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CONSTRUCTING A COMPETITIVENESS INDEX FOR STATES IN MALAYSIA: A PANEL DATA ANALYSIS

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ABSTRACT

This study investigated the competitiveness index of the fourteen states in Malaysia. It also examined various aspects of competitiveness among states and vital elements that might influence competitiveness by utilizing a three-level hierarchical indicator system encompassing economic, social and environmental factors. An equally weighted index was applied to scrutinize the three dimensions. The index output was based on 24 indicators across six components. The critical components were economic performance, economic structure, marketization and openness, social aspects, domestic security and environmental quality. This study also examined the relationship between the components of competitiveness and economic growth for states in Malaysia by using the panel data estimation approach; a method which utilised data sets for fourteen states over a period extending from 2005 to 2016. Data were then analysed using a panel data regression model. Overall, findings showed that Selangor, where Kuala Lumpur the national capital was situated, was the most

competitive state. In 2016, Kuala Lumpur was the best performer in terms of economic performance, social aspects and environmental quality. It was also found that domestic security and environmental quality were significant determinants of economic growth, which had enhanced competitiveness among states in Malaysia. A state's performance according to the three dimensions varied greatly as there were different factors of specializations for each state. This study has proposed that each state in the federation possessed a significant economic performance, as well as substantial social and environmental development to ensure and sustain their respective state of competitiveness.

Keywords: Economic competitiveness, social competitiveness, environmental competitiveness, panel data, state competitiveness.

INTRODUCTION

The transition from an agro-based economy since independence to the present day, had thrust Malaysia into becoming a modern day robust industrial country with a decisive shift of focus to manufacturing and services. The sheer reliance on manufacturing and commodities has moulded the country into a competitive export-oriented economy. As result of the expanding industrial sector, the community as a whole began to prefer engaging in export-oriented economic activities. The unprecedented drastic increase in manufacturing-based economic activities soon led to a rapid urban development, which to date has considerably transformed the overall national economy. Therefore, industrialization has become the core factor in Malaysia's economic progress. With a strategic mission to improve the Malaysian economy, the government formulated several coherent economic policies and Malaysia Plans. Malaysia began to emphasize more on a sustainable economic performance that will ensure a balanced development and yet continuous economic growth, social prosperity and political stability. Sustainable development has been argued is relevant to a country's goal of achieving progress and is consistent with its transformation into an economy-based country (Mokthsim & Salleh, 2014). This study investigated the state competitiveness index for Malaysia and the competitiveness patterns of states in Malaysia.

This is because trends that have provided an edge for certain states in Malaysia have to be looked at, especially when they have assisted the federal and state governments in their efforts to attract foreign investments. The study reported here has created an indicator system to analyse the state competitiveness index of states in Malaysia. Many countries have announced new policies to increase the competitiveness of their economies, but Malaysia appeared to be an exception. The competitiveness concept is investigated from three different levels, namely national, regional, and urban levels. Very few studies have explored the competitiveness level of large Western countries, such as the United States and Europe (Kresl & Singh, 1999; Huggins, 2000; Deas & Giordano, 2001). With regard to Asian countries, research has been carried out in China by Dou et al. (2000), Ning and Tang (2001), Jiang and Shen (2013), Du et al. (2014). It is worth noting that a competitive country is one which is able to sustain its balanced socio-economic status by ensuring more than mere industrial growth.

In essence, there is a need for a government to ensure a balanced socio-economic development strategy which can attract expatriates who form the core workforce of international corporations and investors. As such, urban areas in Malaysia have to be deemed liveable by these interested parties. The race among cities to secure a balanced socio-economic environment increases competitiveness. To investigate this, a competitiveness index has been created to evaluate the urban development objectives of various states. As it is difficult for this study to be carried out at the municipal level, it has instead focused on the state and compiled a competitiveness index of states in Malaysia. The study was aimed at determining the relevant indicators and components that could produce varying levels of competitiveness among Malaysian states, as well as providing an indicator system for determining the rank and level of competitiveness among these states. In addition, it was also aimed at identifying that factors that would cause differences in economic growth among these states.

