SECONDARY CITIES AND SMART CITIES: A CASE STUDY

OF KHON KAEN, THAILAND[*]

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Abstract

By exploring the definitions, theories, conceptual frameworks and criteria of secondary cities, this paper aims to discuss the interrelationship of five factors of secondary cities in the northeast of Thailand and Khon Kaen city. In particular, this paper will analyze the interrelationships of policy and smart city development at the state and local level. This research has employed both qualitative and the quantitative data from secondary sources to find the factors that contribute to the development of secondary cities in the northeast. After indicating the factors, this paper discusses the development of Khon Kaen smart city as one of the secondary cities supported by the Thai government. The findings of this paper illustrate that the development of Khon Kaen smart city is related to the development of secondary cities in the northeast. There are three aspects to discuss the related issues between secondary and smart cities, as follows: 1. a smart city is a secondary shift of infrastructure development in Khon Kaen, following the first shift of infrastructure development under the First National Development Plan; 2. Khon Kaen and other selective smart cities are considered from seven secondary cities based on the centralized view of the government; and 3. a smart city is essential for state or government security.

Keywords: Secondary City, Smart City, City Municipality, Khon Kaen, THAILAND

I. Introduction

There are currently more than 2,400 cities globally with populations between 150,000 and 5 million, which could be loosely described as secondary cities. Nearly two thirds of these cities are located in Africa and Asia. Secondary cities range in form and size, from 150,000 to 5 million people, and perform a wide range of functions in national and international systems of cities (Robert, 2014).

Saskia Sassen, a social scientist, recommends that small cities could be considered as the basis of global development (Sassen, 2012). Meanwhile, the United Nations in its predictions for the growth of urban communities in 2030 predicts that medium-sized cities and large cities with a population of no less than 5 million people will play a significant role in the urban economic growth of developing countries. In China, some secondary cities have populations of over 5 million. Consequently, secondary cities will play an important role as catalysts and secondary hubs in facilitating localized production, transportation, transformation, or transfer of goods, people, trade, information, and services between sub-national, metropolitan, national, regional, and global systems of cities (Robert, 2014). A primary city is defined as "the leading city in its country or region, disproportionately larger than any others in the urban hierarchy" (Goodall, 1987). However, the definition of secondary city is still ambiguous (Rondinelli, 1983). In the last two decades, the literature on urban studies has only emphasized the size and power of cities in major cities. Even though the numbers of secondary cities are growing, only a handful of studies have investigated the path of urban development of secondary cities.

In Thailand, the roles of secondary cities are to support growth of population, infrastructure development, social and economic relations from the region and national levels, and also from neighboring countries. For instance, Chiang Mai is not only one of the main secondary cities in the north of Thailand but it is also one of the main destinations for international tourism, which has led to many benefits for the state revenues. This paper illustrates that policy and development plans are important factors in determining the role and promotion of these cities. Currently, smart cities are related to the government's Thailand 4.0 initiative, which aims to support the growth of technology and the development of the digitalized ecosystem, which is expected to be scaled up across the nation in the near future.

This paper starts by defining the concepts of secondary cities and smart cities. The findings of this paper are drawn from a larger research project that examines the factors of secondary cities in the northeast. It will then examine the regional hub of administration and service of the state, both in the past and present. Next, it will analyze the plans and policies of national development in the northeast, the hub of transportation and logistics, population and density in urban areas, and the revenues of urban and population. Based on the research findings, all of these factors should be considered together. The movement of a smart city and the Khon Kaen development based on the five factors of a secondary city will be discussed. The first infrastructure development policies in 1961 resulted in Khon Kaen's economic development, which was followed by the accumulation of resources and population over 60 years after the First National Development Plan. The argument is that the infrastructure development was used to guarantee the security of the state against the threat of the Communist Party of Thailand (CPT).

This paper considers that urban studies require a sufficient amount of studies from a broad range of aspects to

best understand the concept of secondary cities and the interrelationships with the state. Therefore, this paper focuses on Khon Kaen municipality as the study area. This paper is divided into three sections. The first section investigates the definitions and the concepts of a secondary city and a smart city. The second section discusses the findings of five factors of the secondary city in the northeast, excerpted from the research project. Additionally, the smart city as the latest concept of urban development in Thailand is also explored and discussed, together with the factors of the secondary cities based on the research findings. The last section argues that the movement of Khon Kaen smart city Khon Kaen is related to the development towards the secondary city in three aspects: 1. the second shift of infrastructure; 2. selective smart cities are from the secondary cities; and 3. a smart city for state security or government security.

In summary, this paper will discuss the interrelationship of policy and smart city development between the state and local level. Khon Kaen city is one of the secondary cities in the northeast of Thailand and it is one of selective smart cities cases. It should, however, be noted that urban development needs more research and studies of the role, the relationships, and the city systems of cities around the country, together with their plans and policies. It is hoped that the discussions of this paper would be of benefit for both technocrats and academics in planning and initiating urban development policy.

