chinese companies are ready to contribute by exporting their technology to the world, but not without difficulties. Despite China growing at a tremendous pace in the past 30 to 40 years, its social environment, legal structure and corporate culture may not match well with those of the DSR countries, creating exchange barriers. Friction also exist as far as cross-border flows of capital, talent, technology and information are concerned.

Another requirement for the success of the DSR is the establishment of laws, policies and trade agreements to navigate the way in which data is transferred across borders. It also involves data ownership, data privacy and IP protection, which are highly sensitive issues.

Hong Kong’s Unique Role and Advantages

Hong Kong has a unique role in the DSR initiative. The city started its development as an entrepot, and has a long successful history as a bridge between mainland China and the rest of the world. Hong Kong can continue to play its super-connector role but, this time, it will play out on the digital superhighway, helping to bring China’s digital technology to DSR countries, while also helping them to tap into mainland markets. As such, Hong Kong could become the digital gateway of the DSR.

Hong Kong is eminently qualified to play such a role: it is ranked first as the freest economy in the world with simple and low tax, free trade and free capital flow. It is built on a long history of trade and commerce that nurtures dedicated and agile entrepreneurship. Its close proximity to

southern China allows easy access to manufacturing, supply facilities and a big market. Hong Kong is also strategically located at the heart of Asia, reachable by half of the world's population within five hours flight time, opening the possibility for rapid expansion and international exchange.

On the capital side, Hong Kong is an international financial centre that attracts foreign funding including angel funds, private equity and venture capital. Capital support for start-ups and R&D innovation is abundant. There are also various supportive government policies to create an environment conducive to tech development.

On the talent side, Hong Kong is an international city with an inclusive, open-minded, professional culture, attracting global talent to work and start businesses.

Furthermore, based on the one country, two systems structure, Hong Kong is in a unique position to bridge mainland China and the DSR countries in the exchange of digital technology. Hong Kong has an independent judiciary and follows the common-law system widely adopted in global business, with high-quality legal professionals and a very effective law-enforcement mechanism. These provide a highly credible platform to protect intellectual property, privacy and commercial contract rights.

Hong Kong's roles and advantages in the DSR initiative are asserted by blockchain guru Vitalik Buterin (Ethereum's founder), overseas start-up talent Dimitri Senchenko (Feron Stablecoin's founder) as well as the founders or senior executives of the following mainland Chinese companies and institutes – QuantumCTek (specialising in quantum tech), TimesBigdata (big data), Ping An Bank (fintech), Phoenix Finance (fintech), Suzhou Vortex (agritech), Shenzhen Inlife-Handnet (virtual reality), Beijing Ultrapower (software), and the Shenzhen Institutes of Advanced Technology – who are interviewed for this study.

The Strategic Importance and Potential of the Greater Bay Area

The Greater Bay Area (GBA) provides at least three key functions to Hong Kong, and for the city to contribute to the DSR initiative. First, market demand is a key driver of the healthy development of technology. With its sheer market size, the GBA has the demand and settings for different tech applications.

Second, a lot of Chinese advanced technology and talent are concentrated in Shenzhen and Guangzhou. Hong Kong companies including start-ups are able to tap into the GBA talent pool to advance their digital transformation and/or business development. On the other hand, Hong Kong could help “export” such world-leading technology to countries along the DSR.

Third, the GBA involves different legal and taxation systems, currencies, customs, etc., which complicates the execution of policies, flow of capital, talent exchange and business operations. The GBA therefore provides a huge setting for involved governing parties to jointly structure policies and measures to minimise such cross-boundary frictions and barriers. In this sense, the GBA can be viewed as a huge sandbox on ways to iron out cross-border business difficulties that will likely be much larger in scale and scope in the DSR.

ASEAN – a Larger Market and a Bigger Sandbox

Along the DSR, ASEAN countries are naturally the priority markets for Hong Kong and mainland China. Similar to the GBA, ASEAN can help facilitate Hong Kong's contribution to the DSR initiative. ASEAN is another huge market in which Hong Kong can expand its tech and fintech businesses, providing great opportunities not only to Hong Kong tech firms and start-ups, but also for Hong Kong to take technology from mainland China to ASEAN countries. Interviewees from ASEAN, such as the founder of Raffles Business Solutions in Singapore and the Managing Director of ADVANCE.AI in Indonesia, agreed that Hong Kong has such potential, but that more has to be done to strengthen regional co-operation.

ASEAN can also be viewed as a bigger sandbox. The GBA is still under a single political regime and essentially the same Chinese culture. ASEAN is much more complicated as it involves different political and legal regimes with very different cultures and numerous currencies. If Hong Kong can help iron out not only the physical and technical barriers but also the cultural and socio-political ones across ASEAN countries, it would be a significant step towards the success of the DSR as a whole.

Hong Kong's Positioning

Based on Hong Kong's strength, this study has identified the following areas in which the city has the potential to develop further as the digital gateway of the DSR for policy makers and companies to consider. Yet it should be noted that the history of Hong Kong's success is built on the agility and flexibility of its enterprises to spot business opportunities and quickly adapt to change, and not on specific instructions from the top. Hence, the identified areas should be viewed as general propositions.

1. As a Cloud Data Centre/Platform

A huge amount of data is generated each day worldwide with tremendous value if organised and structured well for use. Recent technology developed to protect confidentiality and data privacy uses homomorphic encryption developed by MIT scientists, which enables computations to be carried out in an encrypted environment. As such, analytics can be performed on encrypted data.

Hong Kong can consider building up a cloud data platform to encourage the sharing and use of data among DSR countries. Hong Kong will be in the best position to host a DSR cloud centre giving it full control of the data and information and upholding its integrity. The city can also get more involved with the Open Data Institute to come up with data standards. While a cloud centre involves huge investment, a government-backed (either government-owned or operated via a public-private partnership) centre for DSR is deemed to be important.

2. As a Digital International Financial Centre

Without dispute, Hong Kong is already an international financial centre. It can draw international capital to support its start-ups and innovative projects as well as capital

investment for digital infrastructure along the DSR. To move to another level of being a Digital International Financial Centre (DIFC), there are at least four aspects to work on. First, a DIFC should naturally be a fintech centre providing fintech-based financial services. Second, Hong Kong can be an offshore RMB settlement and clearance centre for DSR online and mobile payments. Third, a DIFC should have an exchange to trade digitised assets, which become a new class of asset generated in the digitisation process. This will also help move Hong Kong into a “token economy”. Lastly, being the digital gateway of the DSR, Hong Kong would have a unique opportunity to launch a cryptocurrency to support DSR transactions.

3. *As a DSR Arbitration Centre*

Given the credibility built on the common law and an independent judiciary, and being the digital gateway of the DSR, Hong Kong is in one of the best positions to become the DSR arbitration centre. Digital technology itself will transform the arbitration process. E-arbitration and online arbitration could become possible, for instance. Yet there are difficulties in implementing standards for online dispute resolution in different legal environments across DSR countries, and Hong Kong should move fast to define best practices and create a workable environment.

4. *As a Smart Entrepot*

Hong Kong has been an important entrepot with well-established logistics infrastructure and port facilities. Uplifting the handling power and efficiency of Hong Kong’s seaport and airport for cargo delivery through transforming our already world-class port into a smart port empowered by cutting-edge digital technology is the natural way to go. With the blockchain technology to empower supply chain financing and minimise the heavy documentation work in import-export trade, Hong Kong can digitally transform itself from a traditional entrepot to a full-blown smart entrepot.

Along these lines, Hong Kong should work on strengthening the hyper-connected network in the GBA and connections with other neighbouring markets to create a highly efficient logistics and supply chain – in particular, to support the growing expectations for on-demand delivery amid the rapid development of e-commerce markets in the region.

5. *Smart City, Smart Economy*

Smart city development per se is a key objective of every government to deal with various difficult urban problems. Hong Kong should develop into a smart city, as a showcase to ASEAN countries and others along the DSR.

To support its role as the DSR gateway, Hong Kong should develop towards a smart economy that needs four factors: market, capital, policy and talent. Being part of the GBA and with links to ASEAN and other DSR countries, Hong Kong has a large market in which to grow. With a business-friendly and efficient administration, the city has supportive policies and an environment conducive to its growth. Being an international, cross-cultural city with

world-class research universities, Hong Kong is able to groom, attract and retain talent and entrepreneurs, both domestically and globally.

A point to emphasise is that the talent required isn't just in the field of technology, but also people with entrepreneurial minds capable of identifying business opportunities and leading groups of tech specialists in applying digital technology to transform and grow their businesses. Hong Kong's small and medium-sized enterprises (SMEs) are well-known for their agility and flexibility in a changing environment. Their digital awareness and active involvement in digital technology could provide fundamental and important contributions to the digital transformation of Hong Kong towards a smart economy as well as to the digitalisation process of SMEs across the DSR countries.

LYNK, a global digital platform that connects people to experts for advice and insights, and Intria, which provides travel technology consulting and solutions, were interviewed for this study and provide good illustrations of how Hong Kong's home-grown companies can contribute to the DSR initiative.

Challenges Facing Hong Kong

Hong Kong's ride along with the DSR initiative faces various challenges and difficulties, including competition from other cities in the region, but its biggest hurdle is perhaps the macro environment.

The local macro environment essential to Hong Kong is the one country, two systems structure, and its importance to the success of the city in capitalising on the DSR opportunity cannot be overstated. The key is not how good Hong Kong believes it is in upholding the structure, but how its efforts are perceived by DSR countries and the rest of the world. Therefore, strengthening the credibility of the structure and the confidence in it is essential.

The global macro environment detrimental to the DSR initiative is deglobalisation, in particular the China-US tension. One view is that a decoupling of the two nations may lead to the possibility of two competing tech systems – those of China and the US. It would be highly detrimental for global development if the digital world were to split into two, no matter which system dominates. The DSR initiative should aim to help form an ecosystem in which a universal tech system can develop, and Hong Kong could contribute to this, and to the world, as the two tech systems could be complementary to each other.

As one of the interviewees Dr Winnie Tang, a smart city expert, pointed out, “co-opetition” helps healthy development. Through co-operative competition, competing parties can both gain. In fact, digital technology is developing fast, and so are the applications. No one has everything and focusing on mutual competition will only lead to protectionism, causing a shrinkage in the global digital economy. Genuine collaborations help grow the ecosystem in which everybody gains. The DSR initiative, after all, aims to “construct a community of common destiny with mankind”.

Conclusion

For the DSR to succeed, it needs both the technological infrastructure and the superstructure of mutual benefit among DSR countries. This gives Hong Kong a unique role to play as a super-connector and the digital gateway of the DSR, given its strong ties and credibility with mainland China and the DSR countries. Leveraging such a unique advantage, Hong Kong faces a once-in-a-lifetime opportunity to contribute to this era of global digital transformation. If Hong Kong gets it right, it could fundamentally transform itself and make a quantum leap towards a completely new level of economic growth as a “smart economy”.

I. Introduction

The Belt and Road Initiative (BRI) is a development strategy put forward by the Chinese government to promote cross-region connectivity and co-operation among different economies across Asia, Europe and Africa. Like a digital version of the BRI, the Digital Silk Road of the 21st century focuses on digital connectivity across the regions.

The Digital Silk Road aims to pursue development and co-operation in digital technology-driven areas such as, artificial intelligence, big data, cloud and quantum computing, and advance the development of smart cities and the digital economy in countries along the Belt and Road, especially the developing countries.

As one of the world-class smart cities in the region, Hong Kong is well-positioned to foster co-operation between mainland China and countries along the Belt and Road for the building of the Digital Silk Road.

In order to seize the opportunities from the Digital Silk Road Initiative, the Hong Kong Trade Development Council (HKTDC) has commissioned a consultancy study to the project team formed from three research centres, namely, University Research Facility in Big Data Analytics, The Smart City Lab and AMTD Fintech Centre of The Hong Kong Polytechnic University (the PolyU Project Team), with the following objectives:

- To identify the key potential areas for development of the Digital Silk Road, especially those in which Hong Kong possesses comparative strengths and advantages;
- To identify the opportunities and strengths for Hong Kong to serve as a hub for the Digital Silk Road in the key development areas and sectors identified;
- To examine Hong Kong's roles and functions for fostering co-operation between mainland China and countries along the Belt and Road, especially ASEAN countries;
- To identify success cases illustrating Hong Kong's advantages and strengths in different aspects for the Digital Silk Road development; and
- To propose how Hong Kong can further facilitate or participate in the building of the Digital Silk Road.

The PolyU Project Team – consisting of professors with expertise in international economics and finance, in big data analytics and machine learning, and in smart city and remote sensing – aims to provide a technically based, macro perspective on Hong Kong's strength and positioning in the Digital Silk Road Initiative. Yet it should be emphasised that Hong Kong's success is built on the agility and flexibility of its enterprises to spot business opportunities and quickly adapt to change, and not on specific instructions from the top. Hence, the identified areas should be viewed as general propositions.

The analysis in this study is mainly derived from field interviews with industry players, associations, government departments and other related contacts in Hong Kong, mainland China and elsewhere, supplemented by desk research based on published statistics, information and other relevant materials. Target interviewees are the senior management or key decision makers in different areas. The study also incorporates views from members of the Digital Silk Road Working Group under the HKTDC's Belt and Road Committee.

II. Understanding the Digital Silk Road

The Belt and Road Initiative (BRI) – originally known as One Belt, One Road – was first introduced by Chinese President Xi Jinping in a speech in Kazakhstan in 2013 and later promoted by Premier Li Keqiang during visits to Asia and Europe. “Belt” refers to the “Silk Road Economic Belt” that echoes back to China’s ancient Silk Road. The name derives from the silk trade route established during the Han dynasty (207 BC – 220 AD). “Road” refers, somewhat ironically, to the sea routes, or the “21st Century Maritime Silk Road”. The initiative involves US\$4 trillion-dollar investments in infrastructure development in Asia, Europe, the Middle East and Africa, reaching more than 4.4 billion people, representing 63% of the world’s population and 40% of global GDP. Over 150 countries and international organisations have joined the initiative.

In 2015, China’s National Development and Reform Commission, Ministry of Foreign Affairs, and Ministry of Commerce jointly released a white paper. It stated that China should jointly construct communications networks and cross-border optical cables to improve international communications and create an “Information Silk Road”. Today, this is referred to as the “Digital Silk Road” (DSR).

The digital economy along the DSR can be envisioned as having four major components: a cable network, 5G telecommunications, satellite navigation and communication systems, and digital technology. Key technologies that will build up the digital ecosystem include artificial intelligence, blockchain, big data, cloud computing and storage, quantum computing, and the internet of things.

1. Land and Sea Cable Infrastructure

Key infrastructure of the modern digital economy are undersea fibre-optic cables. There are 380 active undersea cables for global internet traffic passing through a thousand landing stations. Submarine cables carry more than 98% of international phone, data and internet traffic, and most are concentrated geographically and dominated by the western countries.

The 13th Five-Year Plan issued by China’s State Council in 2016 has a special section emphasising the plan to construct land and sea cable infrastructure, the creation of a China-ASEAN information harbour, and an “Internet Silk Road” between China and the Arab states.

Under such an objective, Huawei Marine has completed more than a dozen undersea cable projects in Southeast Asia, and close to 20 more are under construction, mainly in Indonesia and the Philippines. China Mobile International has submarine cable systems such as the Southeast Asia-Japan Cable and will expand investments in such systems in Singapore. The Pakistan-China Fibre-Optic Project construction was carried out in 2017 by laying fibre-optic cables across Pakistan, providing a safe route for voice traffic between the two countries and circumventing choke points such as the Straits of Malacca, which have heavy traffic. Once completed in 2020, 6,299 kilometres of underwater cables, crossing the sea from Gwadar Port in Pakistan, will link China’s Xinjiang with Khunjerab on the Pakistani-Chinese

border by land, and extend to Djibouti from Gwadar and form the Digital Silk Road between Asia and Africa.

As a matter of fact, Hong Kong is one of the important landing sites for many of the submarine cable systems in the region due to its strategic location. There are about 15 major submarine cable systems in the region, of which 12-13 have chosen Hong Kong as one of their landing sites. This establishes Hong Kong as a major telecommunications hub in the region.

2. Satellite Navigation and Communication Systems

Other than cross-border optical cable networks and transcontinental submarine optical cables, satellite mobile communications are needed to support places unable to be reached and covered by ground networks. Satellite communication has many advantages, such as wide coverage, large communication capacity, good transmission quality, convenient and rapid networking, and seamless global connections. It is considered to be an indispensable means for establishing global personal communication. Therefore, satellite networks and terrestrial links to provide satellite navigation support to all BRI countries are also required. Hence, the BeiDou Navigation System (BNS).

To put the BNS in perspective, there are essentially three sets of satellite systems for navigation and communication purposes, based on the altitudes of the satellites:

Abbreviation	Orbit Name	Altitude (km)
LEO	Low Earth Orbit	160 to 2,000
MEO	Medium Earth Orbit	2,000 to <35,786
GEO	Geostationary Equatorial orbit	35,786

MEO satellites are commonly used for positioning information, the Global Navigation Satellite Systems (GNSS). There are currently four GNSS, namely the American GPS, the Russian GLONASS, the European Galileo and the Chinese BNS.

The first BNS, BeiDou-1, consists of three satellites that since 2000 have offered limited coverage and navigation services. BeiDou-1 was decommissioned at the end of 2012. The second generation, known as COMPASS or BeiDou-2, became operational in China in December 2011. Since December 2012, it has offered services to customers in the Asia Pacific region. In 2015, China started the build-up of the third generation, BeiDou-3, for global coverage constellation. On June 25, 2019, the 46th satellite was successfully launched, outstripping GPS that runs on 31 satellites.

The first BeiDou base station of the DSR in the Pakistani coastal city of Karachi became operational in 2017. BNS is progressing rapidly and spreading across Southeast Asia, the Arab world and linking 30 BRI countries. BeiDou is planned to ultimately extend services to all 64 BRI countries. By 2020, China hopes to achieve global coverage with the positioning accuracy reaching 2.5 to 5 metres, and to be further improved to centimetres by adding ground base stations. With better accuracy, BNS may be able to replace the American GPS satellite network that has been dominant for decades.

At present, BNS has been widely used in transportation, agriculture, forestry, fisheries, electric power, meteorology, surveying and mapping, water conservancy, finance and other civil industries. Its high-precision positioning, accurate timing and short message transmission functions collide with the internet, big data, cloud computing and advanced “Smart+” to generate huge economic and social benefits. A complete BNS industrial chain has begun to take shape in China. The number of enterprises engaged in the development and application of BNS has reached 14,000, with nearly 450,000 employees. Its overall output value is about RMB211.8 billion, and estimated to expand to RMB400 billion by 2020.

On August 31, 2019, the Chinese and Russian governments signed a co-operation agreement using BeiDou and GLONASS Global Navigation Satellite System to carry out joint projects such as construction of measuring stations, cross-border transportation, and precision agriculture. It also establishes co-operation in the development of Russian-Chinese standards for the control and management of traffic flows across the Russian-Chinese border.

The application of GEO satellites in communication and television broadcasting is very mature but its shortcomings are ever more obvious. For example, it has low spectrum utilisation, limited capacity and long communication delay due to its extended distance from the earth.

Compared with the GEO satellite communication system, LEO has many advantages. For the user, the communication delay is shortened, the data transmission rate is improved, and the transmission power is almost the same as that of the ordinary land mobile communication terminal. It is also compatible with the terrestrial communication system, achieving seamless global access. Hence, other than BNS, two mobile communication satellite systems, the Hongyun Project and Hongyan Constellation, have been launched by the China Aerospace Science and Technology Group (CASTG) and the China Aerospace Science and Industry Group (CASIG), respectively.

The Hongyan Constellation will have more than 300 low-orbit small satellites. The project will be built in three phases, eventually forming a global low-orbit mobile internet satellite system. It can provide an information dissemination channel for BNS, improving BNS positioning accuracy.

The Hongyun Project of CASIG is a low-altitude broadband internet access system based on small satellites. It plans to launch 156 LEO small satellites operating at 1,000km and provide global users with a network service that is hailed as never disconnected, “star-chained” Wi-Fi internet access anytime, anywhere.

Other than BNS, China Aerospace Science and Technology Corporation (CASC) has launched Hongyun-1, which will be used to verify LEO broadband communication technology, and also carries AIS (automatic identification system), ADS-B (automatic dependent surveillance) and DCS (data collection system) payloads. CASC has also launched the 320-plus-satellite Hongyan low-earth-orbit communications constellation.

LEO satellites are much closer to earth and hence provide more precise communication signals, though with much narrower coverage.