Based on the Legatum Prosperity Index as shown in Table 1, the standard of living of Malaysians has been ranked 41 out of 167 countries in 2019. The index was based on 12 key indicators, namely

economy, entrepreneurship, governance, education, health, security, individual freedom, social capital, natural environment, investment environment, marketing and infrastructure as well as living conditions. Although the Legatum Prosperity Index report has shown that the Malaysian economy was among the top 30 countries at 27th place currently compared with its 22nd position in 2018, the security element was even more alarming when the country’s position dropped from its 52nd placing in 2010 to 85th in 2019. Meanwhile, the education quality aspect showed an improvement in ranking from 45th in 2010 to 42nd in 2019.

Table 1

The Legatum Prosperity Index, 2010-2019

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
The Legatum Prosperity Index	43/110	43/110	45/142	44/142	45/142	44/142	38/149	42/149	44/149	41/167
Economic Quality	21	17	15	8	20	28	23	24	22	27
Enterprise Conditions	34	36	44	45	38	40	16	20	23	27
Governance	34	35	35	34	38	37	40	45	47	54
Education	45	46	40	40	51	51	31	31	41	42
Health	44	46	45	53	56	52	37	38	38	39
Safety and Security	52	53	62	64	71	60	58	59	55	85
Personal Freedom	90	96	111	110	112	114	112	120	124	119
Social Capital	90	75	100	80	36	33	33	30	27	29
Natural Environment	-	-	-	-	-	-	49	50	44	39
Investment Environment	-	-	-	-	-	-	-	-	-	28
Market Access and Infrastructure	-	-	-	-	-	-	-	-	-	41
Living Conditions	-	-	-	-	-	-	-	-	-	65

Note: From Legatum Institute (<http://www.prosperity.com/>)

LITERATURE REVIEW

Competitiveness began as a core concept in microeconomics and has since been developed in various disciplines, most notably its close link to concepts in public administration. For example, Vega Rosado (2006) postulated that the potential for technology development varied according to competitiveness. Investment in both human capital and education was affected by technological capabilities. Competitiveness was defined as a firm or organization's capability to generate greater revenue compared with its competitors. The competitiveness concept featured both micro and macro perspectives (Fatimah et al., 2008). The micro level of competitiveness looked at the ability of a firm or industry, while the macro level provided a perspective of competitiveness at the state and country levels. There is a need to understand both levels of competitiveness, which are interrelated, as competition occurs in both micro and macro economies. From a microeconomic perspective, the concept of competition is the firm's potential to sustain progressive growth while generating additional profits. As such, competitiveness is a firm's capability to create products that address market needs in terms of price and quality.

Developing firm competitiveness is greatly affected by the competitiveness of its urban areas or in Malaysia's context, the fourteen states that constitute the federation. The macro perspective of competitiveness comprises an area in the city that promotes entrepreneurial growth. A city must continuously upgrade its potential and infrastructure to encourage significant investment from investors. The city can promote and assist the development of firms in its endeavour to increase competitiveness. Therefore, competitiveness is defined as a city's production quality. Scott and Storper (2003) stressed that substantial amounts of profit generated from urban production would increase the growth, prosperity and quality of urban living, which in turn offered better job opportunities and wage rates. It is also one of the city's core factors that influence competitiveness and impact the city's efficiency, innovation and technology. A competitive city has the ability to adapt to several factors, such as infrastructure, qualified or skilled workers, creation and innovation, quality of life, environmental quality and the capability of public and private

institutions to entice foreign investment for greater productivity (Rondinelli, 2001).

In addition, Porter (1990) highlighted that a city's competitiveness was affected by four main components, namely the quality of endowments, human resources, economic structures and capital. This competitiveness concept is not related to firm competitiveness, but it comprises the economies of scale through industry clustering. Therefore, industry clustering determines a city's competitiveness. Conversely, Hall and Pfeiffer (2013) were of the view that urban competitiveness was the ability of a city to promote economic development, a competitive environment and effective urban planning through a skilled labour force. This then would improve investment flow and foreign capital (Webster & Muller, 2000). A competitive city was an innovative city featuring various technologies and experiences that could promote domestic and foreign investments through research and development (R&D), innovation, business networking and finance (Komminos, 2000).

