



Smart Cities

Digitalisation and Urban Development in Asia

Summary of Case Studies

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Preface

Urbanisation is a megatrend, which has a formative and significant effect on the world economy and society, on people's quality of life, on the future of democracy, as well as on global consumption of resources and energy – and thus on the future of Earth as a whole. Expectedly, up to 70% of the global population will live in cities by 2050. Future urban growth will almost exclusively take place in developing countries, especially medium-size cities will increase rapidly. This growth comes with a host of challenges and opportunities, like considering climate change in urban expansion and construction, managing resources sustainably and ensuring food security for a growing population, which converts former agricultural land into urban space, and ensuring decent job opportunities against the backdrop of increasing digitalisation and automation.

Spatial and functional interrelations between cities, settlements and their surrounding areas are increasing. Integrated territorial development approaches contribute to a paradigm shift away from the traditional dichotomy between urban and rural development. The city-regional scale gains more and more relevance for integrated urban and territorial planning, financing, and implementation. The Agenda 2030 and the New Urban Agenda acknowledge these mutual dependencies and their reciprocity as key potentials for inclusive and sustainable development. Furthermore, they call for integration, cooperation, coordination and dialogue across levels of government and functional areas and relevant stakeholders.

The Sector Project “Sustainable Development of Metropolitan Regions”, implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), develops action-oriented advisory services on the role of metropolitan regions as drivers for sustainable development. This includes political advice, the development of new concepts, trainings and knowledge sharing on practices in cities and regions around the globe.

In its approach, the Sector Project focuses on several thematic areas to address the diverse social, economic and ecological challenges within urban agglomerations.

The focus areas are:

- Metropolitan Governance
- Integrated Territorial Development for Strengthening Urban-Rural Linkages – including City-Region Food Systems
- Urban Resource Management and Climate Change
- Digitalisation and Urban Development – Smart Cities
- Regional Economic Development and Innovative Business Regions

The study at hand examines at the examples of four Asian cities how smart city approaches can be integrated into urban development strategies. While in recent years the focus of smart cities concentrated on providing digital solutions for infrastructure and service delivery this study focuses on governance aspects, such as open governance and citizen participation for enhanced transparency and accountability and inclusive urban development.

The study forms part of the publication series “Sustainable Development of Metropolitan Regions”. It gives conceptual guidance and recommendations for hands-on approaches for development organisations as well as partner countries in the field of sustainable development of metropolitan regions and city-regional approaches.

We encourage a critical and intensive discussion about the publication through policy makers, practitioners and academia. The publication series aims at promoting the local implementation of the Sustainable Development Goals (SDG), the Paris Climate Agreement and the New Urban Agenda (NUA).

Carmen Vogt

Head of Programme

“Sustainable Development of Metropolitan Regions”

Digitalisation and Urban Development in Asia

Summary of Case Studies

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1. Digitalisation and Urban Development

It is projected that by the end of the 21st century more than 85 percent of the world population will live in cities (OECD 2015). The majority of urban growth will take place in Asian and African cities. The fastest growth rates will occur in urban agglomeration with 1-5 million inhabitants and in cities with less than 1 million inhabitants (UN-DESA 2014). The dynamics of this process are exponential: by 2050, the urban population will exceed the current world population (7.4 billion inhabitants) and the needed infrastructure is “roughly the same [...] as has been built since the beginning of industrialisation” (WGBU 2016). The associated social and environmental challenges are enormous. If future urbanisation will take place under prevailing conditions, approximately 20 percent of the urban population will live in slums and 80 percent of greenhouse gases will be emitted in cities.

The international political framework is already set up: the Agenda 2030 contains an urban goal (SDG 11) and 110 out of 162 countries have dedicated urban climate measures in their Nationally Determined Contribution (NDC) to achieve the Paris Agreement (UN-Habitat 2016), amongst them China and India. Additionally, the New Urban Agenda (Habitat 3) is geared towards the implementation of the international agendas at the urban scale. It is crucial to discern that urbanisation is a non-linear, context-specific process, varying strongly with local and regional circumstances. As urban development has a high path dependency, there is now an urgent need for action to shape a sustainable future.

The spread of the internet and the associated interconnection of evermore spheres of life, illustrates the ongoing digital transformation. Access to the internet has continuously increased from 15.8% of the world population in 2005, up to 47.1% in 2016. Breaking with previous disparities, the past 10 years have witnessed internet access in developed and developing countries growing at similar rates. This has resulted in 81% of individuals using the internet in developed countries, compared to 40.1% in developing countries as of 2016 (ITU 2016b).

While developed countries are predicted to reach market saturation in the near future, the demand in the developing world will continue to grow. Especially smart phones are likely to be the single connective device used by consumers in developing countries (Broadband Commission 2016, p.20). This trend, alongside the rapid double-digit increase in mobile broadband subscriptions and the multiplicity of pre-paid business models, which are not visible in most of statistics, suggests that developing countries are leapfrogging stages of technological development such as home-based personal computers and directly using mobile technologies (ITU 2016, p.4). While a digital north-south divide prevails, it is the rural-urban disparity that crucially influences today's usage of digital solutions. As of 2015, 89% of citizens in urban compared to just 29% in rural areas have coverage for mobile broadband.

