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Economies of Scale in Local Thai Government Administration*

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ABSTRACT

Amalgamation reform is a policy adopted by many countries, especially developed. The basic reason for most reforms is to take advantage of the economies of scale in the local provision of public services. However, a review of relevant empirical literature, most of which is based on descriptive evidence, reveals that any benefits arising from amalgamation remain controversial.

Thailand is considered a country with many small local government organizations. In this context, the relationship between economic efficiency and the size of the local government organization is often discussed, and thus also the issue of economies of scale in delivering local public services. In this article, cost function regression is used to analyze the economies of scale in all small local government organizations in Thailand. The cost function is applied to determine whether local government organization costs have increased or decreased compared to changes in population size. The results indicate that many local government organizations operated under increasing returns to scale (more than 90 percent of small local government organizations), some others were found to be operating under decreasing returns to scale. This means that local government amalgamation is required to bring the economies of scale into practice. Based on the results, the authors also attempt to determine the optimal size for a local government organization. The findings suggest that amalgamating to achieve the optimal size will help local organizations to save costs in terms of the number of staff or personnel expenses.

Keywords: Economies of Scale, Local Government, Amalgamation

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Introduction

It is widely agreed that decentralization is an important approach, and this has taken place substantially throughout Thailand. Since 1997, Thailand has undertaken administrative reforms by distributing administrative powers and moving public services from the government to local administrative organizations. As a result of the enforcement of provisions under the plan and procedures for decentralization to local administrative organizations, the task of creating and providing public services has been transferred from central government. From past to present, the local government organization is an important mechanism for providing public services and becoming more involved in the daily lives of the people. The study by Krueathep et al. (2014) found that overall, the earlier decentralization was moderately successful. Decentralization has helped more poor people to gain access to essential services than before, even though some parts of the program were not noticeably successful.

However, decentralization is not an absolute solution to social welfare problems. Local government in Thailand faces a number of chronic and structural problems, such as the discontinuation of decentralization policies, the mistake of transferring missions from central government agencies, true lack of fiscal freedom, operational interventions by central government and regional agencies, corruption at the local level, etc.

One of the serious problems often cited is the lack of efficiency in the provision of public services as a result of the majority of local government organizations being small. There are 7,852 local administrative organizations in Thailand, consisting of 76 provincial administrative organizations, 2,441 municipalities, 5,333 subdistrict administrative organizations, and 2 special local administrative organizations (Department of Local Administration, 2017). The statistics show that there are approximately 4,700 units with a population of less than 7,000 (see Table 1). This has caused criticism of the small population base, resulting in local government organizations experiencing limited income generation, potentially being unable to provide efficient public services to respond responsibly and thoroughly to the needs of the local people.

Table 1 The distribution of local government organizations according to population size

Size category of local organization (grouping by population)	Number of local organizations in category	Number of local organizations (percentage)	Size of population in category	Size of population (percentage)
1-3,000	656	8.44	1,578,925	2.70
3,001-5,000	2,082	26.78	8,476,612	14.51
5,001-7,000	2,032	26.14	12,091,752	20.71
7,001-10,000	1,822	23.44	15,089,872	25.84
10,001-20,000	965	12.41	12,303,052	21.07
20,001-50,000	167	2.15	4,765,191	8.16
50,000-100,000	38	0.49	2,423,738	4.15
100,001-300,000	12	0.15	1,670,616	2.86

Note: Excluding provincial administrative organization and special local administrative organizations
Source: Authors' calculation according to the Department of Local Administration (2017)

To increase the capacity of public services for small local government organizations, The Council for National Reform has attempted to promote the draft code for their amalgamation. A key point in Section 15 of the draft code for local administrative organizations (for approval by the National Reform Steering Assembly in the August 2016 edition) is the call to merge local government organizations generating revenue of less than 20 million baht, excluding subsidies or with a population of less than 7,000 with other authorities adjacent to each other and in the same district. Such amalgamation should take place within a year of the local administrative organization code coming into force, upon announcement by the Ministry of Interior. This is consistent with the report by the World Bank office in Thailand (2012) regarding the size of local government organizations, their functions, and the efficiency of relevant structures. The number of local government organizations in Thailand is higher than in other countries that have decentralized, such as China, Japan, Brazil, the USA, Denmark, and Poland, so "amalgamation or merging" of local government organizations should be considered on a larger scale or for more efficient provision of public services, based on the principle of decentralization. If the law actually comes into force, it may affect a large number of small local government organizations.