3. 5G Telecommunications

5G is the fifth generation of cellular mobile communications, which provides high-speed mobile network equivalent to a fibre-optic internet connection accessed wirelessly. 5G definition is given by the International Telecommunication Union (ITU), the setter of technical standards for communication technologies at the United Nations. The ITU set 13 minimum requirements for 5G in 2017 and developed three usage scenarios for 5G.

The first is Enhanced Mobile Broadband (eMBB) for consumer use. It enables users to have access to faster and more reliable mobile broadband for more demanding usage such as augmented reality (AR), virtual reality (VR), and HD video.

The second scenario is Ultra Reliable and Low Latency Communications (URLLC), which provides real-time services. As such, it requires extremely low delay (latency). Its primary use is for critical tasks like remote surgery, autonomous driving and industry automation.

The final and the best scenario is Massive Machine-Type Communications (mMTC), which is for a very large number of connected devices typically transmitting relatively low volume but sensitive data with no delay.

Unlike LTE (long-term evolution), 5G operates on three different spectrum bands. The low band offers great coverage area and high penetration power but relatively slow data speeds. The mid-band spectrum provides faster coverage and lower latency, but its penetration power is not as good as low-band spectrum. High-band spectrum is often referred to as mmWave and can offer peak speeds up to 10 Gbps with very low latency. The major weaknesses are low coverage area and poor building penetration.

Low penetration power means an obstacle can block the signal. Hence, a combination of 5G with satellite navigation will become powerful transmission systems. One could imagine that BNS+5G will create the space-time infrastructure of the “smart era”, creating an intelligent transportation network, auto-driving, empowering different industries and promoting the development of the new economy. It will be the latest and most exciting highlight of navigation and communication integration with many usage scenarios. The internet of things (IoT) in 5G turns to internet of everything (IoE) with benefits in many areas such as smart home, smart port, smart city, smart farming, industrial IoT, fleet management, healthcare, surgery from afar, autonomous driving, drone operation, security and surveillance. Massive commercial usage of 5G will come soon.

Neil McRae, chief network architect of British Telecom Group (BT), has a vision for 6G communications. He believes that 5G will be a high-speed internet based on heterogeneous multi-layers. In the early phase, it will be “Basic 5G” (entering commercial use in about 2020). The intermediate phase will be “Cloud Computing + 5G”, and the later phase will be “Edge Computing + 5G”. 6G will be “5G + satellite network (communication, telemetry, navigation)”,

which is expected to be commercially available in 2025. Using ultra-fast broadband technology such as “wireless fibre” and integrating satellite networks on the basis of 5G, global coverage would be achieved to provide 6G users with network location identification, multimedia and internet access, weather information and other services.

4. Digital Technology and Applications

There are a few key digital technologies that build up our current digital ecosystem.

Artificial Intelligence (AI)

AI is essentially a computer system that performs tasks normally requiring human intelligence. Such tasks range from direct visual perception and speech recognition to higher levels of language translation and even making decisions. Two frequently mentioned technologies are related to AI. One is machine learning, which is a subset of AI, and the other is deep learning – a type of machine learning. Machine learning is a system that can modify itself when exposed to more data. It teaches computers to process and learn from data. It is therefore a dynamic system that can make changes without human intervention. As such, machine learning doesn't rely on human experts to take up new non-preset tasks.

A special type of machine learning is deep learning. Instead of teaching computers to learn from data, deep learning is the ability for computers to train themselves to process and learn from data. “Deep” refers to the number of layers in an artificial neural network (ANN). ANNs simulate human brains, getting computers acting like interconnected brain cells. As such, ANNs can learn and make decisions like humans. While a shallow network has only one hidden layer, a deep network has multiple hidden layers that allow ANNs to help with natural language processing, recommender systems, sound and image recognition, etc.

According to Gartner Research, global AI derived business value will reach nearly US\$3.9 trillion by 2022. For China, AI will create entirely new sectors of the economy with an estimated value of RMB150 billion by 2030, based on the Next Generation Artificial Intelligence Development Plan.

Blockchain

A blockchain is a decentralised, distributed record of transactions. Using cryptographic techniques, such transactions can be stored in a permanent and near inalterable manner. As transactions added to the blockchain are time-stamped and cannot be altered easily, blockchain technology allows transactions to be traced easily and hence has high transparency. Blockchain with smart contracts allows credible transactions without third parties as these transactions are trackable and irreversible. Smart contracts are computer protocols to digitally verify and enforce the performance of a contract.

Because of the use of cryptographic techniques and the distributed nature, blockchains are highly resilient to cyber-attacks compared with traditional databases. Hence, blockchain technology has useful benefits such as sharing information that is secure and providing data

transfer that is unalterable to ensure data integrity. This makes the technology an important tool in building trust among business and consumers.

There are public (no specific entity manages the platform) or permissionless blockchains (the blockchain is open to everyone like the Bitcoin platform) and private (the platform is controlled by a single entity) or permissioned blockchains (only those permitted can read and/or write on the blockchain). Something in between is the consortium blockchain (managed by a consortium of companies). Many applications in the field of international trade fall into the category of permissioned/consortium blockchains.

Blockchain technology can be applied to various areas such as insurance, trade finance, intellectual property (IP), transportation and logistics, customs and certification processes, distribution, and government procurement. According to estimates by Neimeth, the blockchain ledger could be worth up to 20% of the total big data market by 2030, producing up to US\$100 billion in annual revenue, more than PayPal, Visa and Mastercard combined.

(Big) Data Analytics

Big data refers to very large, diverse data sets from different sources and in different sizes. Data can be structured like text documents, semi-structured like emails and unstructured like images and voice recordings. Big data comes from different sources such as sensing devices, video and audio devices, the internet and social media, and is typically generated in real time and on a very large scale.

Big data analytics uses techniques such as data mining, statistics and natural language processing, text analytics, predictive analytics, and machine learning on such big data sets. Through such processes, data previously not usable or inaccessible becomes available to enable and facilitate users and researchers and to make better and faster decisions.

Big data is the fundamental element for all digital technology applications. Data crawling and data analytics enables businesses to make informed decisions and sensible forecasts. The overall data market is expected to reach US\$274 billion by 2022, according to IDC forecasts.

Cloud Storage and Computing

Globally, there are more than 2.5 billion GB of structured and unstructured data generated every day through emails, videos, audios, presentations, and photo images. Data storage in data centres has become increasingly necessary in today's business world. In fact, the industrial scale of demand is so large that it has led to the rise in mega-data centres, sometimes referred to as cloud data centres, which are fast becoming fundamental to our global technology infrastructure and serve as the backbone of our digital economy.

Naturally, investments in the data centre industry have grown tremendously and gain good returns. According to a 2017 report by Cushman & Wakefield, data centres typically have higher capitalisation rates (6.5%) than traditional asset classes such as Grade-A offices (3.3%), prime retail (4.7%), hospitality (4.5%) and high-end residential (3%), which could be

an attractive investment by itself. Over the past five years, the data centre industry has brought in more than US\$45 billion in investments. The cloud storage market is expected to reach US\$97 billion by 2022.

Along with cloud data centres is cloud computing, the on-demand delivery of different computing services. Other than database storage, a cloud services platform provides other services such as computing power, applications, and IT resources via the internet. Such services are provided under a pay-as-you-go basis and can be categorised into essentially three types, namely Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). For IaaS, a client gets only infrastructure. For PaaS, a client gets infrastructure and software for application development. For SaaS, a client gets a ready-to-use application in the cloud. There can be other type of services (generally called XaaS) such as Desktop as a Service (DaaS), Monitoring as a Service (MaaS), Storage as a Service (STaaS), Communications as a Service (CaaS) and Database as a Service (DBaaS).

Providing such services generates huge revenue for US trillion-dollar giants such as Amazon (AWS) and Microsoft (Azure). In fact, Microsoft recently reported that its Azure Cloud has become its major revenue-generating source for the first time, accounting for one-third of the company's total revenue. It is equally important for China's tech giants such as Alibaba (Alibaba Cloud) and Tencent (Tencent Cloud). Conceivably, the global cloud computing market is expected to grow to US\$623 billion by 2023 from US\$272 billion in 2018.

Quantum Computing

Traditional digital computers run based on the binary system. Quantum goes beyond binary by virtue of a qubit's ability to reside in more than one of two positions. As such, quantum computing has much faster speed, theoretically.

Developments in quantum computing will increase computing power tremendously, which is valuable. For instance, we use AI to extract the value from the enormous data sets 5G produces and sends to the cloud. Quantum computing can empower AI to look for correlations among the data sets. It can also speed up the machine learning process. The high computing power of quantum computers can produce an abundance of solutions to major problems related to nutrition, medical care, and the environment.

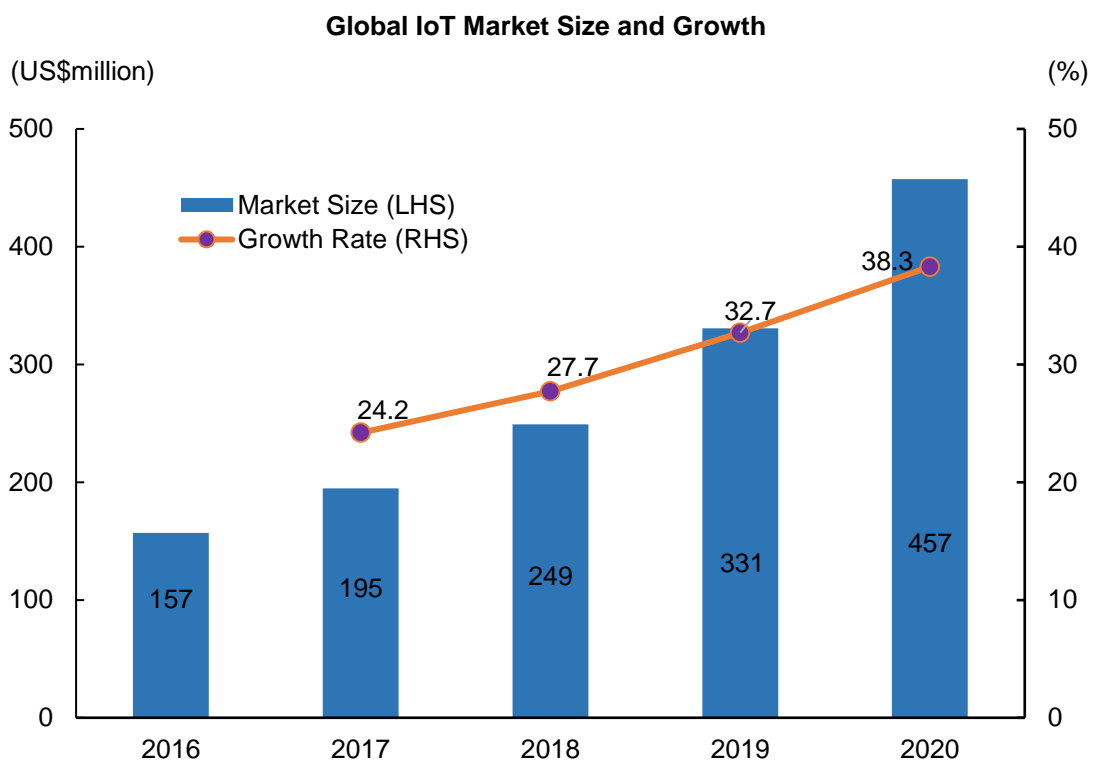
It will have important bearings on cybersecurity as well. The current asymmetric encryption methods could require thousands of years to decrypt using even the most powerful supercomputers today. Yet, theoretically, it could be done on a large-scale quantum computer in hours or days. In that case, it would create a challenge to cybersecurity.

According to Research and Markets, the global market for quantum computing services and hardware will exceed US\$6.4 billion by 2023, while quantum computing services delivered via 5G mobile networks will be a US\$417 million market by the same year. Although the market size is still not too significant due to quantum computing being only in its infant stage, its market potential could be enormous when the technology becomes increasingly mature.

Internet of Things

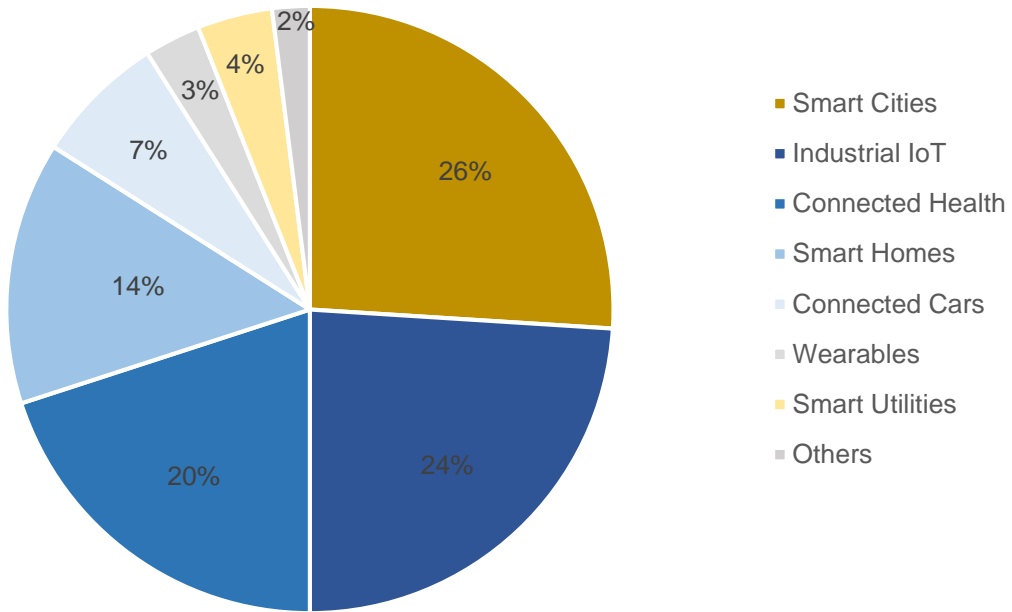
The internet of things (IoT) is the online connection between physical objects. Such internet connectivity is possible when objects are embedded with electronics and other forms of hardware such as sensors so that these devices can communicate and interact, and be remotely monitored and controlled over the internet.

Wearable technology extends IoT to mobile communication and has a variety of applications, such as smartwatches and activity trackers in consumer electronics. Other applications are in healthcare, advanced textiles, and even navigation systems. According to Research and Markets, the global IoT market will grow to US\$457 billion by 2020 from US\$157 billion in 2016.



Source: Louis Columbus, 2017

Global IoT Market Share by Sub-sector



Source: Louis Columbus, 2017

III. Building the Digital Economy and the Prerequisites to the Success of the Digital Silk Road

Economic activities are essentially about exchange (trade if it is cross-border) and production. To achieve economic growth is to increase exchange and production. Increase in exchange leads to increase in demand and hence production. Yet, exchange and trade involve frictions and barriers. By reducing the physical barriers through large-scale infrastructural construction of railways, bridges and freeways, international trade barriers will be reduced tremendously to achieve global economic growth. The BRI aims to achieve this.

Riding on the current megatrend of digital transformation, the DSR aims to digitize the BRI through building a digital economy and establishing a digital ecosystem for connection, inclusion, disintermediation and co-sharing along the BRI countries. Since the internet space is much more widely connected than the physical space with a lot less friction, the DSR helps reduce the physical trade barriers even further. More importantly, digital technology establishes a whole new digital economy that helps grow the global economy even more significantly.

China has been deeply involved in the DSR, which is crucial to its further and future development. In the past 30 years, China's economic growth model has relied on heavy utilisation of resources, capital and labour, which has become increasingly unsustainable with diminishing returns. More importantly, China needs to face the so-called "middle-income trap" problem, which has plagued close to 90 percent of middle-income countries since 1960. The World Bank currently defines middle-income countries as those with gross national income (GNI) per capita between about US\$1,000 and US\$12,500. China's GNI per capita in 2017 was US\$8,690.

To get through the middle-income trap, China wants to have high-value-added products with high profit margins. High technology with valuable innovations is the way to go. Since 2013, China has stirred up technological revolution, implementing the "internet-strong nation strategy", developing digitalisation and pushing for "internet-plus" initiatives. Other than the domestic market, China's digital technologies, digital products, and digital-empowered business models can also be exported to overseas markets. The DSR initiative could serve this purpose as well. By helping DSR countries develop and advance digital technologies, China would also benefit from generating a completely new stream of revenue. Such China-based technologies, products and models could eventually establish a China-tech based digital ecosystem along the DSR.

China has the required infrastructural build-up and possesses advanced and, in some areas, leading digital technologies that the rest of the world desperately needs – and at lower prices. Yet social, cultural, legal and commercial elements are also involved. Although China has grown at a tremendous pace in the past 30 to 40 years, its social environment, language barrier, legal structure, and corporate culture may not match well with those of the DSR countries. Frictions also exist as far as cross-border flows of capital, talent, technologies and information are concerned.

Another requirement for the success of the DSR is the establishment of laws, policies and trade agreements to guide data transfer across borders. It also involves data ownership, data privacy and IP protection, which are highly sensitive issues, creating another form of barriers.

In fact, such a trade barrier also exists in the BRI – that of “mutual trust”. Trust is an indispensable element in all economic transactions. Nobel Laureate economist Kenneth Arrow once said, “Virtually every commercial transaction has within itself an element of trust, certainly any transaction conducted over a period of time. It can be plausibly argued that much of the economic backwardness in the world can be explained by the lack of mutual confidence.”

This mutual confidence is particularly critical in the digital world, as digital technology is built on (big) data and data flow. More data improves utility that is usually a metric related to the performance, efficiency, costs and the quality of service. Yet it also puts personal identity, data privacy and IP protection at higher risk. Privacy-utility trade-off becomes a thorny issue. Hence, for the DSR to succeed, it requires not just the ICT (information and communication technology) infrastructure but also the superstructure of mutual trust, confidence and credibility.

All in all, although initiated by the Chinese government, the DSR is not only beneficial to China but also for the betterment of the whole world. Through establishing a digital ecosystem, the DSR is set to reduce trade barriers and frictions and increase efficiency, contributing tremendously to an inclusive growth of the global economy. Dr Lee George Lam, Chairman of Hong Kong Cyberport, said, “One estimate has it that by 2050, 80% of the world’s GDP will be in the Belt and Road region. I’d like to propose that 80% of that is actually due to the digital economy because the world is moving into digital. The Digital Silk Road is as important as the physical Silk Road and, in the future, it will be even more important.”

IV. Hong Kong's Unique Role and Advantages

To reduce such form of trade barriers, Hong Kong has its unique and indispensable role to play to contribute to the DSR connectivity and success. Hong Kong started its miracle as an entrepot. It has a long history of, and is good at, acting as a bridge between mainland China and the rest of the world. Hence, Hong Kong can play its super-connector role but, this time, on the digital superhighway of the DSR, channelling China's superb digital technologies to DSR countries. On the other hand, Hong Kong could also help DSR countries tap into the China market. As such, Hong Kong could become the digital gateway of the DSR.

Hong Kong is eminently qualified to play such a role – ranked the freest economy in the world with simple and low tax, free trade and free capital flow. The city is built on a long history of trade and commerce that nurtures dedicated and agile entrepreneurship. It is also an integral part of the Greater Bay Area (GBA), where tech giants and many other tech firms are located, and can gain easy access to manufacturing, supply facilities and a big market. Hong Kong is also located at the centre of Asia, with half the world's population within five hours flight time. Such traffic convenience facilitates Hong Kong for rapid international growth and expansion.

On the capital side, Hong Kong is an international financial centre that attracts foreign capital including angel funds, private equity and venture capital. The Stock Exchange of Hong Kong is the sixth-largest stock exchange in the world in terms of market capitalisation. Since 2015, Hong Kong and Shenzhen combined has also been ranked as the largest IPO market in the world in terms of the total amount of capital raised. Hence, capital support for start-ups and R&D innovations is abundant. Hong Kong is also an international city with an inclusive, open-minded and professional culture, attracting global talent to come and work.

Based on its benefit of having the one country, two systems structure, Hong Kong is also in a unique position to bridge mainland China and the DSR countries in the exchange of digital technology. It has an independent judiciary and follows the common-law system widely adopted in global business, with high-quality legal professionals and a very effective law-enforcement mechanism. These provide a highly credible platform to protect intellectual property, privacy and commercial contract rights.

Hong Kong-Mainland Partnership is a Win-Win

– Interview with Jiang Xin, General Manager of the Risk Management Department, Ping An Bank

Listed on the Shenzhen Stock Exchange, Ping An Bank is a Chinese commercial bank headquartered in Shenzhen. At the end of 2018, it had more than 34,000 employees, providing a wide range of financial services to customers through 80 branches and more than 1,000 business offices nationwide.

