SINGAPORE'S SMART CITY DEVELOPMENT POLICY AND LESSONS FOR VIETNAM

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Abstract*: a smart city is a place where traditional networks and services are made more efficient through the use of digital solutions for the benefit of its inhabitants and businesses. The construction of smart cities has attracted attention from many countries. Currently, Singapore is not only a clean and green island nation but also ranks highly among the world's smartest countries. This article analyzes some key policies for building a smart city in Singapore and explores the reasons why Singapore consistently leads in smart city development. In the process of building a smart city, it is clear that the focus should be on human-centered goals. Furthermore, it is crucial to develop cities that offer a high quality of life, sustainable environments, and competitive economies. Drawing from Singapore's experience as one of the world's smartest cities, this article provides assessments and recommendations for building a smart city in Vietnam.*
Keywords: *smart city, policy, Singapore, Vietnam.*

ПОЛИТИКА РАЗВИТИЯ УМНОГО ГОРОДА СИНГАПУРА И УРОКИ ДЛЯ ВЬЕТНАМА

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Аннотация*: умный город — это место, где традиционные сети и услуги становятся более эффективными за счет использования цифровых решений на благо его жителей и бизнеса. Строительство умных городов привлекло внимание многих стран. В настоящее время Сингапур является не только чистым и зеленым островным государством, но и входит в число самых умных стран мира. В этой статье анализируются некоторые ключевые политики по созданию умного города в Сингапуре и исследуются причины, по которым Сингапур последовательно лидирует в развитии умного города. Очевидно, что в процессе построения умного города основное внимание следует уделять целям, ориентированным на человека. Кроме того, крайне важно развивать города, которые предлагают высокое качество жизни, устойчивую окружающую среду и конкурентоспособную экономику. Основываясь на опыте Сингапура как одного из самых умных городов мира, в этой статье представлены оценки и рекомендации по построению умного города во Вьетнаме.*
Ключевые слова: *умный город, политика, Сингапур, Вьетнам.*

1. Introduction

In the 1960s, Singapore, like many other developing countries, faced severe environmental pollution, public disorder, slums, street vendors, land encroachment, and homelessness. In response to these issues, the Singaporean government chose to focus on building a green and clean island nation. The goal of this policy was to transform Singapore into a Southeast Asian oasis with first-world standards.

To this day, Singapore is not only a green and clean island nation but also ranks among the world's top smart countries. According to the Smart City Index 2023 report, Singapore is ranked 7th globally in terms of smart cities (IDM, 2023). The published data shows that Singapore leads among the smartest cities in Asia and is the only Asian city to make it into the top 10 worldwide in this ranking.

2. Theoretical basis

Currently, there are many definitions of a smart city, including terms like "smart city" and "intelligent city." Sometimes, it is also referred to by phrases such as "knowledge city," "wired city," "ubiquitous city," "sustainable city," "digital city," and "modern city," etc.

A smart city is a place where traditional networks and services are made more efficient through the use of digital solutions for the benefit of its inhabitants and businesses.

A smart city goes beyond the use of digital technologies for better resource management and reduced emissions. It encompasses smarter urban transport networks, upgraded water supply and waste disposal facilities, and more efficient ways to light and heat buildings. It also means a more interactive and responsive city administration, safer public spaces, and meeting the needs of an aging population (European Commission).

A smart city can be understood as a city that utilizes information and communication technology to deliver and enhance the quality and performance of urban services. It addresses urban issues such as energy, transportation, and utilities, aiming to reduce waste, resource consumption, and overall costs. Through smart technology, it ensures and improves the quality of life for residents, contributing to the sustainable and efficient development of the city.

2. Method

In this study, the authors employ document collection and analysis methods to examine Singapore's smart city development policy, subsequently deriving lessons applicable to Vietnam. The synthetic method is utilized to logically organize and systematize the information gathered from documents related to Singapore, Vietnam, and the concept of smart city development. Meanwhile, the analytical method focuses on extracting pertinent information from the collected documents, selecting relevant content regarding smart cities, and conducting a thorough analysis to establish the foundation for this research presentation.

