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Construction of Regional Input-Output Table for Sarawak Economy

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Abstract
This aim of this study is to analyse the structure of Sarawak economy through constructing the regional input-output table (RIOT). Limited studies on regional input-output in Malaysia made this study essential to study the economics of Sarawak. This table is a valuable tool for developing the economy as it gives an overview of Sarawak's economic structure. The construction of the RIOT applied the RAS technique using the data from 2015. This regional table assumes Sarawak's technology level and the nation are the same. Results of the study indicate Sarawak's economy has a high dependency on natural resource sectors, especially mining and quarrying, and petroleum products. However, although the output generation for some sectors are lower, those sectors still give significant contribution to the primary inputs of Sarawak economy.
Keywords: Input-output Table, RAS Technique, Final Demand, Primary Inputs, Sarawak

Introduction

The economic structures of Sarawak could be studied by constructing a regional input-output table. It is also a helpful tool for understanding the interdependency of different sectors and their impact on the economy and society. Hence, a lot of study in regional economics depends on the input-output table. This table provides details information for every sector of the economy. However, in most cases, the implementation of input-output analysis at the regional level is hindered due to the availability of a regional input-output table. The different economic structures at the national and regional levels would lead to different outcomes. The most cost-effective way is to use the national input-output table by regionalising it based on regional structure.

The economic structure and its contribution at the regional level are different. Based on the GDP at the regional level, Sarawak is one of the main contributors to Malaysia's GDP. Sarawak contributed 10 percent to the national GDP and ranked third as the most significant contributor after Selangor (22.6 percent) and Kuala Lumpur (15.1 percent) in 2015. The four main sectors driving Sarawak's economy were agriculture, mining and quarrying, manufacturing, and private services. This has been consistent for the past few years (2011-2015). In 2015, these sectors represented 90.4 percent of Sarawak's GDP, with agriculture

accounting for 14.3 percent, mining and quarrying contributing 22.3 percent, manufacturing at 27.1 percent and the private services sector at 26.7 percent (Socioeconomics Reports, Department of Statistics Malaysia, 2017). (Refer to table 1)

Table 1
Sarawak GDP Shared by Sector (Percentage Share to GDP)

Sector	2011	2012	2013	2014	2015
Agriculture	13.9	14.2	14.0	14.5	14.3
Mining & Quarrying	25.5	23.4	23.8	23.2	22.3
Manufacturing	27.7	27.7	27.3	27.2	27.1
Construction	2.4	2.9	2.8	2.6	3.0
Private Service	24.8	25.7	25.8	26.2	26.7
Government Service	5.3	5.8	6.0	6.2	6.2
Import Duties	0.3	0.3	0.2	0.2	0.3
Total	100.0	100.0	100.0	100.0	100.0

Source: Department of Statistics Malaysia, 2017

Moreover, in terms of Malaysia's employment in 2015, Sarawak ranked fourth after Selangor, Sabah, and Johor. Sarawak recorded total employment of 1214.8 million in 2015, compared to 1058.1 million in 2011. Meanwhile, the unemployment rate is at 3.5 percent, much lower than 4.1 percent in 2011. An increase in total employment and better economic growth drove this.

Policymakers require detailed information for economic planning and determining potential sectors in particular areas. Constructing the input-output table will give a clear picture for decision-making as this table could portray the flow of demand and supply and the inter-dependency of every sector in the economy (Leontief,1985). It is a handy planning tool for developing the region. Thus, this paper aims to present the result of developing an input-output table for Sarawak.

Using the national table as a reference, the construction of this table used the non-survey method by applying the RAS technique. RAS procedure will only be used to estimate the intermediate deliveries (first quadrant) between the sector. At the same time, the estimation for final demand and primary input will be based on actual data. This study assumes that Sarawak's technologies are the same at the national level. This assumption should give the closest accuracy (Miller, 1957).

