KEY SUCCESS FACTORS FOR SMART CITY DEVELOPMENT.

Pahfun Chittmittrapap, Assoc. Prof. Dr. Ruedej Kerdwichai, Sudawan Somjai
Graduate School, Suan Sunandha Rajabhat University,
Bangkok, Thailand
Email: sudawan,so@ssru.ac.th

ABSTRACT

Growth of a city opens up economic opportunities and a larger job market that encourages the relocation of the country's population from its suburbs into the city. As a result of the rapid urbanization, cities are confronted by many major issues and problems. The focus of urban development turns to smart cities as tools to mitigate the ramifications caused by population influx to improve the lives of citizens. The objective of this study is to determine the key factors that leads to the success of smart city development. For the study, a sample group was formed comprising of 360 citizens of Mueang Phuket District, Phuket Province, Thailand. Participants are selected using multi-stage sampling of individuals aged between 18-60 that reside in the 8 sub-districts of Mueang Phuket District. The data analysis in this study was conducted through Structural Equation Model (SEM). The findings reveal that citizen participation, infrastructure, technology and governance are the key factors that affect the success of a smart city development respectively. Therefore, the development of smart cities should focus to increase citizen participation and integrate citizens engagement at different stages of development, to establish people potential development and to provide fundamental infrastructure and systems of the information and communications technology (ICT) required to support smart cities.

INTRODUCTION

Thailand continues to grow in economic growth and gross domestic product (GDP). This explicitly reflects in the National Income (NI) of the country which increased by 6.4% in 2017. Thailand NI per capita rose to 218,200 from 205,607 Thai Baht in 2016. People's incomes vary between the industrial sector, service sector and agricultural sector resulting in a difference in income between urban and rural people. Despite the declining disparity in income distribution, there is a still wide gap in income inequality. The richest 10% of the population account for 39.30% of national income while the poorest 10% of earners earn only 1.6% of the national income, the difference of more than 25.2 times. People's incomes vary between the industrial sector, service sector and agricultural sector resulting in a difference in income between urban and rural people. Despite the declining disparity in income distribution, there is a still wide gap in income inequality. The richest 10% of the population accounts for 39.30% of national income while the poorest 10% of earners earn only 1.6% of the national income, the difference of more than 25.2 times. Aside from income inequality, there is also inequality in other aspects spending, education, public health, social welfare, arable land, financial access and infrastructure. (Office of the National Economic and Social Development Council (NESDB), 2018).

These inequalities result in the movement of people from rural areas to urban areas for economic opportunities. As the development in the urban area continues, the superior infrastructure, transportation, education, employment opportunities and income result in ongoing urbanization. The size of urban population increased with more than half of Thailand population living in urban areas, a trend expected to continue. (Institute for Population and Social Research, Mahidol University, 2019).

The growth in the size of urban population and the extent of urban areas also presents many human development challenges and, among others, creates a large demand for infrastructure, job creation and urban environmental management to cope with the demands that growth will place on them. This is to create the urban to be the livable city. These aspects include ensuring a good quality of life, environment, economics, and management as well as technological progress especially in communication, transportation, and energy to allows the city to become the economic center in the region. How cities develop should leverage modern and smart technology and innovation for better management under the concept 'Smart city' (Ministry of Digital Economy and Society, 2019).

Thai government recognized the importance of smart city development and considered it a national agenda that requires urgent action to increase prosperity for all regions of the country, develop livable urban areas with adequate infrastructure and to establish an efficient and effective urban management. 'Thailand Smart City Development Master Plan' was launched with the cooperation of 3 ministries: Ministry of Energy, Ministry of Transport and the Ministry of Digital Economy and Society setting forth ways driving directions to drive the development of smart cities. Based on its vision, a series of targets were determined in the master plan, these can be summarized as: Year 1 (2018-2019): To develop smart city concept in 10 areas of 7 provinces: Phuket, Khon Kaen, Chiang Mai, Chon Buri, Rayong, Chachoengsao, and Bangkok.

Year 2 (2019-2020): To increase the development of the smart city concept in 30 areas in 24 provinces

Year 3-5 (2020-2022): To increase the develop smart city concept in areas in 76 provinces and Bangkok.

Presently, Thailand does not yet have a fully developed and fully functioning a smart city; the development of the smart city in Thailand is still undergoing policy formation, managing roles and responsibility between departments and establishing a collaboration between public and private sectors for the development of each target area in the set timeframe.