The contribution of digitalisation towards the accomplishment of the SDGs and sustainable development per se is decisive. Through its informed and considerate utilisation, processes are designed in a faster, more inclusive, and cheaper manner than ever before. Nevertheless, Digitalisation and ITC will still remain a means to an end and not an end in itself.

The crucial role of cities and urban areas for sustainable development is largely consensus and becomes gradually a central international policy area: Cities are recognised and included in leading international agendas, most prominently by the Agenda 2030 with the alone standing Urban Goal (SDG 11). Furthermore, the Paris Agreement recognised cities as important actors for climate change, where beside the mitigation, adaptation of cities become a pressing issue. With the third United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in Quito, the New Urban Agenda defines the action areas for sustainable urban development. It is the first time that an official UN-Document recognised cities as development actors. Cities are no longer only victims and driver of climate change but also fundamental actors to achieve sustainable development. For now, the national and of course the local implementations of those agendas will decide about the success of sustainable development. The National Determinate Contributions (NDC), where – 110 out of 163 – of the submitted NDCs show clear urban references [...], establishing the relationship between sustainable urbanisation and climate action” (UN-Habitat 2016).

Furthermore, digitalisation, ICT and Smart Cities approaches are included in those national implementing agendas (e.g. India’s 100 Smart Cities mission as part of the NDC-India,) and identified as important enablers to reach sustainable urban development. Promoters of the potential of ICT-based solutions for sustainable urban development say development is ubiquitous. In the early 2000s Cisco, IBM, Siemens and Hitachi started to promote very technological based urban development concept and with those concept the term “Smart Cities” went viral. The marketing origin of the concept “Smart city” is obvious: Which city won’t be a smart city, if the linguistic antonym is the stupid city? The popularity of the term and the increasing number of cities and civil society groups that claim to be a smart city leads to a plurality of concepts. Nowadays the understanding of smart cities has been transformed into a citizen-centred approach for sustainable urban development, where ICT are means to an end, rather than an end in itself.

This study provides four case studies of Asian Cities with different smart cities approaches. The focus of the case studies lies on the governance aspects of the development and implementation of smart cities strategies. The aim was to look behind the shining smart cities visions and illustrate the processes of becoming a smart city.

2. Case Studies

Due to the importance of enabling framework conditions for sustainable development of cities, the study focuses on the governance dimension of the smart cities approach, rather than on technology-driven infrastructure solutions. Therefore, existing smart cities strategies in Asian cities were analysed. The case cities were selected based on their different approaches of including ICT at the local level. The selection intends to provide an overview of the different approaches to introduce modern ICT into urban development strategies. In contrast to other studies, which focus on technical and sectoral examples or descript lighthouse cities, the cases were selected based on traditional urban development issues. The following aspects were considered for the selection of the case studies:

Urban Governance: Improvement of citizen participation and transparency through Open Government, Open Data, eGovernment, citizen platforms, use of social media; improvement of public services in cities through digitalisation of public administration (e.g. One Stop-Shops); create inclusive cities through improved access to internet as well as the accessibility of local information; increase digital literacy, foster dialogue between urban government and citizens through urban dialogue forums (face-to-face and digital).

Evidence-based policy making and Urban Planning: Improvement of urban infrastructure and public service delivery planning through improved capacity regarding data collection, processing and analysis (e.g. integration of Geoinformation Systems – GIS, big data analyses, real time information system, citizen generated data, remote sensing, Data Mining, Agent based Modelling, GPS Tracking).

Local economic development: improvement of local business environment through start-up and (social-) entrepreneurship promotion, innovations systems, provision of co-creation spaces, share economy, cope and integrated new business models in urban development.

Climate change and resource management: mitigation, adaptation and efficient urban resource management through integrated management systems, sensors-based real time management of infrastructure (e.g. smart metering and/or smart grids), Internet of Things, integrated data management system.

Monitoring of SDG and New Urban Agenda as cross-cutting issue: due to the fact that smart cities use disaggregated and geo-referred data as well as big data for decision making, management and monitoring and local monitoring systems for SDG.

In the following case studies, the institutional setting and governance framework for the implementation of the strategy, the development process of the smart city projects/strategies and the integration into the urban development strategy were analysed in order to provide urban practitioners an insight into the processes behind the visible products and solutions, which are prominently represented in literature and media.

