

AVI PERSPECTIVE

Cambodia | 20 July 2022

Smart City: A Model for Cambodian Provincial Cities

SENG Touch^a, PhD

SIEV Sokly^b, DEng

NOU Chanrachna^c, Master of Architecture

Executive Summary

- ❖ This article analyses the most common concepts and components of smart city used in ASEAN, Cambodia, and the world. It examines specific examples of the forms and movements of smart cities in Cambodia.
- ❖ Through examining the dimensions and development areas of smart cities participating in the ASEAN Smart City Network (ASCN), the article found that Phnom Penh, Battambang, and Siem Reap cities have applied the ASCN's definition. However, out of six focused development areas, they have heavily addressed only the civic and social, quality environment, built infrastructure, and safety and security in their project implementation.
- ❖ The article also examines coastal cities such as Sihanoukville and Kampot, which are potential targets for future smart city development in Cambodia. It suggests that all focused development areas of smart cities should consider the initiatives and implementation of Cambodia's smart cities by aligning with the city's natural characteristics, potential, needs, and technological contexts.

^a **SENG Touch** is Deputy Director of the Department of Science, Technology & Innovation Policy of the General Department of Science, Technology & Innovation at the Ministry of Industry, Science, Technology & Innovation (MISTI).

^b **SIEV Sokly** is Deputy Director of the Department of Science, Technology & Innovation Policy of the General Department of Science, Technology & Innovation at MISTI.

^c **NOU Chanrachna** is a Lecturer at the Department of Architecture at the Kirirom Institute of Technology (KIT).

សេចក្តីសង្ខេបអត្ថបទ

- ❖ អត្ថបទនេះវិភាគអំពីគោលគំនិត និងធាតុផ្សំទូទៅនៃទីក្រុងឆ្លាតវៃដែលត្រូវបានប្រើប្រាស់ក្នុងពិភពលោកអាស៊ាន ក៏ដូចជានៅកម្ពុជា។ អត្ថបទនេះពិនិត្យមើលលើឧទាហរណ៍ជាក់លាក់នៃទម្រង់ និងចលនានៃទីក្រុងឆ្លាតវៃក្នុងប្រទេសកម្ពុជា។
- ❖ តាមរយៈការពិនិត្យមើលវិមាត្រ និងការផ្តោតសំខាន់លើផ្នែកអភិវឌ្ឍន៍ទីក្រុងឆ្លាតវៃរបស់ប្រទេសកម្ពុជាដែលបានចូលរួមក្នុងបណ្តាញទីក្រុងឆ្លាតវៃអាស៊ាន អត្ថបទនេះបានរកឃើញថាទីក្រុងភ្នំពេញ បាត់ដំបង និងសៀមរាបបានអនុវត្តទៅតាមនិយមន័យដែលបានកំណត់របស់បណ្តាញទីក្រុងឆ្លាតវៃអាស៊ាន។ ទោះជាយ៉ាងណាក៏ដោយ ក្នុងចំណោមការផ្តោតសំខាន់លើការអភិវឌ្ឍផ្នែកទាំង៦ ទីក្រុងទាំងនេះបានយកចិត្តទុកដាក់យ៉ាងខ្លាំងចំពោះតែ ផ្នែកពលរដ្ឋនិងសង្គម គុណភាពបរិស្ថាន ហេដ្ឋារចនាសម្ព័ន្ធ និងសុវត្ថិភាពនិងសន្តិសុខក្នុងការអនុវត្តគម្រោងអភិវឌ្ឍន៍នៃទីក្រុងឆ្លាតវៃរបស់ខ្លួន។
- ❖ អត្ថបទនេះក៏បានពិនិត្យមើលផងដែរអំពីទីក្រុងដែលស្ថិតនៅតំបន់ឆ្នេរសមុទ្រ ដូចជា ក្រុងព្រះសីហនុ និងក្រុងកំពតដែលមានសក្តានុពលក្នុងការប្រែក្លាយជាគោលដៅនៃទីក្រុងឆ្លាតវៃនាពេលអនាគតរបស់កម្ពុជា។ អត្ថបទនេះក៏បានលើកជាអនុសាសន៍លើការផ្តោតសំខាន់ៗក្នុងការអភិវឌ្ឍន៍ទីក្រុងឆ្លាតវៃគួរគិតគូរនិងសម្របតាម គំនិតផ្តួចផ្តើម និងការអនុវត្តរបស់កម្ពុជាដោយផ្អែកលើលក្ខណៈធម្មជាតិ សក្តានុពល តម្រូវការ និងបរិការណ៍បច្ចេកវិទ្យានៃទីក្រុងទាំងនោះ។

