

# What If the Urban Primacy of Bangkok Did Not Exist?

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## Abstract

The urban primacy of Bangkok has long reflected uneven provincial and regional development in Thailand. To date, various approaches, including indicators in the demographic, socioeconomic, and physical dimensions, have been employed to observe and explain its urban primacy. In contrast to previous studies, the present study starts by asking the question: What if the urban primacy of Bangkok did not exist? Analysis was conducted by setting two scenarios, namely, with and without the Bangkok data. The main objective of the study is to explore and compare the two scenarios at the provincial level using six indicators, namely, urban population and urbanization rate (demographic), gross provincial product (GPP) and GPP per capita (economic), human achievement index (social), and built-up area (physical). Furthermore, the study analyzed the rank-size distribution and relationships among these indicators. The results indicate that indicators in the demographic and economic dimensions evidently reflect the primacy of Bangkok; however, an indicator in the social dimension is not representative of Bangkok's primacy. Thus, the study concludes that with or without the urban primacy of Bangkok, no difference exists in terms of the social development index among Thai cities.

**Keywords:** Bangkok, urban primacy, indicator, Thailand, uneven development

## Introduction

In the majority of developing nations, urban primacy typically reflects uneven provincial and regional development of a country. For example,

Thailand is considered a great economic and social development success according to its continued strong growth and significant poverty reduction over the last four decades (World Bank, 2022). However, the country's prosperous development has occurred primarily in Bangkok, which is the capital.

Bangkok is situated in the heart of the country as well as the heart of mainland Southeast Asia at a latitude of 13° 45' 14.33" N and a longitude of 100° 30' 5.18" E. The capital covers an area of approximately 1,565 km<sup>2</sup> (604 miles<sup>2</sup>). It borders Nonthaburi and Pathum Thani to the north, Chachoengsao to the east, Samut Prakan to the south, and Samut Sakhon and Nakhon Pathom to the west (Figure 1). Among a total of 77 provinces, Bangkok is designated a special administrative area. Nowadays, it comprises 50 districts and 180 subdistricts with an urbanization rate of 100 percent. The capital is the center of financial, political, educational, transportation, commercial, and cultural growth. Bangkok is considered a primate city (McGee, 1967; Goldstein, 1971; Yamashita, 2017; Lang et al., 2021). In 1967, the primacy rate of Bangkok reached the highest mark at approximately 32 times compared with the second-largest city, which at that time was Chiang Mai (Goldstein, 1971). However, since then, the primacy rate has declined due to the government's successive planning policies for regional development. According to the latest 2019 survey of the National Statistics Office [NSO] (n.d.), the primacy rate of Bangkok (5.7 million people) was approximately five times that of the next largest city in the country (Chonburi: 1.1 million).

Several studies examined the urban primacy of Bangkok through different perspectives (McGee, 1967; Vichiensan, 2007; Jongkroy and Thongbai, 2014; Estoque and Murayama, 2017; Yamashita, 2017; Arfanuzzaman and Dahiya, 2019; Lang et al., 2021). The majority of indicators used to observe and explore Bangkok were mainly the rank-size distribution of cities and/or the demographic and socioeconomic domains. For example, Yamashita (2017) conducted a study on the Bangkok metropolitan area and explained Bangkok as an urban primacy by applying rank-size rules and the law of primate city

based on demographic data. Lang et al. (2021) concluded that the urban primacy phenomenon should be analyzed using several dimensions, including rank-size of cities, demographics, and socioeconomic indicators, which are a part of five types of dimensions, namely, economic, historical, cultural, social, and political.



Figure 1 Bangkok and vicinity

For decades, information on built-up areas derived from satellite images provided a reliable, up-to-date, and cost-effective method for mapping and measuring the size of urban extent in a very large area (Zhang et al., 2014). Its applications were to measure the area and extent of Bangkok (World Bank Group, 2015; Yamashita, 2017). Urban applications in the recent decade also integrated information on built-up areas derived from remote sensing and socioeconomic data for exploring different dimensions in urban studies (Li et al., 2013; Yue et al., 2014; and Faisal et al., 2016). For example, Li et al. (2013) used correlation ( $R^2$ ) to investigate the relationship between built-up area (using a satellite's nighttime light) and gross regional product to model the regional economy of China. Faisal et al. (2016) investigated the relationship between built-up area and three socioeconomic parameters, namely, real GDP, total population, and total employment, to facilitate city development and regional planning of seven major cities in Canada between 2005 and 2010. The positive results of incorporating built-up area information for analysis in these studies imply that built-up area is a potential indicator for urban studies.

The abovementioned rank-size and key indicators have long been used to examine the existence of urban primacy. However, the primacy rate of Bangkok has continually declined. Thus, the current study seeks to answer the question, "What if the urban primacy of Bangkok did not exist?" In this regard, the study set two scenarios, namely, with and without the Bangkok data. The main objective of the study is to explore and compare the two scenarios at the provincial level using four dimensions of indicators, namely, demographic (urban population and urbanization), economic (GPP and GPP per capita), social (human achievement index [HAI]), and physical (built-up area). These six indicators were analyzed using rank-size distribution and linear regression using multisource data available for 2019. The study intends to report the output—a comparative analysis of the inclusion and exclusion of the effect of Bangkok. Moreover, the study presents the discussion mainly in the context of the primacy situation of Bangkok. The following sections include a review of literature, data sets, and

methods, results, discussion on the question: 'What if the urban primacy of Bangkok did not exist?' and a conclusion.

## Review of Literature

### Urban Primacy and the Primate City

Urban primacy, often referred to as a primate city, denotes an urban center that wields substantial supremacy in a nation across various domains such as social, economic, political, and educational spheres (Jefferson, 1939; Henderson, 2002; Siddiqui and Tewari, n.d.). Essentially, it represents a preeminent hub where urban activities, economic functions, political operations, and urban population converge. Consequently, the analysis of urban primacy and primate cities is closely tied to city hierarchy and their ranking order (Jefferson, 1939; Henderson, 2002; Siddiqui and Tewari, n.d.).