2.1 Kochi Smart City, India

Context: Kochi (also Cochin) is the second largest city and commercial ‘capital’ of Kerala State in the far southwest of India, along the Arabian Sea. While the city itself has more than 610,000 residents, the metropolitan area counts about 2.3 million people. Kochi is part of Ernakulam District, governed by the Cochin Municipal Corporation with a mayor as head (at the time of the investigation Ms. Soumini Jain). Kochi’s development and larger infrastructure projects are managed by the Greater Cochin Development Authority (City of Kochi, nine other municipalities and 25 village councils) and the Goshree Islands Development Authority (City of Kochi’s islands). As a former spice-trading hub, Kochi has evolved into an economically successful city with tourism, trade, construction and manufacturing, as well as banking and online trading contributing well to the GDP. The economic growth has been carried, amongst other things, by a special economic zone, technology campuses, industrial parks and corridors, as well as smart city and cyber city projects. It is one of the most dynamic second tier cities in India, and is widely considered as highly livable for Indian standards. The Kochi Municipal Corporation has struggled with much of urban growth happening outside of the municipality’s border and thus beyond the control of the corporation. At the same time, there was no master planning and the coordination with very powerful state departments was limited. Major resources have been allocated to the Greater Cochin Development Authority regularly resulting in power conflicts and implementation problems between the entities.

Smart City Strategy: Kochi Smart City is one of the 20 projects for the first phase of the Smart Cities Challenge of the Government of India. Under this umbrella, the national government’s understanding of smart cities is “to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of ‘smart’ solutions. The focus is on sustainable and inclusive development and the idea is to look at compact areas, create a replicable model which will act like a light house to other aspiring cities.” Kochi’s vision is “to transform Kochi into an inclusive, vibrant city of opportunities with efficient urban services, sustainable growth and ease of living”. For that, its Smart City proposal identifies four themes: i) a connected and accessible city (transport and mobility); ii) a city with a vibrant identity (tourism); iii) a clean, green, safe, and healthy city (infrastructure and services); and iv) an inclusive and smartly governed city (governance and citizens engagement). Kochi Smart City addresses four key infrastructure areas: i) adequate water supply; ii) assured electricity supply; iii) sanitation including solid waste management; and iv) efficient urban mobility and public transport. It plans to guide related activities through:

An Area-Based Proposal: It is planned to focus on the renewal of the Fort Kochi-Mattancherry and Central City areas, including i) intelligent transportation and seamless mobility based on high speed water transport and improved accessibility (smart signage and smart parking facilities); ii) reconstituted urban form (transit-oriented development); iii) tourism growth and heritage-related commercial and other business opportunities (with the attention to obtain UNESCO world heritage status) (usage of interactive information platform and improved signage for visitors); and iv) affordable and efficient service delivery to residents (smart meters, LED-powered lighting).

Pan-City Solutions: IT-based data application shall enhance efficiency of infrastructure and services, through i) integrated delivery using smart card and mobile platform for billing/payment, ticketing, information access, and (prospectively) other uses; and ii) intelligent water management with GPS-equipped smart meters for more efficient data collection and billing.

An Implementation Plan: Realisation of smart city activities through i) constitution of a special purpose vehicle (SPV) with government and municipal corporation; ii) monitoring and evaluation along Smart Cities program guidelines; iii) advanced project preparatory work; iv) improved procurement and contracting; and v) sustainable operations and maintenance.

A Financing Plan: Estimated costs of the Smart City proposal are about 310 million US-Dollar. The national government through the Smart Cities Challenge allocates about 15 million US-Dollars per year to the city, to be matched by state and municipal funding and various other resources and cost-recovery mechanisms.

Institutional setting: The Smart City proposal is planned to be implemented by a special purpose vehicle (SPV), of which the government and the municipal corporation each hold one half of the shares. The SPV will formalize a Memorandum of Understanding with each relevant line agency to ensure coordination and clear role assignment. In addition to a traditionally hierarchical organisation structure, an inter-departmental task force and city-level committee are planned to facilitate inter-agency coordination across sectors and government levels. In addition, a city advisory forum is planned to ensure extended participation by residents in the planning and implementation of Smart City activities.

Development process of the strategies: The development of the strategic Smart City blueprint was strongly anchored in citizens' engagement (facilitated through the online platform MyGov of the Indian government) with ward committee meetings, stakeholder workshops, special interest/need focus group discussions, various events and social media interaction, polls, surveys, and competitions. As part of the proposal process, the municipal corporation also had to identify how its planned activities link up with previous or ongoing initiatives and programs, which may also co-finance some sub-projects. Furthermore, the mechanism of using a SPV allows for blended financing options and revenue streams for the municipal budget. Based on Kochi's beneficial role as a tourism gateway and good urban government in comparison to other Indian cities, Kochi is considered as one of the likely better performing participants in the first round of the Smart Cities Challenge. It remains unsettled how other smart city-related activities in Kochi, for instance Dubai Holding's SmartCity Kochi IT Special Economic Zone, link up with projects of Kochi Smart City.

Integration of the smart cities projects into the urban development strategy: Kochi used the application process for the Smart Cities Challenge to revisit its urban development strategy. Having been selected, it may be able to use the challenge as somewhat of a clean-sheet start into a better managed urban re-/development process, where multi-stakeholder coordination functions better than in the past. Due to the strategically focused, but still broad take on various sectoral problems through Kochi Smart City, it is basically a holistic approach and the actual new urban development strategy of the city.