II. Objectives
(1) To discuss the interrelationship of five factors of the secondary cities in the northeast of Thailand and Khon Kaen city, from past to present.
(2) To understand the interrelationship of policy and smart city development between the state and local level.

III. Research Methods
This research employed both qualitative and quantitative data from primary and secondary sources. The key actors who play an important role in developing Khon Kaen into a smart city were interviewed. The secondary data includes population, urban revenues, history of city settlement, urban contexts, and so on. Figure 1 presents the data collected in this research.

Figure 1: Details of Data Collection Method in the Research
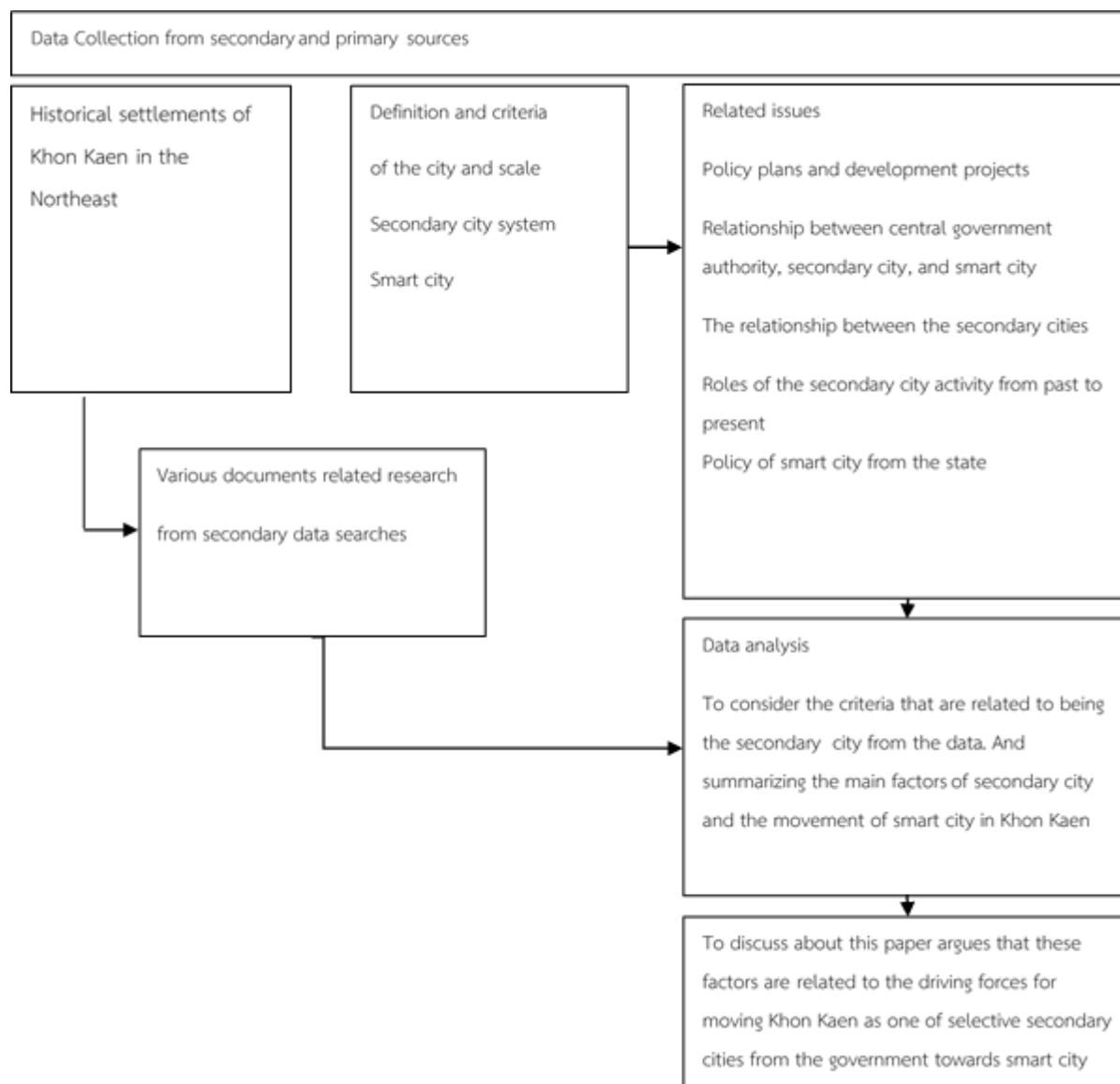
In Thailand, the economic power of secondary cities could be measured from the context of trade center and the average income of the population. The population size and income of the municipality are important criteria to categorize the levels of local administration. Quantitative data are employed to determine out the size of the cities and the urban hierarchy system. However, although secondary cities do not have a large population, they do have major roles and functions. Hence, we need to understand the path of development and power of these cities as the centers of governance and service. The national economic and social development plans are investigated because they are one of the most important factors in promoting the transportation hubs at the regional level, both land and air transport. These factors are considered and compared among the northeastern provinces, which indicates that Khon Kaen is one of the most important secondary cities in the northeast. Currently, the concept of the smart city is employed in some of Thailand's leading provinces. Following these factors of secondary cities from the

research, this paper employs these datasets to discuss the movement of Khon Kaen smart city. Finally, this paper argues that these factors are related to the driving forces to move Khon Kaen, as one of selective secondary cities from the government, towards smart city pilot projects in Thailand.