Table 2 Number of local government organizations amalgamated under the conditions of revenue and population size

Revenue (Excluding subsidies)	Population		
	less than 3,000	less than 5,000	less than 7,000
less than 20 million baht	590	2,297	3,896
less than 30 million baht	637	2,633	4,528
less than 40 million baht	641	2,681	4,667

Source: Authors' calculation according to the Department of Local Administration (2017)

Table 2 represents an assumption regarding the dissolution of local government organizations, considering the facts in relation to revenue and population size, in order to ascertain the number of local government organizations dissolved in different situations. The figures indicate whether relaxed or stringent conditions contributed to the number of local government dissolutions; from 590 to 4,667 units. In other words, the effects will be on a wider scale if the conditions requiring dissolution are stringent.

Although the amalgamation of local government organizations is a guideline for the reform of the local government structure that the government attaches importance to, the idea of amalgamation has also been widely acclaimed by academics and stakeholders. Moreover, no empirical evidence was furnished by The Council for National Reform to support this claim and there is hardly any research on the successful amalgamation of local government organizations in Thailand. Therefore, there is a call for the government to delay the process and study the situation more precisely.

In an effort to partially remedy this neglect, the concept of economies of scale are adopted in this article to analyze whether or not the current population serviced by local government organizations is at the point where the average cost is expected to decrease. Thus, the article analyzes the dependence of public service costs and the size of government organizations in terms of population. Meanwhile, based on the results, the authors will attempt to determine the optimal size of a local government organization for delivering public service at the lowest cost.

Research Objectives

1. to examine the existence of economies of scale in the local government administration of Thailand and determine the form of cost curve

2. to determine the optimal size of local government organization for delivering public services

Literature Reviews

1. Is Local Amalgamation the Answer?

Local government amalgamation is not a new concept and has been used to increase the potential and efficiency of local government in numerous countries. Since World War II, local governments have been reformed in many European countries. This is because during that time local government organizations in developed countries started to play an important role in providing public services as a consequence of decentralization and the transfer of responsibility from the center to the locality.

The efforts of the government to continue the policy of local management usually involve the theoretical question "What is the best form of local government for providing services to the public? Separated or Merged?" This question is very complex since the performance of local government is a matter of detail and can be traced to the quality and efficiency of the service delivered.

Those who propose the amalgamation of local government cite multiple benefits and various issues to support their opinions. Firstly, a larger local government organization will have the advantage of achieving economies of scale or the ability to reduce the cost per unit of services due to the increase in population (Hirsch, 1959; Jimenez & Hendrick, 2010). In other words, the more services provided, the greater the purchase volume. Therefore, the cost will be reduced at a certain point before rising again when the number of service receivers increase. Economies of scale and the optimal size of local government is one of the goals for achieving the expected minimum cost per unit for service receivers.

In addition to economies of scale, mergers also avoid service duplication and operations in small local government organizations, such as management systems, information technology, purchasing, and finance (Kaufman, 2010). Moreover, mergers contribute to a wider tax base, helping local government to provide more specific and professional services. The concept of amalgamation is expected to help local governments offer more quality services to benefit the public (Katsuyama, 2003).

