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Smart Urban Development Solutions in Vietnam

Nguyen Tien Dung [a]

[a] *Department of Construction of Ha Giang Province, Vietnam*.

Abstract

The paper studies the current situation of smart urban development in Vietnam, thereby proposing solutions and recommendations to stakeholders to develop smart cities in the coming time. By using qualitative research methods, such as: aggregation, regression and interpretation, on the basis of assessing the current situation of smart urban development in Vietnam, a number of proposals and recommendations to stakeholders are made to target smart urban development in Vietnam, such as: (i) Investing in infrastructure and technology; (ii) Building data-based ecosystems; (iii) Engaging people in smart city planning and implementation; (iv) Promoting sustainability and green technology; and (v) Strengthening public-private cooperation.

Keywords: Smart Urban, Green Urban, Modern Urban, Vietnam.

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Introduction

Smart cities are cities that use technology and data to improve the quality of life for citizens and improve the efficiency of urban services. Smart cities leverage a range of technologies such as the Internet of Things (IoT), artificial intelligence (AI), and data analytics to collect, analyze, and interpret data from a variety of sources, including sensors, devices, and other infrastructure.

The goal of a smart city is to create a sustainable, efficient and responsive environment. Smart cities focus on many areas including transportation, energy, water management, waste management, public safety, health and education. By using data to optimize and automate urban services, smart cities can reduce costs, improve quality of life, and enhance citizen engagement and engagement. Examples of smart city initiatives include smart transportation systems, such as real-time traffic monitoring and smart parking systems, smart energy grids that optimize energy consumption, and smart waste management systems that use sensors to optimize garbage collection routes. Smart cities also use data to improve public safety, for example by using video surveillance systems to detect and prevent crime as well as by using predictive analytics to identify high-risk areas for natural disasters.

Countries all tend to develop smart cities and Vietnam is no exception, smart cities use technology and data to enhance urban services, making cities more efficient, livable and sustainable. By improving access to public services and amenities such as transportation, energy and healthcare, smart cities can improve the quality of life for their citizens. With the increasing pace of urbanization, cities are facing a range of challenges, including traffic congestion, pollution and overcrowded public services. Smart city solutions can help address these challenges by optimizing urban services and reducing their environmental impact.

However, smart city development requires significant investment in infrastructure, technology, and data analytics, and funding can be a major barrier, especially for small cities. Many cities in Vietnam lack the data and technology infrastructure needed to support smart city initiatives, including sensors, connectivity, and data analytics capabilities. Therefore, the solution for smart urban development in Vietnam has received much attention from policy makers and researchers. The purpose of this article is to summarize the current situation of smart urban development in Vietnam, thereby proposing solutions and recommendations to stakeholders to develop smart cities in the coming time.

Literature Review

In the world, there are many studies on the requirements of smart cities, factors affecting the implementation of smart cities. Most agree that smart cities are based on information technology, artificial intelligence, Big Data to solve environmental problems, services, and energy efficiency. According to Skouby et al., (2014), the 5G system will connect smart homes and smart cities through the internet system into a unified whole. According to the author, the implementation of 5G, the internet of things, the cloud and artificial intelligence have created a driving force for smart cities, a platform for smart home services and a new combined smart city based on big data (Skouby & Lynggaard, 2014). According to Thakker et al., (2020), a smart city cannot lack artificial intelligence (AI). Traditional artificial intelligence technology is used to develop in smart cities (Thakker et al., 2020). AI's participation in operations is inevitable, policymakers are increasingly concerned about the lack of explainability of AI solutions, and this is seen as a major obstacle to wider acceptance and trust in such AI-based solutions. According to Kumar et al., (2020), the minimum requirement of smart cities is to ensure that people live long term and the environment is large enough, timely providing excellent services to the people there (Kumar et al., 2020). One of the proposals to help policymakers, urban managers and government agencies is the adoption of a smart city transformation framework, which is considered the optimal solution. Policymakers need to consider the four key areas of smart cities: planning, city infrastructure, smart technology systems, and solutions that must deliver efficiencies. Smart city transformation frameworks are universally adopted around the world. This is an illustrated diagram that ensures the relationship between visualization and process for the transition from a traditional city to a smart city. According to Sharifi et al., (2021), to build a smart city, it is necessary to have 4 basic elements: planning, preparation, absorption and recovery to adapt to different environments. Investing in a smart city requires good planning (Sharifi et al., 2021). Smart technology solutions for smart cities are mandatory, technology can predict various changes of living environment, especially after the Covid-19 pandemic, facilitate timely adaptation, minimize or delay the spread of viruses, ensure the provision of basic services for smart city life. One note is that building smart technology systems needs to take into account privacy and security, technological capabilities, regulatory hurdles, and the enthusiastic participation of city dwellers. And finally, the development of smart cities is the solution for the recovery of the economy.