Phuket was selected to pilot Thailand's smart city development plan in its first year (2018-2019). Thai government planned for Phuket to be fully-developed smart city in 2 areas by 2020: smart economy and smart living. The potential of Phuket lies in its strong ICT infrastructure; it is one of the city selected as a future high technology industries zone in order to strengthen the whole industrial segment which is the key factor in determining the success of smart city development.

Objective

The objective is to study the influence of citizen participation, infrastructure, technology and governance as the key factors in determining the success of smart city development.

LITERATURE REVIEW

Smart City Development

The development of a city into 'smart' city or other terms such as 'digital city' is complex and involves many factors. According to academic studies, smart city development can be summarized into 6 categories: 1) Smart Environment: The city concerns with its environmental impacts and the climate change, incorporating technology to systematically manage environmental factors such as water management, air quality and pollution monitoring, waste management and disaster risk reduction (DRR) as well as to raise public participation in the conservation of natural resources.

2) Smart Economy: The city engages digital technology as an economic driver and manage resources efficiently. 3) Smart Mobility: The city sets outsmart traffic and transport systems by using technology, communication and information system to increase efficiency, expand connectivity and grow mode of transport to provide safe, reliable and accessible public services, including to be environment-friendly. 4) Smart Governance: The city develops public services and facilitates public access to the government's information and services to citizens and stakeholders, with a focus on transparency, public participation and are kept up-to-date through incorporating service innovation. 5) Smart People: The city focuses to provide education, knowledge, and skills of its citizens as well as to create environment conducive for lifelong learning and be receptive to creative ideas, innovation, and public participation. It should set out to reduce social and economic inequality within society. 6) Smart Living: The city develops its facilities by taking into account universal design to ensure that all citizens enjoy the city's experience. The city should provide a satisfactory standard of health, comfort, safety, and happiness to create a good quality of life (Giffinger et al, 2007; Yu and Xu, 2018; Smart City Office, Thailand, 2019).

Citizen Participation

Citizen or public participation is a major factor in the success or failure of smart city development. Forms of citizen participation includes the following: 1) Information Provision: The public is kept in form and has access to information relating to the development of a smart city. This first level of involvement can positively impact the public response and acceptance to the development. Those with involvements in the development plan should promotes public participation in form of information access. 2) City Development Involvement: The government may collaborate with the public to develop the city by consulting with the public to obtain their feedback on decisions or alternative suggestions. This form of citizen participation ensures the public that their ideas, concerns, and requirements are considered throughout the decision process of management (Siuryte and Davidaviciene, 2016. (Direction of the smart city development operation). Ministry of Information and Communication Technology, 2014) 3) Delegated Power: The government may place decision-making tasks in the public hand. As the public will play a bigger role in providing service in a smart city, a good smart city development plan should implement public participation in the decision-making process (Borsekova, Vanova and Vitalisova, 2016).

Infrastructure

Smart cities directly rely on the infrastructure and system of information and communication technology (ICT infrastructure). This comprises information technology (IT) infrastructure with a high standard and efficient digital devices, internet networks and wireless communication. In addition to the aforementioned, a human infrastructure, citizens should have appropriate equipment access to connect to ICT Infrastructure as well as adequate knowledge required to use, manage, understand, and most benefit from these technological devices (Myeong, Jung and Lee, 2018). The ICT infrastructure and Network system should be systematically linked with the quality and efficiency required to support the running of smart cities (Chourabi et al, 2012).

