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Assessing the Efficiency of Local Government in Malaysia

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Abstract

The objective of this paper is to assess the level of efficiency of local government in Malaysia. Using data envelopment analysis (DEA), the research provides evidence on the efficiency of Malaysian local governments in terms of technical (TE), pure (PTE) and scale efficiency (SE). Secondary data obtained from financial statements of 35 local governments over a period of seven years are used. DEA is performed using three inputs (tax revenues, fees and charges, subsidies from central government) and four outputs (net book value of land and buildings, net book value of motor vehicles, net book value of equipment and fittings, cost of goods and services). The results show that most Malaysian local governments recorded high technical efficiency (TE), pure technical efficiency (PTE) and scale efficiency (SE) with above 0.90 mean scores.

Keywords: Local Government, Efficiency, Malaysia, Data Envelopment Analysis

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1.0 Introduction

Local government is responsible for providing goods and services to the people living within its localities or areas (Ibrahim and Karim, 2004; Fogarty and Mugera, 2013; Da Cruz and Marques, 2014). The services provided cover a wide range that include waste collection, street lighting, road maintenance, development and maintenance of leisure amenities, recreational facilities and activities related to public health (Ibrahim and Karim, 2004; Balaguer-Coll et al., 2007; Geys and Moesen, 2009; Fogarty and Mugera, 2013; Doumpos and Cohen, 2014). Rapid changes in the global environment and the increase in citizens' demand for a diverse range of services and facilities create challenges for local government (Phang, 2008; Benito et al., 2010;) in terms of the scope of services, as well as the quality and efficiency of the facilities and services provided (Gohbadian and Ashworth, 1994; Phang, 2008). Local government is expected to efficiently utilise its financial resources in providing quality goods and services to the public (Gohbadian and Ashworth, 1994; Renne, 1937 as cited in Da Cruz and Marques, 2014; Doumpos and Cohen, 2014). However, statistics from the Public Complaints Bureau (2016) show that public complaints about local government's quality of service have been increasing from year to year. This to some extent indicates some inefficiency of local government in delivering their services.

Various efforts have been undertaken by the federal government to improve local government service delivery efficiency. For example, in the 10th Malaysia Plan, improving local government efficiency was among the important initiatives outlined. The introduction of the Star Rating system, as outlined in the plan, is aimed at encouraging competitiveness among local governments to improve the efficiency of their service delivery (Ministry of Housing and Local Government, 2008). On the other hand, through the federalisation of waste management it is hoped this will allow local government to focus on core functions such as licensing, enforcement, planning and development, which ultimately should result in better efficiency in their service performance (Yahaya and Larsen, 2008). Unfortunately, despite the admirable objectives of these initiatives, the level of citizens' complaints about the inefficiency of local government is still alarming (Osman et al., 2014). These seemingly endless public complaints about Malaysian local government have raised issues that have prompted the researcher to carry out this study. The researcher is attempting to measure the efficiency level of individual local governments in Malaysia, specifically, 8-year efficiency levels from 2008 to 2015 are being observed to examine the efficiency trend.

The remainder of the paper is organised as follows: Section 2 describes local government in Malaysia, Section 3 presents review of previous literature and Section 4 discusses research methods and findings, while section 5 concludes the paper.

2.0 Local Government in Malaysia

Local government is the lowest level of the government system of Malaysia (Khalid, 2010). Under the Local Government Acts, there are three main types of local government: City Hall or City Council, Municipal Council and District Council. The categorisation is based on

specified characteristics such as population size, annual revenues, level of infrastructure and services offered (Local Government Department, 2016). A City Council has its administrative centre in a state that has not less than 500,000 people. It has a stable annual revenue of not less from RM100 million, a structured organisation and the ability to provide comprehensive infrastructural facilities and public utilities. A Municipal Council is situated in a capital city or administrative centre of a state or district that has not less than 150,000 people. It has an annual income of not less than RM20 million. A District Council is located in areas other than major towns and has less than 150,000 people. It has a total annual revenue of less than RM20 million (Local Government Department, 2016).

At present, there are 149 local governments in Malaysia, consisting of 13 City Councils, 38 Municipal Councils and 98 District Councils (Local Government Department, 2016). Table 1 shows the list of local government in each state in Malaysia. In addition to the 149 local governments, there are five special local councils that are authorised by the State Government to function as local government, namely, Perbadanan Putrajaya, Perbadanan Labuan, Lembaga Bandaran Johor Tenggara, the Local Government of Taman Perindustrian Hi-Tech Kulim and Lembaga Pembangunan Tioman.

Table 1: Local Government in States within Malaysia

State	City Council / Hall	Municipal Council	District Council	Total
Johor	1	6	8	15
Kedah	1	3	7	11
Kelantan	-	1	11	12
Melaka	1	3	-	4
Negeri Sembilan	-	3	5	8
Pahang	-	3	8	11
Penang	1	1	-	2
Perak	1	4	10	15
Perlis	-	1	-	1
Selangor	2	6	4	12
Terengganu	1	2	4	7
Sabah	1	2	21	24
Sarawak	3	3	20	26
Wilayah Persekutuan	1	-	-	1
Total	**13**	**38**	**98**	**149**

Source: Local Government Department (2016).

Local government responsibilities may be classified into mandatory and discretionary services (Ibrahim and Karim, 2004; Kuppusamy, 2008). Mandatory services refer to services provided by every local government, such as road maintenance, street lightning and rubbish collections. Discretionary services refer to optional services based on the ability of local government to cater for the public's needs, such as providing recreational parks, sports facilities and wet

markets.

The Local Government Act 1976 outlines the revenues for local government as taxes, license fees, rentals, rates, interests received on money invested, charges or profits from any trade or services, grants or subsidies, loans from state or federal government or financial institutions (Local Government Department, 2016). The main portion of the source of local government revenue comes from tax revenues, which include assessment taxes (Local Government Department, 2016). The non-tax revenue consists of all other forms of income that are collected or charged on a user pay basis, such as license fees, processing fees, parking charges, rental of halls, rental of business space, fines and compounds earnings, and interests received on investment or fixed deposits interest received on monies kept in financial institutions (Kuppusamy, 2008). Additionally, local government receives grants from the state or federal government.

3.0 Literature Review

Previous studies on the efficiency of local government may be classified into two categories. The first category refers to studies that examine the efficiency of local government in general (Ibrahim and Karim, 2004; Storto, 2013; Balaguer-Coll et al., 2007; Revelli and Tovmo, 2007; Fogarty and Mugera, 2013; Da Cruz and Marques, 2014; Doumpos and Cohen, 2014), and the second category covers studies that evaluate the efficiency of a specific service provided by local government, such as water services (Woodbury and Dollery, 2004; García-Sánchez, 2006; Wibowo and Alfen, 2015), road infrastructure (Lopez et al., 2009), the police force (Drake and Simper, 2003; Aristovnik et al., 2014) and refuse collection and street cleaning (Benito et al., 2010; Benito-López et al., 2011). Of the two categories, the present study focuses on the first category, which is the efficiency of local government in general. Hence, the following paragraphs review in more detail literature under the first category.