The planning and amalgamation processes of local government organizations are often tedious and time-consuming. The literature review reveals several drawbacks when small local government organizations merge. According to public choice theory, it can be argued that a larger administrative area affects participation and monitoring difficulties. People may not be able to obtain or access essential information to evaluate the performance of local governments to determine if the taxes they are paying can be justified. On the other hand, the operations of small local government organizations are often less complex, have a higher level of transparency, and convenient for the public to investigate. As a result, if small local governments interact with people, and the public can access information easily, these units are likely to come under pressure from the public to deliver goods and services more effectively (Bailey, 1999; Boyne, 1998; Cox, 2009).

Based on the literature review, amalgamation may result in positive outcomes in some situations. There are no parameters that can be generally used to make decision for an amalgamation and case-by-case analysis should be conducted. In other words, the possibility of amalgamation must be evaluated in a real situation on the basis that political policies often focus on change and result in better wealth distribution and resource allocation. Meanwhile, past studies indicate that amalgamation is likely to be more successful if its implementation is voluntary and free from political pressure.

2. Evidence of Economies of Scale in Local Government

The main theme is the recognition that such amalgamation result in gains for local government organizations through the economies of scale. The term “economies of scale” is widely known and applied in practice to corporations. The economies of scale represent the cost advantages derived by enterprises from the production process of the business unit. Production functions or relationships between inputs and outputs in the production will determine the characteristics of those processes. Changing the proportion of the total output, compared to changing the proportionate number of inputs will lead to identification of the different production characteristics that can be evaluated in terms of “returns to scale”. In other words, returns to scale tells us how much the output will change when the inputs change (increase/decrease). For example, if inputs double, productivity increases by more than double the amount and this is called the increasing returns to scale. If productivity doubles or is equal to the level of the increase in inputs, this is called constant returns to scale. Moreover, if productivity increases by less than twice the level of inputs, this is called decreasing returns to scale.

Returns to scale refer to the physical relationship between inputs and outputs. Economies of scale transform such relationships into financial values. For instance, increasing returns to scale will reflect the increasing economies of scale (lower average cost per unit), and the constant returns to scale will reflect the constant economies of scale (constant average cost per unit), while decreasing returns to scale will reflect the diseconomies of scale (higher average cost per unit) (Dollery & Fleming, 2006).

Early studies on this concept were conducted in the UK and the USA. Generally, the analysis of the economies of scale in local government organizations uses both cross-sectional data and panel data to estimate the relationship between the size and average service cost. Most studies use a multivariate model to identify the cost of service results; relevant parameters are engaged, such as those reflecting the social and economic circumstances of local people. In addition, most studies found that the number of population was used for output measurement, and various function models applied.

Some studies were conducted in parallel to find the optimal size of local government organizations (Bikker & Linde, 2015, 2016; Matějová, Plaček, Krápek, Půček, & Ochrana, 2014; Southwick, 2012). However, the study results of economies of scale were found to be quite varied. Many studies confirmed the existence of economies of scale in the overall cost and other service costs of local organizations, including garbage collection, public transportation, and library services (Callan & Thomas, 2001; DeBoer, 1992; Farsi & Filippini, 2007; Kraus, 1981). While some studies suggested that economies of scale could be achieved only in certain circumstances, otherwise diseconomies of scale would occur (Drew, Kortt, & Dollery, 2016; Solé-Ollé & Bosch, 2005; Southwick, 2005). However, another research group found no relationship between the cost and size of local government organizations and diseconomies of scale (Gyimah-Brempong, 1987; Derksen, 1988; Boyne, 1995). The evidence presented made it possible to conclude that uncertainty existed concerning the results of studies on the economies of scale in the public services of local government organizations, varying according to locality, based on the facts and circumstances contained in each study.

Research Methodology

1. Data

For the analysis, the data were mainly obtained from the Department of Local Administration as a governmental agency under the Ministry of Interior, with a mission-critical role in supporting local government organizations. The local authorities for this study were all

small local government organizations in 2017, including 1,875 subdistrict municipalities and 5,121 subdistrict administrative organizations, covering more than 65 percent of the total Thai population.