2.2 Jakarta Smart City, Indonesia

Context: Jakarta is Indonesia's capital cities and governed as a Special Capital Region (provincial status) with a Governor (at the time of this research Mr. Basuki Tjahaja Purnama). Administratively Jakarta consists of five municipalities and one regency. Located in the northwestern part of Java Island, it is by far the country's largest city with about 10 million residents in Jakarta itself and approximately 30 million people in the wider metropolitan area. Jakarta suffers under both fluvial (river) and coastal (sea) flooding and is at high risk of climate-induced sea-level rise. With one-sixth of the national GDP being produced in Jakarta, the city's role for the country and the Southeast Asian region is significant. Although several projects are under planning or implementation (such as the LRT and MRT), or operation (such as the BRT and toll roads network), the city has not yet eased related congestion pressures, with massive traffic jams characterising daily life. Similar to sub-/national governments in Indonesia, Jakarta politics has also been gridlocked leading to significant delays to urgently needed urban development projects.

Smart City Strategy: In preparation of hosting the 2018 Asian Games and as a response to become a more people-friendly city, Jakarta initiated Jakarta Smart City. The aim is to develop into a "Modern and Innovative City that is able to manage its resources effectively, efficiently and sustainably optimising the utilisation of ICT in the participatory governance, for the achievement of prosperous & cultured society" (Setiaji, Head of Jakarta Smart City). Jakarta Smart City formulated its smart city vision as being based on:

- Smart Governance (transparent, informative and responsive governance)
- Smart Economy (growing productivity with entrepreneurship and innovation)
- Smart People (improving the quality of human resources and facilities for decent living)
- Smart Mobility (provision of transport systems and infrastructure)
- Smart Environment (natural resource management in a sustainable way)
- Smart Living (realising a healthy and livable city)

Jakarta Smart City focuses on three action areas:

- I. *Public Services: Enhance public services to become more efficient and effective*
 - One-stop services for simplified administrative procedures with fewer delays and complaints
 - Vertical fully furnished housing as a solution to relocate poor people from riverbanks and slum areas
 - Multifunction parks as public activity centres for library, free Wi-Fi, playground, and garden
- II. *Public Information: Increase government openness and transparency*
 - Official portal as key information platform
 - Open data access and sharing
 - Government YouTube channel for outreach
 - Smart City portal with interactive map (<http://smartcity.jakarta.go.id/maps/>)
 - Jakarta Smart City apps integrating different partners' apps and providing notification functions; apps include Waze (traffic info), APAJA (city buses), CROP (citizens' complaints responses), Qlue (citizens' complaints), Qraved (smart street

market/restaurant finder), Safetypin (safer city), Berita Jakarta (Jakarta news), iJakarta (digital library), Ragunan Zoo (zoo visitor guide)

III. Public Participation: Encourage citizens to participate more

- Citizens complain mechanism
- Hackjak IT event
- Crowdsourcing for data collection
- Incubator to bring together people with different backgrounds working towards a smarter city

Jakarta Smart City also plans to introduce a smart parking system, smart trash bins, extended city surveillance, smart river canals, smart street lighting system, and customer relationship management for the public sector. In addition to these features directly under Jakarta Smart City, the city government has also introduced other technology-based systems to improve efficiency in the city. One example is the Jakarta One Card, which combines well-known public transportation payment cards with an electronic identification card, while extending the payment options to the existing electronic road pricing system and shops, as well as making it a social security health insurance card. This card is planned to have reached every Jakarta resident until 2019. Jakarta Smart City located in a joint building, called “Smart City LOUNGE”, which also features a command centre with real-time monitoring of city activities. The command centre aims at merging data from different agencies across the city. The LOUNGE stands for Learn, Open, Unity, Networks, Guidance, and Excellence as a motto for what it shall combine and bring together under the smart city roof. This includes for instance a co-working space for start-ups that assist the city government in the development of new apps. Through events such as hackathons, Jakarta Smart City also hopes to find new potential collaborators for technology-driven solutions. Furthermore, Jakarta Smart City engages a range of external experts for data management and analysis. An innovation lab is also planned to be opened in the LOUNGE. Based on a very open marketing campaign, Jakarta Smart City invites citizens to actively contribute to their city and its services. Jakarta Smart City’s YouTube channel exemplifies how the city government sees its smart city approach being anchored on citizens’ participation and feedback.