Storto (2013) uses the DEA to examine the efficiency of 103 large municipalities in Italy. The researcher argues that the sudden requirement to reduce public expenditure has led to concern for measuring efficiency and economies of scale. The findings show that the efficiency level of local government is high, with average efficiency recorded at 80 per cent. However, in terms of economies of scale, more local governments have decreasing rather than increasing returns to scale. The findings also reveal that municipalities are able to increase their efficiency through contracting out services; the contracting out option has been used to overcome local government inefficiency.

Similarly, Balaguer-Coll et al. (2007) examine the efficiency of local government in Spain. The study uses data from budgeted figures from the Audit Institution and survey results from the Public Ministry to calculate efficiency using DEA. From 414 observations, only 32 (7.73%) local governments in Spain were found to be efficient, while most of the other local governments (42.8%) recorded low efficiency. However, these results may have some limitations as municipalities with smaller populations may not have to disclose as much accounting information as larger municipalities, which may demotivate them to monitor their

expenditures.

In Norway, Revelli and Tovmo (2007) tested for the existence of any yardstick competition pattern among local government. Yardstick competition refers to the situation where a spillover from the fiscal policies adopted in a nearby area or district or country has an effect on the trust of the people in the competency and honesty of their own government. Thus, yardstick competition enables local government to learn more about their own administrators' quality and efficiency through comparison with other nearby governments' performance. To analyse the yardstick against 205 municipalities, the study uses the efficiency index and survey information; it is found that yardstick competition does contribute to the spatial pattern of efficiency. However, this implication only applied to municipalities that compare their public service provision to those of nearby localities.

In another study, in measuring the efficiency of 98 local councils in Western Australia, Fogarty and Mugera (2013) gathered information from local government websites and performed a DEA to calculate their efficiency. The analysis covers the entire range of local government activities, including library services, environmental services, recreational services, community services, planning and regulatory services, waste management and recycling services, and road maintenance services. The results show that only 70 per cent efficiency is attained. They discovered that inefficiencies among local government in an area are mainly due to incorrect scale, whereby some of the findings showed that the local government is either too small or too large.

In Portugal, Da Cruz and Marques (2014) apply DEA to compute the efficiency of 308 Portuguese local governments. The data used is obtained from local government financial statements and from the National Statistics Institute. The findings indicate average efficiency scores of 70 per cent. However, the main source of Portuguese local government inefficiency is not caused by their scale; from 308 municipalities, only 5% of inefficiency is due to scale inadequacy. Additionally, Da Cruz and Marques (2014) examine local government scale of operations. Overall, more than 60 per cent of the municipalities show increasing returns to scale, while 20 per cent of municipalities show constant returns and 14 per cent show decreasing returns.

In Greece, Doumpos and Cohen (2014) apply a unique approach to computing local government efficiency. In contrast to earlier studies that use a variety of quantitative non-monetary measures such as tonnes of waste collected, number of schools, number of recreational buildings and such like, this study uses publicly available financial data from local government financial statements. This study relies on the net book value of corresponding assets as proxies of the magnitude and quality of services. Based on DEA of 2,017 observations, the results show average efficiency scores of 70 per cent. Moreover, 53 per cent of Greek local governments were found to be operating in decreasing returns to scale compared to 37 per cent operating in increasing returns to scale, with larger municipalities recording lower scale efficiency than smaller municipalities. These results indicate that municipalities operating in increasing returns to scale should focus on increasing their outputs related

to the value of their assets, for example on their new investments, and the municipalities operating in decreasing returns to scale should be cutting down their inputs' usage.

In the context of Malaysia, Ibrahim and Karim (2004) evaluate the efficiency of Malaysian local government in utilising resources to provide public services. Applying data envelopment analysis (DEA) to 46 local governments' financial statements, the results reveal an average of 70 per cent efficiency, which implies that the average observed cost is 30 per cent less than the best practice costs. In another study, Osman et al. (2014) evaluates the effectiveness and efficiency of local government in the Malaysian state of Perak. The main objective was to identify the departments in local government that delivered effective and efficient services. The results indicate that the majority of the departments in operation are providing poor services. Osman et al. (2014) argue that interaction between local government and the surrounding communities is important in increasing local government's awareness of public needs and in this manner provides encouragement to increase its efficiency in order to deal with the demands of the public.

From these reviews, it is noticeable that most of the research on efficiency involves developed countries (Balaguer-Coll et al., 2007; Da Cruz and Marques, 2014; Fogarty and Mugera, 2013; Doumpus and Cohen, 2014). Developed countries are known for their high per capita income and stable population growth rate. These characteristics are very different from developing countries, such as Malaysia, which have lower per capita income levels and a high population growth rate. Consequently, research conducted in developed countries may reach conclusions different to those of research conducted in developing countries because of the difference in economic background. In addition, aspects contributing to differences in research findings are geography, politics and culture. As a consequence, the results of most efficiency studies in developed countries may not apply to developing countries. Therefore, research on efficiency in developing countries may provide more relevant findings for local government in countries such as Malaysia.

In addition, although earlier studies were conducted on the efficiency of local government in Malaysia such as Ibrahim and Karim (2004) and Osman et al. (2014), their publications were presented more than five years ago. Since their studies, there have been many changes in population demographics and political movements. Considering these changing circumstances, the current study utilises data from 2008 to 2015 to encapsulate the latest information surrounding local government in Malaysia. This study will, therefore, add to the literature on local government performance by providing an updated study on the efficiency of local government in Malaysia.

4.0 Research Method and Discussion

4.1 Data and Variables

The efficiency of local government in Malaysia is measured using the Data Envelopment Analysis (DEA) method by applying a DEA computer programme developed by Coelli (1996).

DEA is a non-parametric programming method performed to establish the production frontier and to calculate the efficiency of decision-making units (DMU), such as organisations or countries using inputs the units consume and outputs that they produce (Doumpos and Cohen, 2014). The DEA scores are expressed as either a number between zero and one or 0 per cent and 100 per cent. Any DMU with a score less than one or 100 per cent is deemed inefficient relative to the most efficient unit. The frontier methodology compares the "best practice" with all other observations in a particular study (Da Cruz and Marques, 2014).

DEA computes the relative efficiency of a group of DMUs that consume identical inputs and produce identical outputs. If we assume data on K inputs and M outputs for N municipalities, for ith municipality, inputs are represented by the vectors x_i and outputs are represented by the vectors y_i. The efficiency of the ith municipality may be measured by the ratio,

$$\theta i = \frac{uiyi}{vixi}$$

where $ui, vi \geq 0$ are weight vectors corresponding to outputs and inputs of the *i*th municipality. Under the DEA, an optimisation programme allows each municipality to specify its own input–output weights (u_i and v_i) in order to maximise its relative performance (Avkiran, 1999; Doumpos and Cohen, 2014; Sufian and Kamarudin, 2015). This maximisation is subject to the constraints (one for each municipality) that the ratio of weighted outputs to weighted inputs is equal to or less than one.