Technology

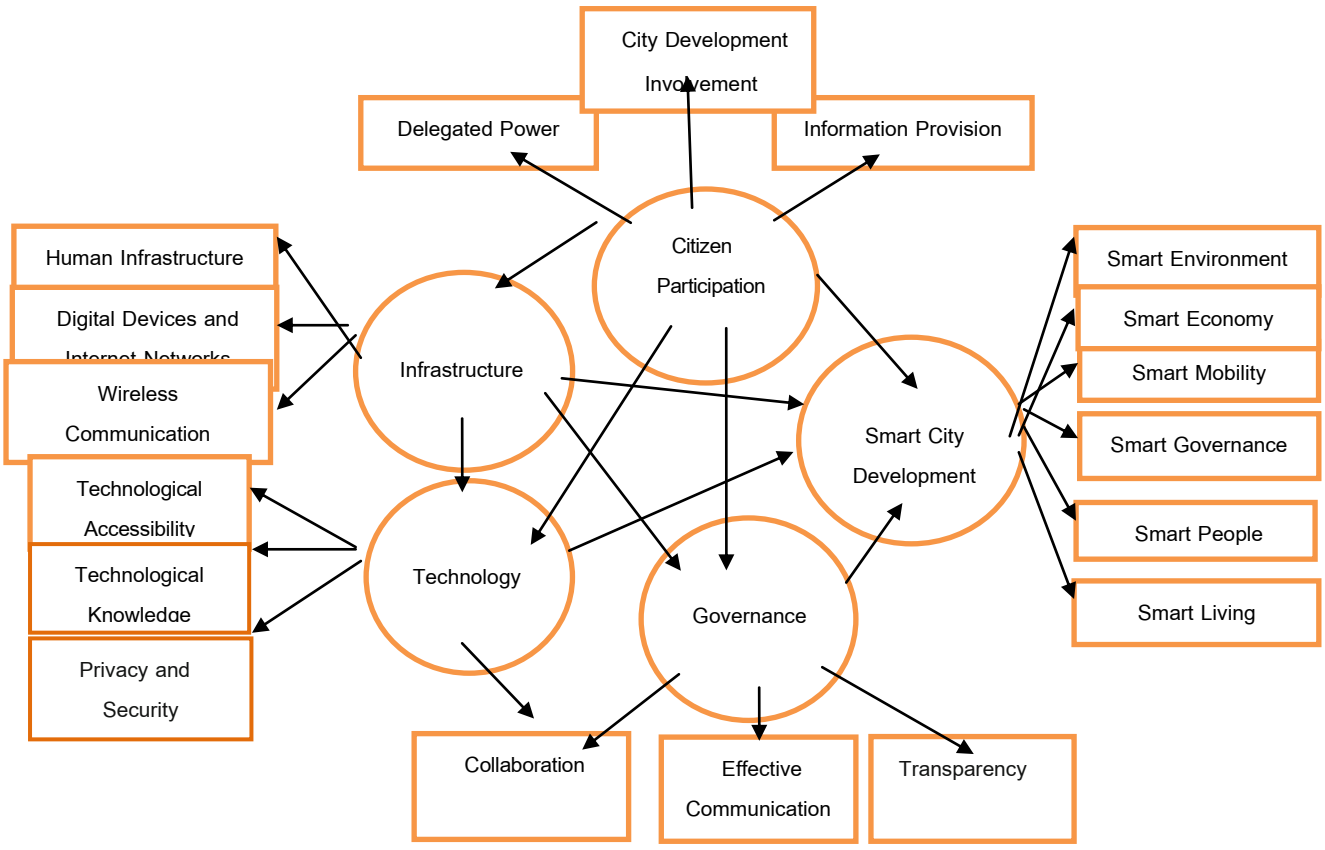
The development of a smart city is a complex one. Technology, the heart of smart city development, can revolutionize cities to increase their potential. In a smart city, technology will be most beneficial if it can be accessed by all citizens. The main factors for technological accessibility lies in the design and systematic integration of technology within the city

(Pérez-delHoyo et al, 2016). All 6 characteristics previously outlined are connected through technology networks and therefore require those involved in the development plan of a smart city to obtain adequate technological knowledge (Naprathansuk, 2017). Furthermore, the technology system in the smart city must provide strict protection for its users in terms of privacy and security (for example virus or hacking attacks) (Rana et al, 2018).

Governance

The development of a city into a 'smart' city, according to empirical data, good governance and good policy results in rich interaction at the city level that emphasizes collaboration, support, and cooperation and therefore a major factor that determines success or failure. As smart city is involved with many stakeholders, it requires good oversight and informative reports to manage the various smart city initiatives that can be achieved by creating collaboration between management level and stakeholders (Chourabi et al, 2012). Managements that involve information exchange requires effective communication and transparency in governance (Nfuka and Rusu, 2010).

Conceptual Framework



RESEARCH METHODOLOGY

Data collection for this study is conducted through a survey research with these method outlines:

Population and Sample

The targeted population for this study is residence evidenced in population census of 8 sub-districts of Mueang Phuket District, Phuket Province, Thailand that aged between 18-60 years, a total of 147,335 individuals. The sample size is determined using statistics for Path Analysis which is 20 times that of the Observed Variable. The sample size of 360 individuals was selected using Multistage Sampling.

Research Tool

The research tool is in a form of questionnaire with 2 parts: 1) personal data with selected responses and short answers. 2) citizen participation, infrastructure, technology, governance and smart city development questionnaire with 1-5 level gauge.

Collection of Data

Primary data has been collected from the sample by coordinating with the community leader of each district, meeting with the sample group, introducing the researcher and clarifying the research objectives in order to ask for cooperation and research volunteer, then the questionnaires were distributed. The researcher then checks for the completion of all questionnaires submitted until reaching the number of 360 individuals.