2. Model

The cost function was applied in the analysis of economies of scale to see if the costs of local government organizations had increased or decreased compared to changes in population size. It was found that the quadratic cost function had been applied to empirical studies, and this was one popular function. Many studies, including Bikker and Linde (2016), Drew et al. (2016), Southwick (2012), Geys, Heinemann and Kalb (2007), and Christensen and Greene (1976), applied the quadratic cost function to study the economies of scale.

$EXPi = f(POPi, POPi^2, \mu)$

Where EXP is personnel expenses per capita of the selected local government organizations in the subdistrict municipality i or subdistrict administrative organization i, POP is the population in the subdistrict municipality i or subdistrict administrative organization i, and μ is an error term. The inclusion of the quadratic variable in the equation is used to determine whether or not the functions can be expressed as U-shaped.

Additional dependent variables that can be used to estimate the regression function are as follows:

$STAFFi = f(POPi, POPi^2, \mu)$

Variable STAFFi or the number of staff members is another variable of this study and can be used to test for robustness. In addition to considering only the costs that can be reduced when economies of scale exist, the number of staff members will help identify the economies of scale in another dimension. That is, it can help determine the aspects of hiring when the size of the service area is bigger or when the amalgamation takes place. Likewise, it may be able to exploit benefit from the staff when services are expand.

Moreover, the study uses the empirical results obtained for the Czech Republic (Matějová et al., 2014). This research combines the quadratic and hyperbolic regression function in the form $y = f(x, x^2, 1/x)$.

$EXPi = f(POPi, POPi^2, 1/POPi, \mu)$

$STAFFi = f(POPi, POPi^2, 1/POPi, \mu)$

Therefore, this study uses the two additional functions shown above, while also adding another control variable, namely, population density (DENS), in order to get a form of the equation that can be better described. The criteria for choosing the form of the best regression function are as follows:

1) U-shaped function according to the economies of scale concept.

2) Variable values in the Y axis are positive throughout the range of the independent variables considered.

3) Independent variables are significant.

4) The function has a higher R-square value.

3. Optimal size

The resulting regression equation is used to find the optimal size of local government organization. By using derivatives and the bisection method of intervals, the roots of the equation are identified. Based on the form of function, the search for roots was divided into two intervals.

Results and Discussion

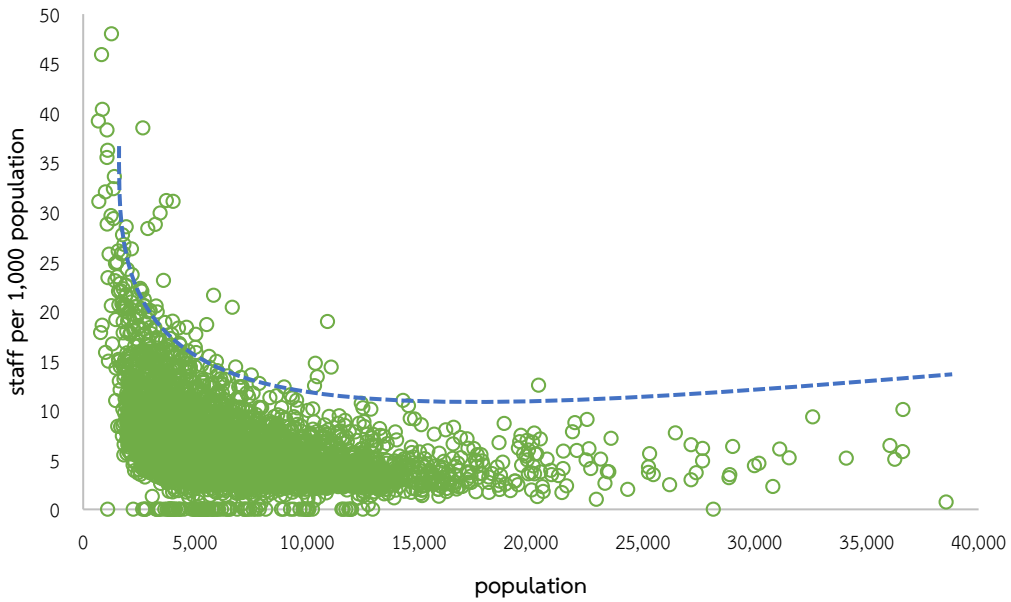

Figure 1 Scatter plot of staff per 1,000 population compared to the population size