Ping An Bank is one of the earliest adopters of artificial intelligence among financial institutions in China. The bank applies AI technology to its credit-card, private-banking and retail operations as part of its “AI Banker” system, which is capable of automatically calculating and updating the credit limits of customers on a 24-7 basis and identifying high-net worth clients. Speaking with the PolyU Project Team, Jiang Xin, General Manager of the Risk Management Department, gave his views about Hong Kong’s roles in the Digital Silk Road Initiative.

“We have high expectations of Hong Kong’s role. Although China’s reform and opening up in the past three decades has expanded our understanding of the global economy, Hong Kong still maintains an edge over any mainland cities including Shenzhen. Being one of the world’s major financial centres, Hong Kong is well-connected with the international financial market with similar laws and practices. Amid the rise of China, Hong Kong can act as a platform connecting the mainland with the world.

“In recent years, China has made rapid advances in technological innovations and become a world leader in many areas. For instance, in terms of internet/mobile payment, China is not just ahead of Hong Kong but also New York and London. In this context, Hong Kong can act as an intermediary, to bring Chinese technologies and their applications to the international market. I think Hong Kong has not yet developed to its full potential.

“Under the Belt and Road Initiative, China needs a lot of information and data on overseas markets during the process of RMB internationalisation and enterprises’ international ventures. Hong Kong is well-positioned to collect and process this data for China.

“Hong Kong has earned a good reputation and recognition from the international community. Its degree of internationalisation is also high, with which no mainland cities like Shenzhen, Shanghai, Beijing and Tianjin can compare. Besides Hong Kong, perhaps Singapore (which seems to be working towards this goal) can also act as a bridge linking China with the world, but Hong Kong has a very unique advantage that Singapore cannot compete with, which is the proximity to the Pearl River Delta. Hong Kong is closely linked with the region, not just concerning the physical location but also in the economic, social and cultural aspects. The Guangdong-Hong Kong-Macao Greater Bay Area as a whole is very important to China given the region’s economic contribution, high concentration of talent and industry aggregation as such. China’s rise is taking place and it’s the time for Hong Kong’s second-time transformation amid the current wave of digital innovation in particular.

“Due to the Sino-US conflicts, many mainland companies are expanding their production base into Southeast Asian countries. However, the supply chain support in these countries is weak. In this regard, Hong Kong can serve as a services platform to support mainland enterprises’ offshore activities. It has highly efficient shipping, logistic and port services. Hong Kong can play an important role to facilitate the product link of these mainland companies between their mainland offices and the branch offices in Southeast Asia.

“On the finance side, Hong Kong as an offshore RMB centre can partner with mainland banks to provide a full range of possibly digitally empowered financial services to ‘going-out’ enterprises. RMB internationalisation is a long-term process and necessarily faces various kinds of challenges. If Hong Kong can facilitate a seamless connection between mainland banks with mainland enterprises in overseas markets, that is going to bring the city’s financial industry to the next level.

“We mainland banks have limited overseas experience. The best and most natural way is to partner with Hong Kong. It will be a win-win situation, particularly at this point of time when the global economy is full of challenges ahead amid the Sino-US conflicts.”

***Hong Kong: Bridging the Regulatory Gap for Chinese Tech Ventures
– Interview with Dr Zhong Jun of QuantumCTek***

A spinoff from the University of Science and Technology of China, QuantumCTek specialises in commercialised quantum information technology. Since its establishment in 2009, the company has grown into a leading global quantum communication equipment manufacturer and quantum security solution provider, serving the government and industries that require high levels of security in their telecommunications such as finance, energy and national defence.

The company is headquartered in Hefei in Anhui province, with wholly owned subsidiaries in Beijing, Shanghai, Guangzhou, Jinan, Urumqi and Suzhou. It currently does not have any operations outside mainland China, but the company has started to explore the possibilities of overseas expansion.

“We’re keen to export our technologies to countries along the Digital Silk Road, and we’ve already touched base with our contacts in Russia, Saudi Arabia, the United Arab Emirates and some other countries,” says Dr Zhong Jun, General Manager.

“During the process, we’ve come to realise some potential challenges we may face in overseas markets such as import and export control, intellectual property protection, regulatory issues and performing marketing and after-sale services. I believe Hong Kong may help iron out some of our concerns, particularly in terms of intellectual property protection.”

Although international expansion is not currently the key development focus of the company, Dr Zhong believes that when the time is right, Hong Kong will likely be the place of their first set-up outside mainland China, for two reasons: “First, most of our existing clients in China have operations in Hong Kong. We can then naturally market our products or extend our services to their subsidiaries in Hong Kong. That would be a good way to test out our capabilities in conducting marketing and after-sale services outside mainland China.

“Second, Hong Kong’s regulatory environment is close to the western world. By serving clients in Hong Kong, our people can have a better understanding of the compliance requirements in overseas markets. This is particularly essential in the banking and finance industry.”

Dr Zhong believes Hong Kong plays a unique and irreplaceable role in facilitating the “going-out” initiative of its fellow tech companies, saying: “As an international financial centre, Hong Kong offer us greater access to both local and foreign funds, at lower costs. Also, Hong Kong has a fair and open business environment with a large pool of professional service suppliers, which is supportive to the tech industry. The better intellectual property rights and asset protection is also conducive to the development of tech firms. As far as I know, many outstanding overseas talents choose Hong Kong as their place of residence.

“I realised that a number of universities in Hong Kong have really strong scientific research capabilities, and they are well connected with other overseas universities and research institutions. This is a treasure trove of knowledge for tech companies. If we can connect with

these international research resources in Hong Kong, we'll be able to come up with more innovations, further contributing to the Digital Silk Road's development.

One of the regional focuses of QuantumCTek is Guangdong, especially Guangzhou and Shenzhen. "The development plan for the Guangdong-Hong Kong-Macao Greater Bay Area is a shot in the arm. It explicitly urges an improvement of the level of network security assurance by actively promoting the use of advanced technologies in cities such as Hong Kong, Macao, Guangzhou and Shenzhen, and promoting the application of confidential communication technologies in government departments and financial institutions."

Hong Kong Advantage Recognised by Chinese VR Company

– Interview with Dr Li Wei, Founder and President of Shenzhen Inlife-Handnet

Established in 2007, Shenzhen Inlife-Handnet is a pioneer in China's 3D display industry, providing comprehensive smart solutions for education, urban development, healthcare and manufacturing, using the latest naked eye 3D, virtual reality (VR) and augmented reality (AR) technologies. It has been awarded more than 200 patents for its 3D display technologies.

The company has already set up subsidiaries in different parts of mainland China including Beijing, Shanghai, Nanjing, Guizhou and Guangdong. It is now fast expanding in overseas market, with sales agents in Taiwan, South Korea, Japan, Brazil, India, the United Kingdom, Italy and France, among others.

Founder and President Dr Li Wei is keen on using Hong Kong as a platform for his overseas expansion, saying: "We have close co-operation with the Hong Kong Productivity Council. Also, every year, we participate in the HKTDC Electronics Fair – both the Spring and Autumn Editions – either as an exhibitor or a visitor.

"Hong Kong excels in different professional services including finance, legal, accounting and exhibitions, which can help us commercialise our technologies and promote our products and services in the global market.

"As an international financial centre, Hong Kong's financing costs are low for business. I believe a key role of Hong Kong in the Digital Silk Road is to finance technology projects, not just those from mainland China but also from the rest of the world.

"Hong Kong has a sound legal system, providing good protection for intellectual property rights, which is important to technology ventures like us. Hong Kong may also serve as a technology trading platform to facilitate intellectual property transactions in the region.

"Talent is the most important driver of technology and innovation. As an international city, Hong Kong is an attractive living place for overseas talents while Shenzhen offers a lot of development potential for tech talents. In this regard, Hong Kong and Shenzhen should work together to attract both mainland Chinese and foreign tech companies, universities or research institutions to set up in this region.

"I'm also well aware that Hong Kong is very good in basic research. Hong Kong universities are at the forefront of some fields such as medicine, mathematics, chemistry, computer science, and electronic engineering. Combining with Shenzhen's capabilities in technology development, this region is going to evolve into a global technology hub."

Dr Li welcomes the Greater Bay Area master plan. He believes the latest government measure of granting subsidies to offset differences in the individual income tax burden between mainland China and other regions can help his company attract more talents from Hong Kong, Macao and Taiwan, which will contribute to greater success in the global markets.

The Hong Kong government has also come up with various supportive policies to create an environment conducive to tech development. For instance, it set up the Hong Kong Applied Science and Technology Research Institute (ASTRI) in 2000 to enhance Hong Kong's competitiveness in technology-based industries with special focuses on financial technologies, health technologies, intelligent manufacturing, smart city, and integrated circuits. Hong Kong Science and Technology Parks Corporation (HKSTP) was established with the mission to transform Hong Kong into the regional hub for innovation and technology development. Now, Hong Kong Science Park has attracted more than 600 technology companies and about 13,000 tech talents are stationed there.

Hong Kong Cyberport is another government organisation with 4,300 square metres of dedicated fintech space to particularly support financial innovation. Cyberport launched its designated incubation programme in 2016. In the 2018 Policy Address, the Hong Kong government targeted fintech as a key sector to invest in, so as to push Hong Kong's status as a financial centre. To provide financial support, the government launched a HK\$500 million (about US\$64 million) fund to develop financial services over the next five years. There is also a HK\$5 billion Innovation and Technology Fund (ITF) to encourage and assist Hong Kong companies to upgrade their technological level and introduce innovative ideas to their businesses.

The Hong Kong Monetary Authority (HKMA) has been implementing seven fintech initiatives, including the launch of the Faster Payment System and the issuance of eight virtual banking licences. The fintech team of InvestHK has organised signature events such as Fintech Week, the Fintech Finals 18 conference and a start-up competition to showcase Hong Kong's unique fintech advantages. It also launched the first fast-track programme during Fintech Week 2018 to encourage foreign fintech start-ups to come to Hong Kong. The Securities and Futures Commission (SFC) and the Office of the Commissioner of Insurance are regulatory bodies providing guidelines to facilitate the community's understanding of the operations.

The government's Technology Talent Scheme, Postdoctoral Hub Programme and Re-industrialisation and Technology Training Programme all add to the power of building up the tech talent pool in Hong Kong.

V. The Strategic Importance and Potential of the Greater Bay Area and ASEAN

The Greater Bay Area

Matthew Phillips, China and Hong Kong Financial Services leader for PwC, when reporting on its survey study, says, “Our survey participants believe that Hong Kong’s position as a global fintech hub will be seriously undermined if it fails to capture the fintech opportunity across the Greater Bay Area.” Furthermore, most of the respondents believe that Hong Kong’s ongoing competitiveness as a global fintech hub may depend on the scale of GBA access it can provide. Indeed, as reflected by some key facts to be stated later, the GBA is strategically important to the DSR initiative.

Importance

The GBA provides at least three key functions to Hong Kong and for the city to contribute to the DSR initiative. One is its *sheer market size*. For healthy development of technologies in general and fintech in particular, market demand is one key driver. It also provides all sorts of settings for different tech applications. Hong Kong, being part of the GBA, would benefit tremendously from it. Through playing well the role of super-connector, Hong Kong can also contribute to the DSR initiative through bringing their businesses into the GBA.

The other is its *advanced technologies*, mainly concentrated in Shenzhen and Guangzhou. Another key driver for tech and fintech development is tech talents. Again, Hong Kong companies including start-ups are able to tap into the GBA talent pool to advance their digital transformation and/or business development. On the other hand, Hong Kong could help “export” some world-leading technologies to the DSR countries.

The last but most important function of the GBA is to provide a large *sandbox for the DSR*. Unlike other bay areas, the GBA has two special administrative regions, Hong Kong and Macao, and nine inner cities of Guangdong. Hong Kong and Macao have their own currencies, legal and taxation systems, and unique identities. This complicates immigration, flow of capital, the execution of policies and business operations. Hence, to facilitate economic integration across the GBA, these differences need to be addressed. As such, the GBA can be considered as a huge setting for involved governing parties to jointly structure policies and measures to minimise such kinds of cross-boundary frictions and barriers. In this sense, the GBA can be viewed as a huge sandbox on ways to iron out cross-border business difficulties that will likely be of much larger in scale and scope in the DSR.

Challenge

A 2018 report by PwC based on in-depth interviews with senior executives from fintechs, financial institutions (Chinese and overseas) and other firms identified a couple of key issues. One major issue is regulatory alignment such as data governance rules, seamless financial identity verification and KYC (Know Your Customer) processes, and virtual banking and

insurance businesses across the GBA. The other issue is the mobility of tech talents in Shenzhen and global financial experts in Hong Kong and across the GBA.

WHub's 2019 white paper also pointed out that less than ideal medical and education facilities and tax incentives would deter talents and start-ups to work on the mainland. Cross-border payments are still challenging. Regulations on financial services do not provide smooth banking experiences for corporates and individuals. Protectionism is not facilitating cooperation.

Government Role

As mentioned, the GBA involves cities with different identities, legal and taxation systems, and currencies, leading to friction and challenges that can only be solved at the government level. In fact, a 2017 survey by KPMG and HKGCC indicates four crucial factors for the successful development of the GBA, namely government support, consistency of laws and regulations, infrastructural support and tax benefits (in order of importance). Most respondents in the PwC 2018 interviews also held the view that greater regulatory reciprocity or alignment will be needed to ensure that the 9+2 cities of the GBA can work together in an integrated and productive way.

Some Factual Analysis

As a policy initiative of China, the GBA aims to promote co-ordination and co-operation between the 11 cities of the Pearl River Delta. It has land area of about 56,000 square km (0.6% of China's total land area) and a population more than 70 million (5% of the country's total). Yet, with Hong Kong, Macao, Shenzhen and Guangzhou as core engines, the GBA has a total GDP of US\$1.56 trillion (12% of the China's GDP), indicating the region's economic efficiency.

A combination of strengths of various cities makes the GBA comparable to San Francisco Bay, New York Bay and Tokyo Bay. Hong Kong, like New York, acts as a financial and trade centre to provide professional services. Shenzhen has high-tech manufacturing and innovation, like Silicon Valley. Macao is another Las Vegas – a centre for tourism and entertainment. CBRE Research provides a useful comparison based on the 2016-17 data as follows:

Comparison of Largest Bay Areas in the World (2017)

	The Greater Bay Area	Tokyo Bay Area*	New York Bay Area*	San Francisco Bay Area*
Land Area (km ²)	56,000	36,500	21,500	17,900
Population (million)	69.6	44.0	20.2	7.7
GDP (US\$ trillion)	1.6	1.9	1.7	0.8
GDP Per Capita (US\$)	23,000	42,000	82,000	102,000
Cargo Throughput (TEU)	7,499	773	625	237
Airport Passengers (million)	200	120	130	80
Contribution to National GDP (%)	11.8%	37.6%	9%	4.2%
Tertiary Industry Output (%)	64.9%	82.3%	89.4%	82.8%
Major Industries	Manufacturing, technology and innovation, finance	Automobiles, petroleum, finance	Finance, real estate, medical and healthcare	Technology and innovation, professional services

Note: *2016 data

Source: Guangdong Bureau of Statistics, National Bureau of Statistics of China, Hong Kong Census and Statistics Department, The Statistics and Census Service (Macao), Japan Ministry of Internal Affairs and Communications, World Bank, Deloitte Research, Hong Kong Legislative Council, United States Census Bureau, World Intellectual Property Organization, CBRE Research

CBRE suggests the GBA will become the world's largest bay-area economy (the largest in terms of population and land area already). It has pointed out a few key advantages.

First, the GBA has Hong Kong and Shenzhen as the two world-class financial hubs with highly rated airports and seaports. Many Fortune 500 companies have their headquarters in Guangzhou, Shenzhen and Hong Kong. These three cities are also major business hubs. Second, the GBA is also an important logistics hub for e-commerce. The largest flows of goods in the region go through Hong Kong, Shenzhen and Guangzhou. With the launch of several major railways and roads to connect the eastern and western cities, logistic operations will become more efficient with cost less. Third, several cities in the GBA are developing cultural and sightseeing sites. Specifically, Hong Kong, Macao and Zhuhai will form an important tourism area with shopping complexes, integrated resorts, and MICE (meetings, incentives, conferences and exhibitions) facilities. These new initiatives will make important contributions to the development of the tourism and retail industries.

On top of these advantages, the Chinese government has issued an Outline Development Plan for the GBA to foster further co-operation in four areas. The first is on *Innovation and Technology*. The "Guangzhou-Shenzhen-Hong Kong-Macao" innovation and technology corridor will be developed as major carriers for innovation such as the Hong Kong-Shenzhen Innovation and Technology Park.

The second area is on *Infrastructural Connectivity*. Hong Kong and Macao, the east and west coasts of the Pearl River Estuary, will be connected with the mainland. Inter-city railways and highways, and a rapid inter-city transport network with high-speed rail will also be built. The Guangzhou-Shenzhen-Hong Kong Express Rail Link and the Hong Kong-Zhuhai-Macao Bridge have recently been built to make a "one-hour life circle" possible. Other than enabling the free movement of people, information capital, goods and services, such integration and connection

provides a huge setting for the development of a mega smart city that leads to growth in high value-added industries to attract more talent, capital and corporations to the region, generating a virtuous spiral.

The other two focused areas are *Financial Integration*, which aims to promote transactions of insurance products within the GBA to support insurance institutions of the mainland, Hong Kong and Macao to develop cross-border RMB reinsurance business; and *Social Betterment*, which aims to support investors of Hong Kong and Macao in setting up pension and other social services facilities through sole proprietorship, joint venture, and co-operation in the other nine cities of the GBA.

A 2018 survey conducted jointly by KPMG, HSBC and HKGCC on more than 700 executives within the GBA suggested businesses such as technology and innovation, trade and logistics, and financial services would benefit the most from GBA development. In fact, 70% of the companies in technology and innovation, and 66% of the financial services companies believe that their businesses will have at least 5% growth in the next three years.

There are opportunities in the tertiary industry, which accounts for just 60% of the GBA economy – significantly lower than the world's three largest bay areas in which the tertiary industry occupies 80% of the economy.

Digital technology can also empower the growth and development of different industrial sectors. For instance, companies can use big data and AI to predict consumer needs and create suitable products. 3D printing enables companies to produce tailor-made products. The hyper-connected network in the GBA and connections with other neighbouring markets create more efficient logistics and supply chain, facilitating product delivery after online purchase.

Hong Kong: A Platform for Guangdong Enterprises
– Interview with Dr Zhu Guoqing, Founder & President of TimesBigdata

TimesBigdata is a big data software and service provider in China. Headquartered in Beijing, the company has subsidiaries in Shanghai, Chengdu, Jinan, Hangzhou, Zhengzhou, Wuhan and Guangdong. With an annual turnover of more than RMB60 million and some 200 employees, the company has a number of big-name clients including Alibaba, China Telecom, China Mobile and some state-owned enterprises.

The company's core business is to provide integrated and streamlined solutions on data asset management, data exploration, data application, and AI assisted self-service marketing, so that quasi-real-time monitoring is possible and data analysis can be easily performed by its clients.

While the company is headquartered in Beijing, 80% of its clients actually come from Guangdong. Dr Zhu Guoqing, Founder and President, explains: "I think the level of openness in Guangdong is the highest in China. Companies in Guangdong are the most dynamic, even for state-owned enterprises. Guangdong's manufacturing and high-tech industries are absolutely leading in the country too. The region, being the front-runner in China's reform and opening up, has attracted talents from all over the country. That's why I focused my business in Guangdong. My thinking is that if my business can run well in Guangdong, then I'm likely to succeed in other parts of China."

Dr Zhu is setting up a company in Hong Kong as a platform to enter the international market. "I'm going to extend our business from Guangdong to Hong Kong. I think it's synergistic if we can combine our technical capabilities with Hong Kong's advantages, including Hong Kong people's international connections and language skills. I would say this is in general a good model for mainland companies 'going out'. At the same time, we're partnering with Alibaba, through its network, to provide data analysis services to mainland companies that are expanding overseas.

"Hong Kong indeed has a lot of advantages. It has long been a metropolitan city. Hong Kong people are well-educated with strong capabilities to communicate with foreigners. At the same time, Hong Kong people share a very similar cultural background with people in Guangdong. Most of them are also Cantonese, speaking the same dialect with many commonalities.

"For the past decades, Guangdong has learnt a lot from Hong Kong in terms of openness and service levels. For example, the public service in Guangdong is very efficient now like Hong Kong. However, I think Hong Kong needs more publicity in China, for example by holding more forums and media interviews so that mainland people would appreciate its roles and advantages. I think Hong Kong should step up its effort in promoting the Guangdong-Hong Kong-Macao Greater Bay Area and roll out policies that encourage young people to work or start business in Guangdong."