IV. Scope of the Study

This research focuses on the area of Khon Kaen city municipality as one of the secondary cities in the northeast of Thailand.

V. Literature Review
(1) Definition of a Secondary City

Patrick Gedds was the first scholar to consider the potential of cities and he explained the size of the cities on the basis of the second city system, or secondary cities (Gedds, 1915; Soo 2004). The term 'secondary cities' was used by Rondinelli (1983), which he defined as second cities from a settlement of cities with a population of at least 100,000 but not including the largest city in the country (Rondinelli, 1983, pp.47-48). Hence, while primary cities would usually be capital cities in each country or region, secondary cities are second-tier level cities based on the city's potential and the size of its population (Goodall, 1987).

In the past, research tended to focus on the development of policies to stimulate the economy of rural areas around secondary city areas (Rondinelli, 1983; Mason, 1989). However, there is no exact number to define the population size of a secondary city. For example, UN-Habitat identifies a second city as having a population between 100,000 and 500,000 people (UN-Habitat, 2008, p.13). In contrast, the World Bank defines a secondary city as having a population from the thousands to the millions. There are more than 4,000 cities around the world that have a total population of over 100,000 people (Angel et al., 2012). Meanwhile, around 2,400

cities have a population of less than 750,000 people, although they are still called secondary cities (World Bank, 2008, p.51).

Some studies suggest that secondary cities cannot be determined by the population size but should be considered based on their roles in the national and global city system (Abdel-Rahman et al., 2004). Angel defines secondary cities as having roles and networks that are connected to the metropolitan areas (Angel et al., 2012, p.146). Friedman suggest that a secondary city is centered and semi-structured within the economic geography of the region (Friedmann, 1986, p.71). However, the secondary city still does not have a prevalent international agreement (Song, 2013, pp.1-5).

According to the World Bank Development Report, based on the new economic geography (NEG), secondary cities differ in each country (World Bank, 2008, 2). The World Bank indicates that a primary city is the center of the country and is a metropolitan area that is combined with neighboring cities. Primary cities lead in all aspects, including politics, government, economy, communication, culture, and the central university. Meanwhile, a secondary city plays an increasingly important role in the region, both economically and socially, and it helps to maintain the city system in each country (World Bank, 2008, p.51).

There are many patterns of secondary cities. Most of them are defined by geography, economics, and city functions (Robert, 2014, pp.28-34). There are three broad categories of the secondary cities as follows:

1. Sub-national cities that are centers of local government, industry, agriculture, tourism, and mining;
2. City clusters that are associated with expanded,

satellite and new town cities that surround large urban metropolitan regions;

3. Economic trade corridors that are urban growth centers or poles planned or developing along major transport corridors.

In summary, a second city can be defined by the size of its population, and by its roles and functions (e.g. logistics infrastructure, service, tourism, etc.). However, there are no exact population or economic criteria to define these cities.

(2) Definition of a Smart City

The smart city concept has developed over the last three decades, following technological growth and innovation in urban development. This term was employed in urban development, planning, and IT at the end of 1980s to the early-1990s. The first reference to the term 'smart city,' based on Google Scholar, is found in 1988–1990. This term is used to capture innovations in urban mobility sustained by information technologies, the use of IT for the provision of city services, and better performance of cities in environmental, economic, and social objectives (Hall, 1988; Raynal, 1988 cited from Komninos, 2018). There are various viewpoints of smart city concept, for example:

The smart city 'connects the physical infrastructure, the IT infrastructure, the social infrastructure and the business infrastructure to leverage the collective intelligence of the city. (Hartley, 2005, pp.27-34)

An analysis of the ontology of many formal definitions of 'smart city' and 'intelligent city' reveals that three blocks of entities characterize this concept: (1) the city, citizen, user, activities and infrastructure and flows in cities; (2) the information, knowledge,

intelligence and innovation institutions and processes within cities; and (3) the smart systems, urban technologies, the Internet, broadband networks and e-services of cities. (Komninos, 2014, p.23)

A smart city uses information and communications technology (ICT) to enhance its livability, workability, and sustainability. (Smart Cities Council, 2014)