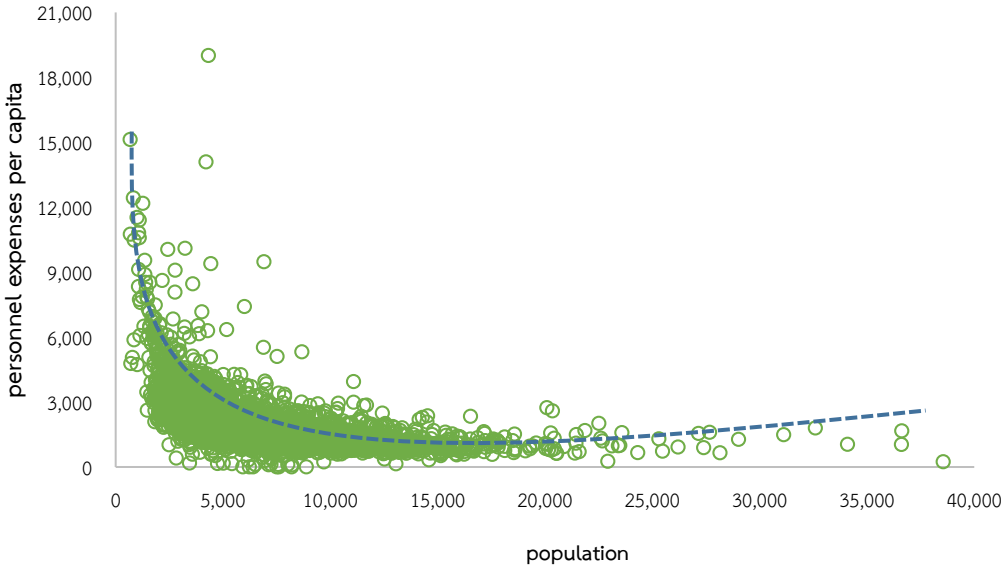

Figure 2 Scatter plot of personnel expenses per capita compared to the population size

Figures 1 and 2 show the distribution point to consider the existence of economies of scale. The relationship of interested variables consists of staff per 1,000 population and personnel expenses per capita compared to the population size. To see when the local population increases, the average cost is. Various points in the figure represent each local organization whereby the curve is a line showing the relationship between the two variables. The trend line is similar to that of the U-shaped, which means that the average cost will decrease when the population increase reaches a certain level. But when the population increases, the average cost will also rise.

The two scatter diagrams show the two key aspects in detail. Some subdistrict administrative organizations and subdistrict municipalities show higher than average cost lines, due to the presence of a larger population in the area than the level causing the economies of scale. In other aspects, there are a number of subdistrict municipalities and subdistrict administrative organizations, with a relatively high average cost compared to the average cost line, and this is due to the low population. Based on this information, the amalgamation of small local government organizations with lower populations will help the country to benefit from the economies of scale.

The relationship of variables reflecting the economies of scale will be used in the regression analysis. The main objective of regression analysis is to estimate the value of one variable, known as a dependent variable. This is achieved by using the knowledge gained from other variables known as explanatory variables. In other words, the knowledge or information from X is used as a basis for estimating Y.

The regression equations used are defined as quadratic forms and combine quadratic and hyperbolic forms. As for the variables used to reflect the average cost, two variables are compared: the number of staff per 1,000 population (STAFF) and personnel expenses per capita (EXP). Accordingly, these conditions can be divided into four cases as shown in the table 3.