Defining urban primacy and a primate city involves the application of Mark Jefferson's law of primate city and Zipf's rank-size Rule (1949) (Siddiqui and Tewari, n.d.). A primate city is one that does not adhere to the hierarchical distribution of urban population sizes as elucidated by Zipf's rank-size Rule (1949). The formula for the rank-size Rule is as follows:

$$P_x = P_1/X$$

$P_x$  = Population city rank  $x$

$P_1$  = Population of 1<sup>st</sup> rank city or the largest city

$X$  = rank of a city

Combining the rank-size rule concept with the law of primate city, a primate city is defined as the largest city in a country with a population of more than twice as large as that of the second-largest city. Consequently, this classification is intricately tied to urban population dynamics, with a primate city automatically assuming the pinnacle of urban primacy in a nation.

City hierarchy and ranking analysis can pivot on various criteria, including population size in adherence to the rank-size rule, economic and political influence, and labor force statistics (Kaplan et al., 2004 in Siddiqui and Tewari, n.d.). Scholars since the late 20th century have proposed that, beyond population, urban primacy shares a profound connection with urban economies. Krugman (1996) argued that economic geography approaches can initiate tendencies of urban concentration in some developing countries, resulting in enormous primate cities. It cannot be denied that provincial economies and economic competitions use primate cities as benchmarks (Shi et al., 2020).

While demographics (urban population) and economics significantly shape urban primacy, politics and governmental policies wield considerable influence in designating a city as a primate city (Krugman, 1996). This influence is notably evident in developing countries. An example is Gafsa, Tunisia. It contains outstanding demographic and functional concentrations, particularly in economic activities, supporting it as the primate city of Tunisia (Nassima and Fahmi, 2023). Furthermore, Faraji et al. (2016) asserted that urban primacy in developing countries emerges from similar factors, including demographic, economic, political, historical factors for those that had been colonies, and social elements. Hence, to comprehensively study urban primacy and primate cities, while demographic and economic factors are pivotal, considering political and social dynamics is equally imperative in understanding their emergence and degrees of influence.

### **Thailand's National Policies and Their Strategies for Handling Bangkok's Primacy**

Currently, the National Economic and Social Development Council (NESDC), previously known as the National Economic Council (NEC) and the National Economic and Social Development Board (NESDB) in earlier periods, functions as the central body responsible for formulating, proposing, and monitoring Thailand's National Economic and Social Development Plans (NESDPs). The NESDC conducts

research, gathers statistics, collaborates with various stakeholders to devise comprehensive development strategies, which include policy analysis, data-driven planning, and advising the government on economic, social, and environmental matters (NESDC, History and Role).

The first National Economic and Social Development Plan (NESDP) (1961-1966) was launched in the 1960s, and the current one is the 13th National Plan (2023-2027). These plans are integral to Thailand's national policies, serving as fundamental frameworks for national development. Each plan contains a comprehensive set of guidelines for policymakers and government agencies (NESDC, History and Role).

Over the span of approximately 65 years covered by these national plans, Thailand has consistently emphasized fostering economic growth while concurrently advocating for decentralization towards regional sectors and promoting equity. Additionally, spatial development was later introduced and used as a strategic means to mitigate developmental disparities (Kmonwatananisa, 2008). However, given the focus of the present study on Bangkok's primacy, particular attention is directed towards the subsequent national plans, as outlined by Kmonwatananisa (2008), for their strategies aimed at briefly addressing and mitigating this specific concern.

- The 3rd National Plan (1972-1976) was the first to explicitly identify the issue of Bangkok's high primacy, prompting national urban policies at that time to focus on controlling population expansion and rural-to-urban migration.
- The 4th National Plan (1977-1981) initiated the Regional Cities Development Policy, aiming to alleviate economic and social disparities between Bangkok and other urban centers.
- The 5th National Plan (1982-1986) continued promoting rural-regional decentralization and concentrated on the development of five regional cities, namely Chiang Mai, Khon Kaen, Nakhon Ratchasima, Chon Buri, and Songkhla-Hat Yai. Additionally, it launched an economic zone in the

Eastern Seaboard to diversify economic activities from the Bangkok Metropolitan Region (BMR).

- The 6th National Plan (1987-1991) accelerated development in the Eastern Seaboard and prepared for new economic zones in the Upper Southern Region.
- The 7th National Plan (1992-1996) sustained development in the Eastern Seaboard area, inaugurated an industrial development policy in the Upper Central Region, and formulated development guidelines for BMR by coordinating infrastructure investments along with land and environmental management.
- The 8th National Plan (1997-2001) continued development in multiple areas (Eastern Seaboard, Southern Seaboard, Western Seaboard, and BMR) while emphasizing economic cooperation with neighboring countries through various frameworks, such as the Greater Mekong Subregion (GMS), and the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT).

After the implementation of those previous plans, it became evident that while Bangkok's primacy position still existed, it had significantly declined (NSO, n.d.). In the meanwhile, in the 21st century, Thailand encountered a series of challenges, including political instability, economic disparities, and environmental issues. Consequently, policies were overhauled to tackle these concerns. Subsequent national plans, spanning from the 9th to the 13th, consistently aimed at achieving sustainable development goals. Take the latest 13th National Plan (2023-2027), for instance, which emphasized fostering sustainable growth, social equality, and environmental conservation. This plan prioritized key sectors, such as technology, innovation, healthcare, and education, to elevate Thailand's global competitiveness. Moreover, it concentrated on advancing digital infrastructure and nurturing a green economy to ensure sustainable development nationwide (NESDC, Thirteenth National Economic and Social Development Plan).

