Analyzing the Importance of Transportation and Financial Services Sectors using Economic Linkages Analysis

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***Abstract*- For decades the agricultural sector has been the most important sector in Malaysia. It was followed by the magnificent growth of the manufacturing sector before the closing of the 20th century. However, after the year 2000, there was a tremendous growth in the service sector worldwide. This scenario has embarked the government to focus more emphasis on the growth of the service sector. It is evident that in 2010 alone, this sector contributed about 58.5% share of the gross domestic product (GDP) in Malaysia. Out of all the service sectors, two-subsectors, namely the transportation and financial sub-sectors account for more than one-third contribution to the national GDP. This paper attempts to analyze the importance of the transportation and financial service sub-sectors in Malaysia using economic linkages analysis. From this approach, we could calculate the values of the backward as well as the forward linkages of various sectors in Malaysia using available input-output tables. Thus, we could reveal the strength of both the transportation as well as the financial sectors as the suppliers to or consumers of other sectors in the economy. In retrospect, the analysis can be used as an economic planning tool whether the government could embark on a more rigorous effort to enhance these two-subsectors as good spots for future growth potentials.**

Keywords: transportation and financial service sector, economic linkages analysis, backward and forward linkages.

I. INTRODUCTION

The first three decades after independence, Malaysia was affluently a commodity-based country, i.e predominantly agricultural based economy. The agricultural sector was initially the foundation and the driving force behind the national economic growth [1]. However, in the seventies and the eighties, the emphasis of the primary sector had shifted the economic structure from commodity-based approach to the product-based approach, i.e manufacturing. Thus the government policy of "import substitution" was replaced to the "export-promotion" policy.

In preparing the nation towards 2020, the government provides policy frameworks and supports to improve the economy. Henceforth, currently the economy is undergoing a structural shift from product-based economy to service-oriented economy. The idea is to embark on a new economic outlook for the betterment of its citizens through the transformation of Malaysia to a high-income economy. It is a great opportunity for Malaysia to do so because the service sector has become the largest contributing sector to the GDP (gross domestic product) of Malaysia since the year 2000. The percentage share of service sector to the overall GDP has increased from 55% in 2008 to 58.5% in 2010 [2].

II. MALAYSIAN SERVICE SECTORS

A. Overall Service Sector Performance

Sector contribution to the economy is normally estimated by measures such as the shares to the GDP, growth rate as well as employment. Data from Economic Report Malaysia 2010, revealed that the main contributor to the Malaysian GDP was no longer originated from agriculture, manufacturing or other sectors but it came from the service sector. Table I shows the percentage share of service sector in terms of GDP to the overall economy from 2008 to 2010.

TABLE I: SHARE OF THE GROSS DOMESTIC PRODUCT BY SECTORS IN MALAYSIA 2008-2010

	Share of GDP (%)		
Sectors	2008	2009	2010
Agriculture	7.5	7.6	7.6
Mining	8.1	8.1	7.9
Manufacturing	29.1	26.4	26.2
Construction	3.0	3.2	3.2
Services	55.0	57.9	58.5
Less: FISIM	3.9	4.3	4.5
Add: Imports	1.3	1.2	1.1
GDP	**100.0**	**100.0**	**100.0**

Source: Economic Report Malaysia, 2010.

From the table, it shows that there was only a nominal increase of the percentage share of agriculture to the GDP from 2008 to 2010, a slight decrease in percentage share in manufacturing during the same period. However, in the case of service sector the percentage share to GDP increased from 55.0% in 2008, to 57.9% in 2009 and 58.5% in 2010.

The figures illustrated by the services sector illustrate its importance in the growth and the development process in the Malaysian economy [3]. The sector is certainly in line with the growth transformation that has taken place in many of the developed economies whereby services sector forms a major

structural component of the economy compared to manufacturing or primary sector.

B. Performance of Transportation and Financial Services Sectors

Further to the above, there are two major subsectors which contributed more to the overall services sector. These subsectors are transportation and financial services sectors. Table 2 below depicts the services subsectors performance in 2008 and 2010.

TABLE II: SERVICE SECTORS' PERFORMANCE AND SHARE OF GDP 2008 AND 2010

Sectors	Change (%) 2008	Change (%) 2010	Share of GDP (%) 2008	Share of GDP (%) 2010
Intermediate Services:				
Transport & storage	6.1	2.1	3.8	3.8
Communication	7.3	6.6	3.9	4.4
Finance and insurance	7.7	4.0	11.0	11.8
Real estate and business	1.5	3.1	5.1	5.4
Final Services:				
Utilities	2.1	1.8	2.9	2.9
Wholesale and retail	9.8	3.5	12.8	13.5
Accomm. & Restaurants	7.3	3.1	2.4	2.6
Other Services	5.2	5.0	5.7	6.3
Government Services	11.1	2.8	7.4	7.8
Total	**7.2**	**3.6**	**55.0**	**58.5**

*Sources: Department of Statistics (DOSM), Malaysia 2010, 2011.

