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EFFICIENCY OF LOCAL GOVERNMENTS IN MALAYSIA AND ITS CORRELATES

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ABSTRACT

The local government as one of the levels of government, plays a crucial role in providing public goods and services that are specific to the localities. However, the performance of local governments has been subjected to various criticisms, based on the increasing number of complaints from the public regarding provision of public goods and the poor services rendered to the locals, suggesting the inefficiency of our local governments. This article investigates this issue by analysing whether local governments in Malaysia use an efficient level of resources to provide their services. To achieve the objective, we estimate cost efficiency using the non-parametric Data Envelopment Analysis (DEA) approach. The efficiency scores were then regressed against factors that are likely to influence the local government's performance. The results indicate that the local governments in Malaysia are not fully efficient in using their inputs. The results also indicate that the variables that influence the local government's efficiency the most are level of technology usage, average income of the population, type of local government and location of the local government.

ABSTRAK

Kerajaan tempatan sebagai salah satu peringkat kerajaan memainkan peranan penting dalam menyediakan barangan awam tempatan dan perkhidmatan. Bagaimanapun, terdapat beberapa kritikan terhadap prestasi kerajaan tempatan, berdasarkan kepada peningkatan dalam bilangan aduan daripada orang awam berkaitan penyediaan barangan awam dan perkhidmatan yang tidak memuaskan kepada penduduk tempatan. Andaian boleh dibuat bahawa adanya ketidakcekapan dalam kerajaan tempatan. Artikel ini mengkaji isu ini untuk melihat sama ada kerajaan tempatan di Malaysia menggunakan

sumber-sumber secara cekap dalam menghasilkan perkhidmatan mereka. Bagi mencapai objektif tersebut, kaedah "non-parametric Data Envelopment Analysis" (DEA) telah digunakan untuk menganggar indeks kecekapan kos pihak-pihak berkuasa tempatan. Indeks kecekapan kos ini kemudiannya "diregresskan" dengan faktor-faktor yang dijangka mempengaruhi prestasi pihak berkuasa tempatan. Hasil kajian mendapati, pihak berkuasa tempatan secara keseluruhan kurang cekap dalam penggunaan input. Hasil kajian juga mendapati kecekapan pihak berkuasa tempatan dipengaruhi oleh tingkat teknologi yang digunakan, purata pendapatan penduduk di kawasan tersebut, bentuk pihak berkuasa tempatan, dan lokasi pihak berkuasa tempatan.

INTRODUCTION

Over the past two decades, Malaysia has experienced a remarkable growth in the economy. The GNP per capita has risen from US$1,710 in 1981 to US$4,284 in 1997. One consequence of this rapid growth of the Malaysian economy is that, the rise in the level of affluence of the local population has created increasing demands for public goods and services. People not only want to consume what is being provided to them but they also care for the quality of the public goods and services. At the local level, the local government, as one of the levels of government, plays a crucial role in providing public goods and services that are specific to the localities. However, the performance of local governments has been subjected to various criticisms, based on the increasing number of complaints and dissatisfaction from the public regarding provision of public goods and the poor services rendered to the locals, suggesting the inefficiency of our local governments. This calls for the local governments to be more responsive in meeting local needs and being able to deliver their functions effectively. As the public at large is concerned about quality services and the greater role expected from local governments, the needs to evaluate the performance of local governments is essential. The efficient allocation of resources by local governments remains an important issue to be addressed. This paper investigates this issue by analysing whether local governments in Malaysia use an efficient level of resources to produce their services. To achieve the objective, we estimate cost efficiency index using the non-parametric Data Envelopment Analysis (DEA) approach. The efficiency scores were then regressed against factors that are likely to influence local government's performance.

The local governments in Malaysia are classified into three groups: city council for city centres, municipality for large towns and district council for small urban centres. As of 1999, there are a total of ninety-

nine local governments in Peninsular Malaysia comprising of four city councils, nineteen municipal councils and seventy-six district councils. They are formed and regulated by the respective state legislation and subordinate to the respective state governments. The Local Government Act of 1976 provides local authorities in Malaysia with a very comprehensive set of functions and responsibilities. The major function of the local governments is to provide public goods and services that are specific to the localities. Local public services that are undertaken by them on behalf of the respective state governments include both mandatory and discretionary functions. The mandatory functions include all critical functions such as refuse collection, maintenance of minor drainage, sewerage treatment, road maintenance, street lighting and activities pertaining to public health. Discretionary functions include all development function such as providing amenities, recreational parks, housing and commercial activities, markets, sports facilities and community centres. The sources of revenue for local governments mainly come from state specific grants that include road maintenance grant, economic development grant, and property tax.