For all municipalities, data is represented by the KxN input matrix **X** and the MxN output matrix **Y**. The efficiency scores of DMUs may be computed through the primal form of linear programming:

Maximise $uiyi$ (1)

Where, $vi\,X - ui\,Y \geq 0$

$vixi = 1$

$ui, vi \geq 0$

or the dual form as follows:

Minimise θ (2)

Where, $\theta_i xi - X\lambda \geq 0$

$Y\lambda \geq yi$

$\lambda \geq 0, \theta \in R$

Efficient DMUs will have efficiency scores equal to one and inefficient DMUs will score less than the value of one. The linear programming above provides a global technical efficiency measure where it assumes constant returns to scale (CRS) without taking into consideration

any scale effects. Efficiency scores calculated using the CRS model represent technical efficiency (TE).

The scale effect may be incorporated through the extension of the CRS model by introducing a new variable in the linear programming (2) that creates a VRS model:

$$\lambda 1 + ...+ \lambda N = 1 \quad (3)$$

This variable separates the scale effect from TE. The efficiency scores achieved under the VRS model represent pure technical efficiency (PTE). The VRS scores incorporate the possibility that some DMUs may not be operating at an optimal scale and this affects the scores of the technical efficiencies. Scale efficiencies (SE) are computed by dividing CRS scores by VRS scores.

This study carries out the input-oriented DEA models (CRS and VRS) in analysing the efficiency level of local government in Malaysia. This study adopts an input-oriented measure, in line with most prior studies on efficiency of local government (Balaguer-Coll et al., 2007; Doumpos and Cohen, 2014). In a study of local government, the most suitable choice of orientation would be measured because local government has the capacity to control inputs (Ibrahim and Karim, 2004; García-Sánchez, 2006; Balaguer-Coll et al., 2007; Benito-López et al., 2011; Storto, 2013; Doumpos and Cohen, 2014). The efficiency measure investigated under this model is technical efficiency (TE), which can be split into two components, namely pure technical efficiency (PTE) and scale efficiency (SE). The analyses are performed on individual local governments.

For this study, the total of local government revenues representing the inputs as the main source of local government revenues is income from tax. Local government uses the revenues to provide various services and facilities to the public. Similar information of local government total revenues has been used in previous studies, including Doumpos and Cohen (2014) and El Mehdi and Hafner (2014). There are three inputs for this study, namely tax revenues, fees and charges, and subsidies.

Output should include a measure of the way facilities are actually utilised by the public, how they benefit their wellbeing and the kind of social as well as economic value the facilities add to the community (Doumpos and Cohen, 2014). However, due to the unavailability of quantitative data on the magnitude of services (e.g. number of lighting points, tonnes of waste, street infrastructure surface area), the value-based approach introduced by Doumpos and Cohen (2014) is used to represent the outputs.

The value-based approach uses the net book values of assets as a proxy for the magnitude of services provided and the cost of goods and services as a proxy of the value of resources used in providing these services. Assumptions are made where the higher net book value of assets and higher costs of goods and services indicate the magnitude and quality of services provided to the public. There are four outputs for this study: the net book value of land and

buildings, the net book value of motor vehicles, the net book value of equipment and fittings and the total costs of goods and services. Table 2 presents the summary of inputs and outputs used.

Table 2: Input and Output Variables

Inputs	Outputs
1. Tax revenues	1. Land and buildings
2. Fees and charges	2. Motor vehicles
3. Subsidies from central government	3. Equipment and fittings
	4. Costs of goods and services

The information used for the efficiency computation is extracted from local government financial statements and related information from websites. Not all local governments were included in the study as the selection of those included was based on data availability. The study covers the period from 2008 to 2015. The numbers of local government yearly financial statements available for the study were 30 (2008), 29 (2009), 30 (2010), 30 (2011), 31 (2012), 33 (2013), 29 (2014) and 24 (2015).

4.2 Efficiency Analysis Results

Table 3 presents descriptive statistics of all input and output variables for the 8 years of panel data used in this study. All amounts indicated are to the nearest thousand. During the 8-year period, the minimum amounts recorded for respective inputs were RM 526,001 (fees and charges), RM 51,344 (tax revenues) and RM 940,295 (subsidies), while the maximum amounts recorded were RM 1,916,089,790 (fees and charges), RM 1,060,064,774 (tax revenues) and RM 172,620,094. The mean amount for inputs was RM 46,653,272 (fees and charges), RM 56,577,708 (tax revenues) and RM 9,360,853 (subsidies).

Table 3: Descriptive Statistics of Inputs and Outputs of Panel Data from 2008 to 2015

	Minimum (RM'000)	Maximum (RM'000)	Mean (RM'000)
Inputs			
Fees and charges	526	1,916,090	46,653
Tax revenue	51	1,060,065	56,578
Subsidies	940	172,620	9,361
Outputs			
Land and buildings	0*	2,679,561	106,491
Motor vehicles	0*	41,315	2,173
Equipment and fittings	77	154,633	5,525
Costs of goods and services	2,721	1,936,609	92,415

Note: The above amount of land and building, motor vehicles, equipment and fittings are based on assets' net book value.
*Minimum amount is RM2 (Land and Building), RM1 (Motor vehicles).

In terms of the outputs, the minimum amounts were stated as RM 2 (land and buildings), RM 1 (motor vehicles), RM 77,491 (equipment and fittings) and RM 2,720,851 (costs of goods and services), while the maximum amounts for respective variables were stated as RM 2,679,561,082 (land and buildings), RM 41,315,079 (motor vehicles), RM 154,632,554 (equipment and fittings) and RM 1,936,608,695 (costs of goods and services). The mean amount for each variable was stated as RM 106,491,432 (land and buildings), RM 2,172,756 (motor vehicles), RM 5,524,731 (equipment and fittings) and RM 92,415,007 (costs of goods and services).

The descriptive statistics results show that there is a big difference between the maximum and minimum for all input and output amounts generated by local government in Malaysia. One of the main reasons for these differences is the panel data used in the study, which is comprised of 8 years of data from 35 local governments, ranging across district, municipal and city councils. The stretch of 8-year data may present a high variation in data amounts for several reasons. One of the reasons could be the variation in yearly economic growth, whereby more recent data may be higher than the previous year's data. The variation could also be due to the source of data, whereby higher amounts may be contributed by city councils, whereas lower amounts may be contributed by district councils.

In order to assess the relationship between inputs and outputs, the correlation between them is calculated. The correlation result identifies whether the inputs are associated with the outputs (de Vaus, 2002). Following Lin et al. (2011), among others, the assumption is made for $p \geq 0.05$ as not significant, $p \leq 0.05$ as significant, $p \leq 0.01$ as more significant and $p \leq 0.001$ as most significant.