Therefore, a smart city can be defined as the development of the urban space to enable a technology-enabled approach for sustainable development. Examining the smart city models, this paper intends to focus the smart city initiatives from Giffinger's (2007) model under the six dimensions that encapsulate the three main issues of sustainable development from the UN: economy, social and environment. The six dimensions of smart city are governance, economy, mobility, environment, people, and living (Ginger, 2007; Das, A. et al., 2019), as follows:

1. Smart Governance: which refers to the smart government in the urban space, associated with technology for service delivery and resource utilization with respect to government policy.
2. Smart Economy: which is the technology and innovation that can escalate business and service growth, employment, and urban growth.
3. Smart Mobility (or Smart Transportation): which enhances the transportation networks with improved, embedded real time monitoring and control systems.
4. Smart Environment: which provides smart innovation and ICT to incorporate natural resource protection and supervision, such as a waste-

product management systems, sensor-based pollution control, and so on.

5. Smart People: which encourages the creativity and the innovation introduced by individuals in society.

6. Smart Living: which improves lifestyles and quality of life in the urban spaces.

Ginger (2007) pointed out that these components are interconnected to provide smart services to the people living in the city. In addition, smart government systems help to successfully execute smart city missions. In Thailand, the recent focus on smart cities is part of the government's Thailand 4.0 initiative, which is a new economic model that aims to transform Thailand into a high-income nation. The Digital Economy Promotion Agency is tasked with supervising the smart city initiative and develop more smart cities. The pilot projects are Phuket, Chiang Mai and Khon Kaen. Phuket was the first city to lead the initiative and was selected because it is one of the biggest tourist cities in the world and therefore already has a well - developed technology infrastructure. Chiang Mai was chosen to promote smart agriculture as one of the main industries of the area, as well as to support tourism from the local heritage and natural attractions. Khon Kaen was chosen as a medical hub, a transportation hub, and a MICE (i.e., meeting, incentives, convention, and exhibition) city. These cities are qualified for the smart city pilot projects because of their readiness for these roles, such as transportation hubs.

VI. Findings: Five Factors to make Khon Kaen a Secondary City in the Northeast of Thailand

After defining secondary cities, this section aims to discuss the research results of the study of secondary cities in northeastern Thailand and in particular

Khon Kaen, including: 1. the city as the administrative center of the Government and service from the past and present; 2. the northeast development plan, which has had a second impact on the city; 3. the city as a transportation hub at the regional level, both land and air; 4. urbanization and population; and 5. the average incomes of the municipality and the average income of the population. Based on the research findings, all of these factors of the secondary city must be scrutinized together (Pechpakdee, 2016). In the discussions, the first argument is that these five factors could be considered as the major keys to gear up from a secondary city to smart city. Hence, this section will illustrate the party of Khon Kaen development through the lenses of five factors of a secondary city. The next section will discuss the movement of smart city and Khon Kaen's development, in the following aspects: 1. the second shift of infrastructure; 2. selective smart city in secondary cities; and 3. smart city for state security or government security.

(1) The city as the administrative and service center for the government

Based on the research findings, the results show that there are secondary cities in the following municipalities in the northeast of Thailand: Udon Thani municipality, Khon Kaen municipality, Nakhon Ratchasima municipality, and Ubon Ratchathani municipality. These cities not only have an outstanding population but they are also centers of governance and services for the surrounding cities, both in the past and in the present. Since the establishment of Thesapibal (or Monthon) during the reign of King Rama V (1868–1910), this city has been a regional center for government administration and centralized power under the Ministry of Interior via a government official who acts as a representative of the King (Bunnag, 1978). The state originally divided the central

power and the administration into various towns throughout Siam, in the northeast the main cities are Nakhon Ratchasima, Ubon Ratchathani, and Udon. These three major cities were centers of administration and services in Isan (i.e. the northeast region) and they continue to maintain the role of the main city of the provincial group. This is the concept of clustered provinces from locations and roles. According to the Ministry of Interior (2003), the Provincial Office of Strategy Management (OSM) was established to act at the operational level to host the strategic coordination of the plans and projects at the provincial level. The operational centers of the five provincial groups in the northeast are: Udon Thani, Sakon nakonn Khon Kaen, Nakhon Ratchasima, and Ubon Ratchathani Province. Interestingly, unlike the three main cities, Khon Kaen city was previously still a small town that depended on Monthon Udon because of its smaller population and fewer resources (Pechpakdee, 2016). This can be seen as an example that the dynamics of the growth of the secondary cities in developing countries is mainly related to public administration (Rondinelli, 1983)

(2) National development plan and infrastructure development

In the 1960s, the priorities of development in the northeast of Thailand were water supply, irrigation, flood control, transport facilities, expansion of agricultural services, marketing, increase of power supply and promotion of industry and commerce. These priorities date to when Thailand began to change its economy in the mid-1950s under the leadership of Field Marshal Sarit Thanarat and the influence of the United States. Parnwell (2005) argued that creating the basic infrastructure in the 1970s required significant physical and social changes. The national economic and social development plans are important factors in promoting the transportation hubs at the

regional level, both land and air. After 1961, the North East Development Plan received assistance and support from the World Bank and the National Economic Development Plan No. 1.

