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Trends for smart city strategies in Emerging Asia

Tadashi Matsumoto,
Jonathan Crook,
Kensuke Tanaka

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By: Tadashi Matsumoto, Jonathan Crook and Kensuke Tanaka

Smart cities represent the future of urban development in Emerging Asia as more and more cities and countries resort to smart technologies to build more efficient and liveable urban environments, boost economic growth, foster well-being and facilitate citizen engagement. Policy makers in the region have adopted plans to develop and promote the use of technology to organise and run urban areas. Governments have also provided significant financial backing to smart city projects, acknowledging the importance of public support in this field. The development of smart cities offers significant prospects to tackle enduring issues faced by Emerging Asian cities in policy areas such as transport, the provision of public services, education, healthcare and utilities.

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Introduction

This working paper discusses smart city strategies in Emerging Asia (Southeast Asia, China and India).[1] Since the 2008 global financial crisis spurred the development of a generalised smart city concept (UNDP, 2017), a wealth of definitions of – and approaches to – smart cities has been developed and used. This working paper defines smart cities as "initiatives or approaches that effectively leverage digitalisation to boost citizen well-being and deliver more efficient, sustainable and inclusive urban services and environments as part of a collaborative, multi-stakeholder process" (OECD, 2019a).

Around the world, governments are making cities "smarter" by leveraging data and digital technology to build more efficient and liveable urban environments, boost economic growth, foster well-being and facilitate citizen engagement. Indeed, as digitalisation evolves, smart cities are increasingly viewed as unprecedented opportunities to drive economic growth and enhance citizen well-being in cities. Emerging digital technologies such as the Internet of Things (IoT), big data analytics, artificial intelligence, energy-storage technologies and blockchain technology are having a major impact on smart city strategies in urban hubs and regions. The opportunities created by digital innovation in urban areas are well-documented both in the literature and from concrete practices. Examples of innovation include: smart grids that improve the management of energy consumption; smart meters and pipes that help track water quality and detect leaks; smart sensors that improve traffic flow, transport efficiency and garbage truck routes; e-career platforms that provide broader access to job opportunities; telemedicine and video-consultations that improve health outcomes and lower healthcare costs; mobile applications that allow citizens to report problems in real-time and engage directly with city services.

However, digitally-driven innovations can also pose acute challenges to policy makers. Without a multi-sectoral perspective, these innovations can: deepen inequality among digitally marginalised groups; upend legal and regulatory frameworks safeguarding affordability objectives, consumer protection, taxation, labour contracts and fair competition; and pose risks for data security and privacy. With urban populations growing and infrastructure under strain, the smart city movement also influences how policy makers and other stakeholders address mega-trends such as globalisation, rapid urbanisation, ageing population, climate change and digitalisation. Therefore, to capitalise on the opportunities, governments will need to have a much deeper understanding of what smart cities can offer their constituents – as well as the potential benefits and risks – and to incorporate this understanding in their policies.

No single level of government can do this alone. From a public policy perspective, subnational governments are on the frontlines of advancing the smart city agenda. Indeed, they are responsible for most local public services that stand to gain from digitalisation. The national government can work closely with subnational governments to enable and support them. Moreover, being closer to citizens than national governments, subnational governments can make use of technological advancements to connect different stakeholders to citizens. As such, citizens can become involved in the development of their cities and regions, while public services can become more citizen-centric. This is key to ensure that digitalisation is pursued as a means for improving the lives of citizens rather than as an end in and of itself.

This working paper examines current policy trends at the national and subnational levels in the aim of offering key takeaways for policy makers and includes three parts. After the introduction, it presents the analytical framework needed to design and implement smart city strategies (promoting a territorial approach). Then, the working paper presents the results of the assessment, focusing on the six countries (China, India, Indonesia, Malaysia, Singapore and Thailand) that have already developed dedicated smart city strategies at the national level. Where possible, the working paper also presents subnational smart city

[1] In the context of this paper, "Southeast Asia" refers to the countries comprising ASEAN: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Viet Nam.

strategies and practices in Emerging Asia and from OECD countries. Given the complexity of smart cities and the current urban policy and governance contexts in Emerging Asia, sharing global best practices and learning from the experience of peers is undoubtedly useful to policy makers.

Promoting a "territorial" approach

This section aims to present the framework that was used for assessing national and subnational smart city strategies in Emerging Asia, based on promoting a "territorial approach". This approach is essential for national and subnational governments when designing and implementing their smart city strategies.

Based on a literature review, certain key features of a territorial approach can be summarised as follows:

Focusing on the needs for cities and regions. Cities and regions are primarily responsible for providing services (Figure 1) and there are certain policy areas (e.g. education, health) where cities and regions have a strong role to play in general (Figure 2).

Addressing diversity and disparity across – and within – all countries. Taking into account the diversity of contexts across all countries is key for inclusive digitalisation (OECD, 2018a). In Emerging Asia, the rates of internet use among the population varies and such gaps exist not only between countries but also across cities and regions within the same country. In Viet Nam in 2014, only 21% of households had access to the internet on a national level compared to 42% in urban areas (OECD, 2018b). Wages per capita in Ha Noi and Ho Chi Minh City were almost three times higher than Viet Nam's country average (OECD, 2018b). It is also important to note that subnational government structures in Emerging Asia vary tremendously from one country to the next. For example, there are more than 250 000 municipalities in India, while Malaysia only has 149 local authorities. The average population of a local level government varies from 2 359 people in Philippines to 500 894 in Indonesia (OECD/UCLG, 2016). Such diversity clearly underlines that the "one-size-fits-all" approach does not work.

Pursuing citizen engagement and collaborative partnerships. Smart city technologies can boost civic engagement through citizen participation and feedback, co-creation and coproduction models, as well as citizen-centred services and engagement platforms. They can also experiment with public access to open data and other forms of collaboration among diverse actors. London is among the most active in the development of various services and infrastructures through private finance. Indeed, Londoners can participate as developers and as investors through the crowdfunding platform "Funding Options" (OECD, 2018c).