## Datasets and Methods

The present study used two types of data for analysis, built-up area and socioeconomic data. The first set of data, built-up area, is derived from Landsat 8 satellite images (a mosaic of 38 image scenes) for 2019 and is a production of an urban project of the Geography and Geoinformatics Research Unit of the Department of Geography, Faculty of Arts, Chulalongkorn University, Thailand (Teerarojanarat, 2022). In summary, the classified built-up area of the entire country was estimated at 2.46 percent (a built-up area of 12,695 km<sup>2</sup> from a total of 515,876 km<sup>2</sup>) with an average accuracy of 84.5 percent. The second set of data, namely, demographic and socioeconomic (Table 1), was provided by the NESDC and the NSO. Currently, these data are analyzed and used by the NESDC for measuring the development of the country at the provincial level.

**Table 1** Demographic and socioeconomic data

Types of indicators	Data	Year of data compilation	Source
Demographic	Urban population Urbanization rate	2019	Population Census (National Statistics Office [NSO], n.d.)
Economic	Gross Provincial Product (GPP) Gross Provincial Product per capita (GPP per capita)	2019	Report (Office of the National Economic and Social Development Council [NESDC], 2021)
Social	Human Achievement Index (HAI)	2019	Report (Office of the National Economic and Social Development Council [NESDC], 2019)

Note: The HAI was first established by the United Nations Development Programme (UNDP, 2020), Thailand and currently is developed extensively and used by the NESDC. It is a measure of average achievement in key dimensions of human and social development, which is similar to that of the HDI developed by the United Nations. However, HAI has adopted additional measurement details to best fit the data available in Thailand. HAI scores range from 0 to 1 (lowest to the highest). HAI comprises eight subindices, namely, health, education, work life, income, housing and environment, family and community life, transportation and communication, and participation. Each subindex presents four equal indicators for a total of 32 sub-indicators.

To explore and compare the effect of the urban primacy of Bangkok, the two scenarios were established prior to analysis. For each scenario, analysis was conducted at the provincial level by examining six indicators that cover four dimensions as follows.

- For the demographic dimension, the rank (X-axis) and urban population size (Y-axis) of the provinces were plotted in descending order. The study applied a similar technique to rank urbanization as well as the remaining indicators.
- For the economic dimension, we plotted the rank of the provinces using two indicators, namely, GPP and GPP per capita. According to the NESDC (2021), GPP per capita can be used to represent the production potential of different provinces averaged per person. The number, however, cannot denote the level of income that people earn from direct occupations.
- For the social dimension, the study created a ranking of provinces using the HAI.
- For the physical dimension, the study plotted the rank of provinces according to the percentage of urban area.
- Finally, we investigated the relationships between the percentage of built-up area and the five abovementioned indicators. The assumption behind this investigation is that built-up area refers to human settlements, economic uses of land, and infrastructure in cities. The growth and development of cities should reflect the expansion of urban areas in cities (Sabo et al., 2018).

Following the methodological concept of previous studies (e.g., Li et al., 2013; Faisal et al., 2016), the present study developed the correlation technique and the scatter plot to examine the relationship. Moreover, it utilized linear regression analysis and the coefficient of determination ( $R^2$ ) to analyze the relationship between the percentage of built-up area and indicators.  $R^2$  values range from 0.0 to 1.0. In this study, the strength of the relationship based on the value of  $R^2$  was set, as shown in Table 2.

**Table 2** Strength of relationship regarding the level of correlation ( $R^2$ )

Value of $R^2$	Strength of relationship
0.0-0.2	Negligible or no correlation
0.2-0.4	Weak
0.4-0.6	Moderate
0.6-0.8	Strong
0.8-1.0	Very strong

## Results

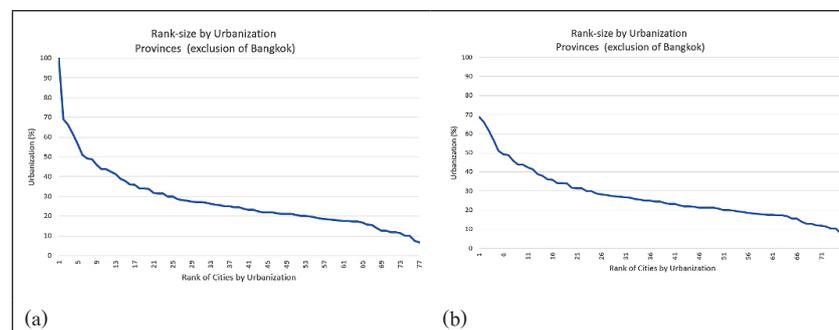
This section reports on and demonstrates the comparison of the two scenarios on the basis of the four types of dimensions (i.e., demographic, economic, social, and physical) at the provincial level.

Figures 2 (a) and (b) present and compare the rank of the provinces as graphs according to urban population in terms of the demographic dimensions. Table 3 provides the first five provinces according to rank-size distribution. The shape of the graph with the Bangkok data [Figure 2(a)] is considerably steeper than the one without the Bangkok data [Figure 2(b)]. In this regard, Figure 2(a) represents a model of the current urban primacy of Bangkok. The shape of the graph follows the concept of Jefferson (1939) called the “Law of the Primate Cities,” which demonstrates a leading city that is disproportionate in urban population size compared with any other cities in the country. By contrast, the graph in Figure 2(b), in which Bangkok data were excluded, describes the regularity in the distribution of population–city size and renders the model similar to that of the rank-size rule by Zipf (1941, 1949). Thus, the findings indicate that a notable difference exists between the two scenarios when comparing the rank of provinces according to urban population. Another demographic indicator, that is, rank of provinces by urbanization, is illustrated as graphs in Figures 3(a) and (b) in comparison. Table 4 presents the first five provinces according to rank-size distribution by urbanization. The graphs of the two scenarios are different. The shape of the graph without the Bangkok

data is less steep than that of the one with the Bangkok data. Thus, the findings indicate that a difference exists between the two scenarios when comparing the rank of cities by urbanization.