3. Results

3.1. Singapore's smart city development policy

The Smart Nation initiative was launched by Prime Minister Lee Hsien Loong on 24 November 2014. In the financial year 2017, to support the momentum in digitalization efforts, the government projected $2.4 billion in ICT tenders and planned to invest in technologies such as data analytics, sensors, and related software and systems. This will include a tender for data analytics and another for communications infrastructure to link data centers and IoT (Internet of Things) sensors. The government will also partner with the industry to increase the deployment of robotics (Government Technology Agency of Singapore, 2017).

In 2017, the Singaporean government announced the establishment of the Smart Nation and Digital Government Office (SNDGO) to coordinate efforts across various government agencies toward the ambitious goal of becoming the world's first smart nation.

To develop a smart city, Singapore focuses on the following key policies:

Firstly, Singapore's Smart Nation project was launched in 2014 with the goal of encouraging Singaporeans to actively adopt digital technologies and smart electronic devices. This initiative aims to collaborate with the government in building a smart city for the future.

Monitoring and analyzing everything from security situations to population density and air quality are considered major breakthroughs in the development of a smart city in the Lion City. A key factor contributing to Singapore's success in building and developing a smart city is its national-level projects and strategies, which are strongly supported by the government. Among these, the two projects identified by the government as crucial drivers for smart city development are the Smart Nation project and Virtual Singapore.

The Smart Nation project includes five national strategies identified as important drivers: 1. a national electronic identification system; 2. a nationwide network of smart sensors; 3. a smart urban transport platform; 4. an electronic payment gateway; and 5. a smart mobile application that helps the government deliver appropriate services to people quickly and efficiently (Moments of Life).

Alongside Smart Nation, a key tool in Singapore's development of a smart city is the Virtual Singapore project. With a total investment of up to USD 73 million, Virtual Singapore is supported by the National Research Fund (NRF), the Prime Minister's Office, the Singapore Land Authority, and the Singapore Government Technology Agency. Virtual Singapore is an interactive digital replica displayed in the form of 3D images. It allows the government to observe the activities of the city's entire infrastructure in real time, enabling them to monitor the structure, architecture, and characteristics of each area. This aids in analyzing flood phenomena, planning solar energy usage, managing traffic flow, adjusting bus routes during peak hours, and monitoring public violations such as smoking, littering, and traffic offenses. Virtual Singapore is also used to respond to natural disasters, pandemics, and terrorism.

Secondly, supporting the development of technology applications is essential. A smart city is a place where technology is used to create systems that are efficient, connected, and intelligent, including smart energy, smart data, smart transportation, smart infrastructure, and connected mobile devices. Singapore leverages advanced technologies such as blockchain, IoT, robotics, artificial intelligence (AI), and others.

To facilitate development, open data is made available on government portals such as Data.gov.sg. AI Singapore was formed in May 2017 with an initial investment of up to S$150 million over five years from the National Research Foundation, in a bid to enhance AI adoption in Singapore and address major challenges in the country using AI (Aaron Tan, TechTarget, 2019).

In the process of building a smart city, Singapore has successfully utilized technology, including sensor technology and automated meters. In terms of transportation, Singapore has implemented a comprehensive one-stop transportation system called One Monitoring. Through this system, citizens can access traffic information collected from surveillance cameras installed on roads and from taxis equipped with Global Positioning System (GPS) technology.

Singapore has invested in upgrading the power grid to make it more energy-efficient and has deployed sensors capable of collecting real-time data on wind, sunlight, and shade in residential areas. The country has also implemented a waste management program by installing solar-powered smart trash bins on the streets, which are equipped with energy storage systems for use when sunlight is unavailable.

Being a densely populated city with high construction density, Singapore constantly grapples with resource issues. This has compelled managers to apply innovative technological solutions to ensure a good quality of life for citizens, such as the NEWater clean water supply solution. The Monetary Authority of Singapore (MAS) also aims to establish a Smart Financial Center, where technology is utilized in the financial sector to enhance efficiency, create economic opportunities, and enable better risk management. MAS has opened the FinTech Innovation Lab, where the community can connect, collaborate, and co-create.