Introduction

In recent years, the world has become more than one-half urban for the first time in history (Demographia 2021). The world's population living in cities has increased from 30% in 1950 to approximately 57% in mid-2021, which is about 4.5 out of the 7.9 billion people worldwide. With this trend, 70% of the global population will have been concentrated in cities by 2050 (Department of Economic and Social Affairs 2019; Destatis 2021). The Cambodian population census 2019 indicated that the percentage of the country's urban population had increased from 19.5% in 2008 to 39.4% in 2019 (NIS 2019). Currently, urban growth has been concentrated in Phnom Penh and its immediate vicinity. Emerging secondary cities such as Sihanoukville, Siem Reap, Battambang, and Poi Pet are smaller than the capital city, with populations ranging from 100,000 to 200,000. These secondary cities are establishing their economic trajectory and witnessed urbanisation rates of between 3 and 5% in 2012 (World Bank Group 2018).

With the rapid growth of the urban population, cities worldwide, including Cambodia, will exacerbate existing social problems, such as traffic congestion, water and energy supply shortages, and sewage and waste disposal issues. Furthermore, the growth is taking place in the absence of a national strategic framework to shape national urban development and ensure a more balanced system of spatial growth. This unstructured urban growth can create significant socio-economic and environmental challenges, including urban sprawl; insufficient provision of basic services and infrastructures such as housing, transport, energy, water supply and sanitation; and increased congestion, pollution, unemployment, inequality, social tensions, crime, and violence (Sokhai 2019; World Bank Group 2018). Other challenges that cities face include a gap in inter-city regional transport to facilitate the flow of goods and services, limited infrastructure and services within cities, and weak institutional delivery capacity in policy, financing, planning, implementation, and enforcement (World Bank Group 2018).

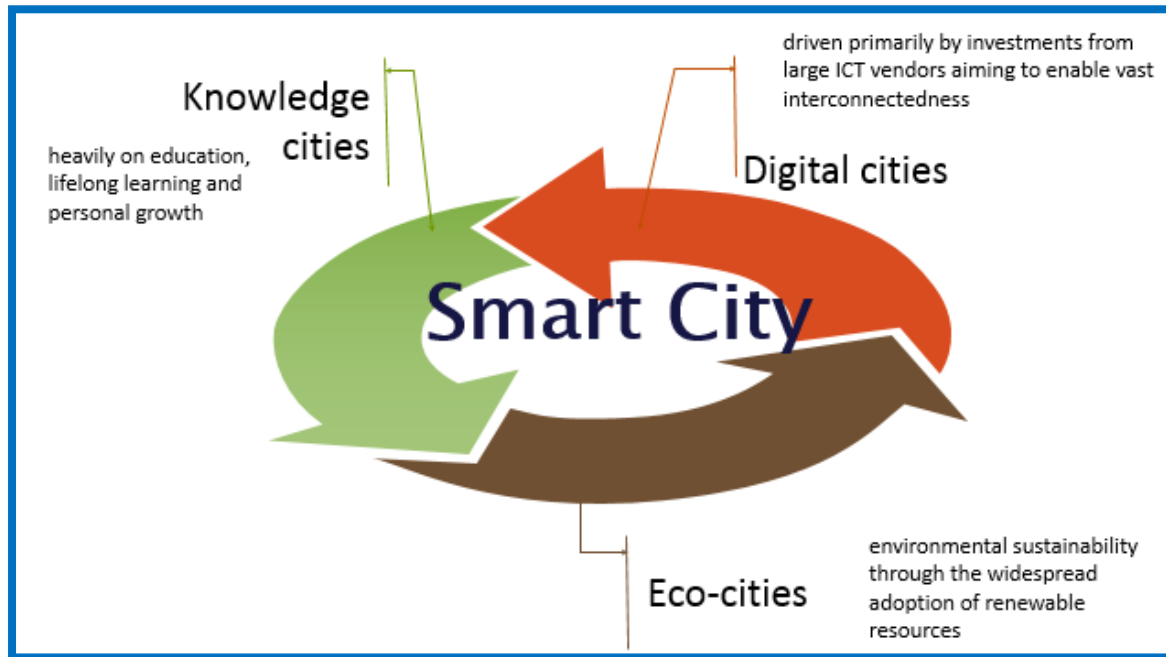
Coping with new challenges, cities worldwide have sought better solutions that enable transportation linkages, mixed land uses, and high-quality urban services with long-term positive effects on the economy (Albino et al. 2015). As a result, the concept of a sustainable city or smart city has been adopted to provide sustainable green growth and encourage healthy economic activities that reduce the burden on the environment while improving the quality of life. The capital city of Phnom Penh and the provincial cities of Battambang and Siem Reap were chosen in 2018 to participate in the ASCN with other 26 ASEAN cities (Pen 2019). Furthermore, Sihanoukville and Kampot, both of which are coastal provinces and serve tourism industries, are planning to promote smart, resilient, sustainable, and safe human settlements. However, the smart city concept is still evolving and not yet mainstreamed throughout the globe due to technological, economic, and governance barriers.