Institutional Settings: As part of the Jakarta Capital City Government, Jakarta Smart City is placed under the Department of Communication, Informatics, and Public Relations. The city government liaises with other government ministries to obtain feedback on Jakarta Smart City activities and performance. Jakarta Smart City is broadly anchored between technology – planning – communication. Due to its command centre is already has a monitoring function that goes across all urban infrastructure and services sectors. Since it does not execute public services itself, it relies on transferring identified actions to the corresponding departments that will act (or not) upon these requests. It is important to recognize that the initiative to introduce smart city technologies and initiatives in Jakarta came from the government’s objective to improve its planning capacities, while closing the funding gap due to lack of national government allocations, by cooperating with the private sector, in particular telecommunication companies. Likewise, the outreach to citizens is meant to broaden the stakeholder platform on which the smart city activities are based. For institutional set-up, also see here: <https://www.youtube.com/watch?v=LtEeyaOVTMo>

Development process of the strategies: Jakarta Smart City started its operations with a focus on improving city government services through a monitoring and complaint mechanism. Once related systems are set up, another focus will be added for data analytics where complaints can basically be preempted by identifying hotspots that require concerned departments attention. Such analytics would also help to guide the execution of public services from firefighting services to construction activities. Increasingly, Jakarta Smart City would extend its thematic focus, covering transport/mobility, public safety, education, infrastructure service delivery, etc. If citizens continue and further increase their feedback possibilities through Smart City Jakarta apps and portal, the command centre can evolve into a management hub or 'brain' for the city government to better prioritize its service delivery. With increased livability as a major objective, the initiative could go beyond technology/IT. However, continued funding and potential upscaling have to be addressed.

Integration of the smart cities projects into the urban development strategy: There is strong leadership by the Governor of Jakarta to use the smart city platform to improve urban infrastructure and service delivery. However, while the planned elements of Jakarta Smart City fit nice with an overall urban development strategy, the current functioning elements are mostly limited to the 'standard' smart city activities of surveillance and complaint management. Further strategic thinking on the side of the government is needed about what to do with all the obtained data and how to institutionally interlink the LOUNGE strongly with line agencies. To a certain extent, the government would also have to realize the limits of Jakarta Smart City in addressing some of the huge urbanisation problems the city is facing.

2.3 Seberang Perai, Malaysia

Context: Seberang Perai (formerly Wellesley Province) is the mainland part of Penang State, with the more famous Penang Island (with UNESCO world heritage site George Town) forming the other part. Seberang Perai consists of three districts and has close to one million inhabitants. Butterworth is the main city with more than 100,000 residents. Seberang Perai has benefited from Penang Island's tourism and wide real estate development along the coast. It is administered by the Seberang Perai Municipal Council (MPSP), which is headed by a Council President (at the time of this research: Ms. Dato' Maimunah Mohd Sharif). Its location opposite to Sumatra, Indonesia, has made Penang State suffer under forest fire-related haze.

Smart City Strategy: Seberang Perai is not a typical smart city project as it emerged from a different angle. With council president Dato' Maimunah Mohd Sharif taking office in 2011, the municipal council changed direction and speed in improving urban planning and service delivery within its districts. A number of initiatives were launched (outlined below), which were linked up with each other and partly based on technologies to enhance results. Although these initiatives are rather direct reactions (solutions) to identified, immediate problems in Seberang Perai, they are designed and implemented under the overall vision to make Seberang Perai a cleaner more beautiful and comfortable place to stay, work, and invest. A vision, which in turn, has been derived from the broader Penang State vision for a "Cleaner, Greener, Safer and Healthier Penang" (see

here: <http://www.cleanergreenerpenang.com/what.html>) – which itself has started a campaign across sectors to improve the livability of the state through local level action, facilitated by a website. The initiatives in Seberang Perai include:

- Addressing the massive solid waste management expenditures (42% of council budget) by i) introducing the ‘4 Rs’ in waste management: reduce, reuse, recycle, and rethink practices and consumption patterns; ii) the sustainable residential area program where neighbourhoods compete against each other in reducing waste production; iii) promotion of organic waste composting; iv) banning free plastic bags; and v) banning Styrofoam.
- Lowering public expenditures for public space management by introducing 4 Ps / PPPP: public-private-people partnerships, with neighbourhood groups or corporations taking care of maintenance of streets, parks, and places.
- Activation of civic life by the council president herself participating in sports and culture activities on weekends in public spaces, partly combined with outreach of municipal services to neighbourhoods (e.g. fee payments via credit card or simple nurse health checks), and by initiating new cultural activities (e.g. the Butterworth Fringe Festival).
- Requiring all public amenities including parks, markets and toilets to be accessible to all genders and ages.
- Promoting gender-responsive, participatory budgeting under the guidance of a gender committee, to include gender concerns in the governance process, obtain sex-disaggregated data for policy analysis and budget allocation, work with community pilot projects, provide capacity building in gender-responsive budgeting methodology and tools, and increase public awareness and participation in the budgeting process.
- Intensifying outreach to users and stakeholders before commissioning of new infrastructure, equipment, or services.
- Engaging citizens in a more transparent governance process through neighbourhood outreach, town hall meetings, ‘dialogue budgeting’ and citizens online survey on annual budget priorities.
- Introducing an electronic budgeting system where council leaders can monitor budget income and expenditures in real-time.
- Setting up of a citizen complaint portal “MPSP Watch” (www.cat.betterpg.com) and apps, developed by volunteers, with status updates on complaint follow-up and management through a Smart Managing System (SMS).
- Obtaining citizens performance ratings for the council.
- Improving towards obtaining quality management system certifications (ISO certification for quality management, environment management, occupational safety and health management, energy management, quality environment management).
- Learning from good practices and knowledge exchange through participation in conferences and workshops, as well as peer-to-peer learning (e.g. Memorandum of Understanding with City of Seoul for exchange on environmental policies and technologies).