Comparing Hong Kong with Singapore, Dr Zhu said he prefers Hong Kong because Singapore is distant and outside of China. In many ways, Hong Kong is still more competitive.

ASEAN

Along the DSR, ASEAN countries are naturally the priority markets for Hong Kong and mainland China, partly due to close geographical proximity and partly because of cultural proximity. In fact, many Hong Kong companies possess a deep, lengthy and well-respected track record of investment and business operations in ASEAN countries. The Chinese government is investing heavily in this market as well.

Importance

Again, as to be reflected by some key facts listed later, ASEAN, similar to the GBA, adds value to Hong Kong in terms of how it may contribute to the DSR initiative. Firstly, ASEAN provides another huge market for Hong Kong to expand its tech and fintech businesses to. This provides great opportunities not just to Hong Kong tech firms and start-ups, but also opportunities for Hong Kong to bring technology from mainland China to them.

Another important value that ASEAN brings to Hong Kong in the DSR initiative is *providing an even bigger sandbox*. The GBA is still under a single political regime and essentially the same Chinese culture. ASEAN is much more complicated as it involves different political and legal regimes with various cultures and numerous currencies. If the GBA is a sandbox for cross-boundary business operations and co-operations under one country of several administrative regions, then ASEAN is a sandbox at a different level of complexity as it involves different countries, currencies and languages. If Hong Kong can help iron out not just the physical and technical barriers but also the cultural and socio-political barriers across ASEAN countries, then it would be a significant step towards the success of the DSR as a whole.

Challenge

Although ASEAN has emerging markets that provide opportunities to Hong Kong, Singapore has advanced quickly in digital technology and is very active in the region. Nicole Wakefield, of PwC's Management Consulting, says Singapore is doing all the right things with its infrastructure and ecosystem, and having built a position of trust within the region. Singapore is playing a critical role as a hub that attracts and develops top digital talent and businesses and takes a leadership role across ASEAN to support the region moving forward as a whole.

On the other hand, as to be discussed later, China is actively involved in ASEAN, which is a double-edged sword. Such active involvement implies China's significant control over vast amounts of ASEAN data, which could cause alarm. On one occasion, Singapore Minister for Foreign Affairs Vivian Balakrishnan emphasized that "we don't want to see a world where just the few oligarchs, or few systems, or few platforms, dominate".

Other than various cross-border frictions and barriers such as different rules and regulations, policies, tax treatments and even certain degrees of territorial protectionism, a very important socio-political barrier involved is mutual trust among different political regimes. If Hong Kong can really build up such trust, on top of reducing the technical trade barriers in the region, then it will have made a significant step towards the success of the DSR initiative.

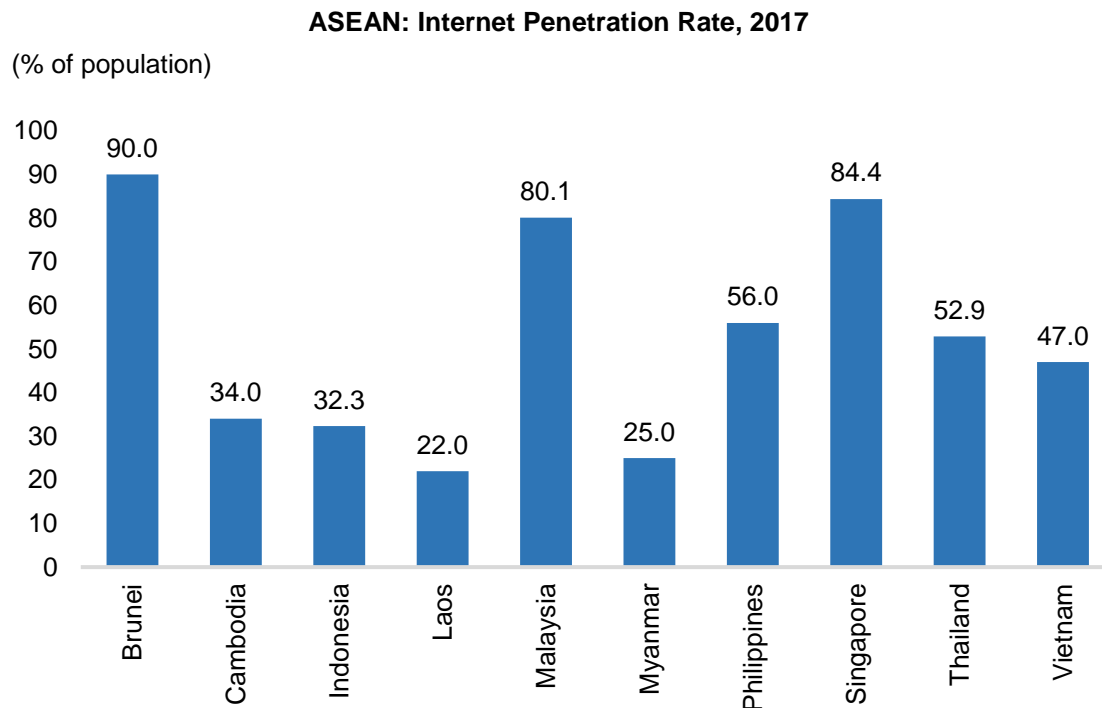
Some Factual Analysis

Favourable Socio-Economic Factors

ASEAN countries have young populations (70% under the age of 40). A high level of dynamism, multiculturalism and English-speaking facilitate international interactions. Its economies are growing fast. A lot of large corporates with back offices and development centres are based there.

High Internet Penetration and Growing Digitalisation Process

ASEAN countries incorporate some of the world's most digitalized societies with more than 90% of internet users gaining access via smartphones, with 935 million mobile connections in 2017. The region has the third-largest number of internet users in the world, after China and India, with an annual compound growth rate of 13% since 2015. The following graph plots internet penetration rates across various ASEAN countries in 2017.



Source: ASEAN Investment Report 2018, The ASEAN Secretariat and UNCTAD

Major drivers for digital growth in ASEAN countries are their active participation in ICT (information and communication technology) infrastructural development and digital involvement that offer tremendous business opportunities for ICT companies from around the world. The fintech industry is also growing fast in the region, though is still in its infancy. Local fintech firms are dominating but there is increasing interest from foreign fintech companies in ASEAN. They enter into the ASEAN fintech industry through either business alliances, partnerships, acquisitions or direct investment.

High Market Potential

ASEAN's internet economy is mainly in e-commerce, online travel, online media, and ride hailing. In fact, the opportunity for further growth is significant. For instance, e-commerce has had an average annual growth rate of 23% in the past five years, yet still accounts for less than 2% of total retail sales in the region. As a whole, the e-commerce market in ASEAN countries accounts for less than 1% of the global market, whereas China's is 32%.

A report by Google and Temasek projects this market to hit US\$176.89 billion by 2025. Technology start-ups, businesses and investors exhibit a lot of interest. In less than four years, the region has attracted US\$17.69 billion in funding, with more than half going to start-up unicorns such as ride-hailing firms GoJek and Grab, and e-commerce company Lazada, among others.

Proactive Governments

ASEAN governments are seen as supportive to the building of the digital economy. Their efforts include attracting investments for infrastructure, encouraging digital start-ups, facilitating the development of e-commerce and the digital transformation of industries. For example, Singapore is driving the Smart Nation initiative, Thailand uses QR codes for cashless payment and develops web-based apps, and the Philippines plans to adopt cloud services.

China's Active Engagement

China has engaged in many high-profile BRI initiatives such as rail and pipeline projects in Malaysia, Kyaukpyu port in Myanmar, and a high-speed railway in northern Laos, to name just a few.

China's involvement in the region's digital infrastructure is also very significant. Huawei and ZTE are laying fibre-optic cables in the region. Chinese ICT firms are developing 5G networks and cloud computing for Southeast Asian markets. Myanmar's Ministry of Transport and Communications is working with Huawei to launch 5G broadband services by 2025, leapfrogging a number of generations of mobile network. Similarly, Alibaba Cloud has opened a second data centre in Indonesia and Huawei has launched its first 5G testbed in Thailand.

Regarding start-ups and e-commerce, Alibaba operates the Singapore-based e-commerce firm Lazada Group, which counts the highest number of monthly active users in Vietnam, Thailand, the Philippines and Malaysia. Alipay launched first in Singapore, Malaysia, Thailand and Vietnam before moving into the e-payment market in Cambodia, Myanmar, Laos and the Philippines. Ant Financial operate in various ASEAN countries through its investments in M-Daq of Singapore, Mynt of the Philippines and Ascend Money of Thailand. Ant Financial also partners with Emtek of Indonesia and Fave of Singapore. It has acquired HelloPay of the Philippines and formed a joint venture with Touch 'n Go of Malaysia. Ant Financial has also invested in a number of start-ups in Indonesia, Malaysia and the Philippines. Tencent and Didi Chuxing have invested in the ride-hailing industry, including Grab and GoJek, the latter overtaking Uber as the leader

in Southeast Asia. Similarly, China's Huawei, Oppo and Vivo have jointly become the market leader in mobile manufacturers in the region, overtaking Samsung.

Chinese technology transfers effectively help Asian countries as emerging economies quickly grow in the digital economy. In fact, many Asian economies now rely more on China than on the United States. Asian Development Bank economist Jayant Menon said that China is ASEAN's largest trading partner, with an annual trade volume of US\$591 billion in 2018, a rise of some 14% from the previous year. Furthermore, ASEAN has been China's third-largest trading partner for eight consecutive years. More than 55 million people a year travel between China and the ASEAN region. ASEAN-China Centre Secretary-General Chen Dehai said, "Such close co-operation has boosted economic growth and benefitted the people of all 11 countries."

***Exploring Hong Kong's Edge and Opportunities in the ASEAN Region
– Interview with Bennett Chen, Director and Founder of Intria***

Bennett Chen is a Hong Kong-Australian. Having worked as a senior executive and IT professional for more than 20 years, Chen has gained good industry knowledge and developed strong business connections within the travel technology ecosystems in Hong Kong, Australia, mainland China and ASEAN.

In 2012, Chen founded Intria Limited in Hong Kong, applying cutting-edge technologies such as blockchain and data analytics to provide travel technology consulting and solutions for its clients including airports, airlines and travel agencies in the Asia Pacific region. Speaking with the PolyU Project Team, he discussed Hong Kong tech companies' edge and opportunities in the ASEAN region.

“There is strong market potential in ASEAN, particularly in developing countries such as Cambodia, Laos and Myanmar because the travel demand is buoyant and the market is less competitive there.

“Technology adoption in these countries is currently low but leapfrogging. In Myanmar, for example, we have witnessed the jump from fixed line directly to low-cost smartphones, bypassing the early stage analogue and digital mobiles.

“Looking ahead, I think businesses should keep an eye out for the opportunities brought by the next-generation wireless technology, 5G. My prediction is that it will first drive the adoption of consumer-level IoT devices in these countries. Since 5G allows more simultaneous connectivity, all household devices can be equipped to have online connectivity. Those kinds of IoT devices are more likely to become popular first. For example, the air-conditioner can send a message to notify the user that its filter requires cleaning.”

Chen also talked about the edge Hong Kong companies have. “International players have less presence in these developing countries. Also, Hong Kong companies are agile in customising solutions and catering to special needs. For instance, I’m offering monthly subscription plans or even free trial for some of my potential clients whose affordability is lower. We’re confident that they will realise the values of our solutions.”

Chen felt that building his business in developing countries was easier than in Hong Kong, saying: “In Hong Kong, the market is too competitive and many traditional industries are saturated. Companies tend to focus on cutting costs rather than creating value. But I’m glad that such a mentality is changing. People have started to become aware that the current wave of digital transformation is a disruptive force that is about company strategy, not IT solutions just concerning the IT department.”

Having said that, Chen believes Hong Kong is well-positioned to develop into a technology hub. “Any applications of technologies need to leverage on industry knowledge. Hong Kong people are experienced and professional in different industries, with good knowledge about international practices and the required international connections for that.

“Also, Hong Kong’s basic research is very strong and a unique strength in the Guangdong-Hong Kong-Macao Greater Bay Area. I believe the technologies developed by Hong Kong universities have good commercial values, but according to my personal experience, they are not easily accessed by the private sector.

Many say Hong Kong has too few technical people to support the industry. Chen considers this not to be a problem, at least to his company, saying: “It’s now the digital age. We don’t need people to be physically here. We contract out our jobs to people from different parts of the world including Brazil, Russia, Ukraine, Vietnam and the Philippines. To my surprise, Vietnam has very good IT people. I think Hong Kong should build a better connection with ASEAN countries in this regard. I believe governments in developing countries would welcome partnerships, which will help build their human capital.”

Asked what public support is needed for the industry development, Chen said he knows the government has different funding schemes that are helpful. Yet he is looking forward to some platforms that can help him better connect with other people in the industry and ideally, potential partners or customers.

Hong Kong: A Financing and Overseas Expansion Platform
– Interview with Han Wei, Chief Operating Officer, Phoenix Finance

Established in 2014, Phoenix Finance is a fintech company under Phoenix Satellite Television Group, providing peer-to-peer lending, funds, insurance, asset management and other financial services using the latest technologies such as blockchain and artificial intelligence.

With assets of about RMB10 billion, Phoenix Finance targets two major customer groups in China – the unbanked population and the well-off. The unbanked population has strong demand for banking and deposit services. Phoenix Finance applies data analytics to perform risk management on this group of customers. For the well-off group, the company keeps looking for global investment opportunities to cater to the increasing needs of asset management.

The company has been in a number of Southeast Asian markets, notably Indonesia, for about two years, largely running consumer finance-related businesses. “We see Southeast Asian markets as priority markets due to their large young populations with strong consumption demand, while the provisions of financial services to this group of people is lacking in these countries,” said Han Wei, Chief Operating Officer.

“While there’s huge market potential, the major challenge is that each of these Southeast Asian countries can be very different, from their consumer behaviour to regulatory environments. Hong Kong could be able to play some roles here. On the one hand, Hong Kong is an international city with rich business experience and high professionalism. On the other hand, Hong Kong is geographically close to Southeast Asian countries and hence has better understanding of their social and business cultures. Hong Kong could help mainland Chinese companies get into these markets more smoothly and effectively.

“Hong Kong is a very important financing and overseas expansion platform to us. It has a sound legal system and good protection of intellectual property rights. Compared with mainland China, Hong Kong has much stronger fundraising capabilities and lower cost of capital. Mainland China has very strict foreign-exchange control and there will be many cost and regulatory issues if we raise funds locally for overseas use.

“I know some mainland companies are using Singapore as a gateway to Southeast Asia, but Hong Kong is preferable from my point of view. It’s closer to mainland China and easier for us to raise funds.

“Now, I think China has a good supply of talent, including those with overseas experience. In this aspect, Hong Kong does not have too much advantage over mainland China in terms of home-grown talent and hence should put more effort into attracting talent from other countries. Along these lines, Hong Kong should work on improving living conditions to attract overseas talent as the cost of living, especially the housing cost, is very high.”

Han believes Hong Kong, given its small population and area, should develop high-tech industries riding on its advantage in basic research. “In fact, the scientific research capabilities

of Hong Kong universities are very strong. We're very eager to have closer co-operation with them."

How the ASEAN Business Community Perceives the Digital Silk Road Initiative – Interview with Hui Yew Ping, Founder and Director of Raffles Business Solutions

Established in 2015, Raffles Business Solutions provides consultancy services to foreign corporations and investors looking to set up businesses or that have private wealth-related needs in Singapore. It also advises businesses on their expansion strategy into Southeast Asia.

Hui Yew Ping had 30 years' experience working for top global and regional banking groups based in Singapore before he founded this company. Recently, Hui has been working on some projects with private enterprises from Hong Kong and mainland China, looking to use Singapore as a hub to expand their digital related products and services in the ASEAN region. Hui gave his expert opinion on what Chinese companies should consider when tapping into ASEAN markets.

Firstly on how the business community in ASEAN perceives the Digital Silk Road Initiative, Hui said: "Many will not be able to discern the commercial consideration of the DSR from any suspicion of political intention. Only strong and independent countries and businesses are prepared to stand objective to risk-manage this 'upheaval'. With this backdrop, the way the DSR is to be rolled out will have to be calibrated sensitively. This could be done – first by winning the user's heart with a compelling proposition with a digital platform that could be of benefit to most or all ASEAN nations.

"Many of my clients from mainland China know that ASEAN is a large and important market, but few understand ASEAN markets and business practices. Under the auspice of the DSR, foreign companies are advised to partner with the local industry to create a collaborative business model for a win-win in this new digital economy. The right business model, joint-venture structure and commercial consideration must be carefully crafted for long-term sustainability.

"On the other hand, local companies should carefully explore their roles. Instead of running a competing or similar business model/basic product offering, they may consider a product breadth extension and integration to other business streams that the foreign partner may be unable to enter into (for instance, due to legal structures or regulatory restrictions).

On Hong Kong's advantages to facilitate the DSR initiative, Hui said: "Hong Kong remains an important centre for global fundraising. So digital projects get their fair share of exposure in Hong Kong. This is a big advantage for Hong Kong.

"Hong Kong has good legal and financial infrastructure and has a good history of providing professional services in banking, legal, accounting, etc. If Hong Kong plays to its long-term strengths (financial centre, international professional services, real estate infrastructure) and adopts a magnanimous approach of complementing these with ASEAN nations to help build this DSR strategy, I believe there would be greater chance of success.

"However, my limited perception is that Hong Kong isn't on top in the areas of technological innovation. Few brands in IT, e-commerce or social network platforms are associated with Hong Kong.

“Now, Hong Kong’s role as a digital hub is not clear to the business community in ASEAN. Hong Kong will need to demonstrate how it has successfully dovetailed (or is in process of) its policy direction with the DSR.

“The theme of the DSR should be to develop a pan-Asian platform to create value for all, instead of a model of competing and maximising profit for the Chinese entities. A similar example is the development of the banking payment gateway of SWIFT in the past. Although owned by many banks and government agencies, SWIFT is so useful that everyone accepts it as the ‘must-go-to’ platform for international payment.

“A DSR-based economic bloc/alliance could be created – say to be led and chaired by Hong Kong. This could receive better reception from the respective governments as it could be seen as an economic co-operation using a digital platform.”

***How Hong Kong can Contribute to the Digital Silk Road
– Interview with Cheng Tao, Managing Director for Indonesia, ADVANCE.AI***

ADVANCE.AI is a data-centric fintech company, founded by a group of tech talents who are graduates from top universities with strong industry experience. Headquartered in Singapore, the company has been in operation for about four years and reached series C funding with a valuation of about US\$100 million. ADVANCE.AI is backed by top-tier venture capital from China and Silicon Valley.

The company's current markets include Indonesia, the Philippines, Vietnam and India, with two main lines of business: P2P lending and providing anti-fraud and EKYC (Electronic Know Your Customer) solutions to financial institutions by adopting the latest technology such as facial recognition and artificial intelligence. Cheng Tao, Managing Director for the company's business in Indonesia, gave his view on the Digital Silk Road Initiative.

"Now, China has eminent advantages in technology. With the DSR initiative, China can help speed up Southeast Asian countries' digital development so everyone can be better off. This is certainly beneficial to the expansion of China's national strength, too.

"There are difficulties and challenges of doing business in Indonesia, such as the red tape when we applied for a P2P licence. But overall, the business environment for start-ups in Southeast Asia is good. There is great business potential for tech companies from mainland China, Hong Kong and other places."

As to how Hong Kong should develop so as to contribute to the DSR, Cheng said: "Hong Kong cannot develop in isolation. Hong Kong must make full use of the opportunities brought by the Greater Bay Area master plan. It should integrate well with Shenzhen and other Guangdong cities, which already have a large number of scientific and technological talents and start-ups. On the other hand, Hong Kong is a very preferred place to live and work for international talents, which is quite an advantage over any mainland city. Therefore, Hong Kong can play an important role for talent exchange.

"However, it may be worth noting that Hong Kong should have its own home-grown tech companies to keep up the economy's productivity. Now, it seems to rely too much on finance and real estate."

Cheng believes Hong Kong may also contribute to the DSR from a technical perspective. "Hong Kong should make use of its special status to introduce and apply technologies not just from China but also from the US and other places. Also, the level of scientific research in Hong Kong is high. Hong Kong researchers may strive for breakthroughs especially in areas in which China is facing restrictions from the US, such as chips, software, basic research, new materials, etc."