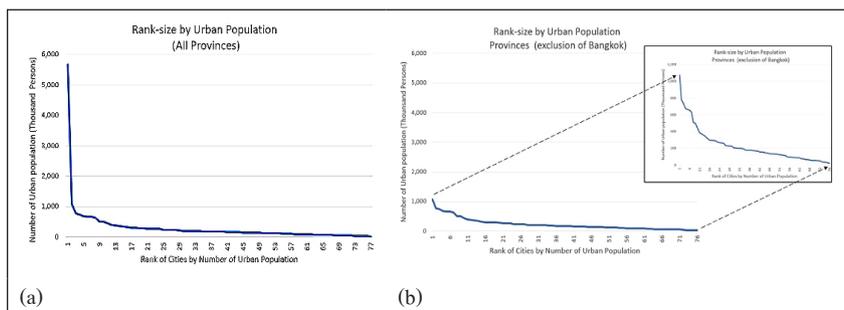
**Table 3** First five ranks of provinces according to urban population for 2019 (NSO, n.d.)

Rank no.	Provinces	Urban population (persons)
1	Bangkok	5,666,264
2	Chon Buri	1,075,244
3	Nonthaburi	777,155
4	Songkhla	731,648
5	Chiang Mai	675,440



**Figure 3** Rank of provinces by urbanization (a) with and (b) without the Bangkok data

Figures 4(a) and (b) display the comparison of the rank of provinces by GPP as an economic indicator. Table 5 presents the first five provinces in rank-size distribution by GPP. With the Bangkok data [Figure 4(a)], the shape of the graph is considerably steeper than that of the one without the Bangkok data [Figure 4(b)]. The graphs of the two scenarios are dramatically different. Their shapes are also similar to those of the indicators in the demographic dimension. Thus, this finding indicates that a difference exists between the two scenarios when comparing the rank of cities by GPP. Figures 5(a) and (b) depict graphs of the comparison of the rank of provinces according to another indicator in the economic dimension, GPP per capita. Table 6 reports the first five provinces in rank-size distribution by GPP per capita. In contrast to GPP, the shape of the graphs for GPP per capita for both scenarios is regularly distributed in the same pattern. According to Table 6, GPP per capita for Rayong was the highest (29,366 USD) and that of Bangkok was the second highest (18,931 USD). The three Eastern provinces, namely, Rayong, Chon Buri, and Chachoengsao, are designated and promoted by successive planning policies of the Thai government as a group of industrial provinces and a special economic zone called the Eastern Economic Corridor (EEC) (Kmonwatananisa, 2008). The earnings of these provinces are heavily reliant on domestic and foreign investment across Thailand (NESDC, 2021). However, the majority of the parts of these provinces remain nonindustrial-based (agricultural-based).



**Figure 2** Rank of provinces by urban population (a) with and (b) without the Bangkok data

**Table 4** The first five rank of provinces by urbanization for 2019 (NSO, n.d.)

Rank no.	Provinces	Urbanization (%)
1	Bangkok	100.00
2	Chon Buri	69.00
3	Phuket	66.11
4	Nonthaburi	61.42
5	Pathum Thani	56.45

Farming remains a predominantly family activity. Therefore, the graph for GPP per capita could not reflect the actual development of the province.

**Table 5** Top five provinces according to GPP for 2019 (NESDC, 2021)

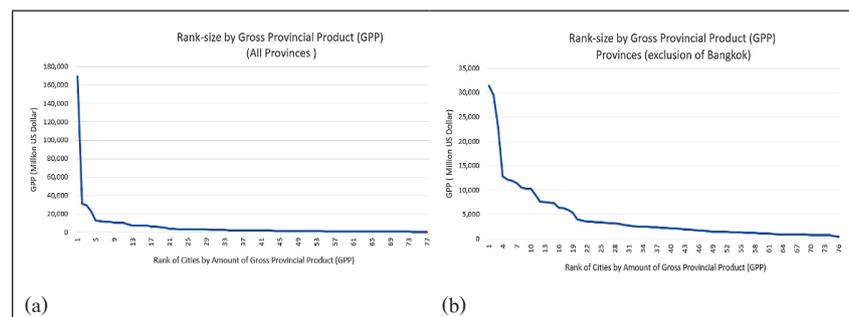
Rank no.	Provinces	GPP (Million USD)
1	Bangkok	169,585
2	Chon Buri	31,476
3	Rayong	29,521
4	Samut Prakan	22,943
5	Pathum Thani	12,890

Remark: 1 USD = 33.67 THB as of 2022

**Table 6** Top five provinces according to GPP per capita for 2019 (NESDC, 2021)

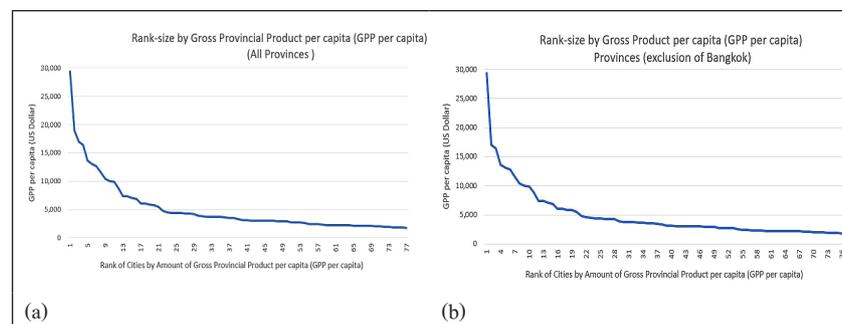
Rank no.	Provinces	GPP per capita (USD)
1	Rayong	29,366
2	Bangkok	18,931
3	Chon Buri	16,966
4	Prachin Buri	16,369
5	Chachoengsao	13,632