- Fostering climate-friendly development by signing up to the Compact of Mayors and having council staff being trained in community-scale GHG inventory and reporting via carbon Climate Registry.
- Planning for the new low-carbon Batu Kawan Township, following global standards for green development, in addition to educational facilities and institutions.
- Furthering of integrated planning and encouragement of cross-sectoral collaboration by distributing iPads to department heads and senior officials, thereby creating direct lines between the council president and departments.
- Setting up of a big data taskforce to interlink departments for joint data collection and usage in planning.
- Promoting transit-oriented development in the re-planning of the transportation system, and improving livability by introducing car-free mornings for selected streets.
- Improving marketing efforts through production of the first tourist map, heritage trail, and coffee table book about Seberang Perai.

Institutional Settings: Although civil society is heavily involved in many of the above-mentioned activities, also the private sector plays an increasingly relevant part. The initiatives overall are spearheaded, planned, and carried by the council president. Most institutional settings for the initiatives are on a case-by-case basis.

Development process of the strategies: With most initiatives being closely attached to Seberang Perai's citizens, in particular neighbourhoods, they can deliver quick changes and lasting results within minimal time. The council president has been very active in lowering costs of doing business for the council, engaging civil society and private sector. At the same time, she has actively promoted Seberang Perai's initiatives on international stages, asking donors and other organisations to approach her with ideas to obtain additional funding.

Integration of the smart cities projects into the urban development strategy: Although 'only' guided by a one-sentence vision, without a broader development strategy, this incremental or organic approach has so far shown to be a tactically successful way to address most urgent constraints. This could also be related to the fact that the larger-scale planning and investment lies with the state government. With a dedicated council president as leader of a strictly managed local government, the approach has brought significant improvements. The weakness, however, lies with the dependence on the persona of the council president, whose successor at one point may not have the same qualities to oversee such variety of activities, while keeping all strings together. Especially since the council president has been in office for five years, it would be a good time to draft a broader strategy to evaluate the impact of initiatives and to give Seberang Perai a more guided way forward.

2.4 Saensuk Smart City, Thailand

Context: Headed by a mayor (currently Narongchai Khunpluem), Saensuk (also Saen Suk) is a small town of about 45,000 residents in the Mueang Chonburi District in Thailand. The district has about 322,000 inhabitants and functions as the capital district of Chonburi Province, which also

includes the world famous resort city of Pattaya. Saensuk is located half way between Pattaya (to the south) and Bangkok metropolitan area (to the north) along the Gulf of Thailand. Benefiting from the strong growth in tourism and related sectors, investments into real estate and service development, particularly catering to longer-staying visitors and expatriates have increasingly spilled over to towns within the province, including Saensuk.

Smart City Strategy: Emerging from the growing field of the Internet of Things (IoT) in relation to big data becoming readily available for urban infrastructure and services delivery, the national Ministry of Information and Communications Technology has developed a “Smart Thailand” action plan for boasting the country’s strategy for a digital economy. With an initiative being equipped with more than 108 million US-dollars, one part of the resources was allocated to smart city pilot projects in Phuket and Saensuk. Initiated in 2014, Saensuk is focusing on health and tourism-related smart city systems to increase livability in the area for both residents and visitors. Under the vision of “Smart Living at Saensuk Smart City”, the mayor plans to achieve smart healthcare, smart homes and improved safety for the municipality’s elderly and handicapped residents. In a three-year pilot project started in 2016, selected elderly patients have been equipped with a Bluetooth-enabled device as a necklace or bracelet (called BlueBLE Tag), which sends information alerts to the city’s nursing station in case of longer non-movement or abrupt falls, while also monitoring movements and walking distance, number of steps, and sleeping patterns. Through an alert button, nurses can also be called by the elderly for immediate assistance. It is planned that the device will be upgraded throughout the process, also providing other medical information, such as blood pressure and heart rate for real-time monitoring purposes. The rationale behind the project is that many elderly (15% of the population) depend on nurses visiting their homes, while younger family members are usually out due to external jobs. With nursing services limited in Saensuk, it is crucial to identify where these services are needed the most, instead of randomly checking in with elderly. Many medical data is being produced through the devices; thus, the management and analysis of the data becomes crucial for putting it to actual use. This makes so-called “systems integrator” services relevant for the larger scale application of smart city health technologies. In the pilot project, smaller gateway systems are installed in the elderly houses, while a larger gateway system being installed in nursing homes, with a converge system archiving information.

