

PARTICIPATORY PLANNING APPROACH TOWARDS SMART SUSTAINABLE CITY DEVELOPMENT

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Cities have been witnessing a growing middle-class population and urbanization which has become challenges apart from development advantages. This huge paradigm shift of rapid development should meet the needs of current and future inhabitants without imposing negative impact on urban system among multi aspects of environment, social and economic dimensions, e.g., congestion, pollution, and poverty. To provide better living conditions, cities need to be improved by focusing on an alternative approach of development and sustainability aspect. This study adopted the principles of sustainable development to find ways to help innovate cities and find a mechanism to drive smart city development by creating participation among all stakeholders. The inclusion of public sector, private sector, local agencies is focused to search for an innovation development from 200 people in Pathumthani Province by using the design thinking process. The 3 dimension of design processes are: 1) define problems and give them a level of importance, 2) identify goals for smart city development and 3) recommend development plan for short term, medium term, and long-term planning by formulating projects on platform of technology and innovations. The study found that given the public and private sector's priority to creating city database with visualize system as a basis for city's problem identification and lead to a sustainable solution. This will be a crucial step in the context of Thailand to find an appropriate way to a real successful smart city development.

Keywords: Design thinking, Roadmap, Public participation, Smart city, Urbanization, Sustainable solution.

1 INTRODUCTION

Urbanization pulls the cities to face the challenges of urgent global issues which comprises of geology, ecosystems, and climate change. However, it is a must to maintain the job opportunities, infrastructure and accommodation to support a better quality of life (QoL) of continued increasing in number of population (Iamtrakul and Klaylee 2018, Huovila *et al.* 2019). The digitalization innovation and technological development is important mechanism to create smart city solutions that can be an option on responding to a number of challenges that pose a risk to their sustainable development (Khan 2018). With the development of information communication technology (ICT), new technologies, participatory planning approaches must be integrated for smart city solutions. Cities possess driven innovative technologies database for

connecting people, sharing information, advancing infrastructure and mobility system to ensure or increase the quality of life of their citizens (Bibri 2018, Söderström *et al.* 2014, Iamtrakul and Raungratanaamporn 2018). However, these must be interconnected and target to share similar goals as sustainable cities. Hence, many researchers have studied and emphasize about this key element to achieve goal of the sustainability concept in smart cities. Various dimension of smart city solution was employed to make the cities more liveable, competitive and sustainable through participatory planning approach (Kourtit and Nijkamp 2012, Albino *et al.* 2015, Belanche *et al.* 2016, Aina 2017, Ahmed and Rani 2018). The current model of urban development has led to the emergence concept of “Smart sustainable city” (Bifulco *et al.* 2016, Ahvenniemi *et al.* 2017, Bibri and Krogstie 2017, Yigitcanlar and Kamruzzaman 2018, Akande *et al.* 2019). Smart sustainable cities are typically rely on the fulfillment of various ICT visions of data computing (Bifulco *et al.* 2016). A Smart sustainable city can be defined as “*an innovative city that uses of information, communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring for meeting the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects*” (ITU 2016). Accordingly, smart city solutions have been, however, heavily criticized of being often about people-centric which was driven by participatory planning approach. It is a need for cooperation from the public, private, and public sectors that must be the key driving force for smart city development (Marsal-Llacuna and Segal 2017). However, with the recent advance technologies (IoT and low cost sensor) allow higher capacity for technology integration and physical entities more efficient and effective. With this platform, it will help for enabling big data analytics and services that need to be fully realized and exploited for urban planning and smart city performance improvement (Bibri and Krogstie 2016). This innovative approach to understand cities’ function can be platform for management and planning towards the goal of sustainable development (Iamtrakul *et al.* 2018). The driving for decision-making processes can be facilitated under smart system by functioning and planning process among multi stakeholders based on concerning of optimizing energy, environmental efficiency, and economic growth (Bibri and Krogstie 2017). Therefore, this study, aims to search for an appropriate way to create an understanding platform of smart sustainable city development by organizing a workshop among group of 200 public and private sectors. By selecting Pathumthani Province as a case study, this study can represent as a prototype area for creating a policy plan which could be crucial in improving how cities function and work for the benefit of citizens in Thailand.