Competitiveness has not been taken lightly in Malaysia. In fact, it has become a core objective of the country to increase living standards and economic prosperity. Malaysia has taken important steps forward to remain competitive in the current globalisation and trade liberalisation era. Surprisingly, nations are not the ones in direct competition, but rather companies are forced to get involved in fierce competition in the global arena. However, there is no doubt that competing international enterprises are restricted by their operating home environment. Hence, the Malaysian government has taken a firm stand in its mission to provide a policy-based environment that would enable its enterprises to secure a position in the international market place, such as steps to instil greater transparency in the country's civil service and optimizing delivery systems.

In 2007, the Department of Urban and Rural Planning, under the Ministry of Urban Wellbeing, Housing and Local Government, improvised an approach known as the Malaysia Urban Indicators' Network (MURNInet) to calculate and evaluate the sustainability of cities through the effective use of urban indicators. Marzukhi et

al. (2011) explained that the indicators were selected to measure the level of sustainability, and provided succinct information about a component and further elaborations on the issue. Marzukhi et al. (2011) further iterated that the indicator system would ensure that a city's development objectives could be achieved within a certain set period. Therefore, this indicator system has become a significant tool for monitoring a city's developmental progress. The indicator system also has the ability to explain trends in the development process, both qualitatively as well as quantitatively.

Agency (2012) mentioned that an indicator system could be utilised to evaluate a city's developmental progress as it would be able to offer essential information about a city. Agency (2012) further explained that this system also provided ample opportunities in the form of increased innovation and effective cost management for local authorities at the municipal level. As a result, the local authorities could envision better cities in terms of economic, socio-cultural and environmental concerns. After the indicators used in the MURNInet were analysed, it was found that there were prevalent flaws with MURNInet 2.0 when analysing urban sustainability issues. This was because the existing data were mostly state level data, but others originated from the local authorities. Inconsistencies in the data collected had resulted in the inaccurate analysis of a specific city's development. Therefore, the study reported here argued that rather than focusing on data from the local authorities, it would be more relevant to analyse the data at the state level. This was because at this higher macro level, data issues could be solved with much greater efficiency.

Other than the MURNInets, a number of other indexes have been improvised by multiple agencies to assess and measure societal liveability, sustainability, competitiveness and wellbeing. The Malaysian Quality of Life Index (MQLI), which was first introduced in 1999, was a good example of such an index. In 2011, the Economic Planning Unit (EPU), under the Prime Minister's Department, released the final report for the MQLI. This index was soon replaced by a newer study known as the Malaysian Wellbeing Index (MWI) in 2013. The MWI is made up of two composites, with 14 components, and 68 indicators. Both the MQLI and the MWI were created with the

intention to measure the quality of life of Malaysians, which included the liveability index of life in Malaysian society.

To date, there still exists a standard mechanism or indicator system that is used to determine the level of competitiveness among states in Malaysia. The index generated from the MURNINet focuses on the local authority level, while the MWI is used for compiling the index at the national level. Previous studies indicated that the competitiveness concept was not only influenced by economic perspectives, but also other factors such as, social sectors, including culture, infrastructure, health, education, security and the environment (Du et al., 2014; Bailey et al., 2002).

METHODOLOGY

City competitiveness is a multidimensional construct, hence it cannot be simply defined by a single indicator (Ning & Tang, 2001; Button, 2002; Li et al., 2009; Jiang & Shen, 2013). Forming a composite index that features a system based on a set of indicators is optimal for producing relevant policies that assist in understanding relative performance among cities. The use of only one indicator, such as productivity, is inadequate for measuring competitiveness due to the multidimensional nature of city competitiveness (Begg, 1999; Huggins, 2000). However, the index system is able to measure competitive performance, provide comparisons and analyse shifts in competitiveness throughout different phases of a city's development. According to Du et al. (2014), the competitiveness index comprises four core components, namely economic, socio-cultural, locational and environmental components. This study has focused on the economic, social and environmental components. From these three main components, the competitive index developed for the study used the following indicators: Economic Performance (EP), Economic Structure (ES), Marketization and Openness (MO), Social Aspects (SA), Domestic Security (DS) and Environment Quality (EQ).