Positive correlations were found (see Table 4), which indicates consistency in the relationship between the inputs and outputs selected. All correlations have a p value of less than 0.01, indicating that all results of the correlation analysis are very strong and significant. In other words, output variables will be affected by input variables and the relationship between cause and effect is significant.

Table 4: Correlation Coefficients of Inputs and Outputs

	Outputs				Inputs		
	Land and buildings	Motor vehicles	Equipment and fittings	Costs of goods and services	Fees and charges	Tax revs.	Subsidies
Correlation coefficient							
Land and buildings	1						
Motor vehicles	0.664*	1					
Equipment and fittings	0.654*	0.607*	1				
Costs of goods and services	0.754*	0.716*	0.672*	1			
Fees and charges	0.766*	0.655*	0.600*	0.914*	1		
Tax revenues	0.736*	0.713*	0.700*	0.966*	0.857*	1	
Subsidies	0.529*	0.466*	0.462*	0.678*	0.561*	0.590*	1

*Correlation is significant at the 0.01 level (2-tailed).

Table 5 presents the mean scores of technical efficiency (TE), pure technical efficiency (PTE) and scale efficiency (SE) for the year 2015 to represent the current level of efficiency of Malaysian local government.

Table 5: Mean of Efficiency Scores for Year 2015

N	TE	PTE	SE
24	0.939	0.960	0.976

Technical efficiency (TE) refers to overall efficiency of local government, while pure technical efficiency (PTE) and scale efficiency (SE) refer to the efficiency of local government in utilising inputs and efficiency in operating at the optimal scale respectively. As shown in Table 5, scale efficiency (SE) has the highest value at 0.976, which indicates that generally all local governments are operating at an almost optimal scale of operations. This is followed by pure technical efficiency with an efficiency value of 0.960 and overall efficiency of 0.939.

As all efficiency measures scored well above 0.900, on average local government is considered to be efficient in managing its resources by optimising inputs and operating at a reasonable scale of operation in providing public services, although it should be noted that there is still room for improving efficiency, as the efficiency values have yet to reach 1.000.

To scrutinise in greater detail the efficiency of local governments, Table 6 provides information on the TE, PTE and SE for the year 2015 for each local government.

Table 6: Efficiency Scores for the Year 2015 by Local Government

	TE	PTE	SE
City Council			
1) DB Kuala Lumpur	1.000	1.000	1.000
2) MB Alor Setar	0.916	1.000	0.916
3) MB Johor Bahru	0.895	0.896	0.999
4) MB Kuala Terengganu	0.986	1.000	0.986
5) MB Shah Alam	1.000	1.000	1.000
Municipal Council			
6) MP Batu Pahat	1.000	1.000	1.000
7) MP Kluang	0.889	0.923	0.963
8) MP Kuala Kangsar	1.000	1.000	1.000
9) MP Sg Petani	1.000	1.000	1.000
10) MP Teluk Intan	1.000	1.000	1.000
District Council			
11) MD Bachok	0.918	1.000	0.918
12) MD Besut	1.000	1.000	1.000
13) MD Gerik	1.000	1.000	1.000
14) MD Hulu Selangor	0.628	0.633	0.992
15) MD Hulu Terengganu	1.000	1.000	1.000
16) MD Jelebu	1.000	1.000	1.000
17) MD Kemaman	1.000	1.000	1.000
18) MD Ketereh	1.000	1.000	1.000
19) MD Mersing	0.962	1.000	0.962
20) MD Pontian	0.772	0.806	0.957
21) MD Rompin	0.576	0.780	0.739
22) MD Sabak Bernam	0.992	1.000	0.992
23) MD Sik	1.000	1.000	1.000
24) MD Tanjung Malim	1.000	1.000	1.000
MEAN	0.939	0.960	0.976

No information is available for 2015 for 11 of the 35 local governments. Of the remaining 24 local governments, 14 achieved a maximum efficiency score of 1.000 for their technical efficiency (TE), pure technical efficiency (PTE) and scale efficiency (SE), which indicates that these local governments are relatively more efficient in utilising their inputs (resources) and operating at an optimal scale than the other 10 local governments in Table 5.5. These comparatively efficient best-practice local governments comprise 2 city councils (DB Kuala Lumpur and MB Shah Alam), 4 municipal councils (MP Batu Pahat, MP Kuala Kangsar, MP Sg Petani and MP Teluk Intan) and 8 district councils (MD Besut, MD Gerik, MD Hulu Terengganu, MD Jelebu, MD Kemaman, MD Ketereh, MD Sik and MD Tanjung Malim). For the other 10 local governments that are relatively inefficient, i.e. they have not achieved technical

efficiency (TE) mean scores of 1.000, their TE results may be further clarified according to their pure technical efficiency (PTE) and scale efficiency (SE) mean scores.

Four of the 10 local governments, namely the MB Alor Setar, MB Kuala Terengganu, MD Bachok, MD Mersing and MD Sabak Bernam, recorded relatively high PTE mean scores of 1.000 but relatively low SE mean scores. Therefore, they were not able to attain the status of a comparatively efficient best-practice local government, i.e. with a relative score of 1.000 overall (technical efficiency). The remaining 6 local governments are relatively inefficient among the 24 local governments listed in Table 5.5 with a score less than 1.000 in all the efficiency measures, i.e. technical efficiency (TE), pure technical efficiency (PTE) or scale efficiency (SE). The lowest TE mean score was recorded by MD Rompin with 0.576, plus 0.780 (PTE) and 0.739 (SE). Based on individual PTE and SE scores, MD Hulu Selangor proved to be the least efficient in terms of PTE mean scores of 0.633 and MD Rompin recorded the lowest SE mean score of 0.739.