Thirdly, building an e-government to meet citizens' goals and interests is crucial. To protect citizens' rights and enforce laws strictly, a modern government with accurate management is essential. Singapore maintains a highly advanced e-government system. All citizen activities related to public authority can be resolved through an automated, top-down electronic system.

One of Singapore's notable successes in building e-government is the creation of a unified database that integrates all public administrative services across ministries and agencies. With this database, citizens only need to access a single portal to perform all administrative services. The Housing and Development Board (HDB) of Singapore has proposed five smart approaches to housing areas to meet residents' needs: 1. smart planning; 2. smart environment; 3. smart real estate; 4. smart living; and 5. smart community. All these approaches capture real-time information, use data analytics, and employ smart technologies to analyze and optimize data, enabling timely interaction with citizens and improving the living environment.

Fourthly, the government support policies from Singapore have played a significant role. Since the implementation of the general development plan (1960–1970), the Singapore government has launched numerous campaigns encouraging citizens to adopt civilized lifestyles in public areas and high-rise residential buildings. The government has explained the advantages of living in high-rise apartments to gradually instill the habit of living in such environments. Leveraging information, technology, and digitization has been key to transforming Singapore into the world's smartest city. The government has supported technological innovation, particularly by fostering collaboration between the public and private sectors and creating a startup ecosystem that allows Singapore to innovate and introduce advanced digital technology solutions. Since 2017, Singapore has invested 2.4 billion SGD (approximately 1.73 billion USD) to build a smart nation, with the goal of creating a city powered by digital innovation and technology that meets the ever-changing needs of its people.

The reasons why singapore has become one of the smartest cities in the world:

First, the Singapore government places great emphasis on the health and safety of its citizens, considering these to be the central focus of development. The government strives to implement people-centric collaboration models, with all societal development efforts directed toward citizen healthcare. As part of this initiative, Singapore has built the largest and most modern healthcare complex in Novena (Health City Novena) in collaboration with Tan Tock Seng Hospital (TTSH). The country has established a healthcare environment that fosters innovation to ensure six essential qualities of medical care. According to the Singapore government's perspective, a healthy population leads to a resilient workforce and citizenry.

Utilizing a range of technologies, such as remote monitoring devices and digital service platforms, Singapore has established healthcare facilities specifically for the elderly. Additionally, the country has rolled out a strategy called “Healthier SG” aimed at healthcare and disease prevention, particularly prioritizing citizens aged 40 and above. Through this program, Singaporeans can regularly contact doctors for routine health screenings to detect illnesses early.

To alleviate the pressure of an aging population on healthcare services, Singapore has digitized its healthcare system. TeleHealth provides online consultations for cases where in-person visits are not feasible, and TeleRehab allows patients to perform exercises at home. IoT (Internet of Things) devices are utilized to monitor patients' conditions and transmit data to therapists wirelessly. Robotics in Singapore also helps reduce loneliness among the elderly. To ensure public safety, police surveillance cameras and police portals on the website operate 24/7. For several years, Singapore has been rated by Forbes Advisor as one of the safest countries in the world.

*Second***,** a smart city needs smart transportation solutions. Singapore is recognized as a city with world-class advanced technology and cleanliness, boasting the best public transportation system globally and a strong commitment to sustainable development. In addition, Singapore offers a wide variety of mobility services, with a balanced modal share between cars (36%), public transit (42%), walking (18%), and other modes. Mobility demand in Singapore accounted for 54 billion kilometers (34 billion miles) traveled in 2022, generating 3.7 MtCO2e (Oliver Wyman Forum).

With the aim of providing advanced and suitable transportation options for its residents, Singapore has developed efficient public transportation systems. The city's transportation network is highly effective, affordable, accessible, and environmentally sustainable. Smart mobility encourages an active lifestyle through comfortable and cost-effective means of travel. Technology plays a crucial role in Singapore's smart mobility initiatives. The emergence of shared mobility services like Ofo, Mobike, OBike, and the electric car-sharing service BlueSG has significantly complemented Singapore's public transportation. Infrastructure is designed to integrate active transportation modes, such as cycling and walking, with public transport networks, including the Mass Rapid Transit (MRT) system and buses.