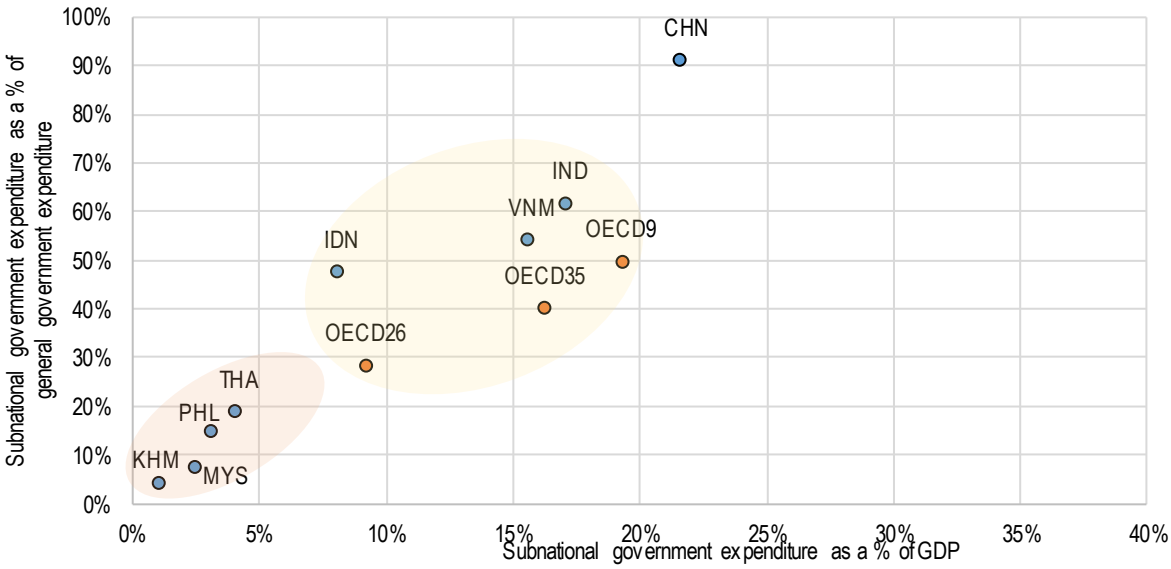
Establishing an integrated, holistic approach. The digital technologies underpinning smart cities are designed using a silo approach specific to individual sectors such as transport, education, healthcare, utilities and other public services, rather than considering the broader, cross-sectoral urban contexts. A territorial approach avoids the missteps of a sectoral approach by applying digital innovation to a city's governance, planning, and investment system as a whole in an integrated manner.

Developing a clear understanding, and allocating responsibilities across levels of government. Subnational governments often understand local specificities better than national governments. They can also better engage their constituents, which fosters inclusiveness. National governments play a significant role in developing a legal framework and providing assistance to cities and regions. With a clear understanding of who should do what, different actors can work together and reduce inefficiencies and misaligned policies. Coherent national strategies that align regulation and investment and cut across relevant policy fields are known to yield positive results. Korea is a successful example of a national government pursuing a co-ordinated approach focused on developing smart cities, applying smart technologies to solve urban challenges and developing a global market for smart services and technologies. Similarly, cities such as

Seoul and Busan are embracing smart city solutions and collaborating with the national government on a number of testbed initiatives with the aim of rolling out successful examples across the country. Similar approaches are being implemented in Japan, in Europe and in the United States (OECD, 2018c).

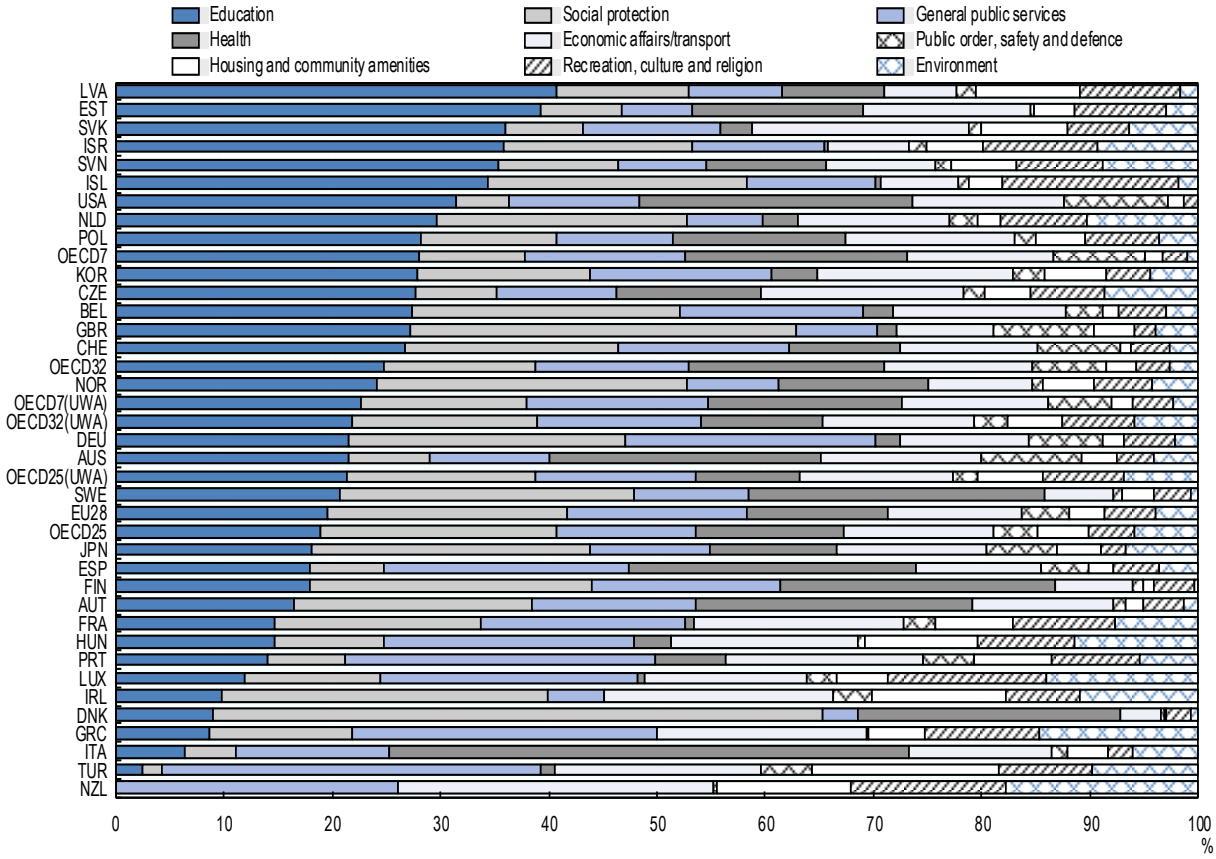
Tracking progress at the city and regional scales. An integrated and holistic approach will require increased capacity and skills for collecting, storing and analysing data. This adds to the associated digital infrastructure, computing power and data scientists that are also required, which may pose a challenge for cities with limited capacity (OECD, 2019b). Data and information at the city level can be compared to data and information from the regional level to see if there is a gap. Data can also be compared with other peer cities to ensure that smart city strategies do not widen the gap between cities. Commonly defined data can also facilitate international comparisons and benchmarking. However, the fact that there is no common definition of a smart city makes it difficult to develop a common methodology to measure smart city advancement.

Figure 1. Breakdown of subnational expenditure as a share of public expenditure, 2016



Source: Authors' compilation based on OECD/UCLG (2019), OECD-UCLG World Observatory on Subnational Government Finance and Investment.

Figure 2. Breakdown of subnational government expenditure by function (COFOG), OECD countries, 2015



Source: OECD (2018d), *OECD Regions and Cities at a Glance 2018*.

Smart city strategies in Emerging Asia

This section presents an assessment of national and local smart city strategies in Emerging Asia, based on the approaches described in the previous section. The methodology for the assessment relied on desk research reviewing OECD publications, research papers, and national and subnational smart city strategies obtained through government websites. At the national level, the assessment considered not only explicit or dedicated national smart city strategies but also national development plans and strategies, since in many countries elements of smart city strategies are incorporated into the broader framework of these plans and strategies.

The analysis found that smart city strategies tend to be developed at the national level in Emerging Asia (Table 1). It found that all of the countries studied have included an element of smart city development in their national development plans and strategies. At the very least, every national development plan describes a strategy for improving ICT or e-government services. In addition, six of the 12 countries have a dedicated smart city strategy, namely China, India, Indonesia, Malaysia, Singapore and Thailand.