Data Analysis

The data analysis in this study was conducted through Structural Equation Model (SEM).

CONCLUSION

The findings reveal that the factors of citizen participation, infrastructure and technology affect statistically significant to the success of smart city development. According to the research, the priority key factors which have the most direct impact appeared in the order of citizen participation, infrastructure and technology. From the research result, there is no indication that governance has direct impact on the success of smart city development.

Suggestion

The government and stakeholders of smart city development should encourage citizen participation in all stages of development and provide adequate education, knowledge, and skills in Information and Communications Technology (ICT). The focus should also be on establishing infrastructure and ICT infrastructure with the quality and efficiency required to support the running of a smart city.

REFERENCE

[1] Ministry of Digital Economy and Society, 2019. *National Agenda Action Plan: Smart City Development*. Searched on August 12, 2019 from http://mdes.go.th/assets/portals/1/files/591130_smart%20city%202.pdf

[2] International Institute for Trade and Development (ITD) (2014). *The policy summary report, research titled "Guidelines and measures for the development of special economic zones in the border areas of Thailand".* Bangkok: The International Institute for Trade and Development.

[3] Institute for Population and Social Research, Mahidol University. (2019). Estimated Population at Mid-year population forecast 2019 (1st of July). *Population of Thailand,* 28 (2019), 1-2.
[4] Office of the National Economic and Social Development Council. (2012). *The report on the status of infrastructure in Thailand in 2011*. Bangkok: Office of the National Economic and Social Development Council.
[5] Smart City Thailand Office. (2019). *Definition, Policy and Goal.* Retrieved September 13, 2019 from https://smartcitythailand.or.th/web?definition
[6] Borsekova, K., Vanova, A., & Vitalisova, K. (2016). The Power of Communities in Smart Urban Development. *Procedia - Social and Behavioral Sciences, 223* (2016), 51 – 57.
[7] Chourabi, H., et al. (2012). Understanding Smart Cities: An Integrative Framework. 45th Hawaii International Conference on System Sciences. *IEEE,* 2289-2297.
[8] Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanovic, N., & Meijers, E. (2007). *Smart cities Ranking of European medium-sized cities*. Centre of Regional Science, Vienna UT.
[9] Ministry of Information and Communication Technology. (2014). *SUSTAINABLE SMART CITIES: IMPROVING QUALITY OF LIFE*. Fact Sheet.
[10] Myeong, S., Jung, Y., & Lee, K. (2018). A Study on Determinant Factors in Smart City Development: An Analytic Hierarchy Process Analysis. *Sustainability, 10*, (2606), 1-17.
[11] Naprathansuk, N. (2017). A National Pilot Project on Smart City Policy in Thailand: a Case Study on Phuket Khon Kaen Chiangmai Province. *European Journal of Multidisciplinary Studies, 2*(6), 338-347.
[12] Nfuka, E. N., & Rusu, L. (2010). *Critical success factors for effective IT governance in the public sector organizations in a developing country: The case of Tanzania*. In Proceedings of the 18th European Conference on Information Systems (ECIS), Pretoria, South Africa, June 7-9.
[13] Perez-delHoyo, R., García-Mayor, C., Mora-Mora, H., Gilart-Iglesias, V., & Andújar-Montoya, M. D. (2016). *Making Smart and Accessible Cities an Urban Model based on the Design of Intelligent Environments*. In Proceedings of the 5th International Conference on Smart Cities and Green ICT Systems (SMARTGREENS 2016), pages 63-70.
[14] Rana, N. P., Luthra, S., Mangla, S. K., Islam, R., Roderick, S., & Dwivedi, Y. K. (2018).*Barriers to the development of smart cities in Indian context.* Retrieved July 2, 2019 from http://usir.salford.ac.uk/id/eprint/48532/
[15] Siuryte, A., & Davidaviciene, V. (2016). Analysis of key factors in developing a smart city.*MOKSLAS – LIETUVOS ATEITIS SCIENCE – FUTURE OF LITHUANIA, 8*(2), 254-262.
[16] Willems, J., Van den Bergh, J., & Viaene, S. (2017). Smart City Projects and Citizen Participation: *The Case of London*. In (Eds.) Andebner, R., Greiling, D., Vogel, R. Public Sector Management in a Globalized World; Part of the series NPO-Management, 249-266**.**
[17] Yu, W., & Xu, C. (2018). Developing Smart Cities in China: An Empirical Analysis. *International Journal of Public Administration in the Digital Age, 5*(3), 76-91.