			Intermediate Demand									Final Demand							
																Exports			
			1	.	.	.	j	.	.	.	n	Total Intermediate Demand	Private consumption	Government Consumption	Changes in Inventories	Gross Fixed Capital Formation	Foreign Commodities	Inter-regional Commodities	Total Final Demand	Total Use
Intermediate Demand		1	First Quadrant (I) Intermediate Demand										Second Quadrant (II) Final Demand							
		.																		
		.																		
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		.																		
		n																		
		Total Intermediate Demand																		
Primary Inputs		Direct Purchases Abroad by Residents	Third Quadrant (III) Primary Inputs										Fourth Quadrant (IV) Primary Inputs to Final Demand							
		Domestic Purchases by Non-Residents																		
		Total Input																		
		Taxes on Products																		
		Subsidies on Products																		
	Imports	Foreign Commodities																		
	Imports	Inter-region Commodities																		
		Value Added																		
		Total Primary Input																		
		Total Output																		

Figure 1: Regional Input-Output Table
Source: Sarawak Input-Output Table 2015

Figure 1 illustrates the structures of the regional input-output table for Sarawak. This study used the national input-output structure as a reference to construct the regional input-output table. Since there is a limitation to obtaining specific data for some sectors, the national table was harmonised into 20 sectors. The error in the estimation analysis could be minimised, especially for the data with small values. As a result, the unstable coefficient can be reduced. This input-output table has four main quadrants: intermediate deliveries; final demands; primary inputs; and transaction of primary inputs to final demands. The first quadrant is presented in the form of 20 X 20 matrix sectors in both columns and rows, while the second quadrant is shown in the form of 20 rows of sector X 5 columns of different industries, namely private expenditure; government expenditure; gross fixed capital formation; changes in inventories; and exports. On the other hand, the primary inputs quadrants include six different rows of industries (abroad purchase; domestic services; imports; taxes; subsidies; and value-added) X 20 sectors in the column. And the fourth quadrant consists of 6 rows of primary inputs X 5 columns of final demands.

The available input-output table for Malaysia could not fully utilised by the state of Sarawak as the structure of Sarawak economy are mainly on resource based compared to Malaysia as a whole which more focusing on non-resource based. Thus, the construction of regional input-output table would ease the planning and policymaking processes for Sarawak. The objective of this study is to analyse the economic structure of Sarawak through the construction of regional input-output table.

Literature Review

This section includes the significant results based on past research to establish the research gaps in constructing the regional input-output table. It is an approach to analysing the interdependency and interrelation with sectors in the region's economic system regardless of the economic size. Miller and Blair (1985) stated that input-output analysis could show economic industry distribution through the linear equation system. There are three significant alternatives in constructing an input-output table: survey-based, namely survey-based method, non-survey based method, or hybrid. Survey-based approaches are usually applied to the input-output of the national table to determine primary data elements. The data from the survey were used to analyse the supply-use table.

On the other hand, the non-survey approach uses the existing national input-output table to construct the regional input-output table. As the survey-based method requires considerable expenses, non-survey based is commonly used. By using the non-survey approach, the structure of the regional input-output table can be derived from the national input-output table. However, to obtain greater accuracy, it is undeniable that some data need the application of survey-based and non-survey-based approaches, namely hybrid methods.

It is essential to construct a better accuracy table based on its framework, partitive and holistic (Jensen, 1980). The main idea of the partitive framework is to determine the elements of economic and social with significant impacts but eliminating the non-significance factors without solid reason would cause a false outcome. However, holistic works best in encountering this issue by focusing on its morale security rather than excluding the non-significance of the element factors. Moreover, it is also essential to consider regional specialisation during the coefficient estimation (McCann & Dewhurst, 1998). Flegg and Webber (2000) also discuss the finding where the region specialisation would generate a better outcome and significant input-output table.

RAS is suggested as the best non-survey approach by (Morrison and Smith, 1974). RAS was found to have a better estimation of the input-output coefficient. This was supported by Allen (1974), which stated RAS procedure has better accuracy with lower significance error by including additional data information. The study by Sawyer and Miller (1983) also highlighted the same outcome, where including more detailed information on the RAS approach reduces error in the estimation outcome. Hewings (1977); Harrigan et al (1980) studied showed a misleading analysis after comparing different regional models after applying the RAS procedures. Even so, Park et al (1981) stated the cause of error in the study was caused by the error of regional purchase rather than the estimated technical coefficient.