In terms of scope, the assessment found that smart city strategies in Emerging Asian countries are at varying stages of advancement, with those of China and Singapore being the most comprehensive,

followed by those of India, Indonesia, Malaysia and Thailand. In terms of institutional arrangements, this assessment has also found that these strategies have not explicitly spelled out the roles of subnational governments or the allocation of responsibility across levels of government in the development of smart cities. For instance, resource and investment allocation at the subnational level remains unclear. Moreover, few national strategies have addressed either diversity between places within a country or challenges faced by different population groups in a country. However, a comprehensive follow-up would be required to determine whether such multi-level coordination also exists in practice. Below, the results of this assessment of the smart city strategies of six countries are detailed. As the strategies of Indonesia and Thailand have only been published in the original language, access to further documentation would be required in order to assess them in greater detail.

Table 1. National-level smart city strategies in Emerging Asia

Country	Name of strategy	Type of strategy	Description of strategy
Brunei Darussalam	Wawasan Brunei 2035/Brunei Vision 2035	National development strategy	The long-term development plan has no explicit focus on smart cities but consists of 13 strategies, which includes "strategy 12 on infrastructure and info-communication technology".
	Strategic Plan 2018-2023	National development strategy	Core Strategy 3 is entitled "Leveraging on Information Technology to Streamline Operational and Process-Structure" and details a strategy to improve governmental e-services, to digitise key information in order to ensure accessibility and proper governance, and to develop a centralised database to enhance data integrity and security, among other plans.
Cambodia	National Strategic Development Plan 2014 – 2018	National development strategy	No explicit focus on smart cities, but it defines 4 key areas of development, of which the second, "Development of Physical Infrastructure", contains a strategy for the development of information and communication technology. The strategy aims to "strengthen the regulatory framework, build institutional capacity, modernize technical equipment base, foster competition, strengthen the efficient use of IT system and e-Government, and build and enhance the efficiency of the backbone infrastructure of the information and communication technology sector".
Indonesia	Movement to 100 Smart City	Explicit smart city strategy	Established in 2017, the plan involves a selection process and features three goals: Smart Connectivity (Infrastructure), Smart Solution (Environment, Governance, Citizen, Security, Education, Transportation, Health Care) and Smart User (Community). In 2017, 25 cities were selected for the first phase, and 50 were selected in 2018 for the second phase. Candidate cities that qualify will receive assistance from academics and a number of other institutions as well as mentoring to prepare a master plan.
Lao PDR	8th Five-Year National Socio-Economic Development Plan 2016 – 2020	National development strategy	One of the identified priority activities is to achieve integration of information and communications technology (ICT). ICT is viewed as a key to socio-economic development to facilitate communications and data transfer as a favourable condition for attracting investment, manufacturing and tourism. A focus is also placed on developing quality ICT networks with high speed services in all areas and to meet ASEAN and international technology standards. Further, an emphasis is placed on developing a system of ICT integration and internet connectivity with countries in the ASEAN region.
Malaysia	11th Malaysian Plan 2016 – 2020	National development strategy	The plan has a strategy devoted to "strengthening infrastructure for smart cities" to address specific challenges related to urban services such as transportation, utilities, waste management, greater connectivity and integration of services. The plan also specifies that the Ministry of Communication and Multimedia will develop a smart cities framework.
	Communications and Multimedia Blueprint 2018-2025	Smart services strategy	The plan details a smart services strategy. Two programmes have been identified to accelerate and broaden the creation of digital government services and bridge capabilities beyond the public service: 1) the "digital service unit" is a public-private initiative that will make a broader range of government services more easily available; 2) the "smart services working group" will orchestrate future smart service development efforts and co-ordinate activities among developers and providers and across agencies.
Myanmar	Myanmar Sustainable Development Plan 2018 – 2030	National development strategy	Launched in July 2016, the plan details twelve policies: policy 4 concerns the prioritisation of a digital government strategy and an e-government system, while policy 9 specifically aims to "build environmentally sustainable cities, upgrading public services

Country	Name of strategy	Type of strategy	Description of strategy
			and utilities, expanding public spaces, and making greater efforts to protect and conserve our cultural heritage". Strategy 5.6, "Manage cities, towns, historical and cultural centres efficiently and sustainably", consists of several actions which include promoting climate-resilient and low-carbon energy, transport and industrial systems and introducing an e-government system.
Philippines	Philippine Development Plan 2017 – 2022	National development strategy	"Accelerating infrastructure development", a key focus area of the plan, formulates a strategy to expand the deployment of ICT infrastructure and address the gaps in digital connectivity and to continue to enhance the country's e-government service.
Singapore	Smart Nation Initiative	Explicit smart city strategy	Launched in 2014, it consists of 3 key pillars: digital economy; digital society; and digital government. Within the framework of the initiative, there are 6 national projects: 1) national digital identity; 2) e-payments; 3) smart nation sensor platform; 4) smart urban mobility; 5) moments of life; and 6) the CODEX digital platform to deliver government digital services.
Thailand	Thailand 4.0 National Development Plan	National development strategy	Considers the pursuit of "integrated research on smart cities" as one of ten future industries to pursue within "Agenda 2: Development of Technology Cluster and Future Industries". Other groups of technology identified in the plan are smart devices, robotics, mechatronics, Internet of Things, Artificial Intelligence as well as other digital and embedded technologies.
	Digital Economy Promotion Masterplan 2018-2021	Explicit smart city strategy	Aims to shape a dynamic digital economy, with digital-ready workforce and greater digital awareness to propel change. The agenda focuses on smart cities and IoT development to achieve Digital Thailand. The 5 areas are: 1) Digital Infrastructure 2) Digital Government 3) Digital Manpower 4) Cyber Security 5) Digital Technology Developments.
Viet Nam	Sustainable Smart City Development Plan	Explicit smart city strategy	A Sustainable Smart City Development Plan was approved in August 2018 but has yet to be published.
China	13th 5-Year Plan (2016-2020)	National development strategy	The plan describes several smart city strategies and industries and the manner in which they will be supported through big data, IoT, e-government services and smart manufacturing transportation and energy.
	Guidance on Promoting Healthy Smart City Development	Explicit smart city strategy	Established in 2014, it lays out principles for smart city development in China, including strengthening comprehensive public services using smart technologies, promoting data collection and sharing on digital platforms, supporting law enforcement, including taxation compliance through smart technologies, and establishing e-government and online channels for citizens to express their opinions.
	New-Type Urbanisation Plan	Explicit smart city strategy	Released in 2014, the plan identifies the construction of smart cities as a priority. The critical applications for smart technologies in cities are identified as 1) broadband information networks; 2) informatisation of planning and management, including building public information platforms; 3) intelligent infrastructure in transportation, power, water and sewage, and pipeline networks; 4) convenient public services; 5) industrial development; and 6) social governance.
	Guidance on Accelerating "Internet Plus Government Services" Initiative	Explicit smart city strategy	Released in 2016, it includes a section dedicated to smart city development where it calls for 1) accelerating the development of new-type smart cities; 2) utilising technologies such as the Internet, IoT, Cloud Computing, Big Data, etc. in an innovative way; 3) building smart cities step by step according to their levels and types; and 4) establishing transparent and efficient service-oriented government.
	Opinions of the State Council on Improving Urban Planning and Development Control	Explicit smart city strategy	Released in 2016, it states that China shall develop a number of smart cities with distinct features by 2020 and the government should enhance digitalisation of city management and service system, facilitate fusion between city management service and emerging digital technologies such as Big Data, IoT, Cloud Computing, etc., and improve the efficiency of city governance and service quality.
India	Smart Cities Mission	Explicit smart city strategy	The strategic components of area-based development in the Smart Cities Mission are city improvement (retrofitting), city renewal (redevelopment) and city extension (greenfield development) plus a pan-city initiative in which Smart Solutions are applied covering larger parts of the city. USD 7.5 billion has been set aside for subnational smart city strategies. Each of the 100 cities will have a Special Purpose Vehicle with nominees of Central Government, State Government and Urban Local Bodies on its board.

