

Envisaging futuristic solutions for the creation of smart and sustainable cities



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Embassy of Switzerland in China
瑞士驻华大使馆

swissnex
network 



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER
**State Secretariat for Education,
Research and Innovation SERI**

Introduction

The two terms, 'smart' and 'sustainable', have considerably gained the attention of governments in the Asia-Pacific region. The increase of population in metropolitan cities such as Seoul, Singapore, Tokyo, Sydney or Beijing require sophisticated solutions to guarantee a well operating ecosystem. Meanwhile, growing concerns about climate change and pollution have urged municipalities to think of sustainable methods on urban development and improvement of livelihood. Technological progress such as AI, 5G networks or cloud technologies, allow approaching these challenges in an innovative and 'smart' way.

General trends

Apart from focusing on sustainability, smart city solutions have shown different characteristics and trends in the Asia-Pacific region:

Country-wide inclusiveness

Smart city concepts are increasingly being applied to rural towns. For instance in **Australia**, while Sydney, Melbourne, Adelaide and Brisbane are developing comprehensive smart city strategies, smaller towns implement ad hoc small-scale smart city projects. Similar to Australia, **India** has chosen smaller tier 2 compact cities as testing grounds so that the model deployed can be replicated to bigger cities. While in Japan, the solutions developed for smart cities are likely to be applied to rural areas where the less dense population is aging rapidly. The inclusion of citizens is an important aspect of the Japanese government's Super City Initiative. For being accepted, the project proposal should fulfill certain conditions. For example, the project should cover at least five areas in the daily life of ordinary people (e.g. Transportation, Logistics, Payment, Administration, Medical

and Nursing Care, Education, Energy and Water, Environment and Waste, Crime prevention, and Disaster Control and Safety), and that the future societies must reflect the viewpoints of its residents.

Streamlining government services and renovating infrastructure

Popular smart city solutions are those focusing on improving communication between the city administration and its citizens, improving city services (garbage collection, parking, traffic, etc.) or renovating existing infrastructure. Measures have been taken in many countries to address the bureaucratic obstacles. **Japan** has passed a bill that allows swiftly overcoming bureaucratic obstacles for accepted projects. **India** is also improving the communication channel between central and local governments to increase cooperation efficiency. Furthermore, **India** has rolled out the Smart Cities Mission (SCM) with the intention of retrofitting the current city infrastructure by providing, in particular, affordable housing, environment friendly

Smart city solutions
can be applied to
almost every aspect
of our daily life.

”

transport solutions, clean sanitation, etc. Meanwhile, **Singapore** is studying intelligent infrastructure systems through international cooperation. A research program on Future Resilient Systems (FRS) is ongoing from the Singapore-ETH Centre. The main objective is to develop methods and tools to make infrastructure systems more robust and resilient with the help of digitalisation, data acquisition analysis and intelligent advisory abilities that interact with users and operators. In **China**, by signing smart city development strategies and contracts, government and enterprises promote the process of smart cities together. The government has more of a guiding role. For example, Alibaba Cloud will work with the Shanghai government to cooperate in fields such as smart government, industry internet platforms, social governance, and traffic management.

Special focus on green environment and medical technology

Smart city solutions can be applied to almost every aspect of our daily life. Considering the severe global environmental issues we are facing nowadays, smart city solutions offer us a gateway to a greener environment.

Funding Mechanisms

Funding support from governments is essential for sustainable development. Countries in the Asia-Pacific region have shown their long-term commitment to developing smart and sustainable cities by providing sufficient funds. In **Singapore**, the government committed \$16 billion from 2011 to 2015 to establish the country as a global

Companies are encouraged to develop smart technology to reduce industrial waste and develop sustainable materials for increased recycling and upcycling. For instance, CO₂ emissions can be reduced through Green IoT technologies and smart public transportation. Big data analysis is also used for real time air quality monitoring. Specific project example includes City Developments Limited (CDL), a real estate developer in **Singapore**. CDL donated a total of \$2.25 million to set up two new research laboratories in partnership with the National University of Singapore. The NUS-CDL Smart Green Home will focus on engineering innovations to enhance green living indoors. Except the environmental challenges, medical technology is another trending area. Hospitals in **Korea** have started cooperating with giant mobile carriers to expand the use of 5G technology into the medical sector. Smart technologies in public health, equipped with 5G network, IoT, VR and AI technologies, will lead to smarter and faster medical data sharing, cleaner and safer hospitals, and a more comfortable patient-care system.

research and development (R&D) hub through the Research, Innovation and Enterprise (RIE) 2015 Plan. The government will sustain its commitment to RIE and will invest \$19 billion for the RIE2020 Plan from 2016 to 2020. 'Urban Solutions and Sustainability (USS)' is one of the four strategic technology domains, where funding will be prioritised



to create new urban mobility solutions. In **Korea**, the project 'Smart City, Seoul' will cost 1.4 trillion won (approx. \$1.2 billion) from the government. And, in May 2019, Siheung city also announced its plan to invest 42.5 billion won (approximately \$34.5 million) by 2022 and carry out the project in the fields of environment, energy, living welfare, data and smart city business model development.