In Vietnam, some scientists have solutions based on research results on smart urban development, such as:

Tran Hoang Giang (2018), "Studying the factors affecting the construction of smart cities in Ho Chi Minh City" (Giang, 2018), according to the author, in order to develop smart cities with a scale and speed, it is necessary to clarify the role of management organizations in smart urban construction; promote the role of people in building smart cities; Promote socio-economic development. The six variables that influence smart building include, smart living, smart residents, smart commuting, smart environment, economy, and smart management. Basically, the study is relatively suitable for the area of Ho Chi Minh City, however, the solutions are not specific, it is necessary to have more secure basic explanations for other areas such as Hanoi and provinces in the country.

According to the current urban planning trend is the application of the benefits of information technology, in which the model simulates and applies it to GIS models (geographic information systems. The role of GIS is not only as a data collection and processing tool, but also as a forerunner in decision-making policies. As a modern support tool, spatial analysis functions and support for policy makers, urban planning requires GIS, because GIS plays a large role in developing intelligent infrastructure systems through effective coordination between the system of smart city operating processes such as health care system, transportation, environmental waste management, monitoring and navigation services...

According to cities with scale and development strategies such as Da Nang need to establish a vision in line with socio-economic characteristics, based on an intelligent and effective architectural framework, solutions for smart development should be considered such as improving the quality of human resources, promoting educational communication to gradually form smart citizens and communities; There must be policies and regulations on the use of infrastructure and resources through the analysis of data and the strong application of information technology and AI. in urban areas and also smart city operating authorities; Especially, it must constantly learn, adapt and innovate in technology, respond faster to changes in the city's smart intellectual environment (Tran, 2021). Thus, it can be seen that in order to operate a smart city, it is first of all strategically synchronized and the information technology system must be updated to the most modern. However, the situation of resources is still limited in terms of both capital and human resources, requiring great caution in the above solutions to ensure efficiency.

According to Luong Nguyen Duy, the core factors that make up the framework for smart cities are: smart economic platform, smart infrastructure, smart population, smart life, smart environment and smart management. In smart cities, there will be an intellectual economy associated with modern technology. According to the author, the motivation for smart city development in Vietnam is: development and application of science and technology; economic restructuring; infrastructure development and urban transformation. In addition, it is necessary to apply solutions such as rapid development of science and technology application, proactively and effectively coordinate with local ministries and agencies in planning to create the synchronization of cities, focusing on the development of smart human resources, connecting the urban infrastructure synchronous system and building the city in the direction of smart urban synchronization with socio-economic development.

Current Situation of Smart Urban Development in Vietnam

Smart city development is an important topic in Vietnam, as the country is undergoing rapid urbanization and faces many challenges related to transportation, energy, water management, waste management, public safety, health and education. Although there have been some smart city initiatives in Vietnam, the overall level of development is still relatively low. Under the Vietnam Smart City Development Project, the government has identified 23 cities with potential to become smart cities, including Hanoi, Ho Chi Minh City and Da Nang. These cities are currently implementing a range of smart city initiatives, including:

Smart Transportation: Hanoi and Ho Chi Minh City have implemented a bus rapid transit system, which includes real-time information on bus schedules and locations. Cities are also planning to introduce other smart transportation solutions, such as electric buses and smart parking systems.

