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Thu Dau mot smart city model

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Abstract
Building smart cities is becoming a global trend. This is considered an important starting point to promote socio-economic development of countries in the future. Therefore, each country often chooses its own path to achieve its goals, depending on the context and development strategy. In Vietnam, on the basis of industrialization, Thu Dau Mot city of Binh Duong province started implementing the smart city program in 2015 to create breakthroughs in the province's socio-economic development, and at the same time build a The company is preparing to enter the era of the industrial revolution 4.0 and has initially achieved certain successes. On the basis of a survey of the practice of building a smart city model by Eindhoven (Netherlands), the article points out a number of problems that are suggestive for Thu Dau Mot in the process of building a smart city in the coming time.

Keywords: smart city, Eindhoven, Netherlands, Thu Dau Mot

1. Introduction

Along with the development and application of information and communication technology, many countries around the world have initially successfully built a smart city model to help improve the quality of life, improve service quality of city government, reduce energy consumption and promote effective management of natural resources. The smart city model is identified as a key solution to solve complex problems arising in the process of urbanization and is increasingly seen as an inevitable trend of cities. Building and developing smart cities also contributes to promoting the national digital transformation process more and more strongly, developing the digital economy on the basis of science - technology and innovation; improve productivity, quality, efficiency and competitiveness of the economy. In other words, the utility that the smart city model brings is huge in many fields. The article is based on surveying the Eindhoven city model (Netherlands), the author suggests some reference issues for the smart city construction model of Thu Dau Mot city in the future.

2. Content

2.1. Concept and evaluation criteria of smart city

Smart city or smart city has become one of the most fascinating new concepts related to public space management. The concept of smart city appeared and is based on initiatives from the early 1970s on cybernetic cities, digital cities, virtual cities, creative cities, knowledge cities, etc., combined with current city models such as green cities, ecological cities, sustainable cities, safe cities... Smart city models built in each country are different, depending on the city, its size, it social conditions. Currently, in the world, there are many different concepts of smart cities that are approached from the perspectives and perspectives of governments, scholars, and researchers.

According to Y Arfah *et al*. "Software-focused smart city involves the use of information and communication technologies to achieve a high quality of life and improve the quality of the environment" [1].

According to Mohanty *et al*. "A sustainable smart city is an innovative city that uses information and communication technology (ICT) and other means to improve the quality of life, efficiency of urban activities and services, and competitiveness, while ensuring that the needs of present and future generations are met in terms of economic, social and environmental aspects" [2].

In Vietnam, according to Official Dispatch No. 58/BTTTT-KHCN dated January 11, 2018 of the Ministry of Information and Communications: A smart city or smart city "is an urban or residential area that applies appropriate, reliable, innovative information and communication technology and other methods to improve the effectiveness and efficiency of analysis, forecasting, and the provision of services by the city's citizens; improve the quality of life and work of the community; promoting innovation, creativity and economic development; and at the same time protect the environment on the basis of enhancing communication, data sharing, safety and security of information between systems and services" [3].

Thus, from the above concepts, it can be understood that a smart city is a city that applies information and communication technology to collect, transmit, store and process data in order to improve the quality of life of people in the city; at the same time, effectively manage the city according to the motto of saving energy, reducing environmental pollution, enhancing security, building scenarios to cope with bad situations that may occur in the future. This will serve as a basis for the sustainable economic, social and environmental development of the city.

Criteria to evaluate smart city

Currently, countries around the world, although successfully building many smart city models, do not yet have official criteria to fully evaluate smart cities. However, some of the following main criteria have been selected by organizations and countries to evaluate and serve as criteria for a smart city:

- **Smart Residents:** is the level of continuous improvement in capacity and qualifications at all stages of the life and career of city residents. This is the key point that determines the quality of human resources and the labor market in association with the quality of life of residents. Smart residents contribute to social development by promoting socio-economic dialogue, directly participating in activities of social life, using cultural and creative potential to develop cultural, sports and tourism infrastructure.
- **Smart Mobility:** The increased use of technology to solve the problem of optimizing transport and public transport, helping city residents not only save time in commuting at a cheaper cost, but also contribute to environmental protection. Build a traffic system that meets all people's needs, directing people to an environmentally friendly transport system. This requires the realization and implementation of solutions to better manage the multimedia transport network and improve the connection quality of the public transport system.
- **Smart Environment:** Towards the goal of maintaining the ecological balance in the socio-economic development of the smart city. This requires effective and comprehensive management of environmental resources, rational use of natural resources and the development of skills to prevent and minimize negative environmental impacts from economic activities. Smart environment adapts to climate change, deploys solutions to reduce greenhouse gas emissions, increases investment in research and technology development related to improving energy efficiency, improves energy and fuel security, develop renewable energy sources.
- **Smart Economy:** having an economy based on innovation, entrepreneurship, high productivity, flexibility of the labor market, expanding international and regional cooperation. This is the new knowledge-based economy, in which innovation is the driving force of development and modern information technology includes: global competition, technological innovation and continuous organizational improvement.
- **Smart Governance:** includes smart public management and public services, which value public participation in decision-making and transparency of actions, as well as the quality and availability of public services. Smart governance is a process of finding a balance in the development process between environmental demands, social pressures to improve quality of life and locally available technological solutions.
- **Smart Living:** is seen as an effort to create a high-quality urban public space system. The urban space is attractive and friendly to the people, harmoniously combining with diverse and rich themes and styles, but still forming a unified whole. One of the goals of smart living is to create a safe and friendly space for the most vulnerable people in the city, with cleaner water and fresher air, more green spaces, gardens, parks, and more people-friendly and energy-efficient buildings.