Data Description and Methodology

Based on the literature, constructing an input-output table could be constructed through three main methods: survey-based, non-survey-based, and hybrid. In the past, to ensure the constructed table's reliability, the data was compiled using a survey-based method. Although this approach produced better accuracy, it is indeed time-consuming and costly. Thus, a lot of studies preferred the non-survey method or the hybrid method. For this study, the non-survey method was applied.

Through the non-survey-based method, the regional input-output table was constructed based on the Malaysia input-output table 2015. The economic indicator of Sarawak, such as

employment, income, output and value-added, were estimated symmetrically to adjust the regional table. The regional input-output table for Sarawak is estimated using 2015 as the base year to ensure consistency with the national table. The RAS procedure, a non-survey method, was applied as the alternative to the survey method. RAS was introduced by Stone (1963) and has been widely used since then, such as (Allen, 1974; Pigozzi and Hinojosa, 1985; Saari and Rashid, 2009; Hassan et al., 2019).

The RAS procedure will only be applied to estimate the first quadrant for data estimation. In contrast, other quadrants will be based on the published data from various resources such as Sarawak's Household income and Expenditure Survey (HES), the Economic Planning Unit (EPU) of Sarawak, and Sarawak External Trade. Based on the structure of the national input-output table, the estimation Sarawak input-output table for the first quadrant is derived by using the RAS procedure. Based on Sarawak's intermediate input and intermediate output, this approach will estimate the flow of transactions between sectors in the first quadrant of Sarawak symmetrically by adjusting the Sarawak table based on the national table 2015. Generally, sectors with homogenous production tend to have the same production structure. Hence, the level of technology and usage of input at the regional level was assumed to be the same as the national table. This assumption should give the closest accuracy (Miller, 1957).

The RAS operation approach can be explained using the following equation:

$$RAS = M \qquad \text{(Equation 1)}$$

Where R and S represent the diagonal matrix while A and M represent the national and regional level of input matrix coefficients, respectively, a diagonal matrix of R work on the adjustment of the excess of matrix rows, while a diagonal matrix of S works as an adjustment on the excess of matrix columns. The matrix's pre- and post-multiplication with the diagonal matrix resulted in the matrix M, where every element of m_{ij} of the matrix, M are generated based on every element of $e_{ij}$of matrix A as the following equation:

$$r_i a_{ij} s_j = m_{ij} \qquad \text{(Equation 2)}$$

Both A and M have the same elements, which makes the two dimensions similar. Every element in R should have the same row number of A and M, and the element in matrix S will be based on the number of the columns of A and M. Element R and a_{ij} in the RAS approach are obtained through the multiplication of every element in row i matrix A with the same R factor, which will result in matrix V as the following equation:

$$RA = W \quad \text{or} \quad r_i a_{ij} = w_{ij} \qquad \text{(Equation 3)}$$

Therefore, to form matrix M, every element in column j matrix W multiply by every element in column j factor S, which will result in matrix WS as the following equation:

$$WS = RAS = M \qquad \text{(Equation 4)}$$

where,

$$w_{ij} s_j = r_i a_{ij} s_j = m_{ij} \qquad \text{(Equation 5)}$$

The equation form for the purchase of inter-sector is as follows,

$$\begin{aligned} Q_1 &= q_{11} + q_{12} + q_{13} + \cdots + q_{1j} + \cdots + q_{1n} + E_1 \\ Q_2 &= q_{21} + q_{22} + q_{23} + \cdots + q_{2j} + \cdots + q_{2n} + E_2 \\ Q_3 &= q_{31} + q_{32} + q_{33} + \cdots + q_{3j} + \cdots + q_{3n} + E_3 \\ &\vdots \\ Q_i &= q_{i1} + q_{i2} + q_{i3} + \cdots + q_{ij} + \cdots + q_{in} + E_i \\ &\vdots \\ Q_n &= q_{n1} + q_{n2} + q_{n3} + \cdots + q_{nj} + \cdots + q_{nn} + E_n \end{aligned} \qquad \text{(Equation 6)}$$