Chinese Environmental Protection Solutions Provider in Search for Partnership with Hong Kong
– Interview with Dr Feng Wanli, Vice President of Suzhou Vortex

Established in 2005, Suzhou Vortex provides environmental protection and monitoring solutions through the application of the latest technologies including the internet of things, big data, artificial intelligence, and so on. One of the applications is the use of satellite remote sensing technology to monitor environmental conditions such as groundwater distribution and sewage treatment's impact for urban management.

Suzhou Vortex has more than 400 employees, of which some 250 are research and development personnel. In 2018, the company started the preparation for an initial public offering. Speaking with the PolyU Project Team, Dr Feng Wanli, Vice President, discussed how Hong Kong can pave the way for the company's entry into Southeast Asian markets.

"Our major clients are governments' environmental protection departments. Our business currently focuses on Jiangsu and Zhejiang provinces as the local governments there attach a lot of importance to the environment. Yet we would like to expand our clientele to include businesses and individuals as well.

"Some of our potential clients would be creditors of farmers, who would like to monitor how the agricultural funds are used. Using satellite, ground sensors, high-definition cameras, unmanned aerial vehicles and other tools, we can give an assessment of the real farmland situation.

"Also, we're interested in exporting our services to Southeast Asian countries, as we expect that the demand for environmental protection will increase with the expansion of manufacturing facilities and industry development there. When more enterprises relocate to Southeast Asian countries from China, we think they would, at the same time, bring more environmental challenges to these countries.

"Indeed, satellite technology is the most useful on target areas that are ocean or large-scale land with scattered populations. Thus there should be many scenarios in which we can apply this technology in countries like Indonesia and the Philippines.

"We anticipate a number of challenges in these countries, however. First, we're not sure about the government structures in these countries, insofar as who are the decision makers for procuring environmental solutions. It's hard to reach out the right people. Second, they may be quite sceptical, as we would be able to collect and process a lot of their countries' data.

"I think Hong Kong can serve as a bridge to make the connection for us. The Hong Kong government may communicate with the relevant departments in Southeast Asian countries to consolidate a list of their projects. If these projects are handled by our office in Hong Kong, their acceptance should be much higher. We may also ride on other strengths of Hong Kong, including its capabilities in information technology."

Suzhou Vortex is in long-term co-operation with learning institutes such as Tsinghua University, Zhejiang University and Tongji University. The company has more than 100 patented technologies and is the editor of several intelligent environmental sanitation and waste classification industry standards. It has also provided environmental information services to more than 200 cities and over 20 environmental enterprises and provided full-cycle garbage sorting operation services for more than 20 customers.

VI. Hong Kong's Positioning

Based on Hong Kong's strengths, this study has identified the following areas in which the city has the potential to develop further as the digital gateway of the DSR for policy makers and companies to consider.

Hong Kong as a DSR Cloud Data Centre/Platform

Importance

Data centres are increasingly becoming a necessity in today's business world and serve as the backbone of systems, as more than 2.5 billion GB of data is generated each day worldwide with such stock of digital data doubling every two years. Exponential use of social media, electronic payments, big data, cloud-based services, and rising mobile usage will only fuel the increase.

In terms of size, data centres can run from relatively small in-house spaces to larger-scale co-locations to huge public cloud centres. Cloud data centres provide the following services, Infrastructure as a Service (IaaS), Database as a service (DBaaS), Storage as a Service (STaaS), Platform as a Services (PaaS), and Software as a Services (SaaS), leading to annual returns running from 10% to 20%, according to CBRE's 2018 survey. The world's 10 biggest enterprise-cloud vendors had total revenue of almost US\$120 billion in 2018.

Top Cloud Vendors by Revenue

Rank	Vendor	2018 Cloud Revenue (US\$ billion)
1	Microsoft	32.2
2	AWS	25.7
3	IBM	19.2
4	Salesforce	13.0
5	Accenture	9.0
6	SAP	5.6
7	Oracle	5.3 (estimate)
8	Google Cloud	3.4 (estimate)
9	Workday	2.8
10	ServiceNow	2.6

Source: @bobevansIT

Big data platforms, other than having big data storage and databases, also provide big data management, business intelligence and support custom development. A major benefit behind a big data platform is to give one cohesive solution. For instance, users can analyse data stored on Microsoft's Azure Cloud platform using different open-source Apache technologies, and Google Cloud offers lots of big data management tools.

Opportunity

According to Cushman & Wakefield, Asia Pacific's data centre market is increasing significantly and will even surpass the European market by 2021. In 2016, the Asia Pacific region achieved 0.31 billion GB in monthly mobile data consumption and this is expected to reach 22.8 billion

GB per month in 2021. Conceivably, if Hong Kong becomes the DSR gateway, the amount of digital data involved will be voluminous. Hence, Hong Kong can enjoy the sheer data volume generated from the DSR that has tremendous value. For instance, data generated from DSR businesses can become a valuable commodity for trading, as such data is relevant and important to involved parties. This is so-called Data as a platform (DaaP) through which applications and services around such core data can be developed to build new DSR product and service ecosystems.

Advantage

Hong Kong is suitable to be a data centre site. A typical risk factor mentioned on site selection consideration is natural disasters such as earthquakes, floods, hurricanes and tornadoes. The fact is that Hong Kong rarely experiences disastrous weather events causing huge damage. Ten other key criteria for data centre site selection were pointed out by Larry Gigerich, Managing Director of Ginovus, as stated below. Again, Hong Kong meets all of them except labour and real estate costs.

- i. Labour costs and availability
- ii. Highway accessibility and quality
- iii. Proximity to major markets and customers
- iv. Availability and cost of real estate options
- v. Amount of local and state economic development incentives
- vi. Availability of telecommunications infrastructure
- vii. Cost of utilities
- viii. Tax and regulatory climate
- ix. Proximity to suppliers
- x. Access to major airport

In fact, to develop Hong Kong as a hub for trade and technological co-operation, the Hong Kong government advocates that the city is the prime location for data centres in the Asia Pacific region. However, a government-backed (either government-owned or operated in public-private partnership format) cloud data centre for the DSR is important.

Justification of Government-Backed Cloud Data Centre

1. Establishment of Credible Data Integrity and Protection

Having a data centre to store and provide XaaS including DPaaS (Data Protection as a Service) would provide huge business potential and opportunities. The Open Data Institute (ODI) sees data as an emerging form of vital infrastructure, and views China's DSR as a major shift in affecting global data infrastructure. The EU recently introduced General Data Protection Regulation (GDPR). Hong Kong has been involved in a project with ODI to build stronger trade links for data-enabled businesses between countries. Hong Kong can become more involved in working with the ODI to come up with standards for data.

A recent technology to protect confidentiality and data privacy is the use of homomorphic encryption developed by MIT scientists, and enables computations to be made in an encrypted environment. As such, data analytics can be performed on the encrypted data without decrypting it first and hence will enable companies to confidently share data. With such added technology, the DSR data centre gains further confidence from the business users along the DSR. If the Hong Kong government could bring in international experts, the data centre would further enhance its credibility and trustworthiness. Hong Kong would be in the best position to host the DSR cloud centre so as to have full control of the data and information, and upholding its integrity. Furthermore, a data centre backed by the Hong Kong government (with a consultancy group consisting of international scholars and experts) would increase the confidence from the business world along the DSR on data integrity, privacy and protection.

2. Costly Investment (but good capital returns in the long run)

Data centre investment can significantly vary. For a small, multi-tenanted facility, it costs about US\$100 million. Yet, for a huge cloud campus housing several buildings, it could be about US\$1.5 billion. The power consumption can be enormous with every watt to run a server matched by another watt to cool the system. Google has reported using enough energy to power 200,000 homes, and its data centres around the world are reported to draw a combined 260 million watts of power. According to Amazon, an eight-megawatt data centre could have more than 46,000 servers at a cost of US\$11 million per megawatt and a power cost of about seven cents per kilowatt-hour. Daimler moved its big data platform to Microsoft's Azure Cloud early this year. In fact, Gartner predicts that by 2025, 80% of enterprises will shut down their traditional data centres.

3. Handling "Cloud Garbage"

Additional data centre costs involve processing "cloud garbage", referring to the various old IT infrastructures that have been phased out due to equipment upgrades in data centres. A medium-sized data centre can hold about 30,000 units of equipment with a service life of five years or even shorter as data centre technology is developing rapidly. The obsolete equipment becomes electronic waste. Alistair Field, the Group CEO and Managing Director of Sims, a leading metals and electronics recycling company, predicts that from 2025, about two million tons of waste equipment will be dismantled and recycled every year. It could become a US\$300 billion market. Yet recycling this kind of garbage is not easy because it involves many hard disks with users' personal data. How to ensure data safety in every step of the recycling process is a tough issue. Improper handling is very likely to cause data leakage. For instance, some companies require recyclers to disassemble servers on site and tape-record of the entire process. Again, the Hong Kong government would be in a good position to take this up.

4. Establishing a DSR-Specific Cloud Centre

Unlike a general-purpose cloud centre, this would be DSR-specific. Major cloud centres such as those of Microsoft, Amazon, IBM, Alibaba and Tencent are for "general purpose", but the proposed DSR cloud centre is DSR-specific. Data so generated and used would be specific for the use, support and development of the DSR initiative. This is particularly important and

meaningful in propagating co-operation and collaboration in the DSR as data sharing can generate significant synergetic effect. A centralised data centre to house all relevant data in a standard format can ensure the integrity of the data being used. With a transparent data source, trust among companies can be enhanced, leading to more efficient collaborations to generate value more easily among business partners. From this angle, setting up of a cloud centre to store business-related data of the DSR can encourage and facilitate more business co-operation and collaboration along the DSR.

Challenge

1. Challenge from Singapore

Data centre operations face significant risks such as energy security, natural disasters and even political instability. Cashman & Wakefield conducted a survey in 2015 to come up with a Data Centre Risk Index for 37 countries. It is designed to assist companies in making strategic investment and operational decisions about where to locate their data. The results indicate that Singapore ranks higher than Hong Kong and is the seventh in the world and first in the Asia Pacific region. Hong Kong is a reasonable 11th in the world and third in the Asia Pacific. With the Hong Kong government's backup, the centre risk profile would be able to improve significantly.

Singapore tycoon Oei Hong Leong, Chairman of Chip Lian Investments, has already invested S\$6.7 billion in 2017 to set up a data centre company that will position Singapore as an IT and investment hub. According to the company, Oei expects the data storage business in Singapore to benefit from China's BRI. Hong Kong, however, should be in a better position than Singapore to leverage the BRI, especially with support from the Chinese government.

2. Sensitive Government Data

Government data is particularly valuable but also rather sensitive. It may be impractical to expect that governments along the DSR would put their data into a central data centre (located in Hong Kong or not). The Hong Kong government may want to take the lead to work with other governments, starting with the city governments in the GBA, to set up a data platform using consortium blockchain technology. Such an arrangement would ensure data integrity and confidentiality. Its success could be extended to ASEAN countries in a co-operative manner.

Hong Kong: Bridgehead for Mainland Tech Enterprises

– Interview with Gao Feng, Director of the Commercialisation of Research Findings Office, Shenzhen Institutes of Advanced Technology

The Shenzhen Institutes of Advanced Technology (SIAT) of the Chinese Academy of Science (CAS) was jointly established by CAS, the Shenzhen municipal government and the Chinese University of Hong Kong in 2006, comprising nine institutes and other labs and facilities. SIAT's aims are to enhance the innovative capacity of the equipment-manufacturing and service industries in the Guangdong-Hong Kong region, promote the development of emerging industries possessing their own proprietary intellectual property, and become a world-class industrial research institute.

To meet the nation's needs in healthcare and manufacturing, SIAT focuses on emerging industries such as low-cost healthcare, service robots, electric vehicles, cloud computing, digital cities, nano-medicine, new energy and new materials. SIAT has also established partnerships with more than 100 firms including Huawei and Tencent. In total, it has incubated more than 700 high-technology companies.

SIAT has also established long-term co-operative ties with many foreign academic and research institutions, including Stanford University (US), Massachusetts Institute of Technology (US), NICTA (Australia), TRILabs (Canada), the University of Hamburg (Germany), the University of Southampton (UK), and many others.

Speaking with the PolyU Project Team, Gao Feng, Director of the Commercialisation of Research Findings Office, Shenzhen Institutes of Advanced Technology, discussed Hong Kong's roles in helping Chinese technologies connect with the rest of the world.

"Hong Kong possesses a number of advantages that support its role to connect Chinese technologies with the rest of the world. The fact is that some countries are sceptical on Chinese tech firms expanding overseas. Yet Hong Kong, in foreigners' eyes, is a place for business. They are in general not defensive about Hong Kong.

"Hong Kong has a large pool of talents who can understand and communicate with foreigners very well. Also, it is an international city in which foreign talents can easily adjust.

"Besides, Hong Kong has a high degree of international recognition. For example, research reports published by Hong Kong are known to be credible and well-accepted by the international community. In fact, many mainland companies also come to Hong Kong to collect information on foreign markets, to help them assess the market opportunities, risks and timing to go overseas, etc."

In view of Hong Kong's advantages, Gao believes the city can be positioned as a data centre, saying: "Chinese tech giants like Alibaba, Huawei, China Mobile and Tencent have their servers placed in Guizhou province because the local government has developed a big data experimental zone with favourable policy support. As far as I know, these tech giants are interested to place their servers in Hong Kong too.

“Now, data is a valuable asset for companies. I would suggest that the Hong Kong government provides legal protection for these digitised assets – something similar to the Swiss banking laws that ensure no information will be divulged even at the request of a foreign government – so as to make Hong Kong an appealing location for the servers of such internet giants as Facebook or Tencent. As to how to attract them, I suggest going step by step and starting with a district data centre. Basically, high value-added technology service industries, such as data collecting or data processing, are eminently suited to Hong Kong and can be developed in association with a number of the complementary industries already operating out of the city.”

Hong Kong as a Digital International Financial Centre

Importance

Without dispute, Hong Kong is already an international financial centre. Yet fintech fundamentally changes the way the financial industry operates and transforms the way people manage their money. It is so fundamental that some people say fintech disrupts the industry. Hence, being an established financial centre may not naturally make Hong Kong a Digital International Financial Centre (DIFC) unless the city knows what, where and how it can improve.

To start with, Hong Kong needs to know where it is right now. According to a Global Financial Centres Index (GFCI) 2019 March report, Hong Kong maintained its place as the third most attractive financial centre globally and best in Asia.

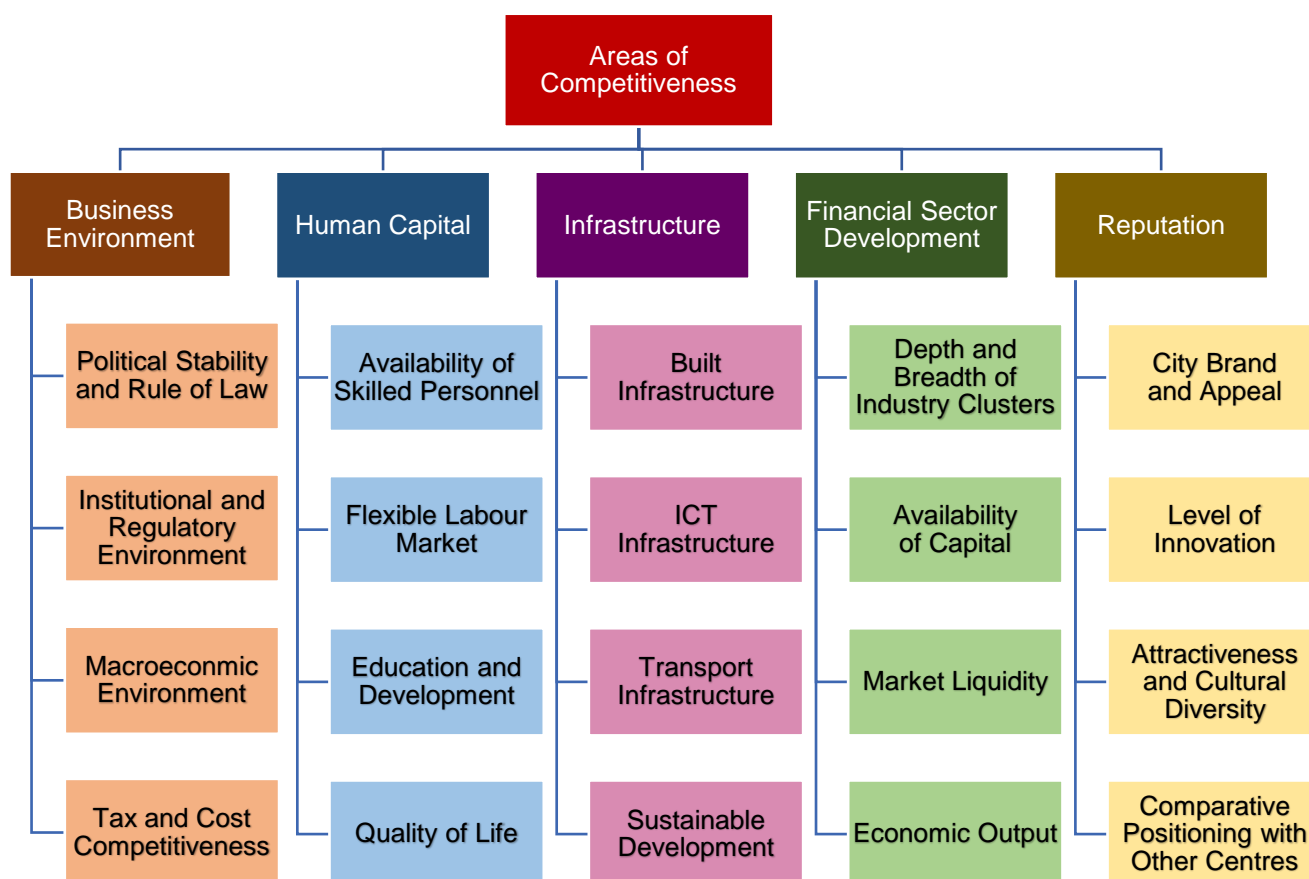
GFCI 25 Top 15 Ranks and Ratings

Centre	GFCI 25		GFCI 24		Change in Rank	Change in Rating
	Rank	Rating	Rank	Rating		
New York	1	794	1	788	0	↑ 6
London	2	787	2	786	0	↑ 1
Hong Kong	3	783	3	783	0	0
Singapore	4	772	4	769	0	↑ 3
Shanghai	5	770	5	766	0	↑ 4
Tokyo	6	756	6	746	0	↑ 10
Toronto	7	755	11	728	↑ 4	↑ 27
Zurich	8	739	9	732	↑ 1	↑ 7
Beijing	9	738	8	733	↓ 1	↑ 5
Frankfurt	10	737	10	730	0	↑ 7
Sydney	11	736	7	734	↓ 4	↑ 2
Dubai	12	733	15	722	↑ 3	↑ 11
Boston	13	732	13	725	0	↑ 7
Shenzhen	14	730	12	726	↓ 2	↑ 4
Melbourne	15	729	20	699	↑ 5	↑ 30

Source: *The Global Financial Centres Index 25, March 2019*

The Index is formed based on five broad areas of competitiveness: business environment, human capital, infrastructure, financial sector development and reputation.

GFCI Areas of Competitiveness



Source: *The Global Financial Centres Index 25, March 2019*

Hong Kong's ranking stands high in each individual component.

GFCI 25 Top 15 By Area of Competitiveness

Rank	Business Environment	Human Capital	Infrastructure	Financial Sector Development	Reputation
1	London	Hong Kong	Hong Kong	New York	New York
2	New York	New York	London	London	London
3	Singapore	London	New York	Hong Kong	Hong Kong
4	Hong Kong	Singapore	Singapore	Singapore	Singapore
5	Shanghai	Shanghai	Shanghai	Tokyo	Shanghai
6	Zurich	Tokyo	Tokyo	Shanghai	San Francisco
7	Chicago	San Francisco	Melbourne	Frankfurt	Chicago
8	Frankfurt	Chicago	Beijing	San Francisco	Boston
9	Tokyo	Frankfurt	Sydney	Toronto	Tokyo
10	Toronto	Dubai	San Francisco	Zurich	Dubai
11	San Francisco	Los Angeles	Dubai	Sydney	Zurich
12	Dubai	Toronto	Boston	Boston	Toronto
13	Geneva	Boston	Tel Aviv	Chicago	Sydney
14	Boston	Paris	Los Angeles	Paris	Los Angeles
15	Sydney	Beijing	Zurich	Dubai	Beijing

Source: *The Global Financial Centres Index 25, March 2019*

Furthermore, Hong Kong is the fifth-fastest growing start-up ecosystem in the world with more than 3,000 such businesses. In fact, there is a 20-fold increase in venture-capital investment into Hong Kong-based start-ups with an average deal size increase of more than 35-fold over the past six years. Currently, Hong Kong has nine home-grown unicorns, namely AirWallex, BitMEX, GoGoVan, Klook, Lalamove, SenseTime, Tink Labs, TNG Wallet and WeLab.