Previous studies have shown that a multi-level indicator system was the most reliable method for calculating a composite index. Therefore,

the state competitiveness index equated the total weighted sum of all the indicators. This approach was effective in assisting researchers and policymakers to compare and contrast the structure and performance of all states in Malaysia, and in producing relevant policy implications for each of the respective states. This study measured state competitiveness from the economic, social and environmental perspectives. Twenty-four indicators were chosen and incorporated into this comprehensive index for measuring state competitiveness using the weighted method. Concepts of the weighted approach involved the objective and subjective methods. A well-known objective weighted method was the Equal Weighting (EW) method and it was utilised in this study for developing the competitiveness indexes for the states.

Although Chakravarty (2001) stressed that the EW featured redundant indicators, indicators for this study were segregated into distinct subgroups and utilized to create a three-level hierarchical indicator system. When using this method, issues with redundant indicators were significantly reduced. Next, equal weights were applied to multiple components and subgroups in a single component, and distinct indicators in a single subgroup (Jiang & Shen, 2013). Therefore, a higher number of indicators in a subgroup would reduce the weight of individual indicators. Relative value was selected over absolute value in the analysis carried out in this study, so as to avoid inequality issues. These included aspects such as the influence of the state's size as well as disparities in administration and governance. The economy of scale was directly related to an area's size, as these changes would affect other indicators when determining the area's level of competitiveness. Greene et al. (2007) pointed out that subjective weighting could produce bias, predominantly in cases concerning social cohesion issues when cities were compared.

The EW approach allocates equal weights to components or indicators at the same level as in a hierarchical indicator system (Huggins, 2000; IMD, 2003). The economic structure indicators in the second level feature six indicators in the third level. Every subgroup in the third level possesses a weight of one to four and the combined weight of four indicators is one. Analysis of the results using this approach is

much more efficient due to its simplicity and transparency, and more importantly, its ability to ‘look behind the ranks’. This study used the values of the 24 indicators to calculate the state competitiveness index (SCI) in Malaysia. The derivation of the model used is as shown by Equation (1) below:

$$SCI_i = W_1 \cdot s_{i,1} + W_2 \cdot s_{i,2} + \dots + W_{24} \cdot s_{i,24} = \sum_{j=1}^{24} W_j \cdot s_{i,j} \quad (1)$$

where, s_{ij} represents indicator j for state i ; W_j denotes the weight for indicator j . Equal weighting means equivalent weights are assigned to every element from the same level, with the condition that each element is within the same range (0-100). The weight of each indicator is comparatively simpler to calculate due to its linear nature. One of the main issues when building an index is the weightage that is given to each component. It is very challenging to determine the actual weight of each indicator for every state by subjective judgement, as various aspects of the individual states are involved in the evaluation of urban competitiveness. Table 2 displays a three-level hierarchical system of indicators that was utilized in the present study to calculate the competitiveness of states.

Table 2

Composite Indicator System Used to Evaluate State Competitiveness in Malaysia

Level I	Level II	Level III
State Competitiveness Index	Economic Performance (EP)	GDP per capita
	Economic Structure (ES)	Contribution of secondary sector in GDP, et al.
	Marketization and Openness (MO)	Domestic and foreign investment, et al.
	Social Aspect (SA)	Number of secondary schools per millions student, et al.
	Domestic Security (DS)	Numbers of violent crime per million people, et al.
	Environmental Quality (EQ)	Scheduled waste managed per thousand people, et al.

Twenty-four indicators were utilized in six subgroups to investigate state competitiveness. In general, the first level referred to the state competitiveness index that contained six components in the following stage. The second level featured six key components from the third stage. The third level was grounded by the review of past literature, with the existing data for indicators from the fourteen states in Malaysia being factored in. A list of all indicators is given in the Appendix attached at the end of this paper. This study was also aimed at identifying factors that cause differences in economic growth in the various states. In order to fulfil this objective, key components for evaluating state competitiveness were considered, such as structure, economy, marketization and openness, social aspects, domestic security and environmental quality as explanatory variables, and GDP per capita as the dependent variable. Results of this study have included information for every state in Malaysia from 2005 to 2016. This period was selected for analysis as there was a surplus of data available. An econometric model uses a general equation, as is shown Equation (2):