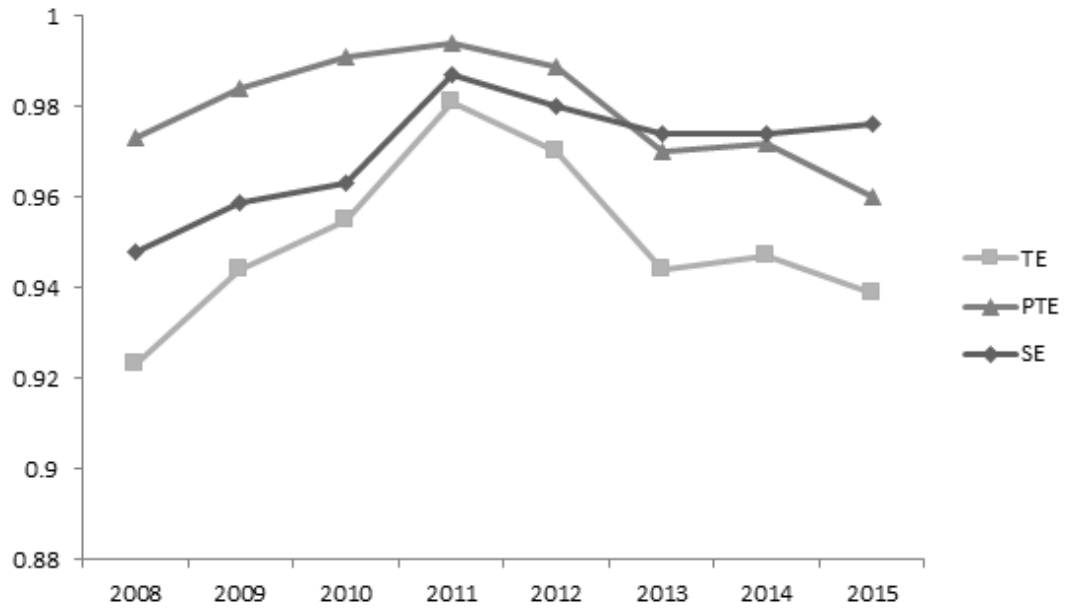
Table 7 below presents efficiency results in terms of TE, PTE and SE over the period of 8 years from 2008 to 2015. The number of observations varies each year depending on data availability. For clearer illustration, the data of Table 7 has been presented graphically in Figure 1. As shown in Table 7 and Figure 1, over the respective 8 year period three measures of efficiency – technical efficiency (TE), pure technical efficiency (PTE) and scale efficiency (SE) – have fluctuated. The TE, PTE and SE mean scores show an increasing trend from 2008 to 2011, followed by a decreasing trend in the following two years and a slight increase again from 2014 onwards.

Table 7: Yearly Mean of Efficiency Scores

Year	2008	2009	2010	2011	2012	2013	2014	2015
N	30	29	30	30	31	33	29	24
TE	0.923	0.944	0.955	0.981	0.970	0.944	0.947	0.939
PTE	0.973	0.984	0.991	0.994	0.989	0.970	0.972	0.960
SE	0.948	0.959	0.963	0.987	0.980	0.974	0.974	0.976

* Note: Number of observations vary each year depending on data availability.

Figure 1: Trend of the Yearly Mean of TE, PTE and SE from 2008 to 2015



The increasing trend in efficiency measures after the 2008 may be interpreted as a boost in Malaysian local government efforts to achieve better performance in line with the enforcement of a new Star Rating system for local government introduced under the 10th Malaysian Plan. This impressive increment in efficiency continued until 2011, at which time a decline in local government efficiency began.

This decline in local government efficiency in the years after 2011 may be associated with the additional responsibility and pressure on them to achieve immediate and effective results – goals of the Government Transformation Programme (GTP), which was initiated in the same year. One of the reasons for the GTP is to improve service delivery in Malaysia. As a result, Malaysian local governments have been forced to set higher goals and deliver consistent and better results.

Table 8 presents the technical efficiency (TE) scores for the respective local governments for the period 2008 to 2015. These scores provide efficiency measures based on the assumption that all local governments are operating at optimal scale. Among the 35 local governments, 7 recorded a constant trend of 1.000 TE efficiency scores within the 8-year period of this study. Of the 7 local governments, 2 are municipal councils and 5 are district councils. The 7 local governments are the MP Kuala Kangsar, MP Sungai Petani, MD Gerik, MD Hulu Terengganu, MD Kemaman, MD Ketereh and MD Sik. None of the 7 local governments listed is a city council. This result is inconsistent with findings from previous studies by Balaguer-Coll et al. (2007), Kristo (2013) and Okuda et al. (2014), which reveal that larger units (referred to as *local government* in Balaguer-Coll et al., 2007 and *banks* in Kristo (2013) and Okuda et al., 2014) are more efficient than smaller ones.

The efficiency trend of the other local governments has been fluctuating, with the lowest score recorded at 0.576 by MD Rompin in 2015. The yearly fluctuation of efficiency scores has been moderate, ranging approximately from 0.700 to 1.000 except for two obvious fluctuations in trend that may be observed in MD Pontian and MD Mersing. With MD Pontian, its upward trend from 2008 suddenly dropped in 2013, recording an abrupt drop in the technical efficiency mean score from a maximum score of 1.000 (2012) to 0.658 (2013), while with MD Mersing, the increasing trend of the technical efficiency scores of 0.988 (2011) dropped abruptly to 0.680 (2012).

Table 8: Technical Efficiency (TE) Scores of Local Government

	2008	2009	2010	2011	2012	2013	2014	2015	MEAN
City Council									
1) DB Kuala Lumpur	1.000	1.000	1.000	0.984	0.801	0.736	0.846	1.000	0.921
2) MB Alor Setar	0.925	0.948	0.921	0.961	0.850	1.000	0.972	0.916	0.937
3) MB Johor Bahru	1.000	1.000	1.000	1.000	0.966	1.000	1.000	0.895	0.983
4) MB Kuala Terengganu	0.784	0.672	0.835	0.880	0.989	0.852	1.000	0.986	0.875
5) MB Petaling Jaya	1.000	0.921	1.000	1.000	1.000	1.000	1.000	#N/A	0.989
6) MB Shah Alam	0.948	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.994
Municipal Council									
7) MP Alor Gajah	0.946	0.919	0.867	1.000	1.000	1.000	0.994	#N/A	0.961
8) MP Batu Pahat	0.856	0.926	0.757	0.848	0.868	0.908	0.996	1.000	0.895
9) MP Hang Tuah Jaya	#N/A	#N/A	1.000	1.000	1.000	1.000	#N/A	#N/A	1.000
10) MP Kluang	0.858	1.000	1.000	1.000	0.982	0.942	0.737	0.889	0.926
11) MP Kuala Kangsar	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
12) MP Kuantan	0.823	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	0.823
13) MP Manjung	1.000	1.000	1.000	1.000	1.000	1.000	#N/A	#N/A	1.000
14) MP Port Dickson	#N/A	#N/A	#N/A	#N/A	1.000	1.000	1.000	#N/A	1.000
15) MP Sg Petani	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
16) MP Taiping	0.793	#N/A	#N/A	#N/A	#N/A	1.000	1.000	#N/A	0.931
17) MP Teluk Intan	0.812	0.861	1.000	1.000	1.000	1.000	0.759	1.000	0.929
18) MP Temerloh	0.930	1.000	0.910	0.920	1.000	0.827	#N/A	#N/A	0.931
District Council									
19) MD Bachok	1.000	1.000	0.886	1.000	0.971	1.000	0.855	0.918	0.954
20) MD Besut	#N/A	#N/A	#N/A	#N/A	1.000	1.000	1.000	1.000	1.000
21) MD Gerik	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
22) MD Hulu Selangor	0.979	1.000	1.000	1.000	0.961	0.849	0.894	0.628	0.914
23) MD Hulu Terengganu	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
24) MD Jelebu	0.900	1.000	1.000	1.000	#N/A	#N/A	1.000	1.000	0.983
25) MD Jeli	#N/A	#N/A	#N/A	#N/A	#N/A	1.000	1.000	#N/A	1.000