Yet to move to another level of being a DIFC, there are at least four aspects to work on. First, a DIFC should naturally be a fintech centre providing fintech-based financial services. Second, Hong Kong can be an offshore RMB settlement and clearance centre for DSR online and mobile payments. Third, a DIFC should have an exchange to trade digitised assets, which become a new class of asset generated in the digitization process. This will also help move Hong Kong into a “token economy”. Lastly, being the digital gateway of the DSR, Hong Kong would have a unique opportunity to launch a cryptocurrency to support DSR transactions.

1. To Be a Fintech Centre

Importance

Fintech refers to the use and application of new technology and innovation in the financial services industry to provide new and better user experiences. By exploiting the gap between technology and financial services, fintechs disrupt the traditional way of doing things. They include, but are not limited to, digital lending, e-commerce, e-marketing, data solutions, insurance, healthcare, payments, banking services and risk management.

For a city to be an international financial centre in the digital era, it has to be digitally transformed into a fintech centre by adapting its financial institutions, services and products. To be the DSR digital gateway, Hong Kong needs to be a fintech centre to support the DSR’s business transactions and export the experience to DSR countries.

Advantage

In terms of fintech development, Hong Kong is performing well. According to InvestHK, there are now about 550 fintechs based in the city. According to WHub, the key fintech sectors in Hong Kong include big data, blockchain, initial coin offerings (ICO) & token sales, digital payments, crowdfunding, digital lending, insurtech, regtech and wealthtech.

A recent joint survey by KPMG and Alibaba Entrepreneurs Funds also indicates that fintech is Hong Kong’s strongest innovation sector, over other sectors such as smart city, artificial intelligence, e-commerce, big data, IoT, robotics and biotech. Fintech appears to be the most vibrant sector due to following evidence:

- There are more than 50% more fintech start-ups than other types of start-ups in Hong Kong. Since 2010, Hong Kong fintech start-ups have raised US\$940 million, compared with US\$387 million raised by the fintech start-ups in Singapore. So far, Hong Kong has four home-grown fintech unicorns – AirWallex, BitMEX, TNG Wallet and WeLab.

- There are strong Hong Kong-based fintech companies such as WeLab securing a virtual banking licence and Bowtie getting a virtual insurance licence.
- The Hong Kong Monetary Authority (HKMA) successfully pushed for the Open API in the banking sector in January 2018 and set up eTradeConnect in October 2018, a blockchain-based trade finance platform developed by a consortium of 12 major banks in Hong Kong. The HKMA earlier signed a co-operation agreement with the Monetary Authority of Singapore (MAS) to set up a cross-border blockchain trade finance platform.

Challenge and Opportunity

In 2017, Deloitte computed an Index Performance Score for 44 global fintech hubs. The score is the aggregated total of the Global Financial Centre Index, Doing Business Index, and Global Innovation Index. The lower the score, the more it can be considered as conducive to fintech growth. Hong Kong scored 22 whereas London and Singapore scored 11. Hong Kong ranks favourably in terms of being a global financial centre and the ease of doing business. The challenge, and hence the opportunity, rests with the improvement in being innovative, from both the input and the output side. Advocating the advancement of a DIFC through the introduction of an exchange for digitised assets and a cryptocurrency would improve the score as the market becomes more sophisticated (innovation input) and more innovative products are introduced (innovation output).

Index Performance Scores on Fintech Hubs

Range	New Hubs		Old Hubs	
	City	Score	City	Score
1-25	Chicago	20	London	11
			Hong Kong	22
			New York	14
			Silicon Valley	18
			Singapore	11
26-150	Abu Dhabi	99	Amsterdam	70
	Bangkok	137	Brussels	127
	Copenhagen	71	Dublin	56
	Edinburgh	76	Frankfurt	46
	Kuala Lumpur	101	Luxembourg City	83
	Lisbon	124	Paris	76
	Madrid	132	Shanghai	119
	Milan	128	Sydney	45
	Oslo	77	Tel Aviv	111
	Prague	126	Toronto	50
	Shenzhen	125	Zurich	41
	Stockholm	55		
	Taipei	57		
	Tokyo	55		
	Warsaw	108		
150+	Auckland	n/a	Bangalore	n/a
	Budapest	151	Johannesburg	187
	Istanbul	168	Mexico City	181
	Jakarta	255	Nairobi	n/a
	Lagos	n/a		
	Manama	178		
	Moscow	167		
Sao Paulo	243			

Note: A lower Index Performance Scores indicates that the Hub is more conducive to FinTech growth based on the amalgamation of three global indices.

Source: HKTDC from "A Tale of 44 Cities", Deloitte

From another angle, Ernst & Young computed a Fintech Adoption Index in 2019 based on its survey on people’s awareness and usage of fintech services grouped into five categories – money transfer and payments, budgeting and financial planning, savings and investment, borrowing, and insurance. Hong Kong, together with Singapore and South Korea, scores 67%, which is above the average of 64% by just a small margin.

Consumer Fintech Adoption Index across 27 Markets

Market	Consumer Fintech Adoption Index (%)
China	87
India	87
Russia	82
South Africa	82
Colombia	76
Peru	75
Netherlands	73
Mexico	72
Ireland	71
UK	71
Argentina	67
Hong Kong	67
Singapore	67
South Korea	67
Chile	66
Brazil	64
Germany	64
Sweden	64
Switzerland	64
Australia	58
Spain	56
Italy	51
Canada	50
USA	46
Belgium & Luxembourg	42
France	35
Japan	34
Average Adoption	64

Notes: The figures show FinTech adopters as a percentage of the digitally active population in each market. All averages are shown on an unweighted basis.

Source: HKTDC from "Global FinTech Adoption Index 2019", E&Y

To improve people's awareness and usage of fintech services, one way to go is to develop and expand Hong Kong's fintech ecosystem by linking Hong Kong and mainland China's fintech markets. The Stock Connect scheme in 2014 and the Bond Connect scheme in 2017 are good examples. The Greater Bay Area will prove to be an even better and bigger scheme as China is at the top of EY's Fintech Adoption Index. When fintech instruments and talents move across various GBA cities, it would definitely improve Hong Kong's fintech adoption.

2. To be an Offshore RMB Non-Bank Settlement and Clearance Centre for DSR Online and Mobile Payments

All current-account transactions today involving trade in mainland China can be conducted in RMB, and RMB internationalisation is a Chinese government policy. A major step forward was the International Monetary Fund's (IMF) inclusion of RMB into the SDR (Special Drawing Rights) currency basket in November 2015. The very purpose of BRI is to open up trade across the Belt and Road countries and the DSR initiative expands it to the cyber world in forms such as B2B and B2C. Yet unlike the traditional trade settlements and clearance through the

banking system in the BRI, the DSR is expected to involve a lot of non-bank online and mobile payments when the use of various non-bank payment technologies accompanied with cross-border business movements become increasingly frequent.

Importance

Mobile payment has become increasingly popular in the digital world. The payments are not just being used for retail purchases, but also in increasingly innovative ways to support all manner of payments, investments, loans and money transfers in B2B, B2C and C2C. According to the Payment and Clearing Association of China, the number of transactions made through non-banking mobile apps in China increased to around 239 billion in 2017 from 3.8 billion in 2013, a compound annual growth rate close to 180%.

Development of Cashless Payments in China: 2013-2017

	2013	2014	2015	2016	2017
Card					
Transaction Volume (billion)	47.596	59.573	85.229	115.474	149.431
Transaction Amount (RMB trillion)	423.36	449.90	669.82	741.81	761.65
Mobile Payment via Banking Apps					
Transaction Volume (billion)	1.674	4.524	13.837	25.710	37.500
Transaction Amount (RMB trillion)	9.64	22.59	108.22	157.55	202.00
Mobile Payment via Non-Banking Apps					
Transaction Volume (billion)	3.777	15.331	39.861	97.051	239.000
Transaction Amount (RMB trillion)	1.19	8.24	21.96	51.01	105.00

Source: People's Bank of China, Payment and Clearing Association of China

As e-business prospers along the DSR, non-bank e-payments such as smart card, e-wallet and mobile payments will likely explode in volume. Again, to enhance its role as a digital gateway of the DSR, Hong Kong should naturally extend from a “conventional” offshore RMB settlement and clearance centre to include RMB non-bank online payment settlement and clearance.

Advantage

Hong Kong has at least two major advantages to be the clearance centre for DSR online and mobile payments. *First, Hong Kong is a major offshore RMB centre.* Starting as the first RMB offshore market in 2004, Hong Kong has since becomes the global hub for RMB business in trade settlement, financing and asset management. According to the HKMA, RMB deposits in Hong Kong amounted to RMB615 billion at the end of 2018, and remittances for RMB cross-border trade settlement was about RMB4,200 billion for 2018. The triennial survey by the Bank for International Settlements (BIS) indicates that Hong Kong was the second-largest foreign-exchange market in Asia and the fourth-largest in the world in 2019, with net daily average turnover of forex transactions reaching US\$632 billion.

Second, Hong Kong is a major offshore RMB settlement centre. In 2007, the RMB Real Time Gross Settlement (RTGS) system was set up for banks in Hong Kong and all over the world to make RMB payments. According to HKMA's announcement in August 2019, the average

turnover of RMB RTGS system was over RMB1 trillion every day. RTGS links with China's National Advanced Payment System (CNAPS), mainland China's RMB payment system. As such, RTGS can handle RMB transactions with the mainland. According to SWIFT, Hong Kong was the largest offshore RMB clearing centre in 2018, handling about 79% of the world's RMB payments.

Opportunity

As an established major offshore RMB settlement and clearance centre, Hong Kong is in the best position to serve as the offshore RMB non-bank online settlement and clearance centre to support DSR trade transactions and contribute to the ongoing path of RMB internationalisation. Hong Kong currently provides four major offshore RMB services: retail and corporate banking, capital markets, money and forex markets, and insurance. A new type of offshore RMB service, RMB non-bank online and mobile payments, to support DSR e-business will likely be in big demand.

Challenge (Macro)

Offshore RMB business across the globe has notably weakened in recent years together with an increase in exchange-rate volatility. RMB as a global payment currency has declined in importance, with its share in total value of international payments falling to 2% at the end of 2018 from 2.3% at the end of 2015. Its ranking as the most frequently used payments currency dropped accordingly to eighth in 2018 from fifth in 2015. RMB trade settlement likewise weakened, with its annual value falling by 38% from RMB6,833 billion in 2015 to RMB4,206 billion in 2018.

RMB Cross-border Trade Settlement			
(RMB billion)	RMB Deposits	RMB Certificate of Deposit	RMB Cross-border Trade Settlement
2011	589	72	1,914
2012	603	117	2,633
2013	860	193	3,841
2014	1,004	155	6,258
2015	851	159	6,833
2016	547	78	4,542
2017	559	59	3,926
2018	615	43	4,206

Source: CEIC

With trade tension between the US and China likely to continue for the long term, and hence possible currency pressure, the downward trend in RMB demand could continue. However, this adds another reason for Hong Kong to play out its DSR role well by increasing RMB demand through an efficient and effective RMB non-bank online payment system.

Challenge (Technical)

There are problems and risks faced by the online payment industry, including the risk of fraudulent payments, money laundering and tax avoidance, embezzlement or misdirection of funds, misused or misappropriated customer data, and bypassing the money control of the central banks.

A useful example to learn from is the NetsUnion Clearing Corporation (NUCC), established in 2017 under the supervision of the People's Bank of China. It is a clearing platform for network payments of non-bank payment institutions to deal with online payment services involving bank accounts initiated by non-bank payment institutions. The NUCC is considered as a national-level, important financial infrastructural establishment.

The NUCC is purely for domestic settlement within China, but conceptually, it is applicable to other markets. If the Chinese mobile payment technology becomes popular along the DSR, it will be natural to apply such settlement structure.

Hong Kong: Poised to be the RMB Settlement Platform for International Online Payments – Interview with Bie Changjiang, Vice President, Beijing Ultrapower

Listed on the Shenzhen Stock Exchange, Beijing Ultrapower is a Chinese software company providing IT solutions to different industries such as finance, online education, automobile and real estate with applications of technologies such as artificial intelligence, big data, cloud computing, blockchain and the internet of things. The company also develops mobile games.

Speaking with the PolyU Project Team, Vice President Bie Changjiang discussed how he would use Hong Kong as a platform to explore the international market and explained the special role Hong Kong can play in the Digital Silk Road Initiative.

“We’re planning to expand into the global market in the next two to three years, and ASEAN countries will be our priority markets. Compared with western countries, I think the political and regulatory environments in ASEAN countries are more similar to that in mainland China, which would make it easier for us to understand their market rules.

“I think Hong Kong will be able to help out during our ‘going-out’ process because Hong Kong as the “super-connector” is closely linked to ASEAN countries, as well as to western countries. Hong Kong people are agile, as observed by the recent change of listing rules of the Hong Kong Stock Exchange to allow dual-class share structure, for instance.

“By setting up a company in Hong Kong, we’ll be able to handle the capital flows with the world, particularly concerning online payments and forex exchange, and that would save us a lot of paper work compared with doing cross-border transactions with our company in mainland China.

“Hong Kong is not just an international financial centre, but it’s also an international trade centre that can help mainland enterprises explore the international market.”

On top of these roles, Bie believes Hong Kong has a special role to play in the Digital Silk Road Initiative, which is to be the RMB settlement platform for international online payments.

“When I travelled to ASEAN countries such as Cambodia or Malaysia, many times when I paid for goods in a store using third-party e-payment platforms like WeChat Pay or Alipay, the payee was not the local store owner but a Chinese name. This indicates that these transactions, seemingly performed in other countries, are still within the circle of Chinese people. That means RMB is not truly internationalised online despite the popularity of Alipay and WeChat Pay overseas.

“The People's Bank of China (PBOC) has published an announcement ordering all the non-banking payment institutions (such as Alipay and WeChat Pay) to connect their own systems to a unified online payment clearance platform, which is created by the Payment and Clearing Association of China under the guidance of the PBOC and operated by the NetsUnion Clearing Corporation (NUCC).

“The NUCC platform is established with the aim of better regulating online payment through non-banking payment institutions, as it can be easily abused for money laundering and financial fraud.

“I would suggest the Hong Kong government take the initiative to form a Hong Kong version of the NUCC as a settlement platform for third-party online/mobile RMB payment in ASEAN, to start with. Then after a transaction is done via online/mobile payment in ASEAN, the money will go to the local bank account of the store owner via this Hong Kong platform in real time.

“If the initiative is supported by the ASEAN governments, I believe it will penetrate into markets very rapidly. That is going to facilitate offshore RMB transactions. As Hong Kong is an international financial centre, I believe the negotiation with the ASEAN governments would not be difficult.

3. To have an Exchange for Digitised Assets

Importance

A building block of digital transformation is digitization – creating digital versions of physical items to be transmitted and operated on the internet. One type of digitization is asset digitization, which includes digitizing tangible and intangible assets. Tokens are typically issued alongside the digitised assets for investors to buy and trade. Such process is called asset tokenisation. This is essentially converting the rights of ownership of the asset into digital “security tokens”, which are different from “utility tokens” that give owners access to products, services or certain privileges. Security tokens are created through a process called security token offering (STO), a special type of initial coin offering (ICO) that produces different types of tokens such as utility, equity or payments. It is consistent with the idea of a sharing economy in the digital economy in the way that all assets in the economy can, theoretically, be jointly owned by all citizens. Furthermore, assets like properties and antiques that can be digitised are typically illiquid and of significant value. Through this tokenisation process, transactions of these assets would be facilitated tremendously when the transaction costs reduce significantly through improvements in trading efficiencies, transparency and lower minimum investments. Hence, it will be one development trend of the digital economy, sometimes referred as a “token economy”.

Note that *digitised assets* are very different from *digital assets*, i.e., cryptocurrencies such as Bitcoin that typically have no underlying assets to back up the issue. One commonality between the two, however, is that they are basically traded on internet platforms with minimum supervision. To take on the trend of asset tokenisation on the one hand and to provide investor confidence and protect investor interests on the other, Hong Kong should set up a formal exchange to trade on these digitised assets with corresponding regulatory guidance to provide better investor protection and hence investor confidence.

Advantage

Hong Kong has a well-developed, well-functioning stock market. With a combined market capitalisation of HK\$32.7 trillion, it is the third-largest in Asia and the sixth single largest stock market in the world. Hong Kong has also been at the top in the global IPO market for six of the past 10 years. Hong Kong Exchanges & Clearing (HKEX) provides world-class facilities for trading and clearing securities and derivatives in equities, bonds, commodities, and currencies. Together with the Securities and Futures Commission (SFC), Hong Kong has rich experience in operating and governing exchanges.

Hong Kong already has platforms for the exchange of intellectual property (IP). For instance, the Hong Kong Trade Development Council (HKTDC) has developed and managed Asia IP Exchange (AsialPEX), which is a free online platform and database of IP around the world. It helps facilitate international IP trade and connection for global IP players.

Opportunity

There are already various open platforms trading on digitised precious assets such as high-end liquor and wine, antiques and pleasure yachts. However, the trading volume is typically thin, probably due to weak structure and governance. On the other hand, Deloitte foresees that tokenisation has the potential to unlock the illiquid, tangible assets that are currently worth trillions of euros by converting them into liquid security tokens. Hong Kong should grab this opportunity to form an organised exchange to trade on all forms of digitised assets, including tangible and intangible ones.

For intangible digitised assets, specific attention should be placed on big data, especially when Hong Kong can indeed become the big data centre and platform for the DSR. Big data is the most valuable asset in the digital world. The ability to access and analyse huge and ever-changing datasets represents huge profit potential. For instance, big data can be used in the investment world for algo trading, hi-frequency trading, and backtesting. For ordinary businesses, big data could help their operations, customer relations and marketing. Setting up a market to facilitate data exchange will bring huge economic benefits to DSR countries.

There are several such data exchanges in the world, mostly in the US such as Factual and Azure, Quandl in Canada, and Data Plaza in Japan. Based on the experience of Guiyang Big Data Exchange, they connect to 225 high-quality data sources with more than 4,000 data products online. The tradable data covers more than 30 areas such as e-commerce, customs, energy and satellite. In 2019, China's big data core industry is expected to exceed RMB720 billion. Building a data trading ecosystem could hence bring a huge amount of business to Hong Kong.

4. To (Jointly) Develop an Official Digital Currency for the DSR

There are currently more than 1,600 cryptocurrencies but very few have significant trading and their prices are typically highly volatile. This reflects the lack of genuine demand. Facebook's Libra has drawn public attention but is not welcome by governments including the US. Hence, an official cryptocurrency would be more acceptable by the public as well as other governments. The Hong Kong government issued a press release last May stating it had no intention of issuing a CBDC (central bank-issued digital currency) in the near future, citing the existence of an already efficient payment infrastructure. Yet the proposed digital currency is not for Hong Kong, but purely for the DSR.

Importance

To facilitate e-trade and cross-border trade along the DSR, an official digital currency is very important. In fact, one unified currency (called "Bancor") to facilitate international trade was once proposed by the famous economist, John Maynard Keynes, after World War II. Also, if blockchain is to become a common technology in the DSR trade, the introduction of a related cryptocurrency is natural and meaningful. This cryptocurrency (call it "Silk Coin" for convenience sake) would be more meaningful if it were officially developed by the Hong Kong government or the HKMA, and should be a stablecoin (linked at least partially with RMB to avoid high volatility such as Bitcoin) to gain public confidence. Currently, popular cryptocurrencies such as Bitcoin and Ether are typically quite volatile in price due to no underlying assets to anchor the value. Stablecoins, in which coin values are relatively stable, are typically pegged to some "stable" asset or basket of assets to gain their stability. Silk Coin, for instance, could be linked at least partially with RMB to avoid high volatility such as Bitcoin. Similar to Libra but unlike Bitcoin, it should be under a consortium chain with DSR governments forming the consortium for permission, for the sake of scalability and energy consumption.

Advantage

The HKMA has a long, successful and credible history of stabilising the Hong Kong dollar under the currency board system. Hence, Hong Kong has the needed expertise to launch an "official" stablecoin to facilitate cross-border transactions along the DSR. Such stability could come from the coin value being at least partially pegged with the RMB, which is possible as Hong Kong has the largest offshore RMB pool. In the long run, this Silk Coin would facilitate the RMB internationalisation process. JPMorgan Chase recently reported that with the rise of Asian economies, the US dollar will not be able to maintain its position as the world's top currency for decades to come. JPMorgan analyst Krech Cohen said that the US dollar had been the main reserve currency of the global financial market for nearly a century, but as the global economic centre gradually shifted from Europe and the US to Asian countries, especially with China turning into a globally big country, the old guard is likely to lose its leadership. Also, as early as the 2008-2009 financial crisis, many Asian economies prioritised trade relations with China. Many Asian economies now rely more on China than on the US.