Conceptual Definitions of Smart City

Though sustainable cities have become a highly desired goal for future urban development, there are several different descriptions of what a sustainable city should look like. Thus, there can be confusions regarding definitions and usage of such concepts. In terms of urban development and planning, governments normally consider the fourth pillar among the economic, social, and environmental components of the sustainability concept, since governance is very important to push cities to meet the needs of their citizens in terms of cultural, economic, social, and environmental development (Murray et al. 2011). Smart cities emerged as a solution to addressing the challenges that arise as a result of the exponential

growth of urbanisation and population (Silva et al. 2018). The smart city concept consists of holistic and systemic integration of knowledge cities, digital cities or cyber-cities, and eco-cities (Murray et al. 2011) (see Figure 1).

Figure 1. Holistic and systemic integration of smart city



(Source: Murray et al. 2011)

Additionally, the key interconnected components of a smart city are technology, people (creativity, diversity, and education), and institutions (governance and policy) (Giffinger et al. 2010; Steinert et al. 2011; Lazaroiu and Roscia 2012). A city can be considered smart when investments in these areas of development lead to sustainable growth and enhanced quality of life.

As for the definition, smart city is a concept whose definition has not clearly been given by academia and practitioners regarding characteristics, requirements, and components (Mohanty et al., 2016). There are more than a hundred definitions of smart cities found in a literature review (ITU 2014).

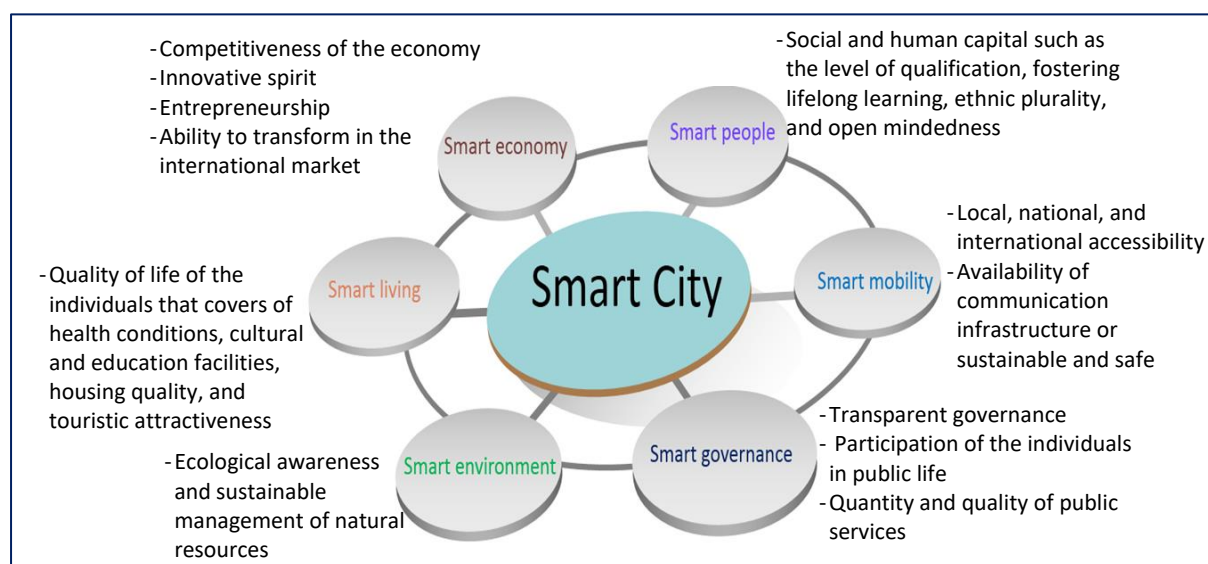
At its most optimistic, a smart city might be best defined as an advanced city utilising information and communication technologies and other means to improve the quality of life, efficiency of urban operation and services, and competitiveness while ensuring the availability of resources or sustaining the needs of present and future generations in terms of economic, social, environmental as well as cultural aspects (ITU 2014; Mohanty et al. 2016; UN-Habitat 2020). Smart cities leverage information and communication technologies to enhance service quality, citizen well-being, sustainability, and economic development. Expanding the smart city concept will, for instance, improve the existing infrastructures, increase the digitalisation and integration of facilities and services, expand the use of collaboration tools and automated service management platforms, increase the safety of citizens and transportation, make cities more attractive for stakeholders, and live up to citizens' expectations (Patrão et al. 2020).