These developments were a response to the growth of a communist-inspired regional separatist movement in the northeast that was led by the CPT, which included the study area. This led the Thai government to assert much more direct control than had been the case hitherto, including the stationing of a military corps in the northeast. Hence, partly because of the resistance movement, the government greatly intensified its development interventions to pave the way for the rapid integration of the area with the external market, including the involvement of extra-local actors and agencies in local development (Parnwell, 2005). Additionally, the forests were cleared for state security and the settlement of villages was managed by the Royal Thai Army. The communist insurgency threatened the state, which responded by clearing these areas for village settlement and roads during the 1970s to flush out CPT supporters (McCargo, 2002, p.56).

Remarkably, after the 1st National Economic Development Plan in Khon Kaen city, the city benefited from Field Marshal Sarit Thanarat's (who served as prime minister at that time) policy and development plan for the northeast region. Consequently, Khon Kaen has well-developed infrastructure such as roads, dams, and Khon Kaen University is the leading higher educational institute in the northeast. These state plans have led to a highly-educated population who earn more revenues, have a better quality of life, and a diverse range of occupations. Khon Kaen city later become a hub city for a broad range of activities. This city has also attracted public institutions and investment from the private sectors for trading and services. Subsequently, the average income per capita higher in Khon Kaen

than other cities. However, it could be argued that this development in the northeast of Thailand was only been conducted for the interests of state security.

(3) **A transportation hub at the regional level, both land and air**

a. Friendship Road (Mittraphap Road)

In 1958, the Friendship Road (Mittraphap Road), a major US aid project, was constructed as the first road to span the region and enhance a rapid connection between Bangkok and Nongkhai, the northeastern border province to Lao PRD. The United States was a large aid donor to the northeast for military and security reasons in the 1960s and 1970s. Mittraphap Road has also had a wide impact on the economy of the northeast, which the railway system had been unable to do. Due to car transportation, there is no need to change products, which is required in rail transportation. This cities in the northeast region along the Mitraphap Road have benefited from the transportation business, and they have consequently become a major source for the processing and sale of agricultural products, such as Nakhon Ratchasima city, Khon Kaen city, and Udon Thani city.

The Friendship Road was a major infrastructure development in the northeast that opened the region to the outside world via transportation and logistics. Apart from serving the national security purposes and promoting rural, economic and communication development in the region, this road network has been an important means for the northeastern people to seek both temporary and permanent job opportunities in Bangkok (Gebhardt, 2005; Myers, 2005).

b. Rail network

In the reign of King Rama V (or King Chulalongkorn), the construction of the first state railway began, namely the Northeast Railway, which ran from Bangkok to Nong Khai in the Northern line and to Ubon Ratchathani in the Eastern line. This railway line made an important contribution to this region's economic and social development (Sunanhta Charoenpanyaying 2014). The Northeast Railway runs through eight provinces in the northeast: Nakhon Ratchasima, Buriram, Surin, Si Sa Ket, Ubon Ratchathani, Khon Kaen, Udon Thani and Nong Khai. This line serves a large number of people and it led to immense socioeconomic changes, both from trading and travelling to work in Bangkok. This line also led to the growth of the railroad community, with new occupations developing in the main cities with railway stations and the expansion of demand for products, services, and new occupations such as hotels, restaurants, small business operators, mills, and ice plants in Nakhon Ratchasima, Mueang, Khon Kaen, Muang, Udon Thani And Ubon Ratchathani (Theerasasawat, 2007, pp.112-125).

c. Airport

There are nine airports in the northeast of Thailand: Buriram, Khon Kaen, Nakhon Phanom, Nakhon Ratchasima, Roi Et, Udon Thani, Ubon Ratchathani, Sakon Nakhon and Loei. Two international airports are in Ubon Ratchathani and Udon Thani (Wijitnopparat, 2012). Khon Kaen International Airport will be opened in 2021. However, for Nakhon Ratchasima Province, this location is unsuitable for flights to Bangkok.

The Northeastern Railway has had no additional construction since 1956. Instead, three main cities—Udon Thani, Khon Kaen, and Ubon Ratchathani—have grown because they have become major

airport hubs in the region. Additionally, international airports have been built in Khon Kaen and Udon Thani, which means that they are able to connect with the city center and other cities. Robert reported that an airport is an important element to show the relationship of a regional city to the capital, and also to cities around the world (Robert, 2014, pp.36-40). Air transportation has not only reduced the cost and time of transportation but it has also increased the accumulation of capital and resources of the secondary cities along the economic corridor (Song, 2013). Thus, an airport is an important element that represents the relationship between secondary cities and cities in the world and address the transport needs from both local residents and tourists.

d. Urbanization and population

The current global population of 7.3 billion is expected to reach 8.5 billion by 2030, 9.7 billion in 2050 and 11.2 billion in 2100. In total, 55 percent of the world's population lives in urban areas, which is expected to increase to 68 percent by 2050 (United Nations, 2015). There are enormous disparities between primary cities and secondary or tertiary cities in many countries. In Thailand, this problem of inequality has existed for a long time. For example, in 1969 Bell found that the large surplus transfers from the poor northeast region led to the underdevelopment of the region because most of the producers were exploited by low wages and poor agricultural returns (Bell, 1969). In Thailand, it could be argued that there is a large gap between Bangkok, the capital city, and other secondary or tertiary cities.