Remark: 1 US Dollar = 33.67 Bath as of 2022



**Figure 4** Rank of provinces by GPP (a) with and (b) without the Bangkok data

Remark: 1 USD = 33.67 THB as of 2022



**Figure 5** Rank of provinces according to GPP per capita

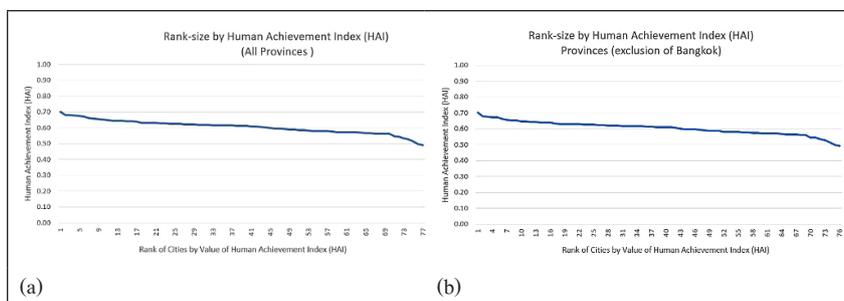
(a) with and (b) without the Bangkok data

Remark: 1 USD = 33.67 TBH as of 2022

According to the social dimension, Figures 6(a) and (b) depict the rank of provinces according to the HAI. Table 7 lists the top five provinces in rank-size distribution according to HAI. The HAI scores of nearly all provinces were relatively close and ranged from 0.49 to 0.70. Moreover, the shapes of the graphs of the two scenarios are nearly the same. For this reason, the result implies that the social index is irrelevant to the measurement of the primacy of Bangkok.

**Table 7** Top five provinces according to the HAI for 2019 (NESDC, 2019)

Rank no.	Provinces	HAI
1	Nonthaburi	0.70
2	Bangkok	0.68
3	Pathum Thani	0.68
4	Phuket	0.68
5	Rayong	0.67

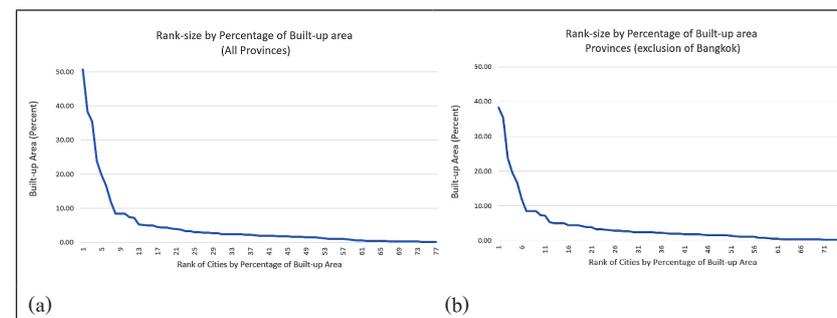


**Figure 6** Rank of provinces according to the HAI (a) with and (b) without the Bangkok data

Figures 7(a) and (b) present the rank of provinces according to the percentage of built-up area (physical dimension), which represents urban extent. Table 8 provides the top five provinces in rank-size distribution by percentage of urban area. With the Bangkok data [Figure 7(a)], the study found that the shape of the graph was steeper than that without the Bangkok data [Figure 7(b)]. However, the results of the two scenarios are nearly similar to each other compared with the graphs of the demographic dimension. In other words, the built-up areas of provinces expanded regardless of whether or not Bangkok was considered a primate city. Notably, Nonthaburi, Samut Prakan, Pathum Thani, and Samut Sakhon, which are included in the list of the top five provinces, are adjacent to Bangkok (Figure 1). These neighboring provinces are part of the so-called Bangkok Metropolitan Region, which the government defines in political terms as an urban agglomeration of Bangkok. The urban extent of Bangkok stretches into these surrounding provinces (Vichiensan, 2007; Yamashita, 2017); thus, the result that the percentages of built-up areas in these neighboring provinces were higher than the remaining ones is unsurprising.

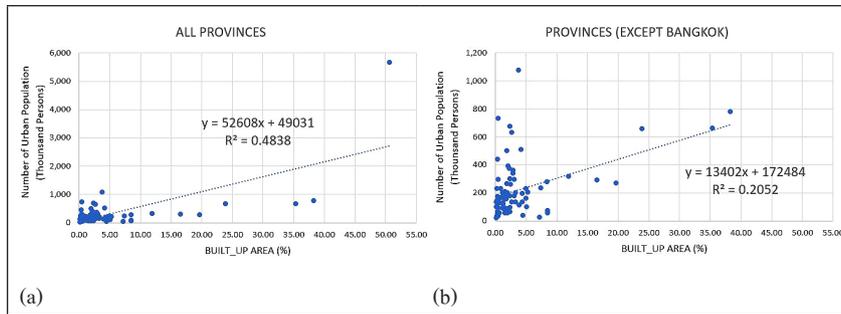
**Table 8** Top five provinces by percentage of built-up area for 2019 (Teerarojanarat, 2022)

Rank no.	Provinces	Urban area (%)
1	Bangkok	50.66
2	Nonthaburi	38.26
3	Samut Prakan	35.39
4	Pathum Thani	23.87
5	Samut Sakhon	19.72