26) MD Kemaman	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
27) MD Ketereh	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
28) MD Mersing	0.879	0.852	0.897	0.988	0.680	0.756	0.978	0.962	0.874
29) MD Padang Terap	1.000	1.000	1.000	1.000	1.000	0.914	#N/A	#N/A	0.986
30) MD Perak Tengah	1.000	1.000	1.000	1.000	1.000	0.879	#N/A	#N/A	0.980
31) MD Pontian	0.589	0.685	0.805	0.910	1.000	0.658	0.802	0.772	0.778
32) MD Rompin	0.826	0.985	1.000	0.967	0.996	0.837	0.783	0.576	0.871
33) MD Sabak Bernam	0.852	0.694	0.879	1.000	1.000	1.000	0.845	0.992	0.908
34) MD Sik	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
35) MD Tanjung Malim	#N/A	0.913	0.905	0.976	1.000	1.000	1.000	1.000	0.971
MEAN	0.923	0.944	0.955	0.981	0.970	0.944	0.947	0.939	0.951

Note: “N/A” refers to data not available.

Table 9 presents the pure technical efficiency (PTE) scores for 35 local governments. In contrast to the earlier TE scores, these PTE scores incorporate the scale effect by comparing the efficiency of local government operating in the same region of return-to-scale or similar in size. High pure technical scores indicate the advanced ability of local government to utilise their inputs (tax fees and charges, and subsidies) to convert them into outputs (infrastructures, facilities, goods and services).

From 35 local governments, 11 have shown a constant efficiency trend within the 8-year period of study. The 11 local governments, comprising 3 city councils, 2 municipal councils and 6 district councils, recorded pure technical efficiency (PTE) scores of 1.000 in all 8 years. These local governments are DB Kuala Lumpur, MB Alor Setar, MB Shah Alam, MP Kuala Kangsar, MP Sungai Petani, MD Gerik, MD Hulu Terengganu, MD Kemaman, MD Ketereh, MD Sabak Bernam and MD Sik.

The efficiency trends of the other local governments have been fluctuating, with the lowest score recorded at 0.633 by MD Hulu Selangor in 2015. Among possible reasons for MD Hulu Selangor’s comparative inefficiency compared to other nearby local governments would be due to its small population size and lack of development needs. The small number of population produces fewer public complaints and thus leads to lack of staff motivation to provide better services. A less developed area creates fewer requirements for local government to upgrade or replenish their public service assets.

Table 9: Pure Technical Efficiency (PTE) Scores of Local Government

	2008	2009	2010	2011	2012	2013	2014	2015	MEAN
City Council									
1) DB Kuala Lumpur	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2) MB Alor Setar	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3) MB Johor Bahru	1.000	1.000	1.000	1.000	0.995	1.000	1.000	0.896	0.986
4) MB Kuala Terengganu	0.977	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.997

5) MB Petaling Jaya	1.000	0.996	1.000	1.000	1.000	1.000	1.000	#N/A	0.999
6) MB Shah Alam	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Municipal Council									
7) MP Alor Gajah	1.000	1.000	1.000	1.000	1.000	1.000	1.000	#N/A	1.000
8) MP Batu Pahat	0.963	0.978	0.874	0.917	0.873	0.925	1.000	1.000	0.941
9) MP Hang Tuah Jaya	#N/A	#N/A	1.000	1.000	1.000	1.000	#N/A	#N/A	1.000
10) MP Kluang	0.896	1.000	1.000	1.000	0.983	0.952	0.760	0.923	0.939
11) MP Kuala Kangsar	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
12) MP Kuantan	0.890	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	0.890
13) MP Manjung	1.000	1.000	1.000	1.000	1.000	1.000	#N/A	#N/A	1.000
14) MP Port Dickson	#N/A	#N/A	#N/A	#N/A	1.000	1.000	1.000	#N/A	1.000
15) MP Sg Petani	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
16) MP Taiping	1.000	#N/A	#N/A	#N/A	#N/A	1.000	1.000	#N/A	1.000
17) MP Teluk Intan	0.830	0.866	1.000	1.000	1.000	1.000	0.815	1.000	0.939
18) MP Temerloh	0.981	1.000	0.946	0.925	1.000	0.829	#N/A	#N/A	0.947
District Council									
19) MD Bachok	1.000	1.000	0.953	1.000	1.000	1.000	1.000	1.000	0.994
20) MD Besut	#N/A	#N/A	#N/A	#N/A	1.000	1.000	1.000	1.000	1.000
21) MD Gerik	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
22) MD Hulu Selangor	0.982	1.000	1.000	1.000	0.999	1.000	1.000	0.633	0.952
23) MD Hulu Terengganu	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
24) MD Jelebu	1.000	1.000	1.000	1.000	#N/A	#N/A	1.000	1.000	1.000
25) MD Jeli	#N/A	#N/A	#N/A	#N/A	#N/A	1.000	1.000	#N/A	1.000
26) MD Kemaman	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
27) MD Ketereh	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
28) MD Mersing	0.963	0.934	1.000	1.000	0.807	0.756	0.998	1.000	0.932
29) MD Padang Terap	1.000	1.000	1.000	1.000	1.000	0.915	#N/A	#N/A	0.986
30) MD Perak Tengah	1.000	1.000	1.000	1.000	1.000	1.000	#N/A	#N/A	1.000
31) MD Pontian	0.698	0.751	0.961	1.000	1.000	0.660	0.807	0.806	0.835
32) MD Rompin	1.000	1.000	1.000	0.967	1.000	0.975	0.801	0.780	0.940
33) MD Sabak Bernam	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
34) MD Sik	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
35) MD Tanjung Malim	#N/A	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
MEAN	0.973	0.984	0.991	0.994	0.989	0.970	0.972	0.960	0.979

Note: “N/A” refers to data not available.

Whereas the PTE scores trend for most local governments is relatively stable fluctuating between scores of 0.700 and 1.000, the trend shown by MD Rompin, MD Pontian and MD Mersing are less stable. MD Rompin was maintaining a constant trend of above 0.900 PTE scores until 2013 when its scores started to show a decreasing trend.

With MD Pontian, its upward trend from 2008 suddenly dropped in 2013, recording an abrupt drop in pure technical efficiency mean score from its maximum score of 1.000 in 2012 to 0.660 in 2013. However, the trend went upward again in 2014 and 2015. Likewise, with MD Mersing, the increasing trend of its pure technical efficiency scores hit a downward trend in 2012 and 2013, but later moved up again in 2014.