2 LITERATURE REVIEW

2.1 Smart Sustainable City

A smart sustainable city represents the structures of urban systems, which is aimed to be simple, clear, flexible and responsive via current technology and design based on stakeholder participation planning approach. It should be enabled to deliver an inclusive, prosperous, and sustainable future for local citizens through effective integration through its component among physical, digital and human systems. Correspondingly, it must be designed and planned to cover 4 main variables which are: (1) by means of accessibility towards information and technology, (2) creating "sustainable" which should be transformation and resilient and self-maintainable, (3) allow for "transparency" of open data which should be actionable and functioned, and (4) promoting of investment from public and private partnerships that represents as an important part of Pathumthani province development towards a smart sustainable city with details as follows (Yigitcanlar *et al.* 2018).

2.1.1 Engaging citizens (participatory governance)

Smart Sustainable Cities (SSC) should ensure people to access government data-based, increase engagement and to promote innovation through public service collaboration. The government's responsibility must be promoted and supported bottom-up technology and innovation initiatives. Laws and regulations should support living labs for creativity, diversity and education as well as technological sandbox and artefacts in a variety of real-life usage scenarios. However, engagement by governance by focusing on the public collaboration in improving health and well-being by ensuring effectiveness and coverage of accessibility to urban and community services. In addition, participatory governance should provide a mechanism in effective local platform to ensure equitable and actionable policies.

2.1.2 Opening data (transparency and service delivery)

Open data should help promoting better cities, enhance data transparency, analysis, synthesize and increase public engagement while improving urban solutions to cover physical, environmental and socio-economic problems. The most of data features of openness should be accessed and available for creating innovation as well as 3R (redistribution, replace and reuse). Data management has become considerably important which should be visual to the environment, traffic and related statistics. In addition, open data should ensure transparency by not only focusing on innovations and technologies based, but also integrate with the improvements among the socio-economic, identity-cultural, environmental and governance dimensions to data-driven smart city integration system.

2.1.3 Active involvement (the private sector)

All stakeholders play an important role in active involvement, particularly private sector which has continuously been focused on 3R (redistribution, replace and reuse) of innovation and technology applications. In addition, the local private sector (business and start-up) is expected to establish new solutions and community services. The investment in research and development (R&D) with customizable and standardized solutions is required for more citizen participation with the smart city mechanism and strategies. It must be replicated and scaled up globally and play a critical role on the basis of start-ups innovative and local players. Creative solutions with local understanding must be connecting to create an equation of benefits for local business, citizens and governance.

3 RESEARCH METHODOLOGY AND ANALYSIS

This study organized a workshop with a process of creating design thinking, which was divided into two sectors: public and private, where the goal of the meeting was to know about the readiness of each agency and work plan. The projects that each agency is working on during brainstorming are divided into 2 phases: 1) "Pain Point or city problems" by brainstorming on the importance of the problem by allocate the level of urgency of the problems and 2) "Smart City Planning" by finding the solutions each problem of the pillars of smart city development to be used in the smart city development framework (Figure 1). According to the technology platform group of 7 pillars includes: (1) Smart Environment, (2) Smart Economy, (3) Smart Energy, (4) Smart Government, (5) Smart Living, (6) Smart Transportation and (7) Smart People. The issue to be considered in the framework of this study can be classified into 3 issues, as follows (Table 1);

Table 1. Guidelines for smart city plan in Pathumthani province.

Guidelines	Goals for smart city development and work plan						
	Smart environment	Smart economy	Smart energy	Smart government	Smart living	Smart transportation	Smart people
Driving measures	Reduce plastic bags and bottles	Develop space into a commercial area	Promote the use of renewable energy	Set to use solar energy	TOT call center	Private investment rights and interests of each sector	
	Public awareness	Establish a learning center with online business	Exclusive investment privileges in smart energy	Stationary zone of the district area development.	Public health system	Design a city that can keep pedestrians safe	
	Create incentives for the abandoned public space	Build a tourist attraction development platform	Smart streetlight	One-stop service			
	Specified waste separation are entitled to a tax deduction.	Green market	Installing LED bulbs in the area				
	Establish a connection system to collect data		Promote the use of renewable energy				
	Supports education and educating students, skills and attitudes						
Direction setting policy	Installation of a weather sensor system	Policy and system to promote eco-industrialization	Smart street light system and support private investors	Strategic big data analytic platforms	Residential area development plan, infrastructure system Internet network	Supporting the use of bicycles in industrial areas	Create awareness and create communication channels for people
	Develop the wasteland to be a green area	Promote connections between agricultural and industrial sectors		IOT and data analytics platforms	Pre-aging application	Water connection system	Give awards to people for their success in helping to develop the city
	Strict laws against field burning in open areas			City Data Platforms	Smart health applications	Developing a light rail system in congested areas	
						Set direction, planning of intelligent transportation systems	
Cooperation model	Promote environmental quality development mechanisms			Promote cooperation of the public and private sectors		Promote cooperation of the public and private sectors	Build volunteers in the area to encourage participation
	Creating knowledge in protecting the environment						Providing information and solving problems from the public sector
							Encourage the private sector to build up an innovation district
Knowledge and expertise	Academic personnel in government agencies that develop environmental aspects		Pull the government sector involved in electricity to support the adjustment	Provide knowledge to all sectors		Expert group to support the project	The university for education or provide Re-skill and Up-skill platform for the people
Allocation budget	Local government organization			Open Government Data Platforms	Chatbot system	Intelligent Transportation System (ITS)	System for monitoring non registered population
	The budget is divided into percentages in each sector		Cooperation of the public and private sectors	Allocate budgets both at the local and other levels	The AI system analyzes suspects (safety)	Promote a joint venture between the railway and land owners	Promote housing for low-income people