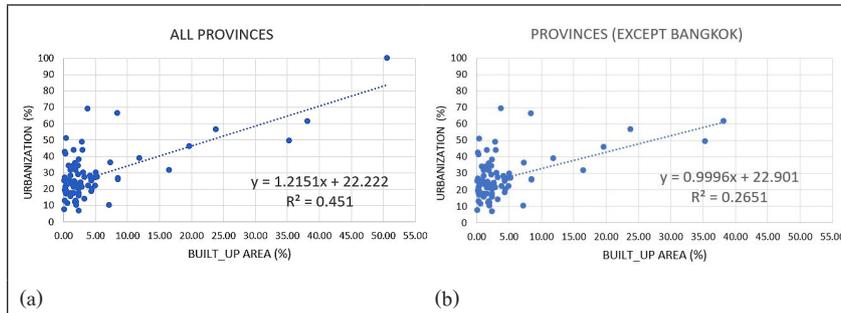


**Figure 7** Rank of provinces according to percentage of built-up area (a) with and (b) without the Bangkok data

The study conducted further investigation to observe the relationships between the percentage of built-up area and the five indicators. Figures 8(a) and (b) present the results of the comparison of the two scenarios in terms of the correlation between built-up area and urban population. With the Bangkok data, the coefficient of determination ( $R^2$ ) was 0.48 compared with that without the Bangkok data ( $R^2 = 0.21$ ). Figure 9(a) and (b) illustrates the comparison of the two scenarios in terms of the correlation between built-up area and urbanization rate. With the Bangkok data, the coefficient of determination ( $R^2$ ) was 0.45 compared with that without the Bangkok data ( $R^2 = 0.27$ ).

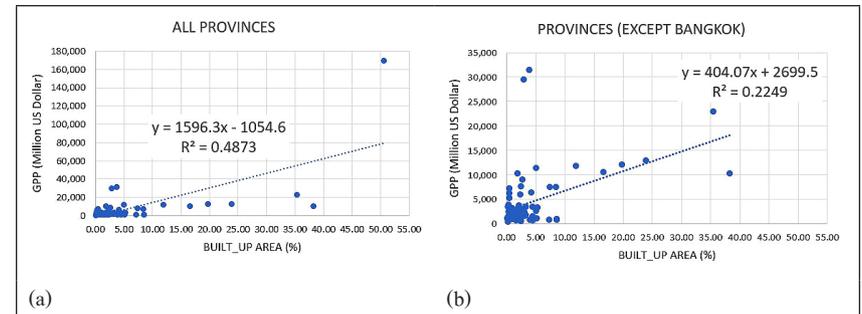


**Figure 8** Relationship between the percentage of built-up area and urban population (a) with ( $R^2 = 0.48$ ) and (b) without ( $R^2 = 0.21$ ) the Bangkok data



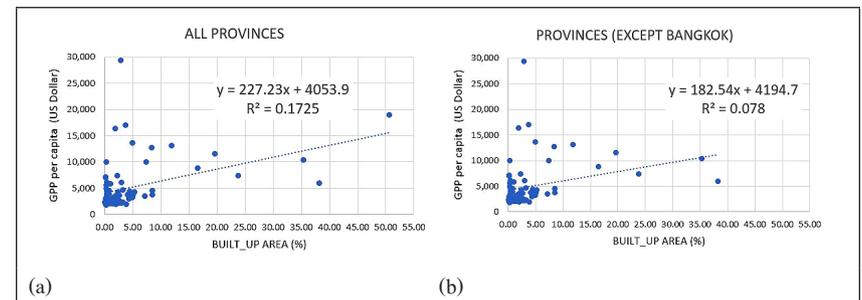
**Figure 9** Relationship between the percentage of built-up area and urbanization (a) with ( $R^2 = 0.45$ ) and (b) without ( $R^2 = 0.27$ ) the Bangkok data

Figures 10(a) and (b) provide the result of the comparison of the two scenarios in terms of the correlation between built-up area and GPP. The  $R^2$  value was 0.49 compared with that of excluding Bangkok data ( $R^2 = 0.22$ ). Figures 11(a) and (b) show the comparison of the two scenarios in terms of the correlation between built-up area and GPP per capita.  $R^2$  was 0.17 compared with that of excluding Bangkok data ( $R^2 = 0.08$ ).



**Figure 10** Relationship between percentage of built-up area and GPP (a) with ( $R^2 = 0.49$ ) and (b) without ( $R^2 = 0.22$ ) the Bangkok data

Remark: 1 USD = 33.67 THB as of 2022



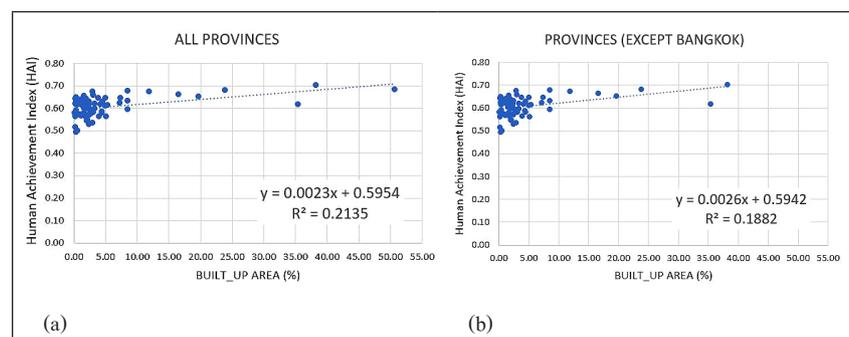
**Figure 11** Relationship between percentage of built-up area and GPP per capita (a) with ( $R^2 = 0.17$ ) and (b) without ( $R^2 = 0.08$ ) the Bangkok data.

Remark: 1 USD = 33.67 THB as of 2022

For the social dimension, Figures 12(a) and (b) present a comparison of the two scenarios in terms of the correlation between built-up area and the HAI. The  $R^2$  for including Bangkok data was 0.21 when compared that excluding Bangkok data ( $R^2 = 0.19$ ).

As summarized in Table 9, the study draws the following conclusions. In the analysis with the Bangkok data, the study found relatively similar patterns in the three relationships (between percentage of built-up area and urban population/urbanization/GPP), because their correlations were considered moderate. In other words, the increase or decrease in urban area is relatively associated with the increase or

decrease in urban population, urbanization, and GPP. However, if GPP per capita was considered, then the study found no relationship. In addition, the study observed a weak relationship between percentage of built-up area and the HAI (social indicator). In other words, the expansion of built-up area is moderately related to the demographic (urban population and urbanization) and economic growth (GPP) indicators, but not GPP per capita and HAI (social indicators). For analysis without the Bangkok data, the study found weak or no relationship between the percentage of built-up area and the five indicators.