As described earlier, there is no exact figure to identify the size of population of secondary cities. Nevertheless, secondary cities are always defined on the size of their population and income. In Thailand, the levels of local administration are categorized on both the population size

and income of the municipality. Basically, cities with a larger population might have more revenue. There are three levels of the municipalities. The four largest city municipalities are Udon Thani municipality, Khon Kaen municipality, Nakhon Ratchasima municipality, and Ubon Ratchathani municipality. The population density of these cities is between 2,000-3999 people per square kilometer (Sathitpongsathaphon, 2015, pp. 10-5). Following the First National Development Plan, Khon Kaen has grown and developed as one of the main centers of the northeast of Thailand. Khon Kaen's location is attractive for public institutions and it has led to investment from the private sector for trading and services.

Geographically, Khon Kaen city municipality is located in the center of the northeast of Thailand. Its position at the intersection of the East-West Economic Corridor (EWEC), supported by The Asian Development Bank (ADB), has led it to develop transportation routes connecting Myanmar, Thailand, Laos, and Vietnam. In the near future, there will be a high-speed rail connection between Thailand, Laos, and China. Consequently, Khon Kaen city is a regional hub for transportation and logistics. In 2016, Khon Kaen City had a population of 120,045 who lived within an area of about 46 sq. km. As its urban area has expanded beyond this administrative boundary, Khon Kaen city municipality is now surrounded by four municipalities. Khon Kaen urban area is about 280 sq. km, with a population of 256,000 (Khon Kaen city municipality, 2017). The next section will discuss population and urbanization, using quantitative data to determine the size of these cities. It will also describe the urban hierarchy system.

e. The average income of the municipality and the average income of the population

The economic power of secondary cities could be measured from the level of trade and the average income of the population. Based on the data of urbanization of the city municipality, in 2012–2013 the average income of Nakhon Ratchasima municipality was the highest top 10 city in Thailand (Phongsathaphon, 2015, 10-5). Three of Kohn Kaen's municipalities are in the high ranks in the northeast of Thailand: Nakhon Ratchasima city municipality, Udon Thani city municipality, and Khon Kaen city municipality. In addition, considering the average income of the population per capita in the main cities in the northeast in 2015, Khon Kaen city municipality had the highest income per capita per year at more than 9,999.99 Thai Baht.

Although Khon Kaen city did not previously have an important role or influence in administration, such as Monthon Nakhon Ratchasima, Monthon Udon Thani, and Monthon Ubon Ratchathani, it currently has the highest income per capita in the northeast. This could be considered to be a result of infrastructure development and also its position as a regional center for education, government institutions, financial and services. These factors are related to Khon Kaen's physical connectivity and mobility from its road, air, and rail networks.

In summary, at present there are four main secondary cities in the northeast of Thailand which are considered as the secondary cities: Nakhon Ratchasima city municipality, Khon Kaen city municipality, Udon Thani city municipality, and Ubon Ratchathani city municipality. In the reign of King Rama V, unlike the other three largest cities, Khon Kaen city was only a small town under Monthon Udon Thani. After Marshall Sarit's era, Khon Kaen city was the initial choice for the First National Development Plan. Infrastructure development has impacted on the growth of Khon Kaen's socioeconomics and urbanization. This paper found that there were five factors of secondary cities: first, the regional hub of administration and service of the state, both in the past and present; second, plans and policies of national development in the northeast; third, hub of transportation and logistics; fourth, population and density in urban area; and finally, the urban revenues and population. These factors should be considered together. The next section will discuss the smart city movement and Khon Kaen's development as a secondary city.

VII. Discussion: Khon Kaen Gearing Up From a Secondary City towards a Smart City

This section discusses Khon Kaen's development from a secondary city towards a smart city in three aspects: 1. the second shift of infrastructure; 2. selective smart city in secondary cities; and 3. smart city for state security or government security.