■ Short term (3-5 years) (Level 5-4)
 ■ Medium term (5-10 Years) (Level 3-2)
 ■ Long term (10-15 Years) (Level 1-0)



- 1) *Define problems and give them a level of importance* to identify trends in issues and the degree of need for correction that will affect the result of implementation in conjunction with the formulation of short-term, medium and long-term plans.
- 2) *Goals for smart city development in Pathumthani Province*, by defining a guideline to support each of the five pillars.
- 3) *Short term, medium term and long-term planning* by formulating plans/ projects/ technology/ innovations to fix the problem after brainstorming on the problems and solutions.

Therefore, it is useful input for the planning process and preparation for action plan which is divided into 5 levels from level 5 to level 1 (from high level to low level of readiness).

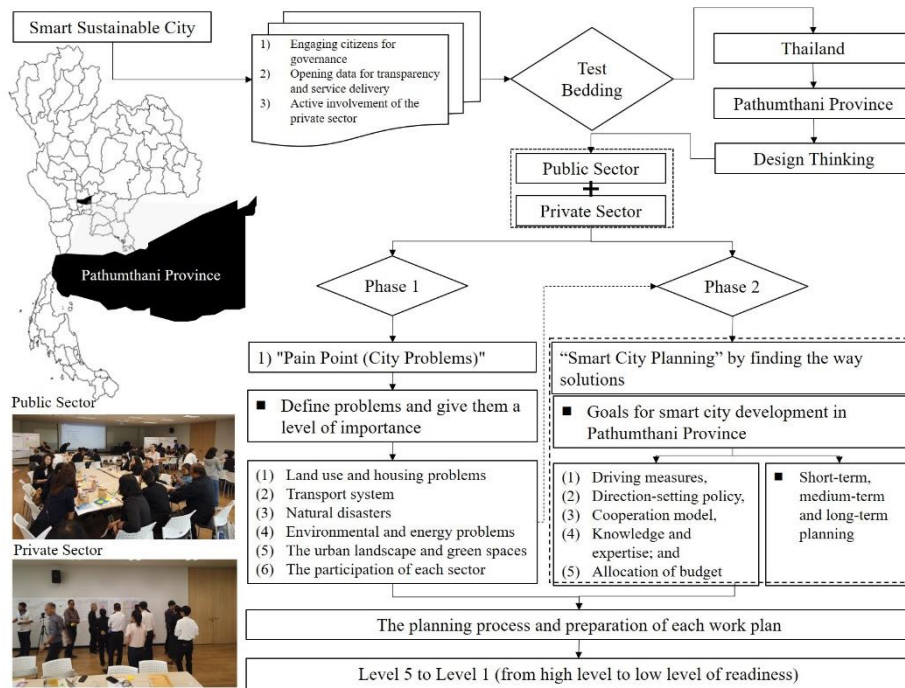


Figure 1. Research methodology and analysis framework.

4 CONCLUSIONS

The agency pays attention to short-term plans for solving smart environmental problems. In particular, measures that can promote data management (such as the installation of sensors for data collection) includes issuing requirements on regulated laws and the creation of the cooperative model between the public and private sectors. It is also necessary to consider on create incentives for investment to achieve a more appropriate direction of partnership by private sector. The urgency issue is also focused on short-term plans for the building, administering and managing the public workflow which include building big data analytic platforms, city data platforms, open government data platforms, and allocate budgets both at the local and other broader level for efficiency transformation scheme that covers more dimensions of urban management.

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