Smart cities are concerned with smart infrastructures, smart buildings, smart transportation, smart energy, smart healthcare, smart technology, smart governance, smart education, and smart citizens (Mohanty et al. 2016). However, certain characteristics or dimensions have commonly been considered the pillars of a smart city, such as smart economy, smart people, smart governance, smart mobility, smart environment, and smart living (Giffinger and Gudrun 2010; Steinert et al. 2011; LazaroIU and Roscia 2012; Albino et al. 2015; Pacheco et al. 2019).

Though the concept and definition of a smart city are diverse, the goal of smart cities is to enhance the life quality of urban citizens by lessening the contradictions between demand and supply in various functionalities (Zanella et al., 2014). Accommodating citizens' life quality demands, modern smart cities need to concentrate on sustainable and efficient solutions for energy management, transportation, health care, governance, and other aspects to meet the necessities of urbanisation (Ejaz et al., 2017).

Smart city development is to enhance the urban citizen's quality of life. Therefore, citizen involvement is the basis of the pillars to gain the maximum benefit of utilising human capital for the betterment of a smart city (Silva et al., 2018). Citizens are a city's greatest resource because they play crucial roles in providing new ideas for innovation, acting as the eyes or ears of the city, monitoring conditions on the ground, and engaging the city more actively in setting priorities. Thus, a truly smart city needs to be people-centred and people-driven rather than technologically-based initiatives (UN-Habitat 2020). Involvement and collaborations between governments, citizens, and other stakeholders are crucial in the innovation processes to improve mutual understanding, strengthen the social fabric, balance the needs, and develop the shared vision of a desired future smart city among stakeholders (Van et al., 2016; Srivastava and Mostafavi 2018).

Figure 2. Smart city's pillars



(Source: Adapted from Giffinger and Gudrun 2010; LazaroIU and Roscia 2012; and Steinert et al. 2011)

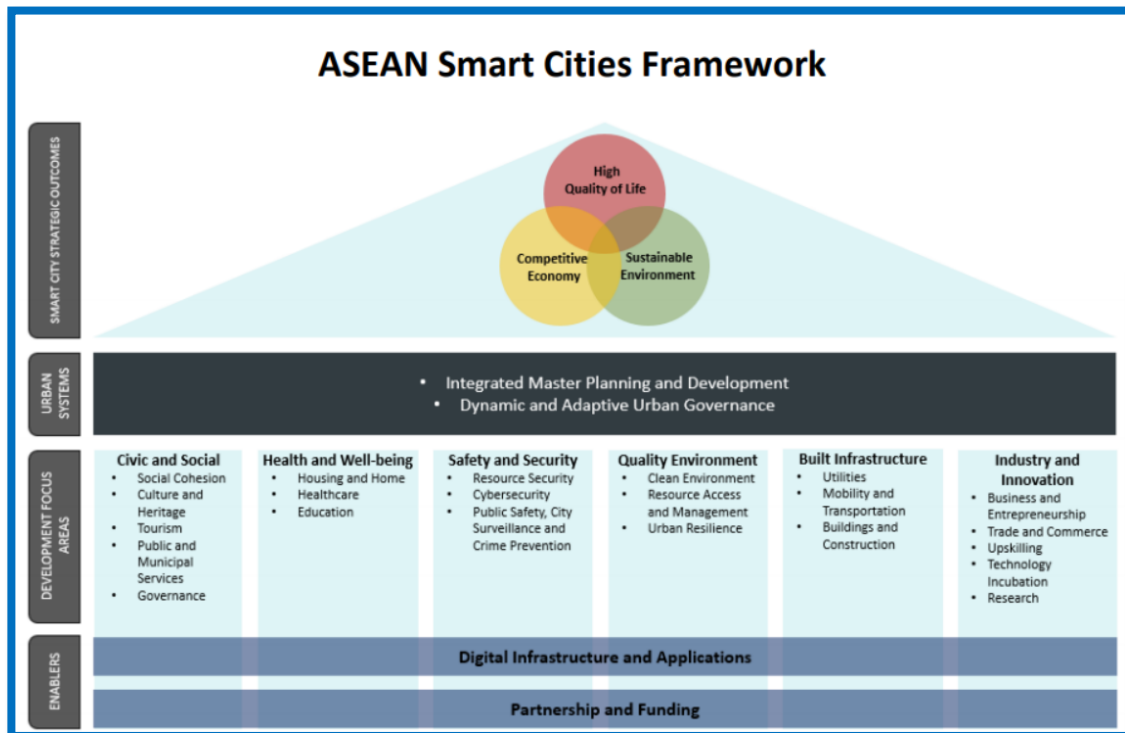
Smart City Movement in ASEAN and Cambodia