To the best of our knowledge, this study is the first attempt to undertake a systematic comparison of cost efficiency of local governments in Malaysia using the DEA approach. The rest of the paper is organised as follows. Second section reviews the existing literature on efficiency analysis and also the study on efficiency of local governments. Third section presents the methodology of estimating cost efficiency using the DEA approach. Fourth section describes the data used and the empirical results. Last section concludes this article.

REVIEW OF LITERATURE

A variety of methods have been developed in the literature to measure economic efficiency. It begins with a classic paper by Farrell (1957), whom suggested a technique with which the efficiency of a production activity could be measured. Farrell defined technical inefficiency as any deviations from the frontier isoquant and allocative inefficiency is associated with deviations from the cost minimising input ratios. His deterministic non-parametric approach has then been further extended and applied by many scholars. One of the approaches to the development of efficiency measurement is the method of mathematical programming. A detailed treatment and exposition of this approach is given in Ali and Seiford (1993). Ferrier and Lovell (1990) studied efficiency using both the stochastic parametric frontier and a DEA model. They found a very weak correlation between the resulting efficiency measures.

Measurements of efficiency have been applied to many sectors. Borger and Kerstens (1996), Eeckaut Tulkensand Jamar (1993) and Deller (1992) studies the efficiency of local governments. The data set for the analysis of efficiency in Borger and Kerstens was based on a sample of 589 Belgian municipalities. They provided a detailed comparative analysis of parametric and non-parametric cost frontiers. Their estimated mean efficiency scores for the Belgian municipalities are in the range of 0.57 to 0.94.

Studies of efficiency using Malaysian data are still lacking. Among the few studies include Kalirajan (1990), Kalirajan and Tse (1989), and Karim (2001). Kalirajan and Tse (1989) provided measures of technical efficiency using panel data. Their study showed that, on average, the firms within the Malaysian food manufacturing industries have achieved 73% of their potential outputs. In the study on efficiency of ASEAN banking sector using the Stochastic Frontier Approach, Karim (2001) found that on average, banks in Malaysia were using about 4.35% more input than if they were fully efficient.

METHODOLOGY

In analysing the efficiency of local governments, the study focused on the cost effectiveness of producing public services. Data Envelopment Analysis (DEA) approach is used to estimate efficiency scores of the local governments in our sample. DEA involves the use of linear programming methods to construct a non-parametric piece-wise surface (or frontier) over the data. Efficiency measures are then calculated relative to this frontier. DEA approach has two main advantages in estimating efficiency scores. First, it does not require assumptions about technology. Hence, one can avoid unnecessary restrictions about functional form that can affect the analysis. Second, it does not require the distributional assumption of the inefficiency term.

A paper by Charnes, Cooper and Rhodes (1978) was the first paper that received wide attention in using mathematical programming methods to estimate the frontier. They proposed a model, which had an input orientation and an assumed constant return to scale. According to Coelli (1996), the constant return to scale (CRS) DEA model is only appropriate when the firm is operating at an optimal level. However, some factors such as imperfect competition, constraint on finance, etc. may cause the firm to be not operating at an optimal level in practice. To allow for this possibility, Banker, Charnes and Cooper (1984)

introduced the variable return to scale (VRS) DEA model. In this study, cost efficiency is calculated using the input-oriented variable return to scale (VRS) DEA model as in Coelli (1996). The model is as follows.

Assume there is data available on K inputs and M outputs in each of the N decision making units (local governments). Input and output vectors are represented by the vectors x_i and y_i, respectively, for the i-th local government. The data for all local governments may be denoted by the KxN input matrix (X) and MxN output matrix (Y). The envelopment form of the input-oriented VRS model is specified as:

$$\begin{aligned} &\min_{\theta,\lambda} \theta, \\ &\text{subject to:} \\ &\quad -y_i + Y\lambda \geq 0, \\ &\quad \theta x_i - X\lambda \geq 0, \\ &\quad N1'\lambda = 1 \\ &\quad \lambda \geq 0 \end{aligned} \tag{1}$$

where θ is the input technical efficiency (TE) score having a value between zero and one. If the q value is equal to one, indicating the local government is on the frontier, the vector λ is an Nx1 vector of weights, which defines the linear combination of the peers of the i-th local government. N1 is an Nx1 vector of ones. Thus, the linear programming problem needs to be solved N times and a value of q is provided for each local government in the sample.