Institutional Settings: An IoT City Innovation Center (ICIC) in the Bangkok head office of the National Innovation Agency brings together CAT Telecom as the provider of the broadband internet, Wi-Fi network, and cloud computing, and the Thailand Embedded System Association as matchmaker to connect local developers with partners. Functioning as a kind of incubator, IoT companies and experts get in contact with potential financiers, technology providers, and colleagues. The centre hopes to attract also global players in the sector, such as Cisco Systems, Dell, or IBM. The pilot project in Saensuk is managed by the city municipality, which collaborates with the Embedded System Laboratory of Burapha University. The development of the technologies by Burapha University was co-financed by the National Innovation Agency and Thailand Research Fund. The intelligent healthcare pilot is implemented with the support of Dell, Intel, and the ICIC. Dell and Intel also provided support in the drafting of blueprints for the Saensuk smart city technology platform.

Development process of the strategies: Key attraction of the pilot is the mainstream application in people's daily life. The pilot is designed as a "multiple proofs-of-concept" to inform the scaling-up of smart city technologies to both a wider audience and other sectors. The interesting aspect in the Saensuk case is that the mayor plans to use the saved costs from more efficiently targeted nursing services to finance the extension of smart city features to other service areas, such as an app-based information system that will guide tourists in Saensuk towards nearby events, sightseeing spots, or related services.

Integration of the smart cities projects into the urban development strategy: The competences of the local government may not be sufficient to develop a broad-based urban development strategy, under which the smart city initiative(s) would be clustered. Rather – also in light of the small size of the municipality – the government decided to participate in a pilot that may provide cost-savings, which in turn could enable a scaling-up of smart city technologies. It functions somehow as a 'pay-as-you-go' equivalent for government services. Due to its sector specificity, it may also be less supported by an urban development strategy than by a more general socioeconomic development strategy for Saensuk. It could be an option to approach such development aspects from the health care, tourism, and expatriate domicile angle, as the municipality has a certain locational and first-mover advantage in this regard. It will be interesting to see how Dell and other project partners can further guide the government in providing infrastructure and services more effectively in the case of this very small-scale town.

3. Key Findings from Smart Cities Case Studies

The four selected case studies for smart cities in Asia, which are presented in the previous section cover a range of action areas. Most of them are strongly linked to urban governance aspects, and also evidence-based policy-making and urban planning. Aspects of local economic development can be found less often. While resource management partly plays a role indirectly in most of the cases, climate change-related aspects are addressed only indirectly, if at all. While monitoring is a key element in many of the case studies, none relates to the monitoring of the Sustainable Development Goals (SDGs) or the New Urban Agenda directly. While such focus and interconnections can vary in each case, there may be some more ‘natural’ linkages between dimensions and action areas of smart cities, which are illustrated in the figure below. The implications, however, of these relations are up for discussion.