Source: Authors' compilation based on government documents.

China

The proportion of China's population living in urban areas has rapidly risen from 18% in 1977 to 58% in 2017, illustrating one of the most striking examples of the global megatrend of urbanisation (UN, 2018). In the context of such rapid urbanisation, China published two national-level strategic documents in 2014: "Guidance on Promoting Healthy Smart City Development" and "New-Type Urbanisation Plan", which laid out principles for smart city design as well as specific technological uses of smart technologies that are also developed further in the 13th 5-Year Plan (2016-2020). Later in 2016, the State Council of China provided additional guidance on smart city strategies in two national development documents: "Guidance on Accelerating 'Internet Plus Government Services' Initiative" and "Opinions of the State Council on Improving Urban Planning and Development Control".

- The "Guidance on Promoting Healthy Smart City Development", jointly issued by the National Development Reform Commission and seven other ministries, lays out principles for smart city development in China, including strengthening comprehensive public services using smart technologies, promoting data collection and sharing on digital platforms, supporting law enforcement, including taxation compliance through smart technologies, and establishing e-government and online channels for citizens to express their opinions (UNDP, 2017).
- The "New-Type Urbanisation Plan" identifies the construction of smart cities as a priority in China's urbanisation strategy. The critical applications for smart technologies in cities are identified as 1) broadband information networks; 2) informatisation of planning and management, including building public information platforms; 3) intelligent infrastructure in transport, power, water and sewage, and pipeline networks; 4) convenient public services; 5) industrial development; and social governance (UNDP, 2017).
- Building on these plans, the 13th 5-Year Plan details how the development of big data, IoT, smart manufacturing, smart transport, smart energy, and e-government services will be further pursued within the context of "A New Style of City" prioritising green and smart cities (Central Committee of the Communist Party of China, 2015).
- The "Guidance on Accelerating 'Internet Plus Government Services' Initiative" dedicates one section to smart city development which calls for 1) accelerating the development of new-type smart cities, 2) utilising technologies such as the Internet, IoT, Cloud Computing, Big Data, etc. in an innovative way, 3) building smart cities step by step according to their levels and types, and 4) establishing transparent and efficient service-oriented government (State Council, 2016a).
- The "Opinions of the State Council on Improving Urban Planning and Development Control" states that China shall develop a number of smart cities with distinct features by 2020 and the government should enhance digitalisation of city management and service system, facilitate fusion between city management service and emerging digital technologies such as Big Data, IoT, Cloud Computing, etc., and improve the efficiency of city governance and service quality (State Council, 2016b).

Smart city initiatives are steered, monitored and evaluated by the central government, with funding provided by national ministries. For example, in 2013, the Ministry of Housing and Urban-Rural Development had designated 193 official smart city project sites, eligible for up to CNY 100 billion in funding (UNDP, 2015). As of 2017, up to 500 cities were selected as pilots, with a total estimated investment of CNY 1.6 trillion during the 12th 5-Year Plan (2011-2015) (Deloitte, 2017; UNDP, 2015). The ambitious multi-scalar scope of China's smart city programme is remarkable: large, medium and small cities have all featured as pilots, reflecting different contexts and forming smart city clusters. While a significant number of smart cities have been selected as pilots, highlighting the government's commitment to their widespread implementation, China's smart city initiatives remain overwhelmingly designed and funded by the

government. Limited private sector financial contribution thus places a significant financial burden on the central government.

Although there is evidence of horizontal co-ordination across national ministries for smart city implementation over several years, the extent of vertical co-ordination remains limited or unclear. The distribution of competences across levels of government is sometimes unclear and uneven, with further differences in hierarchal status across cities and provinces. This limits subnational authority and financial autonomy in implementing smart city initiatives. Delegation is the underlying basis of subnational governance, handed down by administrative directive from the central and provincial levels, which can be unpredictable and subject to modification, rendering municipal planning and budgeting difficult. Moreover, there is no legal requirement for co-ordination across levels of government, nor are there fiscal incentives for enhancing co-ordination or for promoting regional urbanisation initiatives (OECD, 2015; Kamal-Chaoui et al., 2009). However, in order to definitively assess multi-level co-ordination for smart city implementation, further follow-up is required.

India

India's Smart Cities Mission, launched in 2015, is an advanced strategy for the development of 100 smart cities based on retrofitting, redevelopment and greenfield development. It requires each city to develop its own locally-tailored vision. The national government has set aside USD 7.5 billion for the Smart Cities Mission, which comes under the purview of the Ministry of Housing and Urban Affairs. While many instances of national government support to smart city development involves prescribing areas where money should be allocated, India's Smart Cities Mission required every city that took part in the challenge to develop a vision, thereby allowing cities to play to their strengths. Through this national competition, cities sought funding from the national government for their context-specific ideas. However, the lack of a national-level master plan with a clear definition of what constitutes a smart city may lead to a lack of co-ordination across cities as well as the development of silo approaches to common issues. Not only is India's strategy ambitious in scope but it is also a good example of co-operation between the national and subnational levels of government in the development of smart cities.

Following the selection process, winning cities carry out their smart city plans through special purpose vehicles (SPVs) created by urban local bodies to oversee the implementation process at the city level. Each of the 100 cities will have an SPV (headed by a full-time officer) that includes, on its board, representatives of the central, state and local city governments (India Ministry of Urban Development, 2015). The SPVs were established to ensure transparency and multi-level co-ordination because they foster autonomy in the implementation of each mission.

Digitalisation – a key global megatrend with significant implications for smart city developments – is highlighted as an important feature in the Smart Cities Mission. In fact, part of the programme ensures that each selected city will have a Smart City Centre (SCC), which acts as an integrated command and control hub. Digital technologies are integrated into the city's social, physical and environmental policies, thus enabling centralised monitoring and decision-making. As of July 2018, SCCs had already been set up in ten cities (Naya Raipur, Ahmedabad, Vadodara, Surat, Pune, Nagpur, Rajkot, Visakhapatnam, Kakinada, and Bhopal) and a further 13 cities had begun the process of setting up their SCCs (Hindustan Times, 2018).

The Smart Cities Mission was designed in such a way that either the state government or the urban local body is required to match the sum – INR 1 billion per year for five years – provided by the central government (India Ministry of Urban Development, 2017). This design thereby grants the subnational government more responsibility, along with the associated potential difficulties and opportunities, as well as greater flexibility regarding how financing can be secured through, for instance, PPPs, user charges,

multilateral funding and other taxes. In this way, such a framework provides subnational governments with a degree of flexibility in pursuing their priorities.