For the case of VRS cost minimisation, the input-oriented DEA model, defined in equation 1, is conducted to obtain technical efficiencies (TE). The next step requires the solution of the following cost minimisation DEA.

$$\begin{aligned} &\min_{\lambda,x} \; w_i' x_i^*, \\ &\text{Subject to:} \\ &\quad -y_i + Y\lambda \geq 0, \\ &\quad x_i^* - X\lambda \geq 0 \\ &\quad N1'\lambda = 1 \\ &\quad \lambda \geq 0, \end{aligned} \tag{2}$$

where w_i is a vector of input prices for the i-th firm and x_i^* (which is calculated by the LP) is the cost-minimising vector of input quantities for the i-th firm, given the input prices w_i and the output levels y_i. The total cost efficiency or economic efficiency of the i-th firm is calculated as,

$$CE = w_i^* x_i^* / w_i' x_i. \tag{3}$$

This measure indicates the proportion of observed cost required to produce the local government's observed level of outputs. Alternatively, (1/CE – 1) gives the proportion by which observed cost exceeds best practice cost. Failure to achieve cost efficiency may be due to the excessive use of all inputs or the incorrect mix of inputs.

DATA AND EMPIRICAL RESULTS

The local governments in Peninsular Malaysia that we studied comprised of four city councils, 19 municipal councils and 76 district councils. The study utilised both primary and secondary data. Since the population of the local governments is not large, this study employs the population of local governments as unit of analysis.

The total operating expenditure data of each local government is employed to measure the aggregate total cost incurred by local governments in supplying their local services. The source of data on expenditure is available from the financial statement report of the local governments. Labour is the input used in our analysis since we are unable to obtained data on capital. The price of labour was calculated as the total labour cost divided by the number of personnel. Data on output indicators to measure the level of public goods provided was proxied indirectly to reflect the expenditure areas most visible to the general public. Since we did not have a direct measure to quantify the local public services, the following indicators were utilised to proxy the output indicators. The output measure that we used in our analysis were number of public toilets, number of multipurpose halls, number of recreational parks, number of children's playgrounds, number of sport facilities, number of parking lots, number of markets (both wet and dry), amount of waste disposed, number of trees planted, total population to reflect the basic administrative services provided to the local population, and length of road (kilometre) to reflect on the road maintenance provided by the local governments.

A survey instrument was utilised to obtain information on these local public goods and services provided by the local governments. The questionnaires were distributed to all local governments throughout the Peninsular Malaysia. However, some of the local governments have not responded to the questionnaires. Only 67 out of 99 local governments responded to the questionnaires (or 67.7% respond rate). Out of this, a total of 21 local governments have not provided information on the amount of emoluments, which is required to

estimate the wages in the said institutions. Thus, our final data set comprised a cross section of only 46 local governments where 9 are municipal councils and 37 are district councils in the state of Kedah, Perak, Johore, Pahang, Terengganu, Kelantan, Negeri Sembilan, Selangor and Melaka. Data collected was analysed using DEAP as in Coelli (1996). The descriptive statistics of the input and output measures is presented in Table 1.

Table 1
Descriptive Statistics of Sample Local Councils

	Mean	**Min.**	**Max.**	**s.d.**
Cost (in RM)	10848179.9	751794.5	106536576.0	17565548.0
No. of public toilets	9.08	1.00	40.00	7.73
No. of parking lots	1839.02	0	18505.00	3117.52
No. of business lots	524.56	0	2800	661.41
Solid waste (kg)	33684.37	400	216000	47652.62
No. of trees planted	5677.13	300	50000	9177.12
Population	127900	16981	475000	113835.87
Road length (km)	112.64	0	554.21	121.88
Wages (in RM)	11104.10	6094.34	234271.41	3317.12

Table 2 provides the results of the DEA estimation. The average level of cost efficiency is 0.763. This indicates that on average observed cost is almost 24% more than best practice cost. This cost inefficiency arises due to the excessive use of inputs. Our results indicate that there is a fair amount of dispersion in the ability to transform resources into services among the local governments in our sample. The average local council operates with 24% higher costs relative to the best local council in the sample, which serve as the benchmark in evaluating performance.