2.2. Smart city model of Eindhoven (Netherlands)

Eindhoven in the province of North Brabant, is the largest city in the South of the Netherlands with a population of 277.8 thousand [4]. In the late 1990s, Eindhoven was hit hard by a severe pandemic. The economic crisis caused many corporations and companies (such as Philips, DAF....) located in Eindhoven city to face difficulties and even go bankrupt. Faced with that situation, the Mayor of the city together with the President of the Chamber of Commerce of Eindhoven and the Rector of the Eindhoven University of Technology decided to develop a strategy called the "Triple Helix" model to create a link between the state government, schools and businesses. State government here can be understood as central government, regional government or can be local government. Schools are understood as universities, colleges, research institutes as well as other educational and training institutions. Businesses range from multinational corporations to regional businesses and startups. In order to effectively implement the Triple Helix model, Eindhoven has opened forums for relevant parties to exchange with each other in order to understand the needs and difficulties of each party when implementing the smart city project in Eindhoven. In the Triple Helix model, Eindhoven University is one of the places where smart products and services are invented, businesses rely on the inventions of Eindhoven University to produce and manufacture items that ensure to meet the increasingly high quality of life requirements of city residents. In parallel with carrying out the task of closely monitoring and evaluating the process of supporting the work of Eindhoven University and businesses, the Eindhoven city government has invited people to consult information and can share their own opinions about the products and services brought by the Triple Helix model. It can be said that building a smart city is considered an effective solution to the problems posed during Eindhoven's development.

By 2004, the city of Eindhoven was considered the "Brainport" of the country. The Brainport program focuses on further development and completion of the value chain of the key technology fields of value stabilization: life-tech (life science, medical technology), high-tech systems (ICT, microelectronics, nanotechnology, automotive and

mechatronics) and creative industries. A lot of ideas have been applied in Brainport Eindhoven's smart space, especially non-tech strategies like Triple Helix. In addition, Brainport continues to see Eindhoven as the focal point where resources and initiatives are tested in the early stages so that the Eindhoven brand can be improved and strengthened worldwide. Thanks to the Brainport program, Eindhoven overcame the crisis and rose to become one of the centers of high-tech innovation and creativity in the Netherlands in particular and Europe in general [5]. The quality of life of Eindhoven people has improved rapidly with the achievements of technology, people's income will reach 55.6 thousand USD in 2020 [6]. In 2011, Eindhoven was named "World's Smartest Regional City" by ICF (Intelligent Community Forum) [7].

It can be seen that Eindhoven's smart city building model has really proved successful in sharing vision and goals with key stakeholders. A smart city is not only a technology project of the government, universities and research institutes, but also requires the cooperation of businesses and corporations. Currently, Eindhoven is still strongly promoting the linkage between research centers, universities, public and private sectors in the smart city development strategy. Eindhoven has ambitions to become an energy hub by 2045 to significantly reduce total CO2 emissions and maintain the sustainable living of the city's residents. With this goal in mind, Eindhoven is seeking to engage with stakeholders in its decision-making and policy processes in all areas of life [8].