ASEAN Smart Cities Network (ASCN)

The ASCN is envisioned as a collaborative platform to work towards the common goal of smart and sustainable urban development to improve the quality of life of ASEAN citizens using technology as an enabler and concerning an inclusive approach to smart city development that is respectful of human rights and fundamental freedoms as inscribed in the ASEAN Charter. ASCN members have adopted the smart city definition as the city that promotes economic and social development alongside environmental protection through effective mechanisms to meet its people's current and future challenges while leaving no one behind. Furthermore, the ASCN focuses on people-oriented, people-centred solutions and liveability and enhances mutual understanding across cultures. It has set its smart city strategic outcomes to realise the balance of high quality of life, a competitive economy, and a sustainable environment (ASEAN Secretariat 2018). Civic and social engagement, health and well-being, safety and security, quality environment, built infrastructure, and industry and innovation are the key development focus of the conceptualisation and implementation of smart city projects.

However, member cities of the ASCN may have different priorities related to their smart cities due to the different needs of cities and people and their different local and cultural contexts (ASEAN Secretariat 2018; Centre for Liveable Cities 2018). Technological and digital solutions, as well as partnership and funding, are the key enablers underpinning planning, implementation, and management of ASEAN smart cities and their projects in various focuses (ASEAN Secretariat 2018).

Figure 3. ASEAN smart cities framework (Endorsed by the ASCN on 8 July 2018)



(Source: ASEAN Secretariat 2018)

Smart Cities in Cambodia

The capital city of Phnom Penh and the provincial cities of Battambang and Siem Reap were selected in 2018 as pilot cities to participate in the ASCN with the other 26 ASEAN cities to provide sustainable green growth and encourage healthy economic activities that reduce the burden on the environment while improving the quality of life (Pen 2019). These cities have mainly focused on four key development areas: civic and social dimensions, quality environment, built infrastructure, and safety and security.

Phnom Penh Smart City

Phnom Penh is Cambodia's gateway city (World Bank Group 2018). It had an approximated population of 2.2 million (as of 2019) and is projected to reach 2.86 million in 2035. The city has become the centre of industrial and economic activities, politics, and cultural heritage. While Phnom Penh is growing, the city is increasingly facing challenges such as a burden on infrastructure, traffic congestion, unregulated construction and parking, air and water pollution, lack of proper waste management, flooding, and socio-economic inequality due to rapid urbanisation and urban population growth (Centre for Liveable Cities 2018; GGGI 2019). To address these challenges, the Phnom Penh Master Plan on Land Use 2035 and the Phnom Penh Urban Transport Master Plan 2035 were developed. Their development was intended to make the city become Cambodia's competitive political, economic, business, and cultural centre and solve the current transport problems. Another goal of the development is to maintain environmentally-friendly urban conditions and vitalise urban activities in Phnom Penh.

Similarly, the concept of Phnom Penh Sustainable City aims to provide sustainable green growth and encourage healthy economic activities that reduce the burden on the environment, while improving the quality of life. It is designed to support the implementation of the Phnom Penh Master Plan for Land Use 2035. It also holistically considers all aspects of green urban development, such as low-carbon development, climate resilience, resource efficiency, social inclusion, and poverty alleviation (Chea 2019; GGGI 2019).

As a smart city initiative in the ASCN, Phnom Penh has set its mission to improve the urban environment to enhance citizens' quality of life. Phnom Penh Smart City focuses on three key areas: (1) efficient and green infrastructure for current and future growth, (2) a healthy environment adopting best practices in public space design for enhancing a healthy urban environment and economic growth, and (3) civic engagement developed through social media or applications to crowdsource suggestions for improving public space and public transport.

Two smart city projects have also been launched. The eleven sidewalks were rejuvenated to increase pedestrianisation through the rejuvenation, restoration, and repurposing of sidewalks along 11 boulevards. This project also delivered traffic de-congestion and public space benefits by managing unlicensed street vendors and illegal parking. Another project is to improve the efficiency of the Phnom Penh Public Transit by enhancing urban public transport and active mobility (Singaporean Ministry of Foreign Affairs 2018).

Siem Reap Smart City

Siem Reap province has an area of 10,299 km² with a population of 1,014,234 (NIS 2019). It is one of Cambodia's three gateway cities hosting international and domestic airports and has high economic potential by serving as a centre for regional economies and land transportation (World Bank Group 2018). Siem Reap is one of Cambodia's pilot cities to have participated in the ASCN. The vision of Siem Reap Smart City is to make the city become a beautiful, unique, and ideal tourist destination characterised by the harmonisation of Khmer history, arts, and nature.