(1) The second shift of infrastructure: light rail transit, high-speed rail, transit- oriented development

Parnwell (2005) argued that the first shift of the northeast was from the basic infrastructure in the 1970s, which led to significant physical and social changes. This paper further argues that the movement of local people in Khon Kaen thanks to the immense effort that has been put into the Light Rai Transit is an example of the dramatic shift towards secondary cities that can be seen throughout Thailand. Public transport infrastructure in Khon Kaen—such as a new 26km light rail line—is being funded and spearheaded by the Khon Kaen City Development, formerly known as Khon Kaen Think Tank (KKTT), which is a group of Khon Kaen's 20 leading businessmen. This group of business

leaders remembers well that "mobility drives the city", but are no longer content to wait for the benevolence of the central government to provide a solution (Pechpakdee, 2018), for example:

> For Khon Kaen, if we work together to find a way to develop and solve problems by ourselves based on academic principles, which Khon Kaen already has many academic sources to support in local. We should lead our province to have a proper development plan. Thailand today, there are two traps. The first is the middle-income trap. And another thing, with thought, means that we always need to rely on others. (KKTT, 2017)

Both the Light rail transit (LRT) and High-Speed Rail development should be considered as part of the concept of Transit- Oriented Development (TOD), which includes the plans and designs to bring people, activities, buildings, and public spaces together through easy walking and cycling to connect between the transit station service to the rest of the city (Calthorpe, 1993). The Khon Kaen model is based on private-sector driven development in cooperation with the technocrats from Khon Kaen University to implement an ambitious plan based on the provincial development path in Thailand. This model has already widely spread out in many secondary cities based on the semi-formal alliance of KKTT members and networks, including Chiangmai, Phuket, and Pitsanulok province. Generally, the founders in each city development company are drawn from provincial tycoon families.

There are many urban development initiatives in these provinces. This prototype could be seen as a good sign of the urban development at provincial level,

such as transportation service through TOD in Chiangmai, Phuket, and Rayong province. The alliances of city development companies are becoming stronger thanks to knowledge transfer and meetings because the founders have flexible roles as members of business associations (e.g., chamber commerce, real estate association, and the Federation of Thai Industries) at provincial level. Unlike the fixed structure of the government, the formation and pattern of city development organization is more flexible because of cooperation between the business sector and technocrats. It could be argued that the LRT with TOD—as an infrastructure development from a local initiative, KKTT—has led to the widespread expansion of urban development. This development has many advantages for urban physical planning and design, and also for local creation. In practice, planning, policies, and implementation continue rely on the fixed structure and centralized state.

(2) Selective smart cities in secondary cities: an (un)intentional tension between the top and bottom

Policy and development plans are important factors in determining the role and promotion of a city. The Thailand 4.0 initiative has been introduced by the government as part of its smart city policy to support the development of technology and the digital ecosystem and it is expected to be scaled up at the national level. The concept of a smart city in Thailand can be traced back to Yingluck's Government in 2013. Nakhon Nayok was appointed as a pilot province by the Ministry of Digital Economy and Society (MODES), formerly known as the Ministry of Information and Communication Technology (MICT). After the 2014 coup, Air Chief Marshall Prajin Juntong served as the Minister of Transport (MOT) from August 2014 to August 2015. Inspired by a visit to a small smart town in Stockholm,

Juntong pursued his interest in smart city and smart mobility, and set up a working group to develop a plan to formulate a smart city policy for Thailand.

In 2015, Khon Kaen city municipality attempted to find a new idea for urban development. Khon Khaen university was the local institution who took the lead in the design of the well-publicized "Khon Kaen Special City" development blueprint. Meanwhile, Air Chief Marshall Prajin Juntong, as a Minister of MOT, came to Khon Kaen on his first official visit and gave strong verbal support for the LRT project, although legal permission for the LRT's operation was still required. KKTT was granted an opportunity to present their ideas about transforming Khon Kaen into a smart city, beginning with a light rail system. In a debriefing session, they emphasized smart mobility, while not overlooking the importance of other aspects of a smart city. They selected 10 locations in seven pilot provinces of the smart city, based on a study from Chulalongkorn University, Bangkok that was commissioned by the central government. The implication is that all smart cities would be under the oversight of central government agencies (Suradech Taweesaengsakulthai et al. 2019). Khon Kaen province was found to be one of the most suitable provinces for a smart city and it has also been included in the country's 12th National Social and Economic Plan (2017–2021).

Khon Kaen city municipality and the local universities had already launched the local concept of the Special City as an urban solution that included local participation. Additionally, based on the urbanization and comprehensive plan, Khon Kaen city municipality sought for the cooperation from the annex municipalities by signing a memo of understanding (MOU) for urban mobility, sustainable housing, clean energy, waste management, ICT, and local governance coordinated by the technocrats at Khon Kaen University. This project could be seen as a leader of local cooperation. In theory, the Ministry of Interior (MOI) has created a syndicate (sahakarn in Thai) for cooperation between different local authorities, such as between Tambon Authority Organizations (TAOs), and between municipalities and Provincial Authority Organizations (PAOs). In practice, however, it is hard to see evidence of this syndicated project of collective development in the local authorities' management of their resources because of the complicated processes of bureaucracy involved (Pechpakdee, 2014, p.161).