$$EG_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Y_{it} + \alpha_i + \varepsilon_{it} \quad (2)$$

where, i represents the states in Malaysia ($i = 1, \dots, 14$), and t represents time ($t = 2005 \dots, 2016$). EG_{it} is the dependent variable that represents the GDP per capita. β_0 is the common intercept and β is the vector of coefficients associated with explanatory variables. X_{it} is the vector of explanatory variables for state i at time t . Y_{it} is the vector of explanatory variables for country i at time t . ε_{it} is the random term for country i at time t . This study's model adapted the Fixed Effects Model (FEM) and the Random Effects Model (REM) as expressed in Equation (3) and Equation (4):

$$y_{it} = (\alpha + \mu_i + \lambda_t) + X_{it}'\beta + v_{it} \quad (3)$$

$$y_{it} = \alpha + x'_{it}\beta + (\mu_i + \lambda_t + v_{it}) \quad (4)$$

Where: $i=1, \dots, N$, $t=1, \dots, T$, $\mu_i \neq 0$, $\lambda_t \neq 0$, explanatory variables were represented by the structure economic index (SE), marketization

and openness index (MO), social aspect index (SA), domestic security index (DS) and environmental quality index (EQ). Index of explanatory variables were generated from the previous section.

Since the data included both time series and cross-sectional data, a regression model was applied to the balanced panel data for analysing explanatory variables related to the growth of state economies in Malaysia. Two different models were used to investigate the model designed for this study, due to features of its unique characteristics. The models used were the FEM and the REM. The FEM investigated the link between the predictor and outcome variables of an entity and presumed that the independent variables were constant observation units. These units were calculated using differences in each unit over time. In contrast, the REM was superior when there were variables excluded or if it was believed that the excluded variables had no relation with the explanatory variables considered in the model. This model effectively calculated skewed estimates of coefficients, utilized every data in hand, and optimized accuracy. Greene (2003) and Baltagi (2008) stressed that one notable difference between fixed and random effects was whether the excluded individual effect incorporated elements that were associated with regressors in the model. The Hausman test used to test differences in coefficients between the FEM and the REM was systematic (Schmidheiny & Basel, 2011). This study utilised the Hausman test to determine the choice between the FEM and the REM.

RESULTS AND DISCUSSION

Constructing a State Competitiveness Index

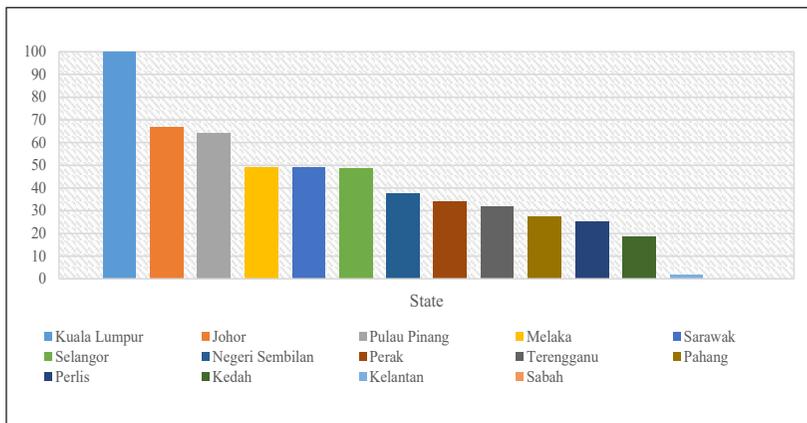
A three-level hierarchical system of indicators was applied in this study. In line with data in Table 2, the state competitiveness index was the first level in the system, followed by the second level, which was measured based on the six core components mentioned earlier. The third level was made up of twenty-four indicators from different dimensions. This system was created based on the review of previous

studies on city competitiveness, factoring on the availability of data for all states in Malaysia. This study produced a ranking for state competitiveness level in Malaysia. The components discovered by this study for calculating state competitiveness were separated into six major components derived from the economic, social and environment indicators. In accordance with the Equal Weighting System, relative indicators were used over absolute indicators to avoid possible influences, such as the size of the state and different administrative areas. Although size of the state is linked to economies of scale and agglomeration, these effects should be seen in other performance indicators in the state competitiveness concept.