Indonesia

Indonesia's "Movement to 100 Smart City" features a competition and selection process similar to those of India's "Smart Cities Mission". The plan was established in 2017 by the Ministry of Communication and Information Technology in co-operation with the Ministry of Internal Affairs, the Ministry of National Development Planning (Bappenas), the Ministry for Public Works and Human Settlements, the Presidential Staff Office, the Ministry of Finance and the Ministry of Economic Affairs. The plan includes three goals: 1) Smart Connectivity (Infrastructure); 2) Smart Solutions (Environment, Governance, Citizen, Security, Education, Transport, Healthcare); and 3) Smart Users (Community).

"Movement to 100 Smart City" begins with a selection process for cities or districts in Indonesia, after which the candidates undergo an assessment process in Jakarta to measure readiness to pursue each stage. Candidate cities that qualify will receive assistance from academics from the University of Indonesia, Bandung Institute of Technology, STIE Perbanas, and the Technology Research and Development Agency (BBPT) and a number of other institutions. Mentoring includes preparing a master plan that includes a Smart City Development Plan in each city or district on a 5-10 year horizon. Twenty-five cities were selected in 2017 for the first phase, and fifty were selected in 2018 for the second phase (Indonesia Ministry of Communication and Information Technology, 2018a; 2018b). In order to facilitate communication and data sharing among smart cities, the Ministry of Communication and Information Technology is currently preparing assessment for systems and applications used by cities.

At the subnational level, Bandung City has elaborated a "Smart City Bandung" vision, in which it defines its smart city approach as "the use of ICTs to connect, monitor efficiently and effectively and control a variety of resources that exist within the city in order to maximise service to citizens" (City of Bandung, 2015). The vision to develop Bandung as a smart city was initially spelled out in a strategic document entitled "Smart City Grand Design" and was later revised and incorporated into the 2013-2018 ICT Master Plan. This plan placed significant emphasis on e-government and basic digital infrastructure (OECD, 2016). As "Smart City Bandung" was tailored to local knowledge, it demonstrates the capacity of local governments to develop effective and relevant smart city strategies.

The Bandung Command Centre, the flagship smart city project for Bandung City, collects data on traffic and violations, emergency needs and the location of public utility vehicles (Box 1). Collecting input from citizens on a range of issues through social media helps authorities to identify problems and react to them more rapidly. It also increases citizens' participation and engagement in the city's smart city plans. This fosters citizen centricity and social inclusion, which remain at the core of a successful smart city. Involving inhabitants is especially crucial for a city like Bandung, where more than 120 000 people live in slums. The Command Centre is managed by the Information and Communication Agency of Bandung City, but each district of the municipality possesses a scaled-down version, as part of its strategy for local government to decentralise smart city actions. However, internal governance can be further improved as there is not enough involvement of line departments such as Bappeda, the Provincial Development Planning Agency (Badan Perencanaan Pembangunan Daerah), and those in charge of transport and environment issues. Likewise, one area of improvement is the data sharing and digital application alignment in order to minimise inefficiency (OECD, 2016).

Box 1. Bandung Command Centre

The Bandung Command Centre is Bandung City's flagship project for its vision to become a smart city. It was initiated in early 2015, in partnership with IBM and Institut Teknologi Bandung (ITB), one of the top universities in Indonesia. The Centre is similar to other command centres in Japan and Korea, which all aim to improve public services. The Centre consists of a digital control board that allows city staff to remotely monitor traffic and manage crises in the city (e.g. accidents, crime, etc.). Fifteen operators from the Bandung Telecommunication and Information Agency work permanently in the Command Centre, but it is also accessible to other city departments, such as fire brigades, police officers and transport agencies. It collects information from the street level to make informed decisions to improve such public services as ambulances, fire fighters and police intervention. The information is shown on a digital screen in the Command Centre. Two types of methods are used to collect street-level data:

- It uses CCTV cameras in streets and GPS tracking installed in school buses, ambulances, public buses and garbage trucks. For instance, a traffic violation could be easily spotted by the cameras and the information would be immediately transmitted to the Centre and appear on the screen.
- In addition to CCTV cameras and GPS tracking, social media is used by the Command Centre to collect information at street level. The Command Centre can be reached directly by citizens through Twitter, and they can transmit via their smartphones or computers any concerns they might have regarding safety and traffic (e.g., poor road conditions). Some of the information gathered by the Command Centre is also accessible to the public. The data collected through GPS devices in school buses can be viewed by the local population, so they can make an informed decision if a bus is held up by traffic. The Command Centre is being developed as the exclusive interface for communication between governments and local communities in the city.

The Bandung Command Centre also works as a data bank, storing information on traffic violations, road infrastructure conditions, safety performance, disaster frequency and locations, etc. It makes it possible to visualise the types of problems that occur most frequently in every district of the city, and make a performance assessment for each of them. In the future, smaller operational centres will be opened in each district, as part of a strategy to decentralise smart city tool management. The Centre is being developed in three stages, only the first of which has been completed; in the future, the Centre will be expanded so that it can manage other sectors.

Source: OECD (2016), *Green Growth in Bandung, Indonesia.*

With transport systems stretched to the limit and given challenges related to climate change, Bandung's smart city initiatives have largely targeted the transport sector (Table 2). A third-generation bicycle-sharing programme, an electronic parking system, smart cards and traffic visualisation are being developed; although as of 2016, they were still in the pilot or design stage. Bandung could become "smarter" through the use of digital technologies to analyse traffic congestion and commuting flows. It could also develop smart city initiatives that target the energy sector (i.e., reduce energy consumption and increase the use of more renewable energy sources) (OECD, 2016). In addition to e-government and digital infrastructure integrated on transportation and environment sector, Bandung's smart city initiatives also take into account

the tourism and economic sector. Projects in both sectors aim to improve city's competitiveness and to adapt to the rapidly changing economic ecosystem (e.g. increasing financial literacy through less-cash society programme).

Table 2. Bandung's smart city initiatives

Smart environment	CO_2 and CO emissions sensors Air pollution monitoring (in development) Digitalisation of clean water disaster reports GPS tracking of garbage trucks
Smart transport	Smart card (in development) Bicycle-sharing (pilot stage) Electronic parking (in development) Emergency services management
Smart governance	Bandung Command Centre Citizens communication through social networks Electronic remuneration and performance Electronic planning and budgeting Bandung Planning Gallery
Smart people	Video crime monitoring Panic button Digital classes Digital education administration Online administrative procedures (e.g., building permits, tax records) Counselling car
Smart branding	Stunning Bandung Thematic parks Bandung Technopolis (in development) Gadget Application Mobile for Licence
Smart economy	Little Bandung New entrepreneur portal

Source: OECD (2016), *Green Growth in Bandung, Indonesia*.