This smart city initiative focuses on three key areas. The civic and social aspect is to sustain the culture, heritage, and tourism, including tourist centres and service improvement. The security dimension focuses on personal safety and security by setting up CCTV, road traffic sensors, and pedestrian traffic sensors at key tourist and traffic spots. The quality environment aspect focuses on clean environment and resource management, including garbage collection and disposal for households and public zones, drainage sensors to measure water levels, environmental management awareness and training, and other relevant areas.

Two smart city projects have been implemented to drive Siem Reap Smart City. The smart tourist management system project is to enhance the use of security enhancement systems such as CCTV and traffic sensors to support Siem Reap's vision of being a liveable, smart, clean, safe, and sustainable city for both residents and tourists alike. The solid waste and wastewater management project aims to develop infrastructure for solid waste and wastewater management and ensure a high-quality environment by capitalising on technology and data management systems (Ministry of Foreign Affairs 2018).

In addition, several sub-projects have been proposed to support the Siem Reap Smart City, including smart city data collection and analysis, CCTV system introduction, official parking system introduction, traffic signal system improvement, QR code development, rental cycling service, landfill management system introduction, and garbage collection LoT installation (MLIT 2020). In addition, with Smart City supported by Japan ASEAN Mutual Partnership (Smart JAMP), JICA has supported the selected projects for Siem Reap Smart City, such as the smart city data collection and analysis programme and the CCTV system introduction plan. The smart city data collection and analysis will establish an integrated data collection and analysis system of the urban environment, while the CCTV system introduction aims to install CCTV camera systems to monitor streets (Seav 2020).

Battambang Smart City

Battambang is well-known as a province of rice fields and high quality and safe living environment. It has a population of 987,400 and an area of 11,702 km² (NIS 2019). Battambang city is one of Cambodia's regional economic corridor cities. The city has high economic potential due to its strategic location and accessibility to inter-regional trade and value-added industries, strong market access and connectivity, and a strong incentive for regional cooperation (World Bank Group 2018). Battambang Smart City's vision is to achieve a socially responsible, environmentally friendly, and economically successful city, whilst retaining Battambang's unique character. Among the ASCN's six development focus areas, Battambang Smart City addresses three: civic and social area, quality environment, and built infrastructure.

The civic and social area heavily focuses on informal settlement improvement, informal street vendors, low-cost housing, and skill development for youth.

The quality environment concentrates on developing the urban physical infrastructure, such as drainage systems, sewage systems, and wastewater treatment plants, as well as raising public awareness of waste management issues. Meanwhile, the built infrastructure aspect aims at building a night market, defining places for street vendors, and improving roads (Singaporean Ministry of Foreign Affairs 2018).

Two smart city projects have been launched to support the Battambang Smart City development. The urban street and public space management project is to improve liveability by upgrading public street and space design, organising space for street vendors, and enhancing the infrastructure for informal settlers. The project will be done by developing markets, low-cost housing, and skills upgrading. The solid and liquid waste management project aims to make Battambang become a green and healthy city. This project will transform river-based natural waste management into sewage and wastewater management systems (Singaporean Ministry of Foreign Affairs 2018). Other prior projects for Battambang Smart City are urban street and public space management, street corridors and public gardens along the Sangkae River, and solid and liquid waste management (Crumpton et al. 2020).

Table 1. Summary of action plans of Cambodia’s pilot smart cities participating in ASCN

Cities	Vision	Development Focus Areas	Smart City Projects
Phnom Penh (capital city, gateway city)	To improve the urban environment to enhance citizen’s quality of life	<ul style="list-style-type: none"> - Built infrastructure - Quality environment - Civic and social 	<ul style="list-style-type: none"> · 11 Sidewalks Rejuvenation Project · Improving the efficiency of Phnom Penh Public Transit
Siem Reap (provincial city, gateway city)	To make Siem Reap become a beautiful, unique and ideal tourist destination, characterised by the harmonisation of Khmer history, arts, and nature.	<ul style="list-style-type: none"> - Civic and social - Safety and security - Quality environment 	<ul style="list-style-type: none"> · Smart Tourist Management System · Solid waste and Wastewater Management
Battambang (provincial city, regional economic corridor city)	To achieve a socially responsible, environmentally friendly, and economically successful city, whilst Retaining Battambang’s unique character.	<ul style="list-style-type: none"> - Civic and social - Quality environment - Built infrastructure 	<ul style="list-style-type: none"> · Urban Street and Public Space Management · Solid and Liquid Waste Management

(Source: Authors)

Currently, Cambodia’s pilot smart cities participating in the ASCN mainly focus on four key development areas such as civic and social, quality environment, built infrastructure, and safety and security. These key development areas selected to be designed and implemented in Phnom Penh, Siem Reap, and Battambang cities are based on their different natural characteristics, potential, conditions and needs, and technological contexts. On the other hand, the other two

development areas, the health and well-being of people and industry and innovation, have not been considered for the pilot smart city development in Cambodia.