**Figure 12** Relationship between percentage of built-up area and the HAI (a) with ( $R^2 = 0.21$ ) and (b) without ( $R^2 = 0.19$ ) the Bangkok data

**Table 9** Results of the comparison of the level of correlation ( $R^2$ ) between built-up area information and the five indicators

Research studies	Indicators used in the analysis [correlation $R^2$ (level of correlation)]				
	Urban population	Urbanization	GPP	GPP per capita	HAI
With the Bangkok data	0.48 (Moderate)	0.45 (Moderate)	0.49 (Moderate)	0.17 (No correlation)	0.21 (Weak)
Without the Bangkok data	0.21 (Weak)	0.27 (Weak)	0.22 (Weak)	0.08 (No correlation)	0.19 (No correlation)

**Discussion: What if the Urban Primacy of Bangkok Did Not Exist?**

Numerous research studies identify urban primacy and how it is produced. As asserted by many researchers (Galiani and Kim, 2008; Chen et al., 2016; Postiglione et al., 2017; Lang et al., 2021; Shi et al., 2020; Meiwu, 2017), urban–rural inequalities and uneven development are two of the many disadvantages of urban primacy, particularly in developing nations. Governments in developing countries have been endeavoring to reduce the primacy of their primate cities. One such country is Thailand. The urban primacy of Bangkok is continually decreasing; thus, the major question that emerges is, “What if the urban primacy of Bangkok did not exist?”

The results indicate that Bangkok’s supremacy was evident after the investigation of the demographic (urban population and urbanization) and economic (GPP) dimensions (Figures 2-4). Moreover, the findings were consistent with those of previous studies (McGee, 1967; Yamashita, 2017; Frick and Rodríguez-Pose, 2018; Lang et al., 2021). These studies proposed that demographic and economic factors are the major driving forces of the growth of Bangkok. Furthermore, by comparing the demographic and economic factors between the two scenarios, the study found that these two factors are crucial in establishing uneven development or inequality between primate and other cities.

There is a discussion surrounding the relationship between uneven development and urban primacy, particularly in developing countries. Shi et al. (2020) argued that the growth of a primate city is unavoidable, and government regional development policies cannot prevent this growth. In Thailand, the processes of modernization notably accentuated uneven development between Bangkok and the rest of the country, with a substantial escalation observed during the 1980s to 1990s. This trajectory of modernization propelled Bangkok and Thailand into a state of imbalance, marked by social discrepancies and disparate development (Meiwu, 2017).

One intriguing finding of the study pertains to the divergent outcomes in the crucial factors—demographic and economic—

underpinning the establishment of a primate city in the two scenarios. Figures 2 and 3 depict distinct outcomes for demographics, where the traditional rank-size rules fail to apply in the second scenario. Similar discrepancies emerge within economic indicators. This raises an intriguing question: in the absence of Bangkok's urban primacy, could the issues surrounding uneven development in demographic and economic spheres find resolution or persist? However, to seek the answer for this question, further study is required.

Apart from the indicators in the demographic and economic dimensions, the investigation of the physical (percentage of built-up area) dimension (Figures 7-12) also leads to interesting results. Built-up area refers to urban extent, which represents the physical dimension of human settlements and their economic uses of land (Sabo et al., 2018). In this case, the rank-size distribution of built-up area between the two scenarios illustrates a slight difference (Figure 7). However, the relationships between built-up area and other factors provide interesting results (Figures 8-12). With the Bangkok data, the result shows a "moderate relationship" with the demographic and economic factors. This result implies that built-up area partially reflects economic activities and urbanization. In other words, the economic growth of a province and the increase in the urbanization of a province result in the expansion of urban area. However, the result implies that no relationship exists with the demographic and economic factors when excluding Bangkok data. Hence, this information provides a new perspective in that no relation exists between the expansion of urban area and economic growth or urbanization. Therefore, if the urban primacy of Bangkok did not exist, the study concludes that the economic growth of a province and the increase in urbanization might or might not involve or drive the expansion of urban area in a province.

Finally, GPP per capita and HAI exhibited no difference between the two scenarios (with or without the primate city, Bangkok). In this case, the use of GPP per capita as an indicator has its limitations. As previously mentioned in the Data and Result sections, NESDC (2019) stated that this indicator cannot truly reflect the real earnings of people

in certain provinces, particularly a group of well-industrialized provinces. Being promoted as industrial-based provinces, they have gained a great amount of money mainly through domestic and foreign investment, which leads to the extremely high overall GPP. In reality, however, the earnings of the majority of people living in these provinces are derived from agricultural-based occupations. Therefore, GPP per capita could not accurately present the differences between the two scenarios.

A more interesting indicator is HAI, which is a development measure in the social dimension. With or without the Bangkok data, the graph of HAI did not follow the rank-size rule pattern (Figure 6). The two scenarios displayed no difference for HAI and no relationship existed between HAI and built-up area for both scenarios (Figure 12). These findings lead to a few questions, such as "Does urban primacy always occupy supremacy in every angle?" and "Why does the HAI or social index fail to reflect the supremacy of Bangkok?"

Regarding the first question, a few studies, e.g., Henderson (2000, 2002), Srikam (2006), demonstrated that urban primacy overwhelms the other cities in a country in every dimension (e.g., economic, social, and political issues). Urban primacy is always tied to uneven development and is indicated by economy, migration from rural to urban areas, financial activities, distribution of city size due to globalization and urbanization, and GDP. These indicators largely influence the concentration of urban activities and the formation of urban primacy (Lang et al., 2021; Ioannou and Wójcik, 2021). The indicative factors of being an urban primacy can lead to uneven development between rural and urban areas or the primate city and the rest of the country. Urban primacy establishes uneven development not only in terms of the economy, urbanization, and urban area, but also in terms of quality of life, income, and education, which are human development issues.