Malaysia

The 11th Malaysian Plan 2016-2020 has a dedicated focus area on "improving coverage, quality and affordability of digital infrastructure" with a specific strategy on "Strengthening infrastructure for smart cities". The Ministry of Communications and Multimedia has been identified as the responsible ministry for implementing smart city strategies across Malaysia. The strategy takes into account different cross-sectoral applications of smart city technologies, identifying specific challenges related to urban services, such as providing better transportation, utilities and waste management. To enable connectivity and integration of services, the strategy will focus on developing widespread broadband, sensor networks and applications. Data is also planned to be made available on an open basis to support analytics and planning as well as to create opportunities for businesses and individuals (Malaysia Prime Minister's Department, 2015). The Malaysia Industry Government Group for High Technology (MIGHT) is a good example of a national mechanism providing technical support. In 2014, MIGHT collaborated with the Malacca State Government to translate its Green City Action Plan into concrete business ideas with the private sector. Outside of Malacca, MIGHT has also engaged with other federal agencies in formulating smart city frameworks for different cities. In doing so, it integrates components that are designed specifically for each city, which facilitates the development of sustainable, competitive and green city models for cities across Malaysia.

The Ministry of Communication and Multimedia has developed a smart services strategy in its "Communications and Multimedia Blueprint 2018-2025". "Government service delivery" and "information communications" are two key focuses of the blueprint. According to the blueprint 1) the "digital service unit" is a public-private initiative that will make a broader range of government services more readily available and 2) the "smart services working group" will orchestrate future smart service development efforts and co-ordinate activities among developers and providers. It will facilitate co-operation across public and private stakeholders. An objective of the working group is to "help facilitate the approval process with local authorities", which indicates that multi-level co-ordination will be pursued. However, specific details regarding the role played by subnational governments remains unclear. The working group will also be made up of different stakeholders, who will help shape the governance model of the group, among other contributions. This indicates that the group will be based on principles of inclusion and engagement. However, details are scant and it is unclear which stakeholders (or which sectors) will be present in the working group, how participants will be selected, and what direct responsibilities they will have. This initial assessment thus finds that the smart services working group has potential in terms of stakeholder engagement and that the blueprint benefits from horizontal co-ordination, but that there appears to be a lack of vertical co-ordination regarding the role and inclusion of subnational governments in smart service strategy design and implementation.

Singapore

Singapore's status as a city-state is unique as there are no local governments. Rather, there is only one overarching national government responsible for the smart city strategies of Singapore. Despite the fact that this responsibility falls under the purview of the national government only, Singapore has a comprehensive smart city strategy from which other countries can draw lessons.

Singapore's Smart Nation Initiative is a comprehensive smart city strategy that was launched in November 2014. It reflects the country's efforts to improve the economy by ensuring that all segments of society can "harness digital technologies and benefit from these advancements" (Smart Nation Singapore, 2018). Within the framework of the Smart Nation Initiative, there are six national projects: 1) national digital identity (a system for digital operations with public and private sectors); 2) e-payments (a national e-payment infrastructure); 3) smart nation sensor platform (sensor and data development); 4) smart urban mobility (public transport); 5) moments of life (a personalised services for citizens to improve the government's digital services); and 6) CODEX (a digital platform to deliver government digital services) (Smart Nation Singapore, 2018). The three key components of Singapore's Smart Nation initiative are digital economy, digital government and digital society. Each initiative includes framework documents, which are, respectively, the Digital Economy Framework for Action, the Digital Government Blueprint and the Digital Readiness Blueprint (Box 2). The three components are intended to ensure a comprehensive and inclusive smart city strategy through the participation of the government, businesses and citizens.

Box 2. Singapore Smart Nation Initiative: Digital Economy, Digital Government, Digital Society

1. Digital Economy: Developed in 2018, the "Digital Economy Framework for Action" sets out to guide businesses and the workforce about how to adopt digitalisation in order to keep the economy attractive through the creation of opportunities. Organised around three principles – Accelerate, Compete and Transform – the plan lays out a strategy for Singapore to become a digital economy capable of reinventing and adapting itself to change. In addition to strengthening physical and digital infrastructure, the plan details programmes for (re)training the workforce as well as adapting policies, regulations and standards in a manner that intends to strike a balance between making Singapore competitive and protecting the public interest.
2. Digital Government: Launched in 2018, the "Digital Government Blueprint" details a multi-stakeholder and multi-level approach to building a digital government that "will be able to build stakeholder-centric services that cater to citizens' and businesses' needs". The blueprint details six strategies: 1) Integrating services around citizen and business needs; 2) Strengthening integration between policy, operations and technology; 3) Building common digital and data platforms; 4) Operating reliable, resilient and secure systems; 5) Improving digital capabilities to pursue innovation; and 6) Co-creating with citizens and businesses, and facilitating adoption of technology. The blueprint lays the foundation for engagement with the public, private and civil sectors: the priority for digital government is to be easy-to-use, seamless and secure for the private sector and civil society; while for the public sector, emphasis is placed on training public employees and on designing better policies based on data and hard evidence.
3. Digital Society: Published in 2018, the "Digital Readiness Blueprint" takes an inclusive approach by ensuring that citizens have the technical knowledge to use technology safely and confidently. Structured on the principles of digital access, digital literacy and digital participation, the blueprint sets out recommendations to enable citizens to tap into the opportunities that a smart city offers, and to keep citizens engaged in the country's efforts in adopting smart technologies. These recommendations include: customising digital services for those with specific needs; strengthening digital literacy; providing one-on-one assistance; supporting community projects; and reaching out to more citizens in a language that is easy to understand.

Source: IMDA (2018), Digital Economy Framework for Action; Smart Nation Digital Government Group (2018), Digital Government Blueprint; Ministry of Communications and Information (2018), Digital Readiness Blueprint.

An assessment of these framework documents underscores the Smart Nation Initiative's multi-stakeholder approach. Specialised courses and programmes have been established not only to teach coding and other digital skills to school children but also to retrain displaced workers. Beyond educating and retraining younger and middle-aged generations, applications and relevant information have been developed and conveyed in multiple languages and are geared specifically to elderly, disabled and low-income residents who may be at risk of exclusion from digital services. Given that the median age in Singapore is 40.5, the government has placed an emphasis on addressing the challenges associated with an ageing population (Box 3).

Reaching out to all segments of the population is a reflection of the Smart Nation Initiative's coherent and inclusive strategy, which aims to minimise the impact of the disruptions that can result from digitalisation. Indeed, social inclusion is a key feature of the initiative. For instance, the purpose of the Digital Readiness Framework is to improve citizens' quality of life. The framework documents also repeatedly identify

improving digital and physical infrastructure and cybersecurity while ensuring privacy of data as key focus areas. Regarding institutional organisation, the Digital Government Blueprint describes co-ordination measures between ministries, notably through increased sharing and alignment of data between ministries as well as the appointment of Chief Digital Strategy Officers and Chief Information Officers to lead and implement digitalisation plans within their ministries and respective agencies. Key performance indicators for digital government have also been identified that will evaluate stakeholder satisfaction, end-to-end digital options, end-to-end digital transactions, digital capabilities, transformative digital projects, as well as AI and data analytics.

Box 3. Ageing population in the ASEAN region

The projected median age for the entire ASEAN region in 2020 is 29.8 years and 60% of the ASEAN population is below the age of 35. In 2017, in Brunei Darussalam, just 4.6% of the population was aged 65 and above, and only 6.0% in India. In contrast, Singapore has the oldest society in the region with a median age of 40.5. In 2017 in the Southeast Asian region and China, the percentage of people aged 65 and over was respectively 12.9% and 10.6% of the total population. Nevertheless, most countries in Emerging Asia will be confronted with issues related to the ageing population in the near future.