Figure 1 shows the Index for State Competitiveness for the year 2016. Kuala Lumpur, Johor, Pulau Pinang obtained a relatively high state competitiveness index (> 60) while Kedah, Kelantan and Sabah only managed to muster a low state competitiveness index (< 20). The figure shows that the State Competitiveness Index experienced a significant drop by nearly 35 percent from 100 to 64.26 for the top three states, but the data was constant for states ranked four to eleven, ranging from 49.13 to 25.33. Meanwhile, the three bottom states obtained a score ranging from 0 to 18.5.

Figure 1

Index of State Competitiveness, 2016



The State Competitiveness Index for 2016 showed that Kuala Lumpur (in the state of Selangor) was the top-ranking state, obtaining a perfect score (100 percent), followed by Johor (66.71) and Pulau Pinang (64.26). The ranking of the other states was as follows: Melaka (49.18), Sarawak (49.13), Selangor (48.69), Negeri Sembilan (37.63), Perak (34.05), Terengganu (31.72), Pahang (27.48), Perlis (25.33), Kedah (18.5) and Kelantan (1.85), while Sabah (0.00) had the worst competitive index score in Malaysia. Disparity in the competitiveness scores between the top-ranked and worst-ranked state showed that the phenomenon of imbalance existed among states in terms of the competitiveness index. This study also investigated factors that caused the disparity in the competitiveness index scores between the top three and bottom three states. Kuala Lumpur, Johor, Pulau Pinang were the top three as they excelled in the economy component, compared to the other states in Malaysia. Kuala Lumpur scored the highest as it was the capital of Malaysia, and located in the wealthiest and most urbanized state. Johor had a strategic location as it was situated near to Singapore, and therefore, possessing higher foreign investments. Johor also scored the highest for Marketization and Openness components, with a score of 100.

On the other hand, Pulau Pinang, which was located in the Northern Region, was a key area for commodity trading dating back to the colonial period. It hosted the oldest industrial area in the country, which provided significant foreign investments into Malaysia. Pulau Pinang topped the score in all three economic components, which were Economic Performance, Economic Structure, as well as Marketization and Openness, as is shown in Table 3.

As the concept of city competitiveness is proportional to the components of economic, social and environmental competitiveness, Pulau Pinang undeniably achieved high scores in competitiveness. Table 3 shows that states with the top three highest scores in competitiveness had better performance in the economy (Economic Performance, Economic Structure and Marketization and Openness), social (Social Aspect) and environmental (Environmental Quality) competitiveness, compared with the three states recording the lowest score.

Table 3

State Competitiveness Index and Score for Six Main Components, 2016

State	Overall	Economic Performance	Economic Structure	Marketization and Openness	Social Aspect	Domestic Security	Environmental Quality
Kuala Lumpur	100.00	100.00	67.56	61.37	100.00	0.00	100.00
Johor	66.71	21.60	50.98	100.00	30.61	62.02	66.89
Pulau Pinang	64.26	39.67	54.18	50.43	50.98	34.22	95.49
Melaka	49.18	31.94	32.40	23.04	61.83	49.15	82.75
Sarawak	49.13	35.63	19.82	91.47	27.44	90.28	16.32
Selangor	48.69	35.97	100.00	36.68	4.22	49.68	53.16
Negeri Sembilan	37.63	30.09	26.78	18.45	62.96	50.61	58.64
Perak	34.05	16.21	27.52	12.00	66.28	71.46	43.66
Terengganu	31.72	16.00	21.31	5.54	44.37	76.97	66.14
Pahang	27.48	21.81	9.27	37.40	72.16	71.09	6.27
Perlis	25.33	11.17	11.48	0.00	66.66	59.13	63.31
Kedah	18.50	7.62	22.47	29.63	38.78	60.50	32.90
Kelantan	1.85	0.00	15.43	5.98	34.16	74.03	13.84
Sabah	0.00	11.15	0.00	26.92	0.00	100.00	0.00

Therefore, states with strong economic, social and environmental components were the most competitive states. Kuala Lumpur was found to be the most competitive state in Malaysia (2016), as it achieved higher competitive scores in Economic Performance, Economic Structure, Marketing and Openness, Social Aspects and Environmental Quality components, but scored less for Domestic Security. This finding shows that Kuala Lumpur has an imbalance and it has to achieve a higher Domestic Security Index while maintaining rapid economic development. Many factors might have caused such imbalances in competitiveness.