Challenge

There are few successful precedents of CBDC issuance. So far, only four countries have their own official cryptocurrencies, namely Senegal (the crypto called eCFA), Tunisia (eDinar), the Marshall Islands (SOV) and Venezuela (Petro). An even bigger challenge is to have governments along the DSR jointly accepting Silk Coin. A likely solution will be a joint development by key players in the DSR. The support and involvement of the Chinese government may be inevitable. In fact, the People's Bank of China (PBOC), its central bank, is said to be close to issuing its own digital currency after five years of investigation. According to Forbes, the PBOC in November will issue its official cryptocurrency to seven institutions including major state banks and Alibaba and Tencent. As it will be a CBDC issue, it is a China (crypto) currency and cannot be a trading currency across the DSR, probably even in the distant future. Notwithstanding the above, one crypto medium of exchange for the DSR, such as Silk Coin, has its role to play.

Hong Kong Facilitating a New Trust Model along the Digital Silk Road – Interview with Vitalik Buterin, Co-founder of Ethereum

At aged 19, Vitalik Buterin created Ethereum, now the world's largest open-source platform for decentralized applications. Ethereum has a native cryptocurrency called Ether, which can be used to make payments, as a store of value, or as collateral. The Ethereum community is the world's largest and most active blockchain community and includes core protocol developers, cryptoeconomic researchers, cypherpunks, mining organisations, Ether holders, app developers, ordinary users, anarchists and Fortune 500 companies.

Speaking with the PolyU Project Team, the blockchain guru discussed how distributed ledger technology is best applied in the context of the Digital Silk Road Initiative and Hong Kong's unique role in facilitating it.

“Blockchains are most useful in environments where application state is regularly exchanged between multiple users, none of which is willing to allow a single actor to have full control over the application. In mainland China specifically, the government has in many industries been willing to create and enforce centralised ledger-like systems.

“However, this cannot be done in every industry that might conceivably benefit from shared ledgers. Furthermore, and more importantly, in the case of financial systems being built or enhanced in the more international context of the Belt and Road Initiative and the Digital Silk Road Initiative, such an approach will run into more difficulties as sovereign countries will be less willing to submit to a centralised system run by another state. A centralised system for linking international economies faces an uphill battle in convincing the world that it is a genuine attempt to beneficially co-operate with the world, rather than dominating it.

“For this reason, the Belt and Road Initiative and the Digital Silk Road Initiative may well be the most natural place to look for practical and useful applications of distributed ledger technology.

“A consortium chain run between participating governments, or between financial institutions in different countries, is one possible solution to implementing international shared ledgers in many industries, and consortium chains are the form of distributed ledger technology that is being most actively considered in institutional financial contexts.

“Fully public chains can also play a role, especially because this would enable a much larger level of interoperability with applications being built outside the context of this initiative, though in the short term fully public chains represent a very new trust model (permissionless, economic) that is unfamiliar to institutions used to traditional (permissioned, reputation and authority-based) trust models, and so will likely see more success in lower-profile, less institutional and less highly regulated sectors. Where a public chain is used, some use of cryptocurrency is inevitable, because the security model and use of public blockchains inherently depends on cryptocurrency, though specific applications on public chains can make use of only very limited quantities to pay transaction fees. However, it is definitely not the case that financial institutions cannot have any connection to public blockchains.

“The Ethereum ecosystem is unique in that the Ethereum codebase is being used for permissioned *and* public chains, allowing applications being built for one ecosystem to be used in the other; hence the extent to which permissioned versus public is an either-or question is overstated. The answer can sometimes be ‘both’.

“Hong Kong can play a unique role as it is well-suited for creating systems that have a close connection to the mainland Chinese market, but still at some distance from it, and so where risks and failures can be more contained. Financial transactions and trade finance are natural targets for industries to try to reform with blockchain solutions, and there is a home-grown blockchain technology sector that can be supported.”

Buterin first discovered blockchain and cryptocurrency technologies through Bitcoin in 2011, and was immediately excited by the technology and its potential. He co-founded Bitcoin Magazine in September 2011, and after two and a half years looking at what the existing blockchain technology and applications had to offer, wrote the Ethereum white paper in November 2013. He now leads Ethereum’s research team, working on future versions of the Ethereum protocol.

Hong Kong as an Arbitration Centre for the DSR

Importance

Whenever there are businesses, there will be disputes. In an initiative as large as the DSR, there are likely to be many and various types of disputes. Being the digital gateway of the DSR, Hong Kong is in the best position to be the DSR arbitration centre.

Advantage

As Secretary General of the Hong Kong International Arbitration Centre (HKIAC) Sarah Grimmer pointed out, having the advantages of a common-law jurisdiction with independent courts, the rule of law, the high standard of the legal profession, and being the gateway to mainland China, Hong Kong can become an arbitration centre to settle international disputes on the BRI. The HKIAC was established in 1985 and has gained an international reputation. According to a survey, the HKIAC is the third most used and preferred arbitral institution in the world and the most favoured arbitral institution outside Europe. It also aims to enhance Hong Kong’s role as a preferred place of arbitration.

Opportunity

Digital technology will transform the arbitration process, bringing opportunities. Digital technology can be efficiently and legitimately used for arbitration proceedings. E-arbitration and Online Arbitration (OArb) could become possible, for instance. According to Alexis Mourre, President of the ICC International Court of Arbitration, online dispute resolution will become central to the future of arbitration. Mireze Philippe, Special Counsel at the ICC Court, suggests that progress in technology and telecommunications makes access to justice around the globe fair and simple. Yet there is difficulty in implementing standards for online dispute resolution (ODR) in different legal environments across DSR countries. This gets back to the challenge mentioned above that

Hong Kong should move quickly to define best practices and create a workable environment to be fully leveraged for the benefit of all.

Challenge

Arbitration in the digital economy faces challenges as well. Digitalisation transforms the legal and contractual relationships between businesses, individuals and governments. As more data is collected, stored and exchanged electronically, new risks and disputes on data privacy and usage in areas such as cloud computing, IoT, social media and big data analytics emerge, and digital IP and cross-border e-commerce laws and digital regulations evolve. Hong Kong needs to develop corresponding legal guidance commensurate with the advance of business transactions in cyberspace.

Hong Kong as a Smart Entrepot

Hong Kong started as an entrepot due to its unique geographical location. The city has a long history of trade from which it prospers. It has well-established logistics infrastructure and port facilities. The city is an important entrepot for mainland China as well. According to Hong Kong government statistics, 57% of re-exports in 2018 were of mainland origin and 55% were destined for mainland China. According to China Customs statistics, Hong Kong is mainland China's fourth-largest trading partner, accounting for 6.7% of its total trade in 2018.

Today, Hong Kong is also strategically located along the DSR. Trade linkage between mainland China and DSR countries could be strengthened significantly should Hong Kong become actively involved in the DSR initiative by performing its super-connector role well. More importantly, empowered by the digital technology of big data analytics, blockchain, AI, remote sensing and IoT technologies, Hong Kong could turn into a smart entrepot.

1. Smart Container Port

A smart port makes full use of IoT, the sensing network, cloud computing, decision analysis and optimisation, etc. to achieve thorough understanding, extensive connection, and deep calculation of various core resources of the port supply chain. The smart port can automatically sense all kinds of information, and has the ability to integrate and automatically process information to realise information sharing and transparency through real-time publishing systems. Most critical is to have decision-making capabilities based on information analysis and processing, and to provide strategic and operational decision support for port operators, port service companies and other customers.

The smart port transformation action plan can be mainly divided into two major categories, namely the sea side (ship navigation intelligent auxiliary systems, IoT sea meteorological real-time systems, intelligent harbour dispatching integration systems, maritime robotics) and the land side (port area intelligent transportation systems [ITS], intelligent monitoring and management systems, automated container terminal).

Importance

Shanghai International Port Group and Accenture jointly released a report in 2016 called Smart Port Drives Future Trade, saying that the slowdown of global economic growth has become the new normal, and competition among ports is becoming increasingly fierce. The growth model in the past of relying on the geographical advantages of the port and through loading and unloading services is becoming unreliable. The transformation and upgrading of the port industry is therefore imperative.

Advantage

Hong Kong's deep-water seaport and is one of the busiest in the world in terms of shipping movements and cargo handling, and the largest container port serving southern China. Terminal operating companies in Hong Kong are very professional and highly experienced with excellent facilities. The average turnaround time for conventional vessels working in mid-stream at buoys or anchorages is 40 and 52 hours, respectively, whereas for container vessels, the turnaround time is about 10 hours.

Well-developed cross-boundary land transportation networks and facilities are also essential support for port services. The recent key transportation infrastructure in Hong Kong secures its position as a regional transport hub. Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) greatly shortens the travelling time between Hong Kong, Shenzhen, Guangzhou and other cities on the mainland via its connection with the national high-speed rail network. The Liantang/Heung Yuen Wai Boundary Control Point (LT/HYW BCP) will be the seventh land boundary crossing between Hong Kong and Shenzhen. By connecting with the Eastern Corridor in Shenzhen, the LT/HYW BCP will greatly shorten the travelling time to eastern Shenzhen, Guangdong and other neighbouring provinces. Together with the Hong Kong-Zhuhai-Macao Bridge (HZMB), these key infrastructures can strengthen the cross-boundary transport connectivity under the "one-hour living circle" in the Greater Bay Area to facilitate smooth and efficient flow of people and cargo. Such infrastructures can provide Hong Kong with more room for development, regional co-operation and play an important strategic role in supporting Hong Kong's long-term economic growth.

Opportunity

If Hong Kong can successfully play its role as the gateway for the BRI and the DSR, the port demand would increase substantially. A smart port provides a seamless connection and co-ordination between the various participants to make a smart response to the port management operation and form a modern port that is informative, intelligent and optimised.

Challenge

Hong Kong container port has seen declining traffic in recent years amid the fast pace of development in Southern China, leading to the increased dominance of mainland Chinese ports. The continuous keen competition from Singapore and the recent trade war between China and US add further challenges.

2. Smart Airport

A smart airport is essentially the use of digital technology to achieve automation as manual operation is gradually withdrawn. The current technology is based on A-CDM (Airport Collaborative Decision Making), which is a joint venture to improve the operational efficiency of all airport operators and by early 2019 had been fully implemented at 28 European airports. A-CDM relies on big data, cloud computing, mobile internet and IoT to achieve airport automation. People are no longer directly involved in the operation but monitor the system and intervene should it fail.

Other than auto check-in, self-service baggage check, RFID baggage tags, face recognition, fingerprint identification, millimetre wave security scanning, etc., a smart airport should have facilities such as indoor navigation inside terminal building and car parks, automatic flow control at terminals, runways, towers and aprons, and air-traffic control automation.

Importance

The world's 20 busiest airports handled combined air-cargo volumes of 5 million metric tons in 2017, an increase of 6.8% from the previous year. Hong Kong International Airport (HKIA) handled 5.1 million tons of cargo throughput worth HK\$3,710 billion, which accounted for 42% of the total value of Hong Kong's external trade in 2018. As the world's third-busiest international passenger airport, HKIA handles more than 72 million passengers a year.

Advantage

Since 2010, HKIA has been the world's busiest airport for nine consecutive years. It currently provides 43 parking stands for cargo aircraft. As an air-cargo hub, HKIA has state-of-the-art facilities, sufficient cargo handling capacity and provides efficient cargo handling and security. Because of its preparedness and competency in handling air pharmaceuticals that require stringent temperature control at globally assured standards, HKIA has also been certified by the International Air Transport Association (IATA) as a Partner Airport of its Centre of Excellence for Independent Validators in Pharmaceutical Logistics. HKIA has developed its cargo strategy in three key areas: e-commerce, transshipments and high-value logistics.

Opportunity

Being a smart airport, Hong Kong can serve at least two major functions in the DSR. One is to meet the increasing trade demand for air-cargo transportation due to DSR business. The efficiency and reliability of shipment logistics are critical. The other is to meet the increasing volume of business travel across DSR countries via Hong Kong. The customer experience in the airport would matter a lot to foreigners' perception of the digitalisation of Hong Kong as a whole.

Challenge

The shortage of warehouse facilities and the occupancy rate has been close to maximum. The continual surge in property price has driven up the rental cost on factories and warehouses, worsening the supply shortage.

3. Smart Import-Export Trade Through Blockchain Technology

Importance

A World Trade Organization report in 2018 viewed the importance of blockchain in revolutionising the shipping industry and international trade as comparable to the invention of containers – blockchain, in another sense, builds a new trade infrastructure that disrupts the whole industry. One major disruption comes from moving international trade from a paper-intensive industry close to becoming paperless. Starting from opening a letter of credit to transportation and logistics of goods and products, from trade finance to customs clearance, all involve a lot of paper documentation. Through moving towards paperless trade, blockchain can also help improve trade efficiency.

The technology can also help digitalize and automate trade finance processes, in particular letters of credit, and to ease supply chain finance. It also facilitates business-to-government (B2G) and government-to-government (G2G) process at the national level.

Advantage

The Hong Kong Monetary Authority and the Monetary Authority of Singapore signed a co-operation agreement in 2017 to jointly develop the Global Trade Connectivity Network (GTCN), a cross-border infrastructure-based blockchain technology, to digitalize trade and trade finance between the two cities. If successful, the network could be expanded into the whole ASEAN region and globally along the DSR. Hence, the needed technology infrastructure is ready for further development.

Opportunity

The DSR is essentially a cross-border trade initiative. To ride on the GTCN, a similar but more inclusive agreement should be set up across the Belt and Road countries to facilitate the physical, cross-border trades using the distributed ledger technology, specifically consortium blockchain that should be most efficient and manageable. On the other hand, the Hong Kong government could take the lead to help create a regulatory framework to address issues related to interoperability and standardisation across DSR governments to facilitate possible B2G and G2G operations.

Hong Kong as a Smart City and a Smart Economy

1. Smart City

Smart city development per se is a key objective of every government to deal with various difficult urban problems on the one hand, and to generate huge economic benefits on the other. According to Frost & Sullivan, smart city global market potential on initiatives pertaining to sectors such as transportation, healthcare, construction, energy, infrastructure and governance, can reach as much as US\$1.5 trillion. A more modest estimation of the market, according to IDC's Worldwide Semi-Annual Smart Cities Spending Guide, is that it may grow from US\$95.8 billion in 2019 – an increase of 17.7% over 2018 – to more than \$158 billion in 2022. As for the Asia Pacific region, it currently represents more than 40% of the total global expenditure. In a smart city, internet of things networks can be deployed to create applications that will change the manner in which residents coexist with technology.

Importance

Other than the need and the potential benefits for Hong Kong to develop into a smart city, like all large cities, there are two additional important reasons for Hong Kong to do so. One is that its experience of smart city development can be a showcase to many ASEAN and DSR countries. The other is that a smart city is the backbone for smart port development that enables Hong Kong to play its gateway function in both the BRI and the DSR.

Advantage

The Hong Kong government is very proactive in this direction and has established a Smart City Blueprint to address six major areas, namely Smart Mobility, Smart Living, Smart Environment, Smart People, Smart Government and Smart Economy. Hong Kong is more advanced in smart city development compared with ASEAN countries. As pointed out by Dr Winnie Tang, Founder and Chairman at Esri China (Hong Kong), the Hong Kong government introduced advanced information technology 20 years ago and used a geographic information system (GIS) for analysis and decision-making many years before many cities in the Asia Pacific region. The Lands Department took the lead in linking data sets of various government departments. Spatial data infrastructure is already in shape; smart city projects such as smart lampposts are also ready to be launched. All these initiatives show that Hong Kong has established credentials to assist ASEAN countries in smart city development.

Opportunity

The central requirement for smart city applications that continuously operate is the ability to handle an ever-growing amount of data in transit at all times. As such, wireless infrastructure will essentially be the fabric of every smart city. 5G provides high network-connectivity speeds and density. China's 5G technology is hence fundamental to smart city development. Hong Kong can benefit not only itself by bringing in the 5G technology but also benefit by introducing the technology to ASEAN countries.

Another useful smart city technology to introduce is Alibaba Cloud ET City Brain, which is leading the world. It combines city big data (Alibaba Cloud) with AI application (Dharma) to provide holistic solutions to city issues and problems. A particular useful application to support smart port is its Gaode City Brain-Smart Transportation, which provides solutions for transport logistics. Such technology and knowledge of smart cities, smart transportation and logistics, smart electricity grids, and smart agriculture are valuable and can be exported. In fact, Alibaba and Huawei have signed deals to develop smart cities in Kenya, Germany, and Malaysia. The ASEAN governments of Thailand, Vietnam, Indonesia and the Philippines, as well as India, are also working hard to use smart technology to solve their cities' problems. Hence, Hong Kong will be in a very strong position to assist such countries in building their smart cities.

Challenge

There are competitors. Singapore launched its Smart Nation Initiative in 2014 and, like New York City, Tokyo and London, will invest more than US\$1 billion on smart city planning in 2019, according to recent research by IDC. In fact, Singapore ranks sixth in the world smart cities 2018 index compiled by the IESE Business School in Barcelona. Singapore led the establishment of the ASEAN Smart Cities Network (ASCN) last year, attracting 26 cities in the region, including those from Myanmar, Laos and Vietnam, as pilot cities. South Korea is also committed to promoting the same to the Middle East, South Asia and South America. The country claims to be involved in 100 smart city projects with India. Elsewhere, Taipei and Kaohsiung also believe they have big potential to export smart city works.

Hong Kong: Leading in Spatial Data Development

– Interview with Dr Winnie Tang, Founder and Honorary President of Smart City Consortium

In the 1990s, Dr Winnie Tang founded Esri China, a geographic information systems (GIS) and mapping solutions provider in Hong Kong. Dr Tang is now the Adjunct Professor in both the Faculty of Architecture and Faculty of Engineering, Department of Computer Science at the University of Hong Kong. Speaking with the PolyU Project Team, Dr Tang discussed how Hong Kong could contribute to the smart city development in countries along the Digital Silk Road.

Dr Tang believes that the Digital Silk Road Initiative will be the development focus for the world and countries along the DSR will benefit greatly. On how smart city projects should be deployed, she said: “It is important to identify the key resource within the countries by using geographic information systems (GIS) and leverage on that to plan in detail, then recognize the real problems that may come across and be prepared to solve them by deployment of technologies.

“Public-private-people partnership (4P) should be introduced and people-centric policies should be taken into account during the development. Citizen engagement is necessary before project implementation. Also, balance among economic, social and environmental value is essential and must be taken into consideration whenever possible. Once the environment is destroyed, it is not easy to recover.

“Also, governments should encourage innovation and drive innovation through open data. However, the stakeholders should discuss and agree on the privacy issues before sharing the data.”

Yet Dr Tang noted a few challenges of the Digital Silk Road Initiative: “A bottom-up approach is often more realistic and feasible during the development, but it is hard to get consensus. It is not easy to explore the cost benefit of various technological applications, especially dealing with complex issues, such as personal privacy.

“Complicated political issues will arise whenever a development plan is executed, leading to project delay or inefficiency in implementation. Also, people may not be familiar with the use of application programming interface (API) to get real-time data or installing sensor network to collect data for data analytics. They also lack the experience in carrying out smart city projects.”

Commenting on the tech ecosystem and the digital development in Hong Kong, Dr Tang said there was still much room for improvement: “Though the government has committed about HK\$100 billion to drive the development of innovation and technology and the ecosystem has been formed, we cannot afford to become complacent.

“‘Co-opetition’ is the way to its healthy development. I hope that different parties could work together in various forms, combining the advantages of all in making Hong Kong an international innovation and technology hub, and helping one another to achieve success in the near future.”

Dr Tang said Hong Kong should take the lead to export its professional services to countries along the DSR, saying: “By 2022, most smart city infrastructure in Hong Kong will be finished with Open Data, Common Spatial Data Infrastructure (CSDI), Common Operation Picture (COP) & City Dashboard. Hong Kong can lead the way in smart city infrastructure, for example, by setting standards for these infrastructures and exporting related products and services to countries along the DSR.