Shifting demographics will entail a change in lifestyle and consumption patterns, as well as changing demand for housing, infrastructure and services, with particular stress on health and social care systems (OECD, 2018a). Smart technologies are being applied to support independent living for the elderly and monitor long-term health conditions with the intent to enhance citizen well-being and ease the stress on public budgets. In the OECD, younger people tend to dominate digital communication, content creation, social networking, online purchases, cloud computing, and software downloads, whereas older people are more frequent users of e-government and e-banking services (OECD, 2017).

Source: OECD (2018a), “The policy implications of digital innovation and megatrends in (smart) cities of the future: A project proposal”; OECD (2017), OECD Science, Technology and Industry Scoreboard 2017: The digital transformation.

Thailand

Thailand’s Digital Economy Promotion Master Plan 2018-2021 encompasses five different components: digital infrastructure, digital manpower, digital technology development, cyber security and digital government. The agenda propels Thailand towards greater digitalisation, through plans such as equipping 75 000 villages with internet (digital infrastructure), digital literacy training (digital manpower) and moving towards a paperless and cashless society (digital government). Smart city strategies are highlighted under the “digital technology” component, where Thailand has identified six smart city domains (Table 3).

Table 3. Six smart city domains identified in Thailand

Domain	Elements
Smart economy	Ease of doing business Networking Innovating
Smart living	Healthcare services Public safety Living comfort
Smart people	Digital awareness Lifelong learning Citizen centric
Smart governance	Accessible Citizen centric Transparent
Smart energy and environment	Efficient Green Environmentally friendly
Smart mobility	Safe and accessible Efficient Sharing

Source: Authors' compilation based on national sources.

Thailand's National Smart City Committee is constituted by the Office of Energy Policy and Planning (Ministry of Energy), the Digital Economy Promotion Agency (Ministry of Digital Economy and Society) and the Office of Transport and Traffic Policy and Planning (Ministry of Transport). Established in 2018, the committee had set and achieved a first-year target of establishing smart city action plans in seven pilot cities: Bangkok, Chachoengsao, Chiang Mai, Chon Buri, Khon Kaen, Phuket and Rayong (Tortermvasana, 2019). In March 2019, the Committee and the Digital Economy Promotion Agency convened to launch an event, "Smart City Thailand Takeoff", which marked the country's first open call for smart city proposals – with the definition of the application process and qualifying criteria – as well as the announcement of a new city data platform for smart city implementation with an expected launch date by the end of the year (Smart City Thailand Office, 2019). The event also established the committee's new targets for the upcoming years: the development of 24 total smart city plans in 2019, extending to 76 by 2022. Moreover, it was announced that the Digital Economy Promotion Agency, under the supervision of the National Smart City Committee, has initiated the establishment of a national Smart City Thailand Office in Bangkok (Digital Economy Promotion Agency, 2019).

At the subnational level, among the seven pilot cities, Phuket was allocated a budget of THB 386 million by the Ministry of Digital Economy and Society for its smart city programme. With this budget, high-speed internet services with at least 1 000 Wi-Fi hotspots are planned in 100 areas in Phuket. As Phuket is highly dependent on tourism, current smart tourism strategies include free public Wi-Fi and a drove of mobile applications such as "FlaminGO!", which informs both tourists and locals of what to do in Phuket (shopping, restaurants, sights to visit, etc.). Future plans include integrating data with the Smart City Data Platform.

Challenges for smart city strategies in Emerging Asia

Different cities have different strategies and focuses but cities will face a few common challenges (Table 4), as follows:

- Managing positive and negative impacts of smart city strategies
- A more holistic approach including a unified national-level master plan
- Lack of data and indicators at the subnational level
- Fostering peer learning through networks across and within countries.

Table 4. Key features of the smart city strategies assessed in this study

Country	Key features of smart city initiatives
China	Significant scope of 500 cities as of 2017 – with pilots including large, medium and small cities as well as smart city clusters – that have been equipped with a range of technologies (e.g. smart transport, CCTV). Strong national-level engagement with corresponding financial support, but a lack of private sector financial contribution places a burden on public expenditure. While there is evidence of horizontal co-ordination across national ministries, a lack of vertical co-ordination limits subnational authority and financial autonomy.
India	Broad scope (targeting the development of 100 smart cities) with the establishment of urban-led special purpose vehicles intended to promote transparency in decision making. Strong national-level engagement with corresponding financial support as well as flexibility regarding how local government can secure financing: the local government must match the sum provided by the national government but may do so via PPPs, multi-lateral funding, user charges, or other taxes. The bottom-up approach requiring each city to establish its own smart city vision empowers local government with competences and autonomy; however, the lack of a national-level master plan may hamper co-ordination and lead to silo approaches to common issues.
Indonesia	Broad scope targeting the development of 100 smart cities. The bottom-up approach allows cities to propose strategies adapted to local context that are subsequently subject to assessment. The lack of clear national-level smart city criteria and objectives may hinder co-ordination and lead to the development of silo approaches to common issues.
Malaysia	The lack of a national-level master smart city plan stands as an obstacle to the development of smart cities. A national-level smart services strategy identifies multi-stakeholder working groups that seek to promote multi-level co-ordination for the development and deployment of smart services but the participants and responsibilities of these working groups remain unclear. There appears to be a lack of vertical co-ordination concerning the involvement of local government in designing and implementing the smart services strategy.
Singapore	Comprehensive and advanced smart city initiative promoting a multi-stakeholder approach that accounts for key digital and socio-economic opportunities as well as challenges, including measures to boost cybersecurity, ensure data privacy and (re)train different segments of the population (e.g., displaced workers, low-income residents, students, the elderly). Co-ordination between ministries and agencies is promoted through the appointment of Chief Digital Strategy Officers and Chief Information Officers in order to share data and optimise co-ordinated decision making. Key performance indicators for digital government will assess a range of objectives such as stakeholder satisfaction, AI and data analytics.
Thailand	The lack of a national-level master smart city plan could slow development of smart cities. The current national development plan, Thailand 4.0, acknowledges the development of smart cities but has no explicit strategy *per se*, while Thailand's "Plan for the Promotion of the Digital Economy 2018-2021" details six smart city domains (economy, living, people governance, mobility and energy and environment) to be pursued. The range of themes covered in the six smart city domains reflects efforts to promote co-ordination and to limit silo approaches to common issues. The extent of multi-level co-ordination is unclear.

Source: Authors' compilation.

First, smart city strategies require a critical perspective focusing not only on the benefits emerging technologies can provide, but also the associated challenges posed by digitalisation, demographic change and globalisation, which are global megatrends that affect cities in profound and long-lasting ways (OECD, 2019b). In addition to implementation challenges concerning human, technical and governance capacity, there are also key considerations that need to be addressed concerning privacy, security, the future of work and accessibility among citizens of diverse backgrounds. For instance, Singapore identified that rapid digitalisation would have important repercussions for its ageing population and for workers in certain industries. Therefore, the Smart Nation Initiative specifically addresses strategies for retraining displaced workers and for providing relevant information in multiple languages across varied forms of media (e.g., theatre performances, classes, printed material, digital applications) in order to ensure that vast swaths of the population, such as the elderly, are not left behind.