However, as smart cities continue to replace traditional infrastructure and global funds become smaller, governments have started seeking innovative funding mechanisms. Public-Private Partnership (PPP) models are widely applied in different countries. The collaboration between governmental agencies and industry is also highlighted in **Singapore** to create economic value and to establish the country as an international hub for sustainable urban solutions. Equity co-investment schemes and research consortia formed by industry and research performers will be supported to stimulate and to commercialise these urban solutions.

In the city of Pune in **India**, three projects have been recently approved including one PPP model project where there is no financial burden on the Pune Municipal Corporation (PMC) or the citizens of Pune. All the expenditure will be taken care of by the developer. Similar stories have emerged from **Japan**, where smart cities are partly

funded by the central government as well as companies such as Panasonic, Toyota Motor, Sumitomo Corporation, Mitsubishi Heavy Industries, NEC, Softbank and NTT etc. Fujisawa Sustainable Smart Town, the first Japanese smart city built from scratch, cost 60 billion yen (\$740 million) and went into operation in 2014. A total of 18 companies including Panasonic led the development. Because of the companies' contribution, 1000 households in town can make use of solar panels, batteries for energy storage, LED lightning, ride-share services and other smart technologies. Cities are better positioned to attract private investors when the sustainable projects already have local government supports.

In **China**, local governments are more than willing to cooperate with leading internet companies, namely Alibaba, Baidu, Tencent, JD.com, etc. With the advanced cloud computing, AI, IoT and digital solution capabilities of these big companies, smart cities are in rapid development. The municipal government of Shanghai and Alibaba signed a strategic cooperation agreement to explore cloud computing to set a global benchmark for a megacity streamlined by smart technology. Alibaba Cloud will work with the Shanghai government to cooperate in fields such as smart government, industry internet platforms, social governance, and traffic management.

Smart City Projects with Smart Technology

Smart technologies help cities to unlock new solutions and approaches. In the Asia-Pacific region, countries have taken steps towards building sustainable cities with advanced smart technologies. Specific projects vary on

a country-to-country basis. Several pilot cities are already in full operation in Southeast Asia and have drawn the world's attention. Korea's Seoul Metropolitan Government (SMG) was nominated 7 times in a row as the

world's best e-government city and is now trying to push itself as a leading smart city under the city government's project 'Smart City, Seoul'. Under the lead of SMG's effort, cities like Busan, Sejong and Siheung are also widely implementing smart industrial ecosystem with technology from the 4th industrial revolution. Siheung City summarises the aim of its Smart City Project as "safe city, convenient daily life and smart Siheung." In 2018, Siheung was selected as the only National Smart City Innovative Growth Engine Project's R&D demonstration city among 226 lower level local governments.

Meanwhile, through its concept of 'Society 5.0', Japan aims to cope with the challenges brought about by falling population and aging society. The Kashiwa-no-ha Smart City was inaugurated as early as 2006. The project involves public-private-academic partnerships that are jointly developing solutions to the challenges of environmental resources, energy and aging. It has more than 1800 residential buildings and features a next generation smart-grid that enables efficient energy storage, CO2 reduction and electricity availability after disasters. Another project that is scheduled to start in 2021 is Woven city, the energy-efficient and sustainable smart city in Shizuoka Prefecture. By combining Toyota's expertise as an automaker and NTT's communication know-how, the two companies aim to promote autonomous, zero-emission vehicles using 5G in Woven.

China is just building up its own experimental zone. Beijing unveiled a plan to create the Xiong'an New Area in Hebei province in 2017. Xiong'an is located about 100kms southwest of Beijing. It is now the testing ground for

innovative urban development models in China. In order to create an ecofriendly smart city, the integration of artificial intelligence, big data, IoT technologies and cloud computing has been emphasised in the planning and designing of the city. Alibaba's City Brain project is another example in China. The project is located in Hangzhou, and Alibaba is granted access to 104 traffic light junctions in the city's Xiaoshan district. Large amounts of data is gathered and processed by algorithms in supercomputers before the cloud brain determines how they (traffic lights) are to function. Eventually the data is fed back into AI systems around the city. As a result, traffic speed in the district was increased by 15 per cent during the first year of operation. Also, road accidents are now automatically detected so responses are faster and more efficient, while illegal parking is tracked in real-time. The City Brain project is now implemented in 23 cities in Asia.