It could also be argued that the central governments—both civil and coup government—have introduced plans, policies, and development concepts from the top down, as illustrated in the development path. This paper finds that there are three causes of tension between the central state and Khon Kaen's development. First, the phrase "Khon Kaen model", as the name of initiative movement from Khon Kaen development from KKTT, implies two distinct meanings: politically, the Khon Kaen model refers to a group in the provinces who were allegedly amassing forces and weapons to terrorize the citizenry against the government and who were arrested on 23 May 2014. However, in this case this term refers to the city's unique private-sector driven approach to infrastructure development (Pechpakdee, 2018). Second, during the change from a special city to smart city, Khon Kaen needs to compromise its needs and introduce initiatives to meet the needs from the top for legal support, both for the process and for the budget. Finally, LRT and smart city in Khon Kaen have encountered some friction from both the central government and local people for bureaucratic development and lack of trust, respectively. Suradech, who was one of key leaders in KKU and a leading

technocrat in KKU, critiques that this development seems very optimistic and its effects are still too far ahead to see. This development has been fraught with difficulties because of the lacking competency for implementation (Taweesaengsakulthai et al., 2019, pp.144–154). Although KKTT and other teams aim for self-reliance for the local initiative, Khon Kaen teams have encountered with the same old problems. Accordingly, Khon Kaen illustrates a selective smart city that is implemented from the top with (un)intentional tensions between the central state and local development.

(3) Smart city for state security or government security

During the 1970s, infrastructure development in the northeast (e.g., dams, universities, and roads) was implemented to ensure the security of the state (McCargo, 2002). For example, the Mittraphap Road, or Friendship Road, is a strategic route that was built with US support to guard against the threats from the CPT. Politically, because Prayuth's (formerly the leader of the coup government) government has experienced some problems in gaining acceptance from developed countries in the West, it has sought cooperation by turning to China over the United States and the West. For instance, the smart city in Phuket is being developed in cooperation with Huawei, China. In particular, a methodology has been formulated to support the smart city service prioritization and service recommendations for stakeholders in other provinces (Huawei, 2019). According to the Digital Economy Promotion Agency (DEPA), the development of smart cities is one of the government's top priority and is considered national agenda with a view to using digital technology and innovation to give people a better quality of life with less social disparity and more equitable development in all regions of the country (*ibid.*). In practice, there are some worries

about the smart city because smart devices are used to monitor the system, which impacts on privacy and rivals the role of the state and the government, at local, national, and international levels.

In brief, this paper finds that the smart city is the latest concept of urban development for state security, which can be regarded from international to local level. At the international level, the United States and the West are losing the power battle with China, such as in HSR and in the smart city. At the national level, the smart city in Thailand is guided by China. At the local level, the selective smart city from secondary cities are under the control of DEPA and the state. Based on the six pillars of the smart city (i.e., governance, economy, mobility, environment, people, and living), this paper argues that smart governance and smart people at the local level are ignored by the government. This leads to the following questions: without smart people and smart governance, who are we smart for? And, how can Khon Kaen and other secondary cities redesign themselves as smart cities in their own way?

VII. Conclusion

In summary, this paper is excerpted from a larger research project that examines the factors of secondary cities in the northeast of Thailand by exploring the definitions, theories, conceptual frameworks, and criteria of secondary cities. Interestingly, in Thailand the smart city is the latest concept of urban development. However, there are limited sources of academic studies about both secondary cities and smart cities at the provincial level in Thailand.

Based on the research findings from the factors of secondary cities in the northeast, this research states that the five factors of secondary cities should be considered together. Hence, this paper employs the interrelationship of the five factors of the secondary cities in the

northeast to discuss the development path of Khon Kaen city. Remarkably, the smart cities selected by the government in Thailand are also secondary cities in each region. This paper argues that the development of these secondary cities has been influenced by the national development plans and by their roles as transportation hubs. These factors lead to urbanization, the attraction of various people and investment. Subsequently, these secondary cities are ready in many aspects for further development as smart cities.

In Thailand, urban development has been centralized by the state. In the past, the King had the supreme power to govern the state. For example, King Rama V introduced the regional system (monthon thēsāphibān in Thai) by dividing provinces into 18 clusters. Interestingly, before the First National Development Plan that was introduced by Marshall Sarit, Khon Kaen was not a major city in the northeast. However, after the First National Development Plan in 1961, Khon Kaen became a hub for transportation, medicine, and education.

In summary, this paper investigates smart city as the latest urban development concept at national and local levels. The arguments about the movement of smart city and Khon Kaen development could be considered in three aspects: 1. the second shift of infrastructure; 2. selective smart cities are related to the development path towards the secondary cities; and 3. smart city for state security or government security. Finally, this paper asks without smart people and smart governance, who are we smart for? The state should focus on these two important pillars for smart cities in both Khon Kaen and in other secondary cities across the country.

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