Table 3 Functional form and dependent variable according to the model used in the estimation

Model	Variables used to reflect the average cost		Regression function	
	Number of staff per 1,000 population	Personnel expenses per capita	Quadratic	Quadratic and hyperbolic
1	✓		✓	
2	✓			✓
3		✓	✓	
4		✓		✓

The results of the four regression models are shown in Figures 3 and 4. All four cases show the results of the analysis performed in this paper and confirm the expected U-shaped cost curve. However, only the second and fourth models show positive values for the dependent variables among all values of independent variables. The combine quadratic and hyperbolic regression is more appropriate for describing variables. According to the other criteria, the significance of independent variables and the coefficient of determination R^2, the fourth model can best explain the analyzed data (R^2 = 0.5628). All variables are statistically significant at the 1 percent level.

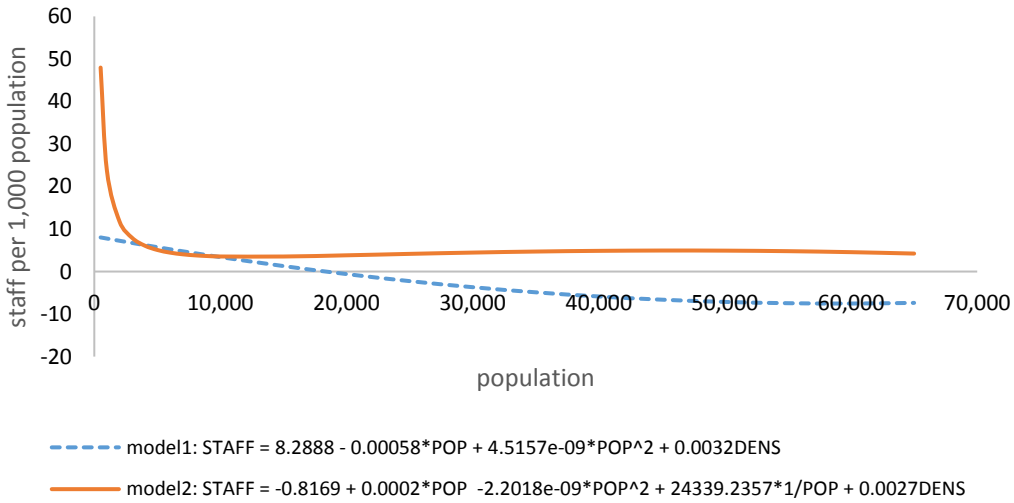

Figure 3 Estimation of regression equations (Models 1 and 2)

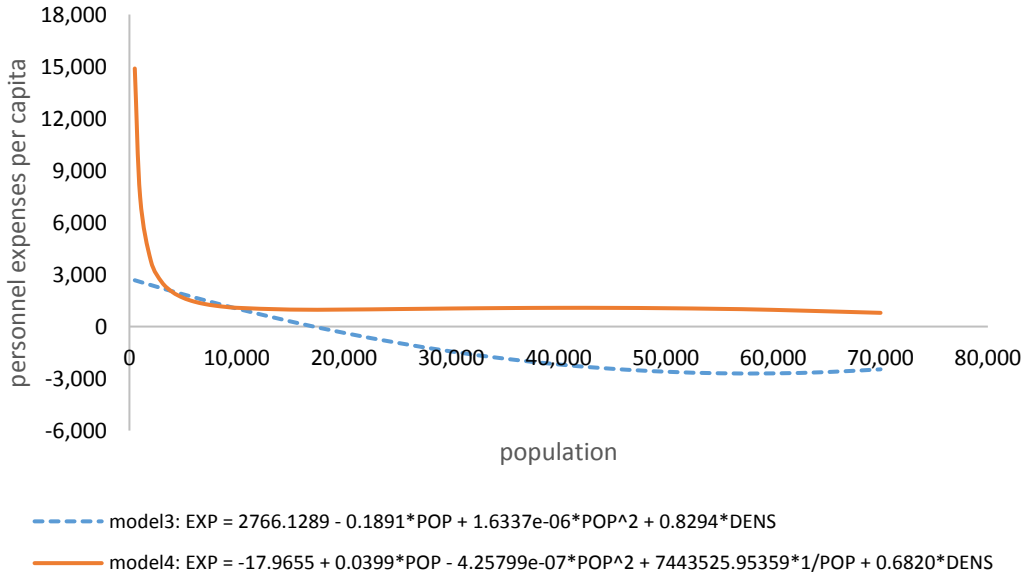

Figure 4 Estimation of regression equations (Models 3 and 4)