Table 2
Results of DEA Estimation

Local Council	**Cost Efficiency Score**
MP Kota Setar	0.828
MP Sg. Petani	1.000
MD Bandar Baharu	1.000
MD Langkawi	0.573
MP Taiping	0.599
MD Kuala Kangsar	0.818
MD Kinta Barat	1.000

(continued)

MD Kinta Selatan	0.861
MD Manjung	1.000
MD Hilir Perak	0.666
MD Tapah	1.000
MD Tg. Malim	0.858
MP Petaling Jaya	0.349
MP Seremban	0.469
MD Rembau	1.000
MD Jelebu	0.761
MD Jempol	1.000
MP Melaka BB	0.544
MD Segamat Utara	0.742
MD Muar Utara	0.994
MD Muar Selatan	1.000
MD Kluang Utara	1.000
MD Kluang Selatan	0.221
MD Batu Pahat Timur	1.000
MD Batu Pahat Barat	0.616
MD Pontian	1.000
MD Kulai	0.391
MD Kota Tinggi	0.471
PBT Pasir Gudang	0.767
MP Kuantan	0.238
MP Temerloh	0.563
MD Lipis	0.711
MD Jerantut	0.635
MD Maran	0.560
MD Rompin	0.735
MP Kuala Terengganu	0.488
MD Besut	0.745
MD Setiu	1.000
MD Dungun	0.874
MD Kemaman	0.692
MD Pasir Mas	0.914
MD Tanah Merah	0.703
MD Jeli	1.000
MD Machang	0.867
MD Kuala Krai Selatan	1.000
MD Gua Musang	0.829
MEAN	0.763

We now turn our attention to analysing the variation in efficiency scores. The efficiency scores were regressed against factors that are

likely to influence a local government's performance. By determining those factors that are correlated with efficiency, local government administrators and public policy makers can become more effective decision makers.

Our list of possible correlates includes level of computerisation, size of the administrative area, type of local government, average income level of the population, and the literacy rate of the population. We perform Tobit estimation of the following model:

$$\begin{aligned} EFF = {} & \alpha + \beta_1 COMLAB + \beta_2 AREA + \beta_3 INCOME + \\ & \beta_4 SCHPOP + \beta_5 TYPE + \beta_6 KTAN + \beta_7 PERAK \\ & + \beta_8 SNGOR + \beta_9 PAHANG + \beta_{10} TGANU \\ & + \beta_{11} NS + \beta_{12} KEDAH + \beta_{13} MELAKA + v \end{aligned} \quad (4)$$

Table 3
TOBIT Model Estimates of the Efficiency Scores

Regressor	Coefficient	Standard Error
CONSTANT	0.534**	0.216
COMLAB	1.581*	0.802
AREA	0.001	0.003
INCOME	0.015**	0.004
SCHPOP	0.155	0.286
TYPE	0.457**	0.151
KTAN	0.209**	0.091
PERAK	0.182**	0.089
SNGOR	0.136**	0.061
PAHANG	-0.075**	0.035
TGANU	0.126**	0.051
NS	0.103**	0.050
KEDAH	0.156**	0.071
MELAKA	-0.059**	0.022
R^2	0.61	
Log-Likelihood ratio	45.17 (0.046)[1]	
Sigma	5.36	
Breusch-Pagan statistic	1.35 (0.118)	
Ramsey reset statistic	1.78 (0.106)	

Note:* indicates significance at 10% level ,** indicates significance at 5% level, Breusch-Pagan and Ramsey reset statistic are from OLS estimation.
[1] number in parenthesis are p-values

where EFF is the cost efficiency derived above; COMLAB is the ratio of number of computers to personnel; AREA is the size of the

administrative area; INCOME is the average monthly gross income of the population; SCHPOP is the ratio of primary and secondary school students to total population; TYPE is a dummy variable equal to 1 if the local government is a district council and 0 if municipal council; KTAN, PERAK, SNGOR, PAHANG, TGANU, NS, KEDAH, and MELAKA are location dummies equal to 1 if the local government is located in Kelantan, Perak, Selangor, Pahang, Terengganu, Negeri Sembilan, Kedah, and Melaka respectively, and zero otherwise (Johore is the base state). The effect of each of these factors on cost efficiency is reported in Table 3 and will be discussed in turn. Because the efficiency scores derived above are bounded between zero and one (the most efficient local government in the sample received a score of 1), Tobit analysis of the efficiency scores is therefore an appropriate tool as compared to ordinary least squares (OLS). The OLS method was first used to check whether OLS assumptions were not violated. The Box-Pierce statistics were insignificant indicating that the error terms were non-autocorrelated, while the Breusch-Pagan statistics for testing heteroskedasticity is also insignificant, indicating that the null hypothesis of homoskedasticity cannot be rejected. The Tobit regression results in Table 3 indicate that the model is a more appropriate tool to be used than the OLS.

COMLAB, which controls the level of technology use by the local government, should therefore be positively correlated with the level of efficiency. The positive relationship between COMLAB and cost efficiency is therefore expected in our result although the relationship is significant at just the 10% level.