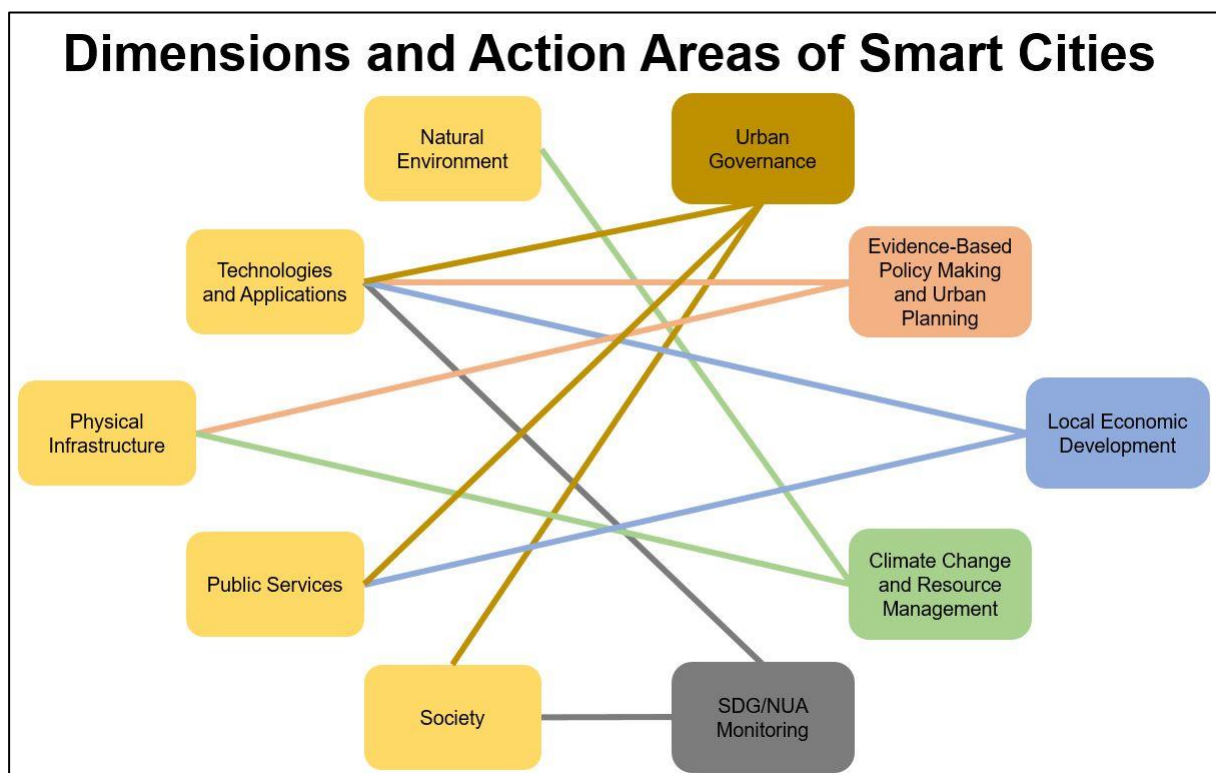


Figure 1: Dimensions and Action Areas of Smart Cities, Source: own illustration

Process: Looking at the process of the smart city initiatives in this analysis, a dominant top-down approach can be identified. Although citizens’ feedback are sought and some engage civil society to contribute content and improvements to various projects and applications throughout the course of their life, their origin is always government-driven. However, this finding from the four case studies may be due to the governmental context/system, in which they are situated. Still, it begs the question if bottom-up, non-governmental smart city initiatives can sustain themselves over the short term and be potentially integrated or overtaken by the public sector/government. What is promising to see is that public sector’s attitude and perspective of other actors seem to

have been changed. Increasingly, the potential of these ‘outside’ actors is recognised with regard to their skills, ideas, and resources.

Institutionalisation: It is quite common that smart city initiatives are born out of a government leader’s idea to position a city or a state on the national or international ‘smart city stage’. Nevertheless, smart city initiatives – at least after an initial piloting phase – are placed under specific line agencies, for instance for information and communications technologies, or for energy and low-carbon development, etc. This is, however, different for those initiatives that actually do not consist of a defined package of activities, but that are rather a loose and evolving assemblage of smart city-related projects. In this case, the sustainability relies heavily on leadership in government and aspects of internal power relations in order for such activities to have sufficient traction in the various line agencies.

Implementation Challenges: As of now, the smart city cases both in this report and beyond are mostly still so young that it is very hard to identify a set of typical implementation challenges. One reason is that such challenges in piloting phases may not be perceived as problems, but as a natural part of trying out new approaches, methodologies, or technologies. Another reason is that the coverage and sources on smart city cases is incredibly slim and strongly characterised by roadshow-style presentations of the corresponding executing agencies. What can be said, though, is that smart city initiatives similar to other types of urban development programs face challenges in ensuring a sustained funding stream. In addition, they still have to prove that they can successfully address existing hurdles in urban planning, such as sectoral siloes or political gridlock.

Synergy Potential: The above figure on dimensions and actions areas of smart cities may point towards certain fields where most synergies can be achieved. Nevertheless, there is no typical group of sectors or themes that can be identified – it depends on the specific context and city case. More important is the way smart city initiatives are designed and implemented. It is less a question of what, than of how. Many smart city initiatives have the potential to be scaled-up across sectors and administrative levels. However, due to the lack of knowledge about good practices in smart cities, it may be advisable to keep the focus rather narrow and to pilot inter-sectoral or inter-level coordination in a defined action area, in order to not get lost and to spread limited resources broadly without sufficient impact. Smart city applications have not changed the way the public sector functions. Therefore, what needs to be done is drafting or adjusting the legal and regulatory framework to impact on the modus operandi of urban planning systems.

Good Governance Potential: In relation to the important question of how smart city initiatives are implemented, it becomes clear from the case studies that they have significant good governance potential. Readily available tools and applications together with a changing behaviour of the government towards private sector and civil society enable new, innovative, and seriously engaging forms of dialogue and cooperation. It is, however, important that executing agencies or smart city leaders define the conversation beyond the technological aspects of smart cities. Although related ICT service providers have started to adjust their language and concepts, it remains the strength of government leaders to understand and underscore the implications of smart city solutions for delivering public services to the people. The next step would then be to extend this bilateral understanding from government-people to a triangle of government-people-

smart city service provider(s). This feature can also be discussed in relation to corporate social responsibility.

Required Capacities: The four case studies show that smart city initiatives can be implemented at different scales and in places that are at different points of their development trajectory. It is advisable for governments to understand smart city initiatives always as co-operative endeavours. Already the complexity of concerned ICT systems makes it nearly impossible for single administrations or agencies to come up and manage smart cities wholly by themselves. In a certain way, this is not even exclusive to smart cities, but the defining character of urban planning and development in the 21st century. It is true that smart cities require re-training and capacity building for government staff. In many cases, the same staff would require such training anyhow due to a general lack of integrated urban development skills. Still, the variety of available actors outside of government enables nowadays less capacitated administrations to turn to the private sector and civil society to forge partnerships and to learn from experts and peers.

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