“In fact, Hong Kong is in the best position to lead the spatial data development in the Guangdong-Hong Kong-Macao Greater Bay Area. What we need to do right now is to speed up the formation of a successful spatial information platform by engaging more start-ups, private organisations and even government departments. With continuous improvement of data quantity and quality, together with our more than 20 years of experience in utilising advanced geographic information systems for analysis, Hong Kong is in the best position to lead our counterparts in the Greater Bay Area to develop a ‘spatial information service platform’ and its applications, e.g., the ‘emergency response platform’ stipulated in the Greater Bay Area Plan. Besides, Hong Kong can also export the technologies deployed in the lampposts and eID to other countries.

“Both Singapore and South Korea are ambitious about exporting their advanced smart city technology and experience to other countries. They have a lot of initiatives to achieve their goal. Hong Kong should take the lead to export its smart city products and services, and help potential start-ups participate in those projects along the Digital Silk Road so as to achieve the win-win situation like South Korea and Singapore.”

ASEAN Smart Cities Network (ASCN) was established by Singapore to resolve the identified challenges of rapid urbanisation and its significance on problems such as city congestion, water and air quality through the use of technological and digital solutions. The member cities will share their action plans and smart city projects as well as meet with private-sector solution providers. These action plans consist of distinct projects and actions that member cities will set in motion from 2018 to 2025.

“ASEAN countries tend to see fast growth in smart city business, as populations in the big cities are increasing quickly, with high demand for security technology and solutions to traffic congestion problems. Smart City as a Service (SCaaS) might become a whole new industry and a product to be ‘exported’ around the world.

“The Hong Kong market is too small and usually dominated by the international players. Start-ups in Hong Kong can hardly expand their business to other countries as they do not have adequate funds and resources to compete with those giant local or international companies. There is an immediate and great need in Hong Kong to mobilise ourselves on Smart City as a Service (SCaaS) to maintain our competitiveness in the Digital Silk Road Initiative.”

Over the years, Dr Tang has been actively advocating the use of technology and sharing her views regarding the ICT industry, eHealth, environmental conservation, entrepreneurship and smart city through her services in government and non-government organisations in Hong Kong.

2. Smart Economy

With many aspects of digital transformation in place, Hong Kong should develop towards, and could eventually be transformed into, a smart economy. Smart economy is the intersection between the economy and smart city conducive to innovation and creativity combined with scientific research, superior technology and sustainability.

Importance

To leapfrog from the traditional economy leveraged on the existing economic propellers to a new level of growth path, Hong Kong needs to digitally transform itself to move towards a smart economy.

Advantage

For a vibrant smart economy, four supporting factors are needed and Hong Kong possesses most of them. One is to have a large enough market for the digital economy to grow. Being part of the GBA and with links to ASEAN and other DSR countries, Hong Kong is already facing a large market it can leverage. Another is to have enough financial capital to fund its development. Being an international financial centre, Hong Kong can draw in international capital to support its start-ups and innovative projects. Having a business friendly and efficient administration is a third important factor. Hong Kong gains supportive policies and environment conducive to its growth. The more challenging part is the talent availability. Being an international, cross-cultural city with world-class research universities, Hong Kong has its ability to groom, attract and retain talents domestically and globally. Given that a global shortage of tech talents and human capital is critical to economic growth, especially for a digital economy, it deserves a more in-depth discussion on two kinds of challenges Hong Kong is facing.

Challenge on Tech Talent Shortage

1. Global Shortage

According to ORC International, information technology across all sectors of the US economy has more than half a million job vacancies. Canada has demand for 182,000 skilled ICT workers, while Australia's will be for 700,000 such workers in 2020. Singapore will have shortage of 30,000. The Asia Pacific region in general also faces a significant shortage of solution architects, integration architects, business analysts, data scientists, automation specialists, product managers, scrum masters, and product owners. Such shortage is largely due to the immense growth in demand for new jobs and positions. The industries that need such types of digital skills to succeed are just growing too fast to be able to train their own individuals in time to meet their needs.

Hong Kong is no exception. Hays Asia believes the city is well supported to be the digital technology hub of Asia. Yet it sees a shortage of qualified candidates for key roles

including data scientists, front-end developers, data warehouse architects, business intelligence professionals and cybersecurity experts.

2. Solutions

The way to deal with such shortages are essentially through attracting, grooming and retaining talents.

Attracting Talents

As a multicultural, international city, Hong Kong has its own attraction for sure. Indeed, according to WHub, Hong Kong is ranked as the fifth most appealing place to work for foreigners and sixth in attracting high-skilled talent. The Hong Kong government also released its first Talent List of 11 professions in 2018 to attract overseas talents. Simultaneously, the Innovation & Technology Commission launched the Technology Talent Scheme, the Postdoctoral Hub Programme and the Re-industrialisation and Technology Training Programme. The schemes have been developed with the intention of nurturing and bringing together additional tech talent. Yet high living costs (Hong Kong is ranked the world's most expensive place to live) and high property prices could deter talents and start-ups from moving to the city. Recent political turmoil could also add to such deterrence.

From another angle, LinkedIn China has a study using big data samples from 439,000 profiles with bachelor's degrees or above and 118,000 profiles with ICT and supplementary skills (digital talent) within the GBA. The study finds that the GBA has a strong talent pool but Hong Kong's talent exchange with cities within the GBA lags far behind Shenzhen and Guangzhou. The study suggests there is more room for Hong Kong to strengthen talent exchange with mainland cities.

Grooming Talents

Hong Kong has incubator and accelerator programmes to help grow local talents and start-ups. Yet a point worth noting is that an estimated 65% of children entering primary schools today will likely work in roles that don't currently exist, according to a report by the World Economic Forum on the Future of Jobs. Other than putting forward STEM (Science, Technology, Engineering and Mathematics) education, the current education system in Hong Kong needs to be restructured as it is not particularly conducive to grooming high-tech talents and building a creative and innovative culture.

Retaining Talents

The key is to have an environment conducive to tech applications, development and growth so that talents feel Hong Kong is a place that can realise their dreams.

Online Talent Service

One aspect that people tend to overlook is the fact that in the internet world, talents need not be physically in the company to provide needed services. We can have “TaaS” (Talent as a Service), which could be particularly attractive to SMEs that may not be able to afford to hire tech talents.

Hong Kong: Well-positioned as a Global Technology Hub
– Interview with Dmitri Senchenko, Founder of Feron Stablecoin

After two years at Goldman Sachs, Dmitri Senchenko founded Feron Stablecoin in 2017, working to develop and implement a fully self-governing algorithmic monetary policy model that addresses the critical shortcomings of existing cryptocurrencies, including the limited transaction handling capacity and high price volatilities. Senchenko recently spoke to the PolyU Project Team about his thoughts on the Digital Silk Road Initiative, and Hong Kong's advantages and challenges in seizing the relevant opportunities.

“By creating a state-of-the-art infrastructural backbone that will underpin future technological advancement of a number of key regions, the Digital Silk Road Initiative is set to ensure China's role as a tech leader and trendsetter in a wide range of global markets for decades to come. Beneficiaries of the initiative will experience a deployment of capital at a scale that market forces have so far failed to generate, providing a crucial opportunity to close the gap on the most advanced economies.

“For Hong Kong, the greater integration brought about by the Digital Silk Road Initiative will certainly have a positive effect on the classical pillars of its economy. However, to capture its full potential, a developed and successful technology sector of its own is a prerequisite. The key strength of the Digital Silk Road Initiative is in its ability to turn local champions into global tech leaders, and thus focusing on having a crop of sufficiently mature tech projects ready to be propelled onto the bigger stage could be an effective strategy to pursue.

“While Hong Kong may have been relatively less tech-focused to date, it has an immense potential that could be made to bear fruit in the medium term, or even the short term. Many of the key ingredients are already in place – a light-touch regulatory environment, a favourable tax regime, proximity to mainland China, potential abundance of capital. The biggest challenge that remains is the shortage of human capital in the technical disciplines.

“To overcome this problem, Hong Kong universities need to become top destinations for students and academics involved in the formal and natural sciences, in engineering and other applied technical disciplines. They need to become places where cutting-edge research is conducted by the brightest minds, using the best infrastructure and supported by reliable long-term funding. A vibrant academic environment should quickly attract existing tech players and sow the seeds for the new champions of tomorrow, positioning Hong Kong as a global technology hub.”

Realising Hong Kong's potential for technology ventures, Senchenko has recently expanded into Hong Kong. “When choosing a jurisdiction, our main requirements were a common-sense regulatory stance on blockchain, a friendly tax regime that does not come with the ‘offshore’ status, and a potential abundance of capital and talent.”

In the process of setting up a company in Hong Kong, Senchenko felt that the government was very supportive, saying: “Our first exploratory steps were taken with the help of InvestHK, the government department tasked with supporting companies like ours to set up in Hong Kong. We

cannot overstate the degree to which the team at InvestHK has been a positive influence on our decision, having done their very considerable best to guide us through the administrative part of the process and to connect Feron to the local tech ecosystem.”

Asked about the needed improvements for Hong Kong to facilitate technology businesses, Senchenko made two comments.

“Indeed, the only step of the process we have found to be less than effortless was the setting up of a local bank account. In that respect, it would be very helpful if qualifying ventures with foreign founders were able to take advantage of a dedicated, streamlined process.

“Beyond the set-up stage, we have found Hong Kong to be a very welcoming place, and our only major suggestion would be to invest heavily in developing academic excellence in the technical disciplines. This would help projects like ours avoid having to look for talent outside Hong Kong, and give rise to a crop of local tech founders of global calibre.”

LYNK: A Global Knowledge Sharing Platform – Interview with Peggy Choi, Founder & CEO

LYNK is a perfect illustration of the Digital Silk Road Initiative. Similar to how Uber has digitised and disrupted the traditional car-rental industry, LYNK is a global digital platform that connects people to experts for advice and insights, making knowledge more accessible. This has challenged the traditional referral business, whose extremely high charges only big enterprises such as banks or fund companies can afford.

“Now, our clients are still mostly financial institutions and management consulting firms, but we’re expanding our clientele to include multinational companies as well as corporations of various sizes,” said Founder and CEO Peggy Choi, who grew up in Hong Kong and Southeast Asia, and studied in the US. Choi founded the company in 2015 after quitting her job as an investment manager with a private equity fund.

With a growing network of more than 500,000 industry professionals, LYNK builds its expert database through invitations, referrals and partnerships. Its proprietary system then cross-checks the experts’ background and expertise information against a number of different sources. After each consultation – all of which are conducted via LYNK’s online platform - the system will ‘learn’ more about the experts and improve the overall quality of the database using Natural Language Processing (NLP) technology. Basically, NLP is a key artificial intelligence attribute and references the ability of a computer program to understand any human’s spoken language.

The platform operates on a software-as-a-service basis. Customers pay for the consultation through subscription, while experts are compensated according to their time of engagement and knowledge level.

LYNK’s first office was in Singapore. Choi explained the reason why she moved back to Hong Kong: “International recruitment is difficult and expensive overseas. In Hong Kong, there are fewer limitations to employing foreign talents. Hong Kong also enjoys a better physical location. It’s much more convenient to go from Hong Kong to Tokyo, the US, the Philippines, not to mention mainland China.

“Singapore has a number of advantages that are conducive to tech start-ups. It’s the sixth best tech city in the world and emerged as the premier tech city among its Asia Pacific peers, according to the 2019 Tech Cities index by Savills.

“Also, the Singapore government is very aggressive in attracting tech companies in terms of policies and funds. As we know, GIC and Temasek, the two Sovereign Wealth Fund of Singapore, as well as Singapore Economic Development Board (EDB), invest a lot in tech start-ups.” Choi suggested that the Hong Kong government should consider investing (through the Hong Kong Monetary Authority, for instance), while also encouraging more tech companies to relocate to Hong Kong.

Based in Hong Kong, LYNK was admitted into Cyberport's Incubation Programme in 2016. Later, Cyberport has become one of its investors. Apart from Hong Kong, LYNK also has offices in New York, Singapore, Mumbai and Shanghai. Choi said she was also considering opening one in Shenzhen, which is known to be the high-tech centre of China.

Challenge on Digital Entrepreneurship

1. Digitalisation of Small- and Medium-Sized Enterprises

A smart economy needs technical people to build it, but it is companies with the necessary entrepreneurial mindset that turn the technical input into meaningful and valuable economic output. Hence, corporate leadership with the ability to spot business opportunities to apply the technology – using skills such as agility, collaboration, creativity and the ability to lead a group of tech specialists – is a vital talent often overlooked.

Such talent is particularly important to small- and medium-sized enterprises (SMEs), which are fundamental to any economy. The Asia Global Institute estimates that 60% of global GDP and 90% of jobs flow from SMEs. Hence, digital transformation to a smart economy cannot be achieved without SMEs themselves being successfully transformed. In fact, by automating repetitive procedures and managing data with cloud-based systems, SMEs can extend their reach to new markets and grow their customer base more efficiently and effectively. Harvard Business School Senior Fellow Karen G. Mills also suggests that artificial intelligence, machine learning and big data will dramatically change the options for small businesses. New technology often helps an SME stand out successfully from the rest. According to Ipsos Consulting, digitally engaged SMEs are more likely to gain 15% additional revenue and are about 3.2 times more likely to derive income from international markets than their peers while enhancing their competitiveness.

In 2018, there were about 340,000 SMEs in Hong Kong, mainly in the import-export business, retail and social services and represent more than 98% of the city's businesses. If Hong Kong's SMEs can be digitised, they could have huge opportunities in emerging markets along the DSR by exporting their technologies there and also being their showcase. In fact, the Asia Pacific region is a huge market with SMEs making up more than 95% of all enterprises, employing about half of the workforce, and contributing about 20% to national GDP in low-income countries and as much as 50% in those with high incomes. Furthermore, promoting growth in this sector is a priority for almost every government and market in Asia as SMEs clearly impact innovation, job creation, economic growth and competitiveness.

However, *SMEs in Hong Kong do not seem to be ready*. According to a recent survey of the "Standard Chartered Hong Kong SME Leading Business Index" on 811 local SMEs in Q3 2018, just 46% had heard of virtual banks and 23% even expressed their reluctance to use virtual banking services. More seriously, according to a study by QBE Hong Kong, 47% of SMEs have no interest in expanding their footprint beyond Hong Kong and 59% were found to operate only in the city. Their ambitions rest mostly within the domestic market, therefore missing out on expansion and growth opportunities in the international arena.

On the contrary, more SMEs in the ASEAN region are increasingly using digital technology to support their traditional operations. They are using apps, developing websites and using platforms developed by digital firms to reach out more effectively to customers and the market. Examples are Javara of Indonesia and Suffy Dairy of Malaysia. Some SMEs have entered into digital businesses by connecting digital SMEs with traditional ones. Examples are 99%SME eMarketplace of Singapore and Acudeen of the Philippines.

Singapore SMEs are turning to new technology offerings to improve their business processes, ranging from payment solutions, accounting and even the way they interact with customers. Development Bank of Singapore (DBS) has developed digital solutions or teamed up with other providers to offer solutions to SMEs that catered to their financing and marketing needs. DBS also created a mobile social network for start-ups and SMEs to seek advice from a global network of business experts, seasoned entrepreneurs and investors. A survey by the Singapore Business Federation revealed more than 80% of SMEs are looking to expand their business overseas. Many SMEs there are now seizing the region's dynamic growth opportunities.

2. Solutions

Digital skills are critical to enabling SMEs to understand the opportunities available in the digital age but *digital transformation of SMEs is indeed not easy*. More than 80% of the companies cannot achieve expected results. Lack of clear direction and strong leadership with vision, and the inability to adapt to change are some of the key reasons suggested by Herbert Chia of Sequoia Capital China. Governments could help in this direction. As pointed out in the ASEAN Investment Report 2018, governments can play a key role in increasing the digital awareness of SMEs and supporting them to use digital technology. ASEAN countries are taking various initiatives to help their SMEs use technology to connect digitally and to markets. In fact, ASEAN governments have helped set up tech hubs of various forms to support SMEs, start-ups and tech entrepreneurs. There are 14 tech hubs in both Myanmar and Indonesia, 34 in the Philippines, 37 in Vietnam, 38 in Thailand, 39 in Malaysia, and 51 in Indonesia, according to the figures provided by the GSM (Global System for Mobile Communications) Association.

VII. Challenges Facing Hong Kong

Digital transformation is not a choice but a must in the digital era. The DSR initiative provides a stronger reason and a better environment for Hong Kong to go through this transformation process. Needless to say, there are many tough challenges ahead but a fundamental one to be highlighted is the macro environment.

Local Macro Environment

The local macro environment is essential for Hong Kong to fully leverage its unique role in the DSR initiative is the one country, two systems structure. The importance of this structure to the success of Hong Kong in riding on this DSR opportunity cannot be overstated. Yet what counts is not how good Hong Kong believes it is in upholding the structure, but how its efforts are perceived by DSR countries and the rest of the world. Therefore, strengthening the credibility of the structure and the confidence in it is of the utmost importance.

Global Macro Environment

The global macro environment detrimental to the DSR initiative is deglobalisation, in particular the China-US tension, leading to a possible decoupling of the two nations and the emergence of two competing tech systems – those of China and the US. Indeed, the Business School Dean of Wharton, Professor Geoffrey Garrett, published an article in 2018 with the title “The ‘Trade War’ is Really About the Future of Innovation”. People like Google’s former CEO Eric Schmidt and Taiwan’s Terry Guo Tai-ming, Founder of Foxconn, also envision two types of 5G in the future – China 5G and US 5G. On one occasion, Guo commented that the future would only have G2, China and the US. In the world of unicorns, the US accounts for 60% and China 25%, together accounting for the vast majority.

However, splitting of the tech systems into two is highly detrimental for the digital transformation era and global development, no matter which system ultimately prevails or dominates. Globalisation through joint development should be the way to go. A case in point is Fabian Vandenreydt, the Executive Chairman of B-hive (a collaborative innovation fintech platform of 13 major financial players including SWIFT and the Belgian government), who advocates collaborations of various European fintech hubs to accelerate the growth of fintech innovation. He argues that the ability to collaborate with other hubs is key to success in the fintech industry as collaboration between important fintech hubs in Europe enables companies to find the right people with the right expertise and to grow and expand. By staying connected he envisions that Europe can compete with China and the US. On the other hand, Wharton’s Dean Professor Geoffrey Garrett commented in the article mentioned earlier that, “It does not matter ‘who wins’ in innovation, because the whole world will benefit from more innovation no matter where it comes from.”

The DSR initiative is not meant to compete with anyone, and “co-opetition” helps healthy development, as suggested by smart city expert Dr Winnie Tang. Through co-operative competition, competing parties can both gain. The fact is, digital technologies are developing fast and so are the applications. No one has everything and focusing on mutual competition will

only lead to protectionism, causing a shrinkage in the global digital economy. Genuine collaborations help grow the ecosystem in which everybody gains. The DSR initiative, after all, aims to “construct a community of common destiny with mankind”.

VIII. Conclusion

The world has entered into an era of digitalisation. Digital transformation is not a choice but a must. Digital technology fundamentally transforms our traditional local ecosystems. Digitally enabled ecosystems built on GNSS, 5G, AI and cloud computing greatly enhance global connectivity to literally bring the world together as one and turbo-charge the world economy. Digital technology can help many developing countries overtake others and gain late-mover advantage.

China has fully engaged in this transformation process and proposed the DSR initiative just two years after the launch of the BRI. It is of great importance to realise that the DSR is not just part of the BRI but a much bigger initiative. It represents a fundamental change and uplifting of global economic growth and development path. Unlike the BRI build-up that is large in scale, involving huge capital outlay and a long-term investment, digital investments once built up have marginal costs close to zero but earn significant economies of scale and scope with relatively fast and high returns.

Yet, for the DSR initiative to succeed, it needs both the technological infrastructure and the superstructure of mutual understanding and mutual benefits among DSR countries. This gives Hong Kong a unique role to play as a super-connector and the digital gateway of the DSR, given Hong Kong has long been a multi-cultural, international city with strong ties and credibility built between both mainland China and DSR countries.

Hong Kong also has a unique advantage that no other DSR countries possess – being part of the GBA, which immediately allows Hong Kong to tap into a huge market next door on the one hand, and the most advanced digital technologies and the corresponding talent pool in China on the other. Such advantage facilitates Hong Kong tremendously in transforming itself into a smart city and exporting the successful technologies and experiences to ASEAN and DSR countries to enable them to gain late-mover advantage.

Leveraging the unique advantage to play out its unique role as the DSR digital gateway, Hong Kong itself faces its once-in-a-lifetime unique opportunity to make contributions and ride on this era of global digital transformation. If Hong Kong does it right, it will not only find its new engine but will also fundamentally transform itself and take a quantum leap to a completely new economic path of growth towards a “smart economy”.

Naturally, all of the above will not happen overnight but, ultimately, the full potential of digital ecosystems to foster inclusive growth of the world economy will be realised.

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