Despite limited resources and a growing population in a limited land area, the city-state, Singapore, continues to develop numerous strategies and initiatives to ensure that town planning and development take place in a sustainable manner. According to the latest IMD Smart Cities Index, Singapore topped

Smart technologies
help cities to unlock
new solutions and
approaches.

”



the ranking as the world's smartest city. The expansion of 5G technology is one of the key factors. They plan to roll out commercial 5G services starting next year and are on track to offer nationwide 5G coverage by 2025, with at least 50% of the city-state covered with a standalone network by the end of 2022. Punggol, a whole area in the north of the country, has been designated as a Strategic

National Project for Smart Nation and is set to become a tech-enabled, sustainable town showcasing Singapore's Smart Nation ambitions. The 50-hectare Punggol Digital District is on track for completion by 2023 and will serve as a living lab to test out new concepts such as 'Smart Transport System', 'Next Generation Business Park', etc.

Table 1: Smart City Index 2020 (Source IMD, 2020)

City	Smart City Rank 2020	Change from 2019
Singapore	1	▲ (0)
Helsinki	2	▲ (+6)
Zurich	3	▼ (-1)
Auckland	4	▲ (+2)
Oslo	5	▼ (-2)
Copenhagen	6	▼ (-1)
Geneva	7	▼ (-3)
Taipei	8	▼ (-1)

City	Smart City Rank 2020	Change from 2019
Sydney	20	▼ (-4)
Hong-Kong	32	▲ (+5)
Seoul	47	▼ (0)
Kuala Lumpur	54	▲ (+16)
Shenzhen	67	▼ (-24)
Tokyo	79	▼ (-17)
Beijing	82	▼ (-22)
New Delhi	86	▼ (-18)

Risks and Barriers

Outdated Infrastructure

Outdated infrastructure has become a major problem in adapting smart technologies. Sensor technology is critical in smart cities for data collection and analyses. However, decades-old infrastructure will not be able to provide necessary support to install and

maintain these sensors, not to mention smart solutions like solar power, battery storage, etc. Taking into account the scale and size of countries like **China** and **India**, the unbalanced development in different regions is slowing down the speed of smart technology deployment. Technical glitches

also tend to cause inability to implement smart projects to their full potential. For instance, the CBRFree WiFi in Canberra, one of Australia's largest free outdoor public WiFi networks, is slow and impractical to use. In many cases, the 'smart-technology-ready' infrastructure is complicated and costly and the approval process may take years. All these factors have made some second/third tier cities reluctant to renovate their infrastructure.

Data Privacy

Big data is the key for innovation in the modern world, and smart technologies are no exception. Data collected by smart sensors, cameras installed on every street, etc., have increased privacy concerns among the public. Eight of the world's top 10 most-surveilled cities are in **China**. Up to 626 million cameras are expected to be in use by 2020. It does help in crime detection and prevention, but it also makes you feel you are being 'watched' 24 hours a day. The advanced facial recognition technology and the amount of data that government has access to, aggravate people's fear of leaking personal information. Public's confidence in the storage and use of data by the administration is shaky. How to balance innovation and privacy is the question that needs to be answered in the future.

Social Inclusion

It is important that smart city planning considers all groups of people, and not just the affluent and technologically savvy. In an

aging population, smart solutions should be inclusive across social boundaries (income disparities or education levels). In **Korea**, the discrimination against elderlies and disabled who are relatively apart from rapid changes in technologies, exist. For instance, smart ordering services through electronic kiosks are reported to limit the usages by elderly or visually handicapped people, and many aged citizens must either make the extra effort to catch up with the new technologies or decide to purely rely on the help of their children from the younger generation.

Talent Shortage

The availability of people with the required skills to carry out Smart City projects has emerged as a critical challenge for local governments. In general, digital skills and smart city leadership are perceived as lacking in the public sector at all administrative levels. A community with a 'sustainable development' mindset should be formed so that the citizens can be more engaged in the process and up-to-date with the newly released technologies. Take **China** for example. Smart city development is heavily government-driven and the government is in need of high-tech talents providing smart city solutions. According to a report published by Tsinghua University, China is in shortage of qualified talents in the big data field. In 2019, the Ministry of Education has approved 35 universities to offer degrees in AI. In 2020, the number jumped to 180. AI has now become the fastest expanding discipline.

nextrends Asia

Ideas & insights from the East

© 2020 swissnex Network in Asia

The swissnex Network in Asia collaborates with a broad spectrum of partners related to international research and innovation, supporting them in their outreach and active engagement in the global exchange of knowledge, ideas and talent. swissnex is an initiative of the State Secretariat for Education, Research and Innovation and is part of the Confederation's network abroad managed by the Federal Department of Foreign Affairs. The activities of the swissnex Network in Asia are based on a collaborative approach, relying on public and private partnerships and funding.