Table 10 presents scale efficiency (SE) scores by local government. These are computed by dividing efficiency scores under CRS by the efficiency scores under VRS. The SE scores indicate how well a local government is optimising its scale of operations. According to Table 10, 7 local governments are found to have a constant trend of 1.000 scale efficiency (SE) scores within the 8-year period of study. These local governments appear to be the same as those listed under the Table 8 (TE), which record a constant trend of 1.000 for technical efficiency (TE). The 7 local governments are MP Kuala Kangsar, MP Sungai Petani, MD Gerik, MD Hulu Terengganu, MD Kemaman, MD Ketereh and MD Sik. The efficiency trend of the other local governments has been fluctuating over the 8-year period, with the lowest score recorded at 0.672 by MB Kuala Terengganu in 2009.

Table 10: Scale Efficiency (SE) Scores of Local Government

	2008	2009	2010	2011	2012	2013	2014	2015	MEAN
City Council									
1) DB Kuala Lumpur	1.000	1.000	1.000	0.984	0.801	0.736	0.846	1.000	0.921
2) MB Alor Setar	0.925	0.948	0.921	0.961	0.850	1.000	0.972	0.916	0.937
3) MB Johor Bahru	1.000	1.000	1.000	1.000	0.971	1.000	1.000	0.999	0.996
4) MB Kuala Terengganu	0.803	0.672	0.835	0.880	0.989	0.852	1.000	0.986	0.877
5) MB Petaling Jaya	1.000	0.924	1.000	1.000	1.000	1.000	1.000	#N/A	0.989
6) MB Shah Alam	0.948	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.994
Municipal Council									
7) MP Alor Gajah	0.946	0.919	0.867	1.000	1.000	1.000	0.994	#N/A	0.961
8) MP Batu Pahat	0.889	0.947	0.866	0.924	0.994	0.982	0.996	1.000	0.950
9) MP Hang Tuah Jaya	#N/A	#N/A	1.000	1.000	1.000	1.000	#N/A	#N/A	1.000
10) MP Kluang	0.957	1.000	1.000	1.000	0.999	0.990	0.970	0.963	0.985
11) MP Kuala Kangsar	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
12) MP Kuantan	0.925	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	0.925
13) MP Manjung	1.000	1.000	1.000	1.000	1.000	1.000	#N/A	#N/A	1.000
14) MP Port Dickson	#N/A	#N/A	#N/A	#N/A	1.000	1.000	1.000	#N/A	1.000
15) MP Sg Petani	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
16) MP Taiping	0.793	#N/A	#N/A	#N/A	#N/A	1.000	1.000	#N/A	0.931
17) MP Teluk Intan	0.979	0.995	1.000	1.000	1.000	1.000	0.930	1.000	0.988
18) MP Temerloh	0.948	1.000	0.962	0.995	1.000	0.998	#N/A	#N/A	0.984

District Council									
19) MD Bachok	1.000	1.000	0.930	1.000	0.971	1.000	0.855	0.918	0.959
20) MD Besut	#N/A	#N/A	#N/A	#N/A	1.000	1.000	1.000	1.000	1.000
21) MD Gerik	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
22) MD Hulu Selangor	0.996	1.000	1.000	1.000	0.963	0.849	0.894	0.992	0.962
23) MD Hulu Terengganu	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
24) MD Jelebu	0.900	1.000	1.000	1.000	#N/A	#N/A	1.000	1.000	0.983
25) MD Jeli	#N/A	#N/A	#N/A	#N/A	#N/A	1.000	1.000	#N/A	1.000
26) MD Kemaman	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
27) MD Ketereh	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
28) MD Mersing	0.913	0.913	0.897	0.988	0.843	0.999	0.980	0.962	0.937
29) MD Padang Terap	1.000	1.000	1.000	1.000	1.000	0.999	#N/A	#N/A	1.000
30) MD Perak Tengah	1.000	1.000	1.000	1.000	1.000	0.879	#N/A	#N/A	0.980
31) MD Pontian	0.843	0.912	0.837	0.910	1.000	0.996	0.994	0.957	0.931
32) MD Rompin	0.826	0.985	1.000	1.000	0.996	0.859	0.977	0.739	0.923
33) MD Sabak Bernam	0.852	0.694	0.879	1.000	1.000	1.000	0.845	0.992	0.908
34) MD Sik	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
35) MD Tanjung Malim	#N/A	0.913	0.905	0.976	1.000	1.000	1.000	1.000	0.971
MEAN	0.948	0.959	0.963	0.987	0.980	0.974	0.974	0.976	0.970

Note: “N/A” refers to data not available.

While 7 local governments recorded constant TE and SE scores, 11 local governments recorded a constant PTE score of 1.000 throughout the 8-year period. The higher number of local government best practices (score of 1.000) for the PTE compared to the number of local government best practices for the SE imply that most local governments are reasonably competent in managing their resources to provide public services, but are still deficient in operating at the correct scale of operations. These findings support earlier studies by García-Sánchez (2006) and Fogarty and Mugera (2013), which found that most local governments are not operating at an optimal scale. This incorrect operation scale may be caused by these local governments being either too small or too large.

5.0 Conclusions

The present study was designed to assess the efficiency of local government in Malaysia using the DEA approach. The findings suggest that in general local governments in Malaysia are efficient due to all efficiency measures mean scores (TE, PTE and SE) from 2008 to 2015 being above 0.900. The result also shows that the efficiency trend from 2008 to 2015 fluctuates with a combination of upward and downward trends. Although there was improvement in the efficiency scores in 2015 compared to 2008, the highest achievement of mean efficiency scores in the 8-year period are found in 2010, whereby the TE is at 0.955, PTE at 0.991 and SE at 0.963.

There are several implications in the present study. Examining the efficiency level enables the respective local government to understand its current overall efficiency level compared to other local governments across the country. Through identifying the most and least efficient local governments, regulators will be able to gain an understanding of the rank of respective local governments in Malaysia. Close monitoring of the least efficient local governments will allow regulators to ensure that these local governments take the necessary initiatives to improve their efficiency. As the trend of efficiency measures fluctuated over the 8-year period of study, this longitudinal study allows local governments to make better assessment of their own performance as it provides several perspectives, including possible connection to new local government related guidelines.

The findings of the present study also provide insightful information to the government in formulating an alternative measurement or indicator for the purpose of determining annual allocations to individual local governments. In other words, more or additional allocations may be given to those local governments that have proven themselves to be efficient. This will not only motivate local governments that are efficient to continue to be so, but more importantly to inspire less efficient local governments to improve their efficiency. Ultimately in the long run, more local governments will become efficient and thereby, the public at large will benefit from the better and more efficient services provided by local governments.