Cambodia's coastal cities such as Sihanoukville have also embraced smart city initiatives. Sihanoukville has recently launched the Sihanoukville for all: Smart, Sustainable, and Inclusive City Action Plan consisting of three pillars: people-focused smart planning and e-governance through innovative digital application, smart services through crowdsourced data and information, and digital empowerment to reduce the digital divide and foster human rights. These pillars are supported by 13 initiatives to align with the human security principles (OHCHR and UN-Habitat 2021).

Conclusion

Cambodia has applied the ASCN's smart city definition to its pilot smart cities of Phnom Penh, Siem Reap, and Battambang. The Cambodian smart city initiatives mainly focus on four development areas such as civic and social, quality environment, built infrastructure, and safety and security. On the other hand, the health and well-being of people and the industry and innovation areas have not fully been implemented in these pilot smart cities. The development focus areas selected to be designed and implemented in these pilot smart cities were based on their different natural characteristics, potential, needs, and technological contexts. Cambodia's coastal cities such as Sihanoukville and Kampot have potential and should be considered for future smart city development in Cambodia.

Acknowledgements

The authors would like to thank Professor Dr CHHEM Kieth Rethy, Dr HUL Seingheng, Dr KUOK Fidero, Dr BONG Angkeara, and Mr CHHEM Siriwat William for their constructive comments to this article.

The opinions expressed are the author's own and do not reflect the views of the Asian Vision Institute.

References

- Albino, Vito, Umberto Berardi, and Rosa Maria Dangelico. 2015. "Smart Cities: Definitions, Dimensions, Performance, and Initiatives." *Journal of Urban Technology* 22 (1): 3–21.
- ASEAN Secretariat. 2018. "ASEAN Smart Cities Framework." ASEAN Secretariat. Accessed 18 November 2021. <https://asean.org/wp-content/uploads/2021/09/ASEAN-Smart-Cities-Framework.pdf>
- Centre for Liveable Cities. 2018. "ASEAN Smart Cities Network." *Centre for Liveable Cities*. Accessed 28 November 2021. <https://www.clc.gov.sg/docs/default-source/books/book-asean-smart-cities-network.pdf>
- Chea, Muykim. 2019. "All You Need to Know About Smart Cities." *Cambodia Development Center*, June 24. <https://cd-center.org/2019/06/24/all-you-need-to-know-about-smart-cities/>.
- Crumpton, Charles David, Supawatanakorn Wongthanavas, Peerasit Kamnuansilpa, John Draper, and Eva Bialobrzeski. 2021. "Assessing the ASEAN Smart Cities Network (ASCN) via the Quintuple Helix Innovation Framework, with Special Regard to Smart City Discourse, Civil Participation, and Environmental Performance." *International Journal of Urban Sustainable Development* 13 (1): 97–116.
- Demographia. 2021. "Demographia World Urban Areas: Built Up Urban Areas or World Agglomerations". *Demographia*. Accessed 18 November 2021. <https://www.newgeography.com/content/007127-focusing-world-megacities-demographia-world-urban-areas-2021>.
- Department of Economic and Social Affairs. 2019. "World Urbanisation Prospects: The 2018 Revision." *United Nations*. Accessed 7 November 2021. <https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS>.
- Destatis. 2021. "International Statistics: Urban Population Set to Increase by Almost 700 Million by 2030". *Destatis Statistisches Bundesamt*. Accessed 19 November 2021. <https://www.destatis.de/EN/Themes/Countries-Regions/International-Statistics/Data-Topic/Population-Labour-Social-Issues/DemographyMigration/UrbanPopulation.html>.
- Ejaz, Waleed, Muhammad Naeem, Adnan Shahid, Alagan Anpalagan, and Minho Jo. 2017. "Efficient Energy Management for the Internet of Things in Smart Cities." *IEEE Communications Magazine* 55 (1): 84–91.
- Giffinger, Rudolf, and Haindlmaier Gudrun. 2010. "Smart Cities Ranking: An Effective Instrument for the Positioning of the Cities?" *ACE: Architecture, City and Environment* 4 (12): 7–26.
- Global Green Growth Institute (GGGI). 2019. "Phnom Penh Sustainable City Plan 2018-2030". Phnom Penh. *GGGI*. Accessed 8 November 2021. https://ggi.org/site/assets/uploads/2019/06/SUBSTAINABLE-CITY-REPORT_EN_FA3.pdf.