Nevertheless, Bangkok and other provinces in Thailand seemingly do not display uneven development in terms of human development (HAI). Authorities in Thailand use the HAI to measure

social development. As illustrated in Table 1, the index, which was subdivided into 32 sub-indicators, comprises indicators related to health, education, employment, income, housing and living environment, family and community life, transport and communication, and community participation (NESDC, 2019). Out of all sub-indicators used by the HAI, the study infers that slight differences exist between Bangkok and the rest of the provinces. If all key indicators of the HAI could truly reflect human development and the living standard of people in every province, then no gap may have existed between Bangkok and other provinces. Thus, the study proposes that the supremacy of a city is not always reflected in every angle. Social index cannot reflect the supremacy of a city. Bangkok does not occupy supremacy rank in the HAI; however, the study is unable to conclude that uneven development does not exist in all Thai cities.

For the second question, the study assumes that two main reasons exist, namely, decentralized policies and the decline of Bangkok supremacy.

On the one hand, the Thai government's decentralization policies may reduce the supremacy of Bangkok in terms of the HAI. A few scholars note that Bangkok continues to enjoy the supremacy from all aspects. However, the HAI does not indicate the achievement of decentralized policies. The Thai government has been trying to decentralize Bangkok for the past three decades (Kmonwatananisa, 2008). For example, the Thai government established the Eastern Seaboard project, which is a part of the EEC of the country in an effort to transform three major provinces situated east of Bangkok into a hub for high-tech industries and logistics and a regional gateway for investment and trade (Shatkin, 2004; Phuanketkeow, n.d.). As stated by the NESDC, Thai national strategies (the 6th plan onward) presumed that the Eastern Seaboard would be the main industrial base of the country (Kmonwatananisa, 2008). The Eastern Seaboard project aimed not only to support industrial growth and to connect Thailand to the global network but also to spread jobs and development to other parts of Thailand. It was hoped to be used as a strategy for decentralizing

Bangkok. Nevertheless, according to Shatkin (2004), the project in the Extended Bangkok Metropolitan Region, including the Eastern Seaboard project, failed to decentralize Bangkok. Apart from these initiatives, the Thai government endeavored to reduce Bangkok supremacy by constructing infrastructure, such as roads and universities, across the country. Furthermore, policies related to the establishment of the regional centers of the country were formulated. For instance, Chiang Mai is the center of the northern region; Songkhla and Phuket are the centers of the southern region; and Udon Thani and Khon Kaen are the centers of the northeastern region. Moreover, the Tourism Authority of Thailand formulated a policy that supports this idea. The concept of the management of major and minor cities (the *Mueang Lak* and *Mueang Rong* in Thai), which classifies the rank of cities in the Thai regions, is linked to the promotion of tourism throughout Thailand. In this way, this scheme could indirectly reduce the supremacy of Bangkok. This can help in increasing incomes, job opportunities, and migration, which are a few of the key factors that create urban supremacy.

Nevertheless, Bangkok supremacy is declining, but not mainly because of the Thai government's decentralization policies. The decline occurred after the Asian economic crisis in 1997 (Srikam, 2006), which reduced the number of jobs in the city. Thus, the labor population moved out of the Bangkok metropolis to other cities because of the high cost of living and unemployment. Therefore, the spillover effect played an important role in reducing Bangkok primacy.

According to the two abovementioned questions, the study infers that Bangkok supremacy cannot be defined using the social indicator HAI. Moreover, Bangkok does not occupy every angle of supremacy. The study found no relationship between the HAI and built-up area; thus, Bangkok does not possess the social supremacy dimension, that is, human development. However, concluding that no uneven development exists among cities in Thailand is impossible. This article can only conclude that Bangkok supremacy is evident according to the economic and political dimensions. If Bangkok primacy did not exist,

then economic and built-up development would change, and social and GPP per capita would exhibit no differences.

In summary, the merit of this study is that it reveals new information through a comparative analysis of the urban primacy effect both with and without the Bangkok data, which is lacking in studies in Thailand at the provincial level. A further implication is that understanding of the exploration and measurement of the primate city remains limited. Currently, interest in measuring sustainable development and environmental degradation is increasing. Thus, another direction of research could be to compare the two scenarios by including indicators in the environmental dimension, such as CO<sub>2</sub> emissions, urban heat islands, and energy assumption, to the analysis. Another interesting option is the replication of the analysis in other countries, particularly those experiencing the effects of urban primacy.

## Conclusion

Rank-size distribution and key indicators in several dimensions, such as demographic, economic, social, and physical, have long been used to identify urban primacy. Therefore, researchers believe that a relationship exists between rank-size rule distribution and key indicators. The answer to the question posed at the beginning of this paper (What if the urban primacy of Bangkok did not exist?) is that Bangkok primacy seems unrelated to the social index but highly related to demographic and economic dimensions. Based on NESDC data, Bangkok supremacy may not be relevant to uneven development in social aspects. The findings suggest that social indices, specifically within the NESDC's 32 social sub-indicators, do not exhibit a strong association with the extent of urbanization or the overarching supremacy of Bangkok in built-up area. However, this research was limited to the relationship among built-up area, rank-size rule distribution, and the six indicators. Seeking an in-depth response to the question of uneven development as a result of urban primacy in the social dimension will require further studies that include more indicators. This article contributes to the literature

only in that the demographic and economic dimensions are the two factors that display accuracy in identifying urban primacy and uneven development of an urban primacy using Thailand as a case study.

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## Conflict of Interest

The authors report no conflict of interest.

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