*Third***,** Singapore provides transparent and efficient administrative services. The country has a free-market economy with a high per capita GDP, consistently ranking among the highest globally at USD 82,807.63 (2022) (The World Bank, 2022). To attract foreign investors, Singapore has developed an environment characterized by low corruption and low taxes, supported by effective administrative and credit policies for government agencies. The Smart Nation and Digital Government Office (SNDGO) and the Government Technology Agency (GovTech), both under the Prime Minister's Office (PMO), lead the development of a National Digital Identity framework for online transactions between citizens and businesses, building on the current SingPass system. GovTech is also positioned under the Prime Minister's Office (PMO) as the implementing agency of SNDGO. Collectively, the SNDGO and GovTech form the Smart Nation and Digital Government Group (SNDGG). Some integrated and compatible electronic payment methods, such as PayNow, along with the integration of all government services on a single platform called Moments of Life, make Singapore stand out.

3.2. Policy evaluation

The "Smart Nation" project aims to address the main challenges that countries around the world are facing, which include five key challenges: high urban population density, an aging population, increasing demand for healthcare, difficult urban transportation, and energy shortages. By applying digital technologies to tackle these issues, Singapore hopes its "Smart Nation" model can serve as an example for other countries.

Singapore's smart nation model aims to create the following outcomes: a greener, cleaner, and safer living environment for urban residents; more transportation options; improved home healthcare for the elderly; more convenient public services; and better living opportunities for citizens. Jurong Lake, a district in western Singapore, has been chosen as a testbed for the smart city initiatives.

The Smart Nation Platform (SNP) has been established with several important features to support individuals, governments, and businesses, focusing on three aspects: connection, collection, and understanding.

With ambitious and citizen-centric goals, Singapore has mobilized the entire system to participate, bringing together top technology experts, elite talent, businesses, and citizens to collaborate in building a Digital Government.

The most significant achievement of the Smart Nation initiative is the application of information solutions in implementing a digital government, providing public services through a digital platform in order to reduce the number of administrative procedures, as well as the time and cost for both businesses and citizens in their daily lives. The Singapore government has built digital platforms for receiving, processing, and returning documents for businesses, enabling them to access information about land and planning publicly, in detail, and completely free of charge. The digitization of government services has helped make Singapore one of the best business environments in the world for many years in a row. In the social sphere, SNDGO has developed and launched many useful applications to support Singaporeans and families in leading modern, smart, and convenient lives.

Citizens participate in most stages of creating digital products and services through a rigorous five-step process: surveying and collecting public opinions; testing usability; assessing defects; redesigning; and improving service digitization.

The government has constructed 11 service journeys that cover essential utilities for citizens, such as those from birth to high school, job seekers, and healthcare. All of these services are implemented as a one-stop shop, thus saving costs, time, and effort, while changing the awareness, habits, and working methods of officials.

One notable application, "Life Singapore" (LifeSG), has garnered significant attention and enthusiastic participation from a large number of people. This digital service integrates over 40 convenient services, including the registration of birth certificates, child benefits, finding the best schools, information about programs and priorities for the elderly, as well as job opportunities and skills development courses, along with updates on the latest government welfare programs.

These efforts to improve the living conditions of citizens have contributed to Singapore's ability to attract highly qualified workers from around the world to work, live, and contribute to the development of this small country.