- International Telecommunication Union (ITU). 2014. "Focus Group on Smart Sustainable Cities." *ITU*. Accessed 8 November 2021. <https://www.itu.int/en/ITU-T/focusgroups/ssc/Pages/default.aspx>.
- Lazaroiu, George Cristian, and Mariacristina Roscia. 2012. "Definition Methodology for the Smart Cities Model." *Energy* 47 (1): 326–32.
- MLIT. 2020. "Smart JAMP". *MLIT*. Accessed 22 November 2021. <https://www.mlit.go.jp/kokusai/content/001389139.pdf>
- Mohanty, Saraju P., Uma Choppali, and Elias Koungianos. 2016. "Everything You Wanted to Know about Smart Cities: The Internet of Things Is the Backbone." *IEEE Consumer Electronics Magazine* 5 (3): 60–70.
- Murray, Art, Mark Minevich, and Azamat Abdoullaev. 2011. "Being Smart about Smart Cities." *Searcher* 19 (8): 20.
- National Institute of Statistics (NIS). 2019. "General Population Census of Cambodia 2019." *National Institute of Statistics*. <https://www.nis.gov.kh/index.php/en/15-gpc/79-press-release-of-the-2019-cambodia-general-population-census>.
- Nop, Sokhai. 2019. "Sustainable Cities Working Group Meeting: Current Status of Sustainable Cities in Cambodia." *Min-Term AFEO Meeting, Bandar Seri Begawan, Brunei. 30 April – 02 May 2019*. Accessed 17 November 2021. <https://afeo.org/wp-content/uploads/2020/08/BEC-Sustainable-Cities-Report-Update.pdf>.
- OHCHR and UN-Habitat. 2021. "Executive Summary: Sihanoukville for All: Promoting Smart, Sustainable, and Inclusive city." *OHCHR and UN-Habitat*.
- Pacheco Rocha, Nelson, Ana Dias, Gonçalo Santinha, Mário Rodrigues, Alexandra Queirós, and Carlos Rodrigues. 2019. "Smart Cities and Healthcare: A Systematic Review." *Technologies* 7 (3): 58.
- Patrão, Carlos, Pedro Moura, and Anibal T. de Almeida. "Review of Smart City Assessment Tools." *Smart Cities* 3 (4): 1117–32.
- Pen, Sophal. 2019. "Cambodia Initiative for Inclusive, Smart and Sustainable Urban Development." *Ministry of Land Management, Urban Planning and Construction*.
- Seav, Kuoy Yi. 2020. "Siem Reap on Track for Smart City Status with Japanese Help." *The Phnom Penh Post*. <https://www.phnompenhpost.com/national/siem-reap-track-smart-city-status-japanese-help>.
- Silva, Bhagya Nathali, Murad Khan, and Kijun Han. 2018. "Towards Sustainable Smart Cities: A Review of Trends, Architectures, Components, and Open Challenges in Smart Cities." *Sustainable Cities and Society* (38): 697–713.
- Singaporean Ministry of Foreign Affairs. 2018. "ASEAN Smart Cities Network." *Singaporean Ministry of Foreign Affairs*. Accessed 22 November 2021. <https://web.archive.org/web/20190214025243/https://www.asean2018.sg/Newroom/ASCN>

- Srivastava, Parul, and Ali Mostafavi. 2018. "Challenges and Opportunities of Crowdsourcing and Participatory Planning in Developing Infrastructure Systems of Smart Cities." *Infrastructures* 3 (4): 51.
- Steinert, Kurt, Revital Marom, Philippe Richard, Gaspar Veiga, and Louis Witters. 2011. "Making Cities Smart and Sustainable." *The Global Innovation Index*: 87–95.
- UN-Habitat. 2020. "World Cities Report 2020: The Value of Sustainable Urbanization." *UN-Habitat*: 11-15.
- Van Waart, Peter, Ingrid Mulder, and Cees de Bont. 2016. "A Participatory Approach for Envisioning a Smart City." *Social Science Computer Review* 34 (6): 708–23.
- World Bank Group. 2018. "Cambodia: Achieving the Potential of Urbanization." *World Bank Group*. Accessed 8 November 2021.
<https://documents.worldbank.org/curated/en/580101540583913800/pdf/127247-REVISED-CambodiaUrbanizationReportEnfinal.pdf>.
- Zanella, Andrea, Nicola Bui, Angelo Castellani, Lorenzo Vangelista, and Michele Zorzi. 2014. "Internet of Things for Smart Cities." *IEEE Internet of Things Journal* 1 (1): 22–32.