Smart Energy and Water Management: The government is promoting the development of renewable energy sources, such as solar and wind, and investing in smart grids for more efficient energy distribution management. Besides, a series of measures to reduce water waste and improve water quality, such as investing in smart water meters and water treatment plants are also increasingly focused.

Smart Waste Management and Smart Public Safety: The government is accelerating the development of waste-to-energy projects and investing in smart waste management systems to optimize waste collection routes. At the

same time, video surveillance systems to improve public safety and prevent crime are also increasingly focused on investment.

However, the reality shows that, in nearly 4 decades, the work of planning and developing smart cities in Vietnam, despite many efforts of all levels and sectors, the results are still quite modest. By the end of 2020, Vietnam will have more than 862 urban areas of all kinds (including 2 special urban areas, 20 class I urban centers, 29 class II urban centers, 45 class III urban centers and the rest are class IV urban centers). Although the rate of urbanization by area has functionally increased from more than 30.5% in the 2010s, to more than 40% in 2020. The space of the new urban system has been expanded, the socio-economic infrastructure as well as technology has been heavily invested, but it has not yet met the standards of smart cities. The quality of urbanization is not high, urban development in width is the main, causing waste of land and low concentration. Environmental pollution tends to increase in cities that are rated as smart, the quality of life has not improved significantly. Meanwhile, the capacity to manage and operate urban areas is still not high, not keeping pace with modern life.

Some Suggestions for Developing Smart Cities in Vietnam

Developing smart cities in Vietnam is an important task of the Government to meet the needs of urbanization and improve people's quality of life. To achieve this goal, the author offers some suggestive suggestions that can be implemented in the near future.

1. Investment in Infrastructure and Technology: One of the most important solutions for smart city development in Vietnam is to invest in infrastructure and technology. This includes building the necessary physical infrastructure, such as broadband networks, sensors and smart devices, to support the deployment of smart city solutions. In addition, the government needs to invest in advanced technologies such as artificial intelligence (AI), machine learning, and data analytics to support the deployment of these solutions. To fund these investments, the government may consider public-private partnerships, government bonds, and international aid. This may also involve collaboration between domestic and foreign technology companies to bring cutting-edge solutions and expertise to Vietnam.

2. Build Data-driven Ecosystems: Another important solution is to build data-driven ecosystems in cities. This means that city authorities should create a data-sharing platform that encourages the use of open data and collects data from a variety of sources, including IoT devices and citizen feedback. That way, city officials can leverage data to make informed decisions and optimize the efficiency of urban services. To achieve this, governments can work with private companies to develop data analytics capabilities and create data-sharing agreements to ensure that the data collected is used for the benefit of citizens. At the same time, it is important to ensure that data privacy and security measures are in place to protect citizens' personal data.

3. Engaging People in Smart City Planning and Implementation: People's participation and engagement is another important solution for developing smart cities in Vietnam. Governments should encourage citizens to participate in the planning and implementation of smart cities by collecting feedback and ideas, using public opinion polls, and establishing consultation programs. To encourage citizen participation, the government can use social media, mobile apps, and online platforms to collect feedback and communicate with citizens. This could involve creating a citizen feedback platform to report issues such as traffic congestion, street lighting and waste management as well as to monitor the progress of smart city projects.

4. Promote Sustainability and Green Technology: Another important solution is to promote sustainability and green technology in smart city development. This means reducing the carbon footprint of cities by using renewable energy sources, promoting the use of electric vehicles and increasing energy efficiency. This may also be related to green space development, urban agriculture, and building design standards that focus on sustainability. Governments can work with private companies to promote the use of clean energy sources, such as through subsidies and incentives for renewable energy. In addition, the government can create a framework that encourages private companies to invest in green technology, research and development.

5. Strengthening Public-private Partnerships: The government can strengthen public-private partnerships (PPPs) to facilitate smart city development in Vietnam. This means developing a robust framework that encourages the private sector to participate in smart city projects. To achieve this, the government can offer tax incentives, subsidies and other financial benefits to private companies that contribute to smart city development. At the same time, the government should develop clear guidelines and standards to ensure that private companies contribute to the overall goals of smart city development.