Regarding economic components, the top competitive states had higher per capita income, higher contributions from secondary and tertiary sectors to the GDP, substantial domestic and foreign investments, and featured the most tourist hotspots. Furthermore, top states had more productivity, a larger number of professionals and educated groups. In terms of social components, top states relied on the varying conditions of the society and local authority. Most indicators (subgroups) in the social component were closely linked to education, health, culture and infrastructure. Social competitiveness of top states was more significant as they featured more conducive, modern and comfortable environments compared with the other states. These three environments were further enhanced with the provision of better quality physical infrastructures such as the greater number of schools, hospitals, and transportation facilities. A lower unemployment rate also increased a state's competitiveness. It was clearly evident from the results that Kuala Lumpur, Johor and Penang topped the charts in the competitiveness index in Malaysia. In the environmental domain, states with the highest score in the competitiveness index were better equipped to curb the various types of air, water and land pollution.

Estimation Results

The objective of this study was also to identify the factors that could cause differences in the economic growth of states in Malaysia. In order to achieve this objective, this study looked into the key components used as explanatory variables when examining state competitiveness,

namely structure, economy, marketization and openness, social aspects, domestic security and quality of environment. The GDP per capita was the dependent variable. Three different models were applied for the regression analysis, namely the Ordinary Least Squares (OLS), the Fixed Effects Model (FEM) and the Random Effects Model (REM). Table 4 displays the results of the panel data model estimations and the Hausman test.

Table 4

Results of the Panel Data Model Estimations and Hausman Test

Dependent Variable—EG	OLS	FEM	REM
Structure economic	.0052*** (.0018)	.0027 (.0023)	.0032 (.0019)
Marketization and openness	.0032*** (.0010)	-.0001 (.0004)	1.03e-06 (.0004)
Social aspects	.0049*** (.0017)	.0028 (.0020)	.0026 (.0018)
Domestic security	-.0032 (.0024)	-.0054*** (.0014)	-.0056*** (.0013)
Environmental quality	.0011 (.0015)	.0030** (.0011)	.0029*** (.0013)
Sample	168	168	168
R Square		0.1718	0.1714
Hausman test			0.8448

Note: Standard errors in parenthesis. *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively.

The study reported here had carried out tests to evaluate which model was optimal for explaining the relationships identified in the competitiveness index. The Hausman test was used to determine the fixed and random effects. The present analysis indicated that the Hausman test had validated the H_0 hypothesis (H_0 : Random effect is preferred) (p -value = 0.845), which showed that the random effects model was more relevant. Although the Hausman test was in line with the null hypothesis, the random effects regression was much superior for explaining the links between variables tested in this study.

The analytical framework used in this empirical study was the regression analysis model. Results indicated that from 2005 to 2016, domestic security and the quality of the environment had a substantial impact on the economic growth of states in Malaysia. It can be concluded from the results shown in Table 4 that the regression model supported the data and the entire model was statistically significant and relevant to the study (p -value = 0.00). The table shows that R^2 had a value of 0.170, indicating that 17 percent of state economic growth variation could be explained by the independent variables selected for the model. In simpler terms, the state economic growth or GDP per capita was affected by the independent variables used in the model.

The results displayed in Table 4 showed that domestic security had a negative coefficient, but it was statistically significant (at 1% level), meaning that domestic security played a significant role in the economic growth of every state in Malaysia. As such, the increase in crime rate did not motivate state economic growth. This finding was in line with the results in studies by Chiang (2000), Detotto and Otranto (2010), Pan, Widner and Enomoto (2012), Goulas and Zervoyianni (2013), and Ahmad, Ali and Ahmad (2014), all of which stressed that domestic security, which was represented by the crime rate, did influence economic growth and was a key pillar of competitiveness.