Looking at Table II, the subsectors of transport, communication, finance and insurance shows that in 2008 the percentage change from the previous year was a bit lower for transport (6.1%) compared to the overall change in services of 7.2%. However, for communication (7.3%) and finance and insurance (7.7%), they are more than the overall change in services. The year 2010 also saw the same scenario whereby percentage change of transport (2.1%), communication (6.6%) and finance and insurance (4.0%), lower for transport and higher for communication and finance subsectors compared to the overall service sector change of 3.6%.

The percentage share of GDP for the three subsectors of transport, communication and finance are respectively equal to 3.8%, 3.9% and 11.0% in 2008, while the respective percentage share to the GDP for 2010 are 3.8%, 4.4% and 11.8%. Therefore, these three subsectors accounted for 18.7% to the overall contribution to the GDP in 2008 and increased to 20.0% in 2010. All these made up of 34% and 34.2% of the overall services sectors contribution for the two years. Therefore, it is pertinent to pursue the study on the importance of these subsectors and their interrelationship with the rest of the economy.

III. OBJECTIVES

The objective of this study is to analyze the importance of the transportation and communication as well as the financial service sectors in the Malaysian economy.

IV. METHODOLOGY

The exercise utilizes the methodological approach through the use of economic linkages analysis which is part of the input-output framework. The analysis is based on the calculation of both forward as well as the backward linkages.

A. Input-Output Analysis

The input-output framework consists of input-output tables which describe the complex process of production, the use of goods and services and the way in which income and value-added products are generated within the various sectors of the economy, where the set of producers of similar goods and services forms a homogenous industry [4]. Through a set of tables during a given period, the structural change in the economy and the specific sector's economic characteristics can be revealed.

The Input-Output Analysis shows the interrelationship or interdependence among the various sectors of a complex economic system [5]. Besides, it can be used to predict changes in the overall economic activity as a result of a change in the local economy. The major strength of the input-output analysis is that it provides detailed information on direct, indirect and induced effect of a particular economic unit on all economic measures for different industries in the local economic setting [6].

The application of input-output analysis is so vast that it has been used in many areas of economic planning, policy changes, economic development as well as productivity. For instance, Isard as early as in 1951 used input-output analysis as a form of regional and interregional planning [7]. Saunders (1994), on the other hand, looked at the extent of communications industries and economic development [8], whereas Valadkhani (2003) and Sauian (2002) utilized the input-output approach in dealing with labor productivities [9,10]

B. Economic Linkages

Economic linkages analysis is part of input-output analysis and consists of backward and forward linkages. These linkages measure the interrelationship or interdependence between sectors. They are descriptive measures of the economic interdependencies of industries in terms of the magnitude of the transaction [11]. The analysis of strengths of the backward and forward linkages facilitates the identification of the most important sector in a given economy.

In many circumstances, the easiest and reputable measure of backward and forward linkages was due to Rasmussen [12]. It is easily understood as it endorsed values of indices which are greater than unity as strong linkage. For instance the direct and indirect backward linkage index is measured by the power of dispersion index, while the direct and indirect forward linkage index is measured by the sensitivity of the dispersion index. The respective indices can be depicted in equations (1) and (2).

The direct and indirect backward linkage index (the power of dispersion index) is given by U_j.

$$U_j = \frac{\frac{1}{n}\sum_{i=1}^{n} r_{ij}}{\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n} r_{ij}} \quad (1)$$

The direct and indirect forward linkages index (the power of the index of sensitivity) is given by U_i :

$$U_i = \frac{\frac{1}{n}\sum_{j=1}^{n} r_{ij}}{\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n} r_{ij}} \quad (2)$$

where r_{ij} is the value of the i^{th} row and j^{th} column of the matrix of interdependent coefficients of input-output tables, n is the number of sectors involved. In essence, the numerator of equation (1) represents the column sum of the inverse matrix coefficients, whereas the numerator of equation (2) represents the row sum of the inverse matrix coefficients and the denominator represents the mean or average of the overall row and column sums.

V. DATA SOURCES

The data used are taken from the Input-Output Tables Malaysia 2000 and Input-Output Tables Malaysia 2005 [13,14]. These two tables are the latest input-output tables currently available. Other relevant data for the exercise involved data of GDP and sector growth from the Economic Report Malaysia 2010 and Growth of Gross Domestic Product 2002 to 2010 from the Malaysian, Department of Statistics [15].