2.3. Notes on building a smart city in Thu Dau Mot

Located in the southern key economic region, Binh Duong has all the advantages to develop a smart city model with the focus on Thu Dau Mot city. Advantages for Binh Duong province in building a smart city such as Binh Duong actively deploying solutions to catch up with the industry 4.0 trend; expanding the development of services; focus on developing high-quality human resources; In the period 2016-2021, Binh Duong has achieved positive results, the economy is continuously growing, the economic structure continues to shift in the right direction, GDP per capita increases, the urbanization rate reaches 82% in line with the direction of building a smart city, the infrastructure system is strongly invested, the innovation ecosystem is constantly developing in 2021, and Binh Duong is ranked 2nd in attracting foreign investment in total in 2021, with the total number of foreign investment attracting 377. 91.6 million USD [9], leading the country in per capita income with 7,123 thousand VND/person/month [10]. This is an important basis that positively reflects the effectiveness of the Smart City Project, with the focus being on the Innovation Zone project implemented in the past time. This is also a solid foundation for Binh Duong to build a Smart City Project for the period of 2022-2030 to a new height, which is to focus strongly on balancing economic development with social progress and green growth... In the process of building smart cities, Thu Dau Mot and Binh Duong have quite unique approaches, different from other localities across the country. Binh Duong Smart City Project for the period 2022-2030 continues to include 04 areas (people - technology - business - foundation elements) as in the period 2016-2021, but these areas will be adjusted to suit the current situation and the big challenges ahead. At the same time, the Binh Duong Innovation Zone Project is integrated in the new Smart City strategy for the period 2022-2026. Continue to apply the model of three houses (State-School and Enterprise) in building smart city. In 2016, on the basis of learning from the success of the Eindhoven smart city model, Thu Dau Mot city, Binh Duong province began to promote the Triple Helix model in which people and intelligence are centered, stakeholders cooperate flexibly and voluntarily, discuss and share visions, challenges, opportunities and resources for development. The Triple Helix concept built on the relationship between government, schools and businesses has become the guideline for the implementation of groundbreaking projects of Thu Dau Mot. Binh Duong province has identified and developed a specific roadmap for the implementation of 12 key project clusters in 2020 [11] to lay the foundation for the high-tech manufacturing and service industries, and plan to successfully build a smart city model before 2021, moving towards a knowledge economy. Thus, unlike the traditional approach that only focuses on the application of technology in urban areas, the impact of the Smart City program under the Triple Helix model will be more comprehensive, including both technological and non-technological factors, with emphasis on knowledge enhancement and content innovation in daily economic life. A smart city according to Thu Dau Mot's approach is a dynamic, innovative city and a well-connected ecosystem in which all its actors are continuously improved, innovated and optimized. Efforts and creativity in the ambition to build Thu Dau Mot smart city have been recognized by the event that Binh Duong officially became a member of ICF in 2019. And from 2019 to 2022, Binh Duong was voted as one of 21 cities with typical smart city development strategies. In order to continue to realize the smart city development strategy as well as maintain the recognition of the international community in the Top 7 ICF, move towards the Top 1 ICF and based on the close cooperation in sharing experiences with Eindhoven city, in the coming time, Thu Dau Mot should pay attention to the following issues:

Firstly, the Triple Helix model initially proved its suitability with the practical conditions of Thu Dau Mot. Therefore, the province needs to continue to be consistent and maintain the three-party cooperation model: the state, the school and the enterprise. The State needs to continue to play a strong role in creating and facilitating public investment projects. The active and close participation of the State will be a lever for entrepreneurs - an important factor on the economic development front and the school - a decisive factor on the human and scientific and technical development front.

Secondly, Thu Dau Mot is a locality with a very high foundation of facilities and a spirit of sharing and cooperation between schools, training institutions and businesses. This has created favorable conditions for students, start-ups, small and medium enterprises in the province to unleash their creativity and develop new ideas. In the long term, Thu Dau Mot needs a more solid knowledge base to serve the production process of enterprises. Thu Dau Mot can build a better future for people and businesses by using advanced technology as a driver of socio-economic development. To do so, in the coming time, Thu Dau Mot needs to create a more vibrant research cooperation environment, encouraging universities, research institutes, businesses and the international community to jointly develop ideas, solutions and smart business models on the basis of science and technology innovation to bring benefits to all stakeholders. Thu Dau Mot needs to make the most of opportunities to develop cyberspace, digitize, connect and integrate systems,

processes and services for forecasting and overall operation.
Third, building a smart city must be based on the spirit of market demand, always listening, grasping and promptly serving the aspirations and needs of the people. Towards building a flexible and transparent environment, Thu Dau Mot city is the first locality in the country to establish a one-stop administrative center, establishing a Public Administration Center in 2014 for more professional and strict digital management. This event is considered the first platform to build a smart city. In the coming time, the Center needs to work more closely with state agencies, businesses and academia to promote technology application, create favorable conditions and attract local people to participate in monitoring, management and evaluation of city construction quality.
Fourth, in order to realize the ambition to become a typical smart city of the Southern Key Economic Zone in particular and the whole country in general, an important factor to mention is the quality of the staff directly managing and operating the model of the city. Faced with the increasingly strong development of science and technology and increasingly strict requirements on the ability to handle arising problems of the smart city construction process, it is required that the staff directly managing and operating must always be dynamic, creative, responsive and professional. This is the first condition that plays a decisive role for breakthrough and sustainable development in the 4.0 era. Therefore, in the coming time, Thu Dau Mot needs to continue to maintain the view that training and human resource supply, especially high-quality human resources, is a breakthrough in all development policies and orientations. Universities, training institutions in the city and neighboring localities will continue to play an important role to meet the requirements of providing human resources to ensure the process of building and developing smart cities.

3. Conclusion

The smart city model should be understood in the sense of making urban social organization smarter. The trend of building smart cities is taking place popularly not only in developed countries but also in developing countries. The smart city building model of Eindhoven (Netherlands) is a vivid practice that demonstrates the important role in connecting the actors involved in city construction. For Thu Dau Mot, the construction of a smart city is still quite new and has not had much experience. Therefore, on the basis of assessing certain similarities between Thu Dau Mot and Eindhoven city, the city quickly researched, creatively and moderately applied Eindhoven's experience in building a smart city to its practical conditions. Hopefully, in the process of building a smart city in the coming time, Thu Dau Mot will achieve many important results to become the leading locality of Binh Duong province to achieve the goal of prosperity and sustainability.

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