3.3. Lesson for Vietnam

On August 1, 2018, the Prime Minister of Vietnam issued Decision No. 950/QD-TTg approving the project for sustainable smart city development in Vietnam for the 2018-2025 period, with orientation towards 2030 (Government of the Socialist Republic of Vietnam, 2018), The goal is to form smart city clusters in the Northern, Central, Southern regions, and the Mekong Delta, with Hanoi, Ho Chi Minh City, Da Nang, and Can Tho as the core cities, establishing a network linking smart cities. In April 2018, at the 32nd ASEAN Summit held in Singapore, three major cities—Hanoi, Ho Chi Minh City, and Da Nang—joined the ASEAN Smart Cities Network. From Singapore's experience, several lessons can be drawn for Vietnam, including:

Firstly, Smart urban planning demands a comprehensive strategy and a long-term vision to ensure the efficient use of resources. A well-coordinated master plan is crucial, integrating both urban and national infrastructure for seamless connectivity. Future development and the successful implementation of these plans must take priority. Strategic planning and foresight are essential to establish the legal framework needed for technological advancements to follow. Rather than focusing on a single zone, the plan must promote connectivity across different regions. These areas will eventually be linked by a high-speed transportation network. After 5 to 10 years of implementation, it is vital to assess the plan's effectiveness and make timely adjustments to resolve any emerging issues in the smart urban planning process.

Secondly, the application of technology in the development of smart cities is essential for effective management, improving the quality of life for citizens, and fostering sustainable social development. A smart city is one that leverages technology to connect, collect, and analyze information from its residents to the management levels, aiming to enhance living standards and ensure sustainable growth. Smart cities are an integration of digital urban systems and advanced technologies. These technologies facilitate communication between devices, between people and devices, and between individuals and society as a whole, while also making urban management smarter. This includes synchronizing utility software applications, adopting sensor and positioning technologies, among others.

Thirdly, infrastructure development is a key driver of economic growth, including smart urban infrastructure. Encouraging socialization and creating favorable conditions for financially capable enterprises to invest in and develop digital technology solutions and utility services is crucial for advancing smart city development. Infrastructure investment should not rely solely on domestic capital but also seek private and foreign investment. There should be a focus on upgrading digital infrastructure and modern digital technology solutions, promoting cashless payment systems,

and enhancing the efficiency of e-government services. Strong development of foundational sectors of the digital economy—such as digital infrastructure, digital resources, digital services, and digital markets—is essential. This will accelerate the implementation of smart digital applications and the expansion of cashless payment systems. For Vietnam, the priority should be to focus on developing digital economy sectors. This will allow the country to seize the opportunities presented by international integration, particularly through free trade agreements, without requiring extremely advanced technological capabilities.

Fourthly, alongside prioritizing the upgrade of digital infrastructure, the development of a workforce capable of adapting to modern technology is equally critical. Special attention must be paid to cultivating human resources for the digital economy, with a focus on attracting and developing digital technology experts and digital entrepreneurs. It is essential to innovate in education and training, ensuring the workforce is re-skilled to keep pace with the digital technology trends. This includes updating and supplementing training materials on digital technology and skills in schools, enabling students to access technology as early as possible. Strengthening collaboration between educational institutions and businesses in digital technology applications is also crucial, with an emphasis on flexibility and practical, hands-on training programs.

Fifthly, the development and improvement of institutions, laws, and policies are essential to create a framework for economic and social growth, with a focus on advancing smart city development. Specific plans and guidelines must be established to effectively operate smart cities, and these plans must be aligned with the country's financial resources. Additionally, attention must be given to developing policies on standards, procedures, and smart city operations to enhance connectivity, integration, and synchronization. The government should also formulate and implement laws and policies on cybersecurity and information management, laying the foundation for setting information exchange standards and ensuring data security for organizations and individuals in the development of smart cities.

For Vietnam, it is necessary to improve and harmonize policies with regional frameworks to ensure more effective implementation. Moreover, the government should introduce policies to maximize the potential of domestic digital technologies. This includes providing digital service platforms to support businesses, reducing time and transaction costs, and facilitating processes such as online licensing and approvals in the most convenient and efficient manner.

4. Conclusion

From Singapore's experience in building smart cities, it is evident that the focus should be on human-centered goals. Additionally, it is crucial to develop cities that offer a high quality of life, sustainable environments, and competitive economies. Singapore’s success in urban development and construction serves as a model for many countries, including Vietnam. However, each country and city has its own characteristics, strengths, and circumstances. Therefore, it is necessary to tailor models and solutions to the specific realities of each country to ensure the most effective and appropriate approach to urban development.

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