VI. RESULTS AND DISCUSSION

Using equation (1) as stated in the previous section, the index of dispersion or the backward linkages of the services sectors for the years 2000 and 2005 are given in Table III below. It is noted from the table that the transportation subsectors are further disaggregated into 5 subsectors, namely land transport, water transport, air transport, other transportation and communications.

TABLE III: BACKWARD LINKAGES' INDICES OF SERVICE SECTORS 2000 AND 2005

Service Sectors	2000	2005
Land Transport	0.947	0.730
Water Transport	1.435	2.362
Air Transport	0.849	1.000
Other Transportation	0.974	0.742
Communication	0.847	0.683
Finance and Insurance	0.921	0.890
Utilities	1.051	1.067
Business Services	1.109	1.071
Real Estate	0.852	0.833
Wholesale and Retail	0.845	0.748
Accomm. and Restaurants	1.142	1.118
Government Services	0.920	0.867

From table III, the results depict that water transport, utilities, business services and accommodations and restaurants services subsectors show strong backward linkages for both years 2000 and 2005 as the values of the indices are greater than unity. However, air transport shows strong backward linkage in year 2005.

For the case of transportation and financial subsectors, on the other hand, only water transport and air transport show strong backward linkages. This means that these subsectors are good suppliers of inputs to the rest of the sectors in the economy. Looking at the communication subsector, it shows medium to strong backward linkage in 2000(0.847) but rather low backward linkage in 2005 (0.683). For the case of financial and insurance subsectors the values of the backward linkages are from medium to strong for both years of 2000 and 2005, i.e 0.921 and 0.890 respectively.

Following equation (2), the results for the forward linkages or the index of sensitivity of dispersion from the major service sectors for the years 2000 and 2005 are shown in Table IV. As can be seen from Table IV, strong forward linkages are seen in water transport, other transport, utilities and business services subsectors in the year 2000. However, in 20005, the subsectors that show high forward linkages are air transport, finance and insurance, utilities, business and wholesale and retail sectors.

Looking at subsectors of transportation, communication and the financial subsectors, it is obvious that water and other transport dictate strong forward linkages in 2000 but air transport and financial subsectors show strong forward linkages in 2005. This means that they are good purchasers of inputs from other sectors in the economy.

By and large, for the rest of the transportation and financial subsectors, the values of the forward linkages are between medium to strong forward linkages for both years 2000 and 20005. For instance, in 2000 the land transport, air transport, communications as well as financial subsectors show medium to high indices of forward linkages with respective values of 0.888, 0.994, 0.881 and 0.719.

TABLE IV: FORWARD LINKAGES" INDICES OF SERVICE SECTORS 2000 AND 2005

Service Sectors	2000	2005
Land Transport	0.888	0.746
Water Transport	1.057	0.801
Air Transport	0.994	2.333
Other Transportation	1.060	0.729
Communication	0.881	0.935
Finance and Insurance	0.719	1.144
Utilities	1.750	1.157
Business Services	1.053	1.073
Real Estate	0.896	0.936
Wholesale and Retail	1.186	1.146
Accomm. and Restaurants	0.938	0.831
Government Services	0.633	0.604

*Calculated from Input-Output Tables Malaysia, 2000 and 2005.

In 2005, land transport, water transport, other transport and communications also show medium to high forward linkages of

0.746, 0.801, 0.729 and 0.935 respectively. None of the subsectors of transportation and financial sectors shows low index of forward linkages.

Combining the backward and forward linkages together, it was found that in the year 2000, water transport had both high backward and forward linkages, whereas in 2005, air transport had both high backward and forward linkages. There are therefore both are good users as well as good purchasers of input from other sectors or industries in the especially in the service sectors.

VII. CONCLUSION

The study reveals that we can analyze the importance of various sectors in the economy using economic linkages analysis. As can be seen from the results it is obvious that the transportation, communication and financial subsectors play important roles in the generation of value-added of other sectors in the overall economy. The values of the backward linkages and the forward linkages range between medium to high in all sectors within these grouping. It means that all these sectors are important providers as well as purchasers of inputs to all other sectors in the economy.

Further, it was also shown that these three subsectors accounted for the large share in the contribution of GDP to the Malaysian economy, about 20% share of the total GDP of Malaysia in 2010. Taking into account of the overall service sectors, these subsectors of transportation, communication and financial service sectors accounted about 34% contribution. It makes sense that the government takes a concerted effort to promote the overall service sectors in the Economic Transformation Programme (ETP) for future development [16]. Such effort has a rational stand as these subsectors have strong interdependence to business services, utilities, tourism, banking as well as ICT (information technology and communications) in the economic structure of Malaysia.

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