Finally, a number of limitations need to be considered, the first being the sample size. Due to a slow response time and unavailability of financial statements' information required, the study has had to exclude certain local governments in Peninsular Malaysia from the analysis, thus leading to a smaller sample size. In addition, although the study was completed in 2017, most local governments in the sample have still not published their financial statements for the year ending 2016. Second, the study analyses only technical efficiency (TE), pure technical efficiency (PTE) and scale efficiency (SE) and excludes cost and allocative efficiency. The exclusion of cost and allocative efficiency is due to the unavailability of input price details. Future research can be extended to other efficiency measures, such as allocative efficiency and cost efficiency. In addition, both DEA output and input orientation may be measured to enable comparison of both results. While this study uses a combination of revenues (inputs) and expenses (outputs), future studies may opt for a different combination of inputs and outputs, such as labour cost (inputs) and revenues (outputs) or expenses (inputs) and revenues (outputs). This input and output information may be gathered through interviews and questionnaires, as opposed to the current use of secondary data. Alternatively, future research may use other parametric or non-parametric methods in measuring efficiency, such as the Stochastic Frontier Approach and Distribution Free Approach. Despite the limitations, the findings of the current study offer insightful information on the efficiency level of local government in Malaysia.

References

Aristovnik, A., Seljak, J., & Mencinger, J. (2014). Performance measurement of police forces at the local level: A non-parametric mathematical programming approach. *Expert Systems with Applications*, 41(4), 1647-1653.

Avkiran, N. K. (1999). An application reference for data envelopment analysis in branch banking: helping the novice researcher. *International Journal of Bank Marketing*, 17(5), 206-220.

Balaguer-Coll, M. T., Prior, D., & Tortosa-Ausina, E. (2007). On the determinants of local government performance: A two-stage nonparametric approach. *European Economic Review*, 51(2), 425-451.

Benito, B., Bastida, F., & García, J. A. (2010). Explaining differences in efficiency: an application to Spanish municipalities. *Applied economics, 42*(4), 515-528.

Benito-López, B., del Rocio Moreno-Enguix, M., & Solana-Ibañez, J. (2011). Determinants of efficiency in the provision of municipal street-cleaning and refuse collection services. *Waste Management, 31*(6), 1099-1108.

Coelli, T. J. (1996). Centre for efficiency and productivity analysis (CEPA) working papers. *Department of Econometrics Universíty of New England Armidale, Australia.*

Da Cruz, N. F., & Marques, R. C. (2014). Revisiting the determinants of local government performance. *Omega, 44*, 91-103.

De Vaus, D. (2002). *Analyzing social science data: 50 key problems in data analysis*. Sage.

Doumpos, M., & Cohen, S. (2014). Applying data envelopment analysis on accounting data to assess and optimize the efficiency of Greek local government. *Omega, 46*, 74-85.

Drake, L., & Simper, R. (2003). The measurement of English and Welsh police force efficiency: A comparison of distance function models. *European Journal of Operational Research, 147*(1), 165-186.

El Mehdi, R., & Hafner, C. M. (2014). Local government efficiency: The case of Moroccan municipalities. *African Development Review, 26*(1), 88-101.

Fogarty, J., & Mugera, A. (2013). Local Government Efficiency: Evidence from Western Australia. *Australian Economic Review, 46*(3), 300-311.

García-Sánchez, I. M. (2006). Efficiency measurement in Spanish local government: the case of municipal water services. *Review of Policy Research, 23*(2), 355-372.

Geys, B., & Moesen, W. (2009). Exploring sources of local government technical inefficiency: Evidence from Flemish municipalities. *Public Finance and Management, 9*(1), 1.

Ibrahim, F., & Karim, M. Z. (2004). Efficiency of local government in Malaysia and its correlates. *International Journal of Management Studies, 11*(1), 57-70.

Khalid, S. N. A. (2010). Improving the service delivery: A case study of a local authority in Malaysia. *Global Business Review, 11*(1), 65-77.

Kristo, S. (2013). Efficiency of the Albanian banking system: Traditional approach and Stochastic Frontier Analysis. *International Journal of Economic Sciences & Applied Research, 6*(3).

Kuppusamy, S. (2008). Local government in Malaysia: Back to basics and the current scene. *Journal of Malaysian Chinese Studies, 11*, 77-96.

Lo Storto, C. (2013). Evaluating technical efficiency of Italian major municipalities: a Data Envelopment Analysis model. *Procedia-Social and Behavioural Sciences, 81*, 346-350.

Local Government Department. (2016). Local Authority Statistics. Retrieved from http://jkt.kpkt.gov.my/index.php/pages/view/187

Lopez, M., Dollery, B., & Byrnes, J. (2009). An Empirical Evaluation of the Relative Efficiency of Roads to Recovery Expenditure in New South Wales Local Government, 2005/06. *Australasian Journal of Regional Studies, 15*(3), 311.

Malaysia. Economic Planning Unit. (2010). *Tenth Malaysia Plan 2011-2015*. Putrajaya: The Economic Planning Unit, Prime Minister's Department.

Ministry of Housing and Local Government. (2008). *Pekeliling Ketua Setiausaha Kementerian Perumahan Dan Kerajaan Tempatan Bilangan 1 Tahun 2008*. Retrieved from http://jkt.kpkt.gov.my/jkt/resources/PDF/Perkhidmatan/ Pekeliling/2008/2008-1_Pekeliling_SSR-PBT.pdf

Okuda, H., Poleng, C., & Aiba, D. (2014). Operational Efficiency and Productivity Change of Major Cambodian Financial Institutions During the 2006-2011 Period1. *International Journal of Business and Information, 9*(3), 335.

Osman, M. M., Bachok, S., Bakri, N. I. M., & Harun, N. Z. (2014). Government delivery system: effectiveness of local authorities in Perak, Malaysia. *Procedia-Social and Behavioral Sciences, 153*, 452-462.

Phang, S. N. (2008). Decentralisation or Recentralisation? Trends in local government in Malaysia. *Commonwealth Journal of Local Governance*, (1), 126-132.

Public Complaints Bureau. (2016). Statistics by year. Retrieved from: http://www.pcb.gov.my/en/complaint/statistics-by-year

Revelli, F., & Tovmo, P. (2007). Revealed yardstick competition: Local government efficiency patterns in Norway. *Journal of Urban Economics, 62*(1), 121-134.

Sufian, F., & Kamarudin, F. (2015). Determinants of revenue efficiency of Islamic banks: Empirical evidence from the Southeast Asian countries. *International Journal of Islamic and Middle Eastern Finance and Management, 8*(1), 36-63.

Wibowo, A., & Alfen, H. W. (2015). Benchmarking the efficiencies of Indonesia's municipal water utilities using Stackelberg data envelopment analysis. *Benchmarking: An International Journal, 22*(4), 588-609.

Woodbury, K., & Dollery, B. (2004). Efficiency measurement in Australian local government: The case of New South Wales municipal water services. *Review of Policy Research, 21*(5), 615-636.

Yahaya, N., & Larsen, I. B. (2008). Federalising solid waste management in peninsular Malaysia. In *Proceeding of International Solid Waste Association (ISWA) World Congress, Singapore*.