Furthermore, the quality of the environment had a positive coefficient and it was statistically significant (at 1% level). This means that environmental quality played a major role in influencing the economic growth of states in Malaysia. The findings in the current study corroborated the results of previous studies, such as that in Panayotou (2016) and Hitam and Borhan (2012), indicating that environmental quality benefitted economic growth by enhancing competitiveness. Moreover, the present findings also showed that domestic security and environmental quality had an important role in enticing economic growth, especially in promoting competitiveness among the states in Malaysia. The positive relationship that existed between environmental quality and economic growth indicated that there was an inverse relationship between domestic security and economic growth.

CONCLUSION

In conclusion, Malaysia was no different in terms of the common performance and explanatory indicators that were found in other countries which experienced the development of a competitive city. This study investigated the concept of urban competitiveness from the perspective of the various states in Malaysia. Previous studies on competitiveness in more established countries, such as China and the United States, provided a useful reference for this study. Policymakers will benefit from this study since the most competitive state can be utilized as a benchmark.

The competitiveness concept, due to its broad prospective nature as defined in this study, is not limited to only economic competitiveness. State competitiveness should not be misunderstood as only referring to economic performance as that will prevent policy implementations. Malaysia needs to adopt a sustainable and competitive development paradigm comprising not only economic perspectives, but also social and environmental ones as well. In order to sustain competitiveness, a state must have outstanding economic performance, as well as social and environmental development.

The empirical results have shown that when enhancing state competitiveness in Malaysia, the social security index was negatively significant to economic growth, while the environment quality index was positively significant to economic growth. The review of literature has shown that various indicators from the economic, social and environmental perspectives are factors that significantly affect the level of economic development due to states competitiveness. Besides that, these factors were also included in the analysis as control variables. They were useful in measuring trends in economic, social and environmental perspectives of competitiveness in the panel. Excellent achievement in all three main dimensions will lead to an accomplished and balanced development of the state. The results of this study can assist in monitoring the dynamic changes in the environmental development of states in Malaysia.

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APPENDIX

List of All Indicators

Indicators	Sources
Economic Performance (EP)	
GDP per capita (RM)	Department of Statistics (DOS)
Economic Structure (ES)	
Contribution of secondary sector in GDP (%)	Department of Statistics (DOS)
Contribution of Tertiary sector in GDP (%)	Department of Statistics (DOS)
Marketization and Openness (MO)	
Percentage of employment in the secondary sector per labour force (%)	Department of Statistics (DOS)
Percentage of employment in the secondary sector per labour force (%)	Department of Statistics (DOS)
Projects approved with foreign participation (RM Million)	Malaysian Investment Development Authority (MIDA)
Foreign owned (51% and above) projects approved (RM Million)	Malaysian Investment Development Authority (MIDA)
Number of hotel guests (Numbers)	Tourism Malaysia
Social Aspect (SA)	
Number of secondary schools per millions student (Numbers)	Ministry of Education (MOE)
Ratio of teachers and students in secondary schools per thousand students (Numbers)	Ministry of Education (MOE)
Number of doctors per million persons (Numbers)	Ministry of Health (MOH)
Number of hospitals per million persons (Numbers)	Ministry of Health (MOH)
Number of hospital beds per million persons (Numbers)	Ministry of Health (MOH)

(continued)

Indicators	Sources
Number of clinics and rural clinics per million persons (Numbers)	Ministry of Health (MOH)
Number of post offices per million persons (Numbers)	Pos Malaysia Berhad
Number of registered vehicles per thousand persons (Numbers)	Ministry of Transport (MOT)
Unemployment rate (%)	Department of Statistics (DOS)
Domestic Security (DS)	
Numbers of violent crime per million persons (Numbers)	Royal Malaysia Police
Property crime Per million persons (Numbers)	Royal Malaysia Police
Number of drug addicts per million persons (Numbers)	National Anti-Drug Agency
Number of road accidents per million persons (Numbers)	Royal Malaysia Police
Quality of Environment (QoE)	
Scheduled waste managed per thousand persons (Numbers)	Department of Environment
Ratio of total length of paved road and total area of land (Numbers)	Malaysian Public Works Department
Ratio of non-forest area and total area (Numbers)	Ministry of Water, Land and Natural Resources