Some Recommendations to Stakeholders

To successfully implement the smart city development proposals in Vietnam as mentioned above, all stakeholders, including the government, private enterprises and the people, need to cooperate with each other. Here are some specific recommendations for each stakeholder.

For the Government: Prioritize investment in infrastructure and technology through the development of a national strategy for smart city development with clear objectives, action plans and capital sources. Create a data-driven ecosystem by establishing data standards, investing in data collection and analysis, and establishing a regulatory framework that promotes open data sharing. Engage people by creating communication channels for feedback and engagement, including mobile apps, social media, and mentoring programs. Promote sustainability and green technology by developing incentives and subsidies for clean energy and energy-efficient activities, such as promoting the use of electric vehicles, renewable energy sources and green building standards. Strengthen public-private partnerships by developing clear guidelines and standards for companies to contribute to smart city development and encouraging private companies to invest in smart city projects.

For Private Companies: Work with governments to identify the most important areas of investment and development in smart cities. Invest in the development of advanced technologies and data analytics capabilities that support smart city solutions. Collaborate with governments to create a data-sharing platform that facilitates the exchange of information and supports decision making. Developing smart city solutions that focus on sustainable and energy-efficient practices. Participate in public-private partnerships to implement smart city solutions.

For Citizens: Provide feedback on the current state of urban services and participate in decision-making processes related to smart city development. Leverage citizen feedback platforms to report issues such as traffic congestion, waste management, and public safety. Use mobile apps and online platforms to stay informed about smart city initiatives and provide feedback to city officials. Implement sustainable and energy-efficient practices in everyday life, such as reducing energy consumption and using public transport.

In addition to these recommendations, it is important for all stakeholders to prioritize cooperation and communication in the smart city development process. This means working together to identify problems, share knowledge and expertise, and implement solutions that best meet people's needs. By taking a collaborative approach, stakeholders can ensure that the smart city development process in Vietnam is successful and sustainable in the long term.

Conclusion

Based on the research results, the author offers some suggestions on solutions to develop smart cities in the coming time. Developing smart cities in Vietnam requires a combination of government leadership and private sector engagement. It is important to invest in infrastructure and technology, build data-driven ecosystems, engage citizens in smart city planning and deployment, promote sustainability and green technology, and strengthen public-private partnerships. With these solutions, Vietnam can realize its vision of a smart city and bring a better quality of life to its people.

References

Communist Party of Vietnam. (2022, January 24). *Regarding planning, construction, management and sustainable development of urban areas in Vietnam to 2030, with a vision to 2045 (No. 06-NQ/TW).* Communist Party of Vietnam.

Giang, T.H. (2018). Research on factors affecting the construction of smart cities in Ho Chi Minh City. *Journal of Science and Technology*, 1-4.

Kumar, H., Singh, M.K., Gupta, M., & Madaan, J. (2020). Moving towards smart cities: Solutions that lead to the Smart City Transformation Framework. *Technological Forecasting and Social Change, 153,* 119281.

Sharifi, A., Khavarian-Garmsir, A.R., & Kummitha, R.K.R. (2021). Contributions of smart city solutions and technologies to resilience against the COVID-19 pandemic: A literature review. *Sustainability, 13*(*14*),8018.

Skouby, K.E., & Lynggaard, P. (2014). Smart home and smart city solutions enabled by 5G, IoT, AAI and CoT services. *In International Conference on Contemporary Computing and Informatics (IC3I)*, 874-878.

Thakker, D., Mishra, B.K., Abdullatif, A., Mazumdar, S., & Simpson, S. (2020). Explainable artificial intelligence for developing smart cities solutions. *Smart Cities*, *3*(4), 1353-1382.

Thong, L.N.D., Huy, D.X., & Khanh, N.T. (2022). Building a smart city in Ho Chi Minh City with modern digital technology. *Journal of Science and Technology of the University*, (1).

Tran, P.H.T. (2021). *Smart urban model in Da Nang: current situation and some recommendations*.

Tuan, V.A., Giang, N.C., Lan, B.T.N., & Anh, N.D. *Towards smart cities and the role of GIS - challenges in Vietnam*.