After selecting the appropriate model (Model 4), the lowest point was then calculated to find the critical value of the function. The critical value of the function is the place where the graph has a vertex at its lowest point. In this case, the critical value of the function can be used to determine the optimal average cost. The calculation of this optimal value will give the researcher an idea of what the appropriate population level should be. In other words, this

point is the maximum population that each local organization can take care of effectively. If the population is higher than this, diseconomies of scale will result.

The analysis results show the optimal size of local government organization with the lowest costs calculated. Local authorities with a population of 17,178 or similar are considered as the most economical size for personnel management. Comparing the results with the actual data, it can be observed that many small local organizations (more than 90 percent) can take advantage of the economies of scale through amalgamation.

Conclusion

The emphasis on local government policies has been strongly linked to the principles of subsidies and decentralization in Thailand since 1997. The distribution model of local government organization is linked to discussions on the suitability or need for change. The controversy regarding change often depends on the economic efficiency and size of the local government organization in terms of population, i.e. the concept of economies of scale. This article contributes to the discussion of economies of scale under the conditions of local Thai government and is one of the main implications of these analyses. This article focuses on the issues of economies of scale specifically relating to the expenditure of small local government organizations, such as subdistrict administrative organizations and subdistrict municipalities. The results of the analysis confirm the expected U-shaped cost curve. The amalgamations resulted in a decrease in local government organization spending, with the costs measured by the number of staff and personnel expenses, thus will likely decrease and economies of scale can be achieved. This suggests that small local government organizations have higher unit costs than larger. However, after a certain population level is reached, decreasing returns to scale may begin to emerge and unit costs rise, providing evidence to support local amalgamation, at least from an economic analytical perspective.

From a policy perspective, the major implication of this article is the theoretical size of a local unit of around 17,000 inhabitants which has a minimum cost per capita for delivering public services. Of course, the results are different from other foreign studies. In such cases, the differences are due to each country having different local authority territorial fragmentation, different levels of autonomy, and different levels of fiscal federation. Nevertheless, the optimal size of a local government organization obtained from this analysis is only a preliminary estimate obtained from quantitative analysis, rather than a definitive figure. However, from the empirical

results, it can be said that the amalgamation of local government organizations in adjacent areas can at least help to reduce the unit costs.

Recommendation

From the structural efficiency viewpoint, the aim is to have a local government that facilitates the efficiency of public services or focuses on local government organizations to provide good public services. The weight of the fiscal and economic dimensions will be greater than the social and political. In addition, this approach covers the structural design process that focuses on economies of scale by creating as a large organization or amalgamation from smaller authorities, to better respond to government policy in terms of economic competitiveness.

The proof of economies of scale clearly shows that amalgamation can help reduce the cost per unit of local government organizations, which is consistent with models focusing on structural efficiency. However, based on the assessment of other contexts in Thailand, it is difficult to facilitate local reform by forcing amalgamation. Local government organization amalgamation is highly relevant to the context of the local community, and it is not therefore possible to apply directives from central government to local government organizations, known as top-down or mandatory policies determined by the national government.

For Thailand, since the government intends to implement a policy on local government amalgamation, it is more likely that a preliminary practical way will be found, involving voluntary amalgamation or collaborative approaches. The government may allocate special subsidies to support the integration of small local authorities which have been adversely affected by local amalgamation.

Further Study

This analysis focuses mainly on the supply or service viewpoint. In fact, to decide what size is most appropriate, the client-aspect must also be considered. Each area has a different social and geographical context. The convenience with which the public can access the service is therefore an essential factor to consider when determining the size of a local government organization.

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