The size of the administrative area (AREA) is expected to be negatively related to cost efficiency since a smaller administrative area tend to be easily managed than a much bigger area. Our results indicate otherwise. However, the AREA coefficient is not statistically significant.

The coefficient on INCOME is positive and significant. The positive effect of INCOME on performance is consistent with the idea that higher income individuals tend to be more critical of the local government. They demand more efficient services, which in turn, causing local government to become more efficient. However, although the variable SCHPOP, to control for literacy rate of the population, is positively related to performance, it is not statistically significant. This suggests that income is a better factor that affects local government performance compare to literacy rate.

The variable TYPE is positively significant indicating that district councils are more efficient than the municipal councils. This might be due to the poor management of inputs since the scale of operations for municipal council is much larger than the district council.

Finally, we find evidence of locational differences in performance. Such differences are to be expected due to such factors as difference in demographic characteristics and etc. Our results show that local governments in Kelantan, Perak, Selangor, Terengganu, Negeri Sembilan, and Kedah are more efficient than local governments in Johor while local governments in Pahang and Melaka are less efficient than Johore.

Average Cost Efficiency Across Type

To further analyse the degree to which district councils are more efficient than municipal councils, the mean cost efficiency for each type was calculated and presented in Table 4. The mean cost efficiency for district councils and municipal council are 0.8109 and 0.5642 respectively. Result of the mean difference test indicates that the differences in the efficiency scores are significant (t-statistic = -7.35). This result indicates that district councils are more efficient than municipal councils. This indicates that, on average, observed cost for municipal council is almost 44% more than best practice cost while it is only 19% for the district council.

Table 4
Average Cost Efficiency by Type of Local Government

	Municipal Council	District Council
Mean	0.5642	0.8109
Min.	0.238	0.221
Max.	1.000	1.000
s.d.	0.077	0.033
t-statistic	-7.355	

Average Cost Efficiency Across Location

To further analyse the degree to which efficiency differs across states, the mean cost efficiency for each state was calculated and presented in Table 5. The mean cost efficiency for Kelantan (0.885) is the highest followed by Kedah, Perak, Negeri Sembilan, Terengganu, and Johore, while Pahang is the least efficient (0.573). Results of the mean difference

test show that there is a significant difference between Kelantan, the best state in our sample and all the other states (Table 6). Likewise, the result also indicates that there is a significant difference between Pahang, the worst state in the sample, and all the other states. The result indicates that on average, observed cost for local government in Pahang is almost 43% more than best practice cost while it is only 12% for Kelantan.

Table 5
Average Cost Efficiency by State

State	Mean	Min.	Max	s.d.
Johor	0.745	0.221	1.000	0.086
Kedah	0.852	0.573	1.000	0.101
Kelantan	0.885	0.703	1.000	0.046
Negeri Sembilan	0.807	0.469	1.000	0.126
Pahang	0.573	0.238	0.735	0.073
Perak	0.850	0.599	1.000	0.054
Terengganu	0.759	0.488	1.000	0.086

Table 6
Mean Difference Test of Cost Efficiency Across State

	Perak	Negeri Sembilan	Johor	Pahang	Terengganu	Kelantan
Kedah	0.22	4.64	5.62	26.02	10.11	-4.19
Perak		3.69	5.51	25.88	8.60	-3.94
Negeri Sembilan			2.93	21.59	4.68	-8.46
Johor				8.86	-0.67	-7.59
Pahang					-18.31	-36.01
Terengganu						-15.08

Numbers are t-statistic for mean difference test

CONCLUSION

In this paper we analysed the cost efficiencies of a sample of local governments in Malaysia using the DEA approach. There are several conclusions that can be made from our study. Firstly, our findings suggest that most of the local governments are less than cost efficient in providing public goods and services. Secondly, the variables that influence the local government's efficiency the most are level of technology usage, average income of the population, type of local

government, and location of the local government. Thirdly, there is a significant difference in average cost efficiency across states, with local governments in Kelantan the most efficient while local governments in Pahang the least efficient. Lastly, the results indicate that municipal councils are less efficient than district councils. This might be due to the inefficient scale of the operations of municipal council because of its bigger size.

The above results indicate that priority should be given by the authorities concerned to improve the efficiency of local governments, especially the municipal councils, by making sure that inputs are being used efficiently to produce their services. In addition, local governments should improve their technology usage by increasing the number of computers per labour ratio. Finally, local population should be aware and be critical of their local government to ensure that they are being operated efficiently, hence reducing the cost of their services to consumers.

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