Second, countries often lack a scope of "unified" national-level master plan that would provide a clear definition of a smart city (as well as smart city criteria and objectives). This shortcoming can stand in the way of co-ordination, which can unfortunately cause silo approaches to develop. For instance, while smart energy grids and transport are included in certain smart city strategies, they are not always considered within the framework of urban climate resilience and environmental sustainability, thereby missing important opportunities for synergy. Since urban climate resilience and environmental sustainability are often addressed in separate strategic documents, their integration into smart city initiatives would eliminate silo approaches and provide co-benefits that are especially important to consider in the context of climate change. In a similar vein, smart urban transportation initiatives can be integrated with land-use, urban planning and related policy frameworks (OECD 2018e). At the local level, it has also been observed that, partly due to the lack of a shared understanding of what constitutes a smart city, smart city strategies have not yet featured as a key component in public policy discussions and policy frameworks. The private sector has tended to focus exclusively on a technology-driven phenomenon: how digital innovation can improve city government operations and services. As a result, the smart city concept has been largely supply-side driven, with the private sector having "taken the lead role so far in defining both the problem and the solution" (Kleinman, 2016). A more holistic approach is needed in order to include a wider range of policy areas based on local needs and the potential that digitalisation can unlock.

Third, there is dearth of data and indicators at the subnational level. Data-driven assessments are needed in order to design better policies that take into account the opportunities and challenges that are unique to each local context. While mature smart city strategies, such as those in China and Singapore, have developed key performance indicators and collected data, the majority of the strategies analysed in this assessment have not yet collected sufficiently granular data at the local level. Going forward, each strategy thus needs to start by clearly prioritising what a smart city initiative aims to accomplish. Subsequently, relevant indicators should be developed, for which data can be collected. The indicators should be developed in such a way that the performance of cities can be compared to other international peers as well as to the national average.

Fourth, fostering peer learning through networks across and within countries can help to scale up smart city initiatives. Municipal governments in many cases may not have the human capacity or infrastructure required to develop and adopt comprehensive smart city initiatives on their own. Countries are at different levels of development in the Emerging Asia Region, which provides an opportunity for cities that are less developed to learn from leaders of smart city initiatives within the region. The ASEAN Smart Cities Network as well as the United Cities and Local Governments Asia-Pacific are two subnational networks aiming to contribute to capacity building, to facilitate co-operation across cities and to raise funding from a range of public and private sources (Box 4).

Box 4. Subnational smart city and capacity building networks in Asia

In April 2018 at the 32nd ASEAN Summit, Singapore revealed that the ASEAN Smart Cities Network (ACSN) would be one of the key deliverables during its chairmanship of ASEAN. Recognising that the Southeast Asian region is undergoing rapid urbanisation and that many cities across the region have established smart city plans, ACSN was created to synergise smart city development efforts and bring smart cities in ASEAN States together. The 26 pilot cities within the ASEAN Smart Cities Network are as follows: Bandar Seri Begawan (Brunei Darussalam); Battambang, Phnom Penh and Siem Reap (Cambodia); Banyuwangi, DKI Jakarta and Makassar (Indonesia); Luang Prabang and Vientiane (Lao PDR); Johor Bahru, Kota Kinabalu, Kuala Lumpur and Kuching (Malaysia); Mandalay, Nay Pyi Taw and Yangon (Myanmar); Cebu City, Davao City and Manila (Philippines); Singapore (Singapore); Bangkok, Chonburi and Phuket (Thailand); Da Nang, Ha Noi and Ho Chi Minh City (Viet Nam). By using technology as an enabler to improve the lives of ASEAN citizens, this current 26-city strong collaborative platform will help to facilitate co-operation on smart cities development, catalyse bankable projects with the private sector, and secure funding and support from ASEAN's external partners. This network also helps cities shift from theoretical smart city strategies to developing concrete city-level plans through the recognition of diversity in the region. While national strategies are not the focus of this network, ACSN will help to improve the inter-operability of smart city initiatives among cities in the network, and will work towards creating opportunities to harmonise different national systems (ASEAN, 2018).

Capacity building, which is an integral component of making smart city strategies a reality, has been actively pursued by subnational networks such as the United Cities and Local Governments Asia-Pacific (UCLG ASPAC), which promotes co-operation between governments and within wider international communities in the region. The organisation's scope of work includes advocacy, capacity building and training, research and knowledge management, project development and management, and decentralised co-operation. Regarding capacity building, UCLG ASPAC specialises in four areas that are of relevance for smart city strategies: sustainable mobility; climate change adaptation and disaster risk reduction; tourism and culture; and local economic development. To promote capacity building, UCLG ASPAC has organised several training workshops and peer exchanges over the years. For example, UCLG ASPAC has worked for a long time with the Seoul Human Resource Development Center to share, with other cities in the region, Seoul's best practices in the field of transport. This collaboration led to the establishment of the Local Government Transport Officer Forum in Indonesia, serving as a platform for officials at the national and regional level to address escalating transport challenges in urban areas. In fact, the forum developed an action plan to adopt Seoul's best practices during its first meeting in March 2016, in Salatiga City, Indonesia (UCLG ASPAC, n.d.).

Source: ASEAN (2018), Concept Note of the ASEAN Smart Cities Network; UCLG ASPAC (n.d.) "Capacity Building".

Conclusion

Smart city initiatives present unique opportunities and challenges to cities, but their implementation faces obstacles for both subnational and national levels of government. The rapid spread of digitalisation has led many cities across Emerging Asia to undertake smart initiatives. On the one hand, the diversity across and within Emerging Asian countries can pose challenges for national governments to implement smart city initiatives. On the other hand, such diversity is an opportunity for the development of innovative ideas, precisely because cities at an earlier stage of development can learn from best practices and “leapfrog” the most difficult stages, thereby avoiding the pitfalls and challenges that peer cities have already faced. The sharing of best practices on smart city initiatives is especially valuable in light of the global megatrends of globalisation, urbanisation, ageing population, climate change and digitalisation. Despite the fact that these megatrends impact Emerging Asian countries in different ways and that each country is at a different starting point in tackling their associated challenges, they pose risks to all cities. A range of subnational indicators are required in order to monitor how smart city initiatives impact the lives of citizens and to provide a benchmark for governments to develop even smarter cities.

Effective planning and implementation of smart city initiatives requires a territorial approach underpinned by co-ordination across levels of government. Top-down approaches that disregard or do not involve the subnational level run the risk of being exclusive and failing to meet the varied needs of all citizens. National governments have greater access to funds and are in an ideal position to develop national urban plans that incorporate “smart” goals. However, national smart city strategies do not always consider subnational actors, missing key opportunities for effective planning of smart city solutions. The subnational level of government, which is closest to the local populace, has a better understanding of citizen needs but has little incentive to be an early adopter of new smart city technologies due to the high risk involved. Moreover, with limited investment scope, subnational governments may not choose to invest in research and development, even though it is critical to the success of smart cities. The successful implementation of smart city initiatives that are citizen-centric and socially inclusive thus requires co-ordination between national and subnational levels of government.

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