Based on the equation, the Q_i indicates the total output of sector *i*, while the q_{ij} indicates the inter-sector sales from sector *i* to sector j and the E_i indicates final demand for the product of sector *i*. The general assumption of this method is to determine the sector *j*'s needs for the sector *i*'s output proportional to the sector *j*'s output. The input coefficient for the estimation can be measured through this formula:

$$b_{ij} = \frac{q_{ij}}{q_j} \qquad \text{(Equation 7)}$$

where q_{ij} represents input from sector *i* required to produce one unit worth sector *j*'s product and q_j is the total input of sector *j*. This b_{ij} will determine the output and input sector fixed relationship. Therefore, the notation of q_{ij} can be replaced with $b_{ij}q_j$ as,

$$\begin{aligned} X_1 &= b_{11}q_1 + b_{12}q_2 + b_{13}q_3 + \cdots + b_{1j}q_j + \cdots + b_{1n}q_n + E_1 \\ X_2 &= b_{21}q_1 + b_{22}q_2 + b_{23}q_3 + \cdots + b_{2j}q_j + \cdots + b_{2n}q_n + E_2 \\ X_1 &= b_{11}q_1 + b_{12}q_2 + b_{13}q_3 + \cdots + b_{3j}q_j + \cdots + b_{3n}q_n + E_3 \\ &\vdots \\ X_i &= b_{i1}q_1 + b_{i2}q_2 + b_{i3}q_3 + \cdots + b_{ij}q_j + \cdots + b_{in}q_n + E_i \\ &\vdots \\ X_n &= b_{n1}q_1 + b_{n2}q_2 + b_{n3}q_3 + \cdots + b_{nj}q_j + \cdots + b_{nn}q_n + E_n \end{aligned} \qquad \text{(Equation 8)}$$

Based on the notation, the equation of each sector in Equation 9 can be simplified in a simple notation of matrix form as

$$Q = AQ + E \qquad \text{(Equation 9)}$$

where A represents the input-output matrix's coefficient, Q is the output's vector, and E is the final demand's vector. By including the identity matrix, the equation can be written as

$$Q = (I - Q)^{-1}E \qquad \text{(Equation 10)}$$

where $(I - Q)^{-1}$ is an inverse matrix representing the final demand, the economy needs to utilise the production sector activities, and E is the final demand's vector.

Empirical Study

The constructed input-output table 2015 for Sarawak has identified 20 sectors in the Sarawak economy. This is shown in Table 2 below. Based on Table 2, the total RM391,998 million of total output and RM236,269 million of intermediate input-output were recorded. Mining and

quarrying recorded the highest output contributor, with a total of RM236,269 million (23.8%). This sector actively involves crude oil, metal ores, clay, sand, stone, natural gas, etc.

Meanwhile, wholesale and retail trade and petroleum products ranked second and third. Wholesale and retail trade was estimated at a total of RM41,185 million (17.4%), while petroleum product was estimated at 28,428 million (12%). However, the performance of output production for forestry and logging (RM2,181 million), chemical products (RM2,169 million), fixture and furniture products (RM1,759 million), and fishing and aquaculture (RM0.484 million) recorded less than 1%. Even so, these sectors are still crucial in supplying sources for production to other economic sectors.

Table 2
The Production of Sarawak Output

Sector	RM (million)	Percentage (%)
Agriculture and Livestock (AGL)	7,580,594	3.21
Forestry and Logging (FOL)	2,180,961	0.92
Fishing and Aquaculture (FIA)	484,246	0.20
Mining and Quarrying (MIQ)	56,316,316	23.84
Food Manufacturing (FDM)	13,516,867	5.72
Wood Manufacturing (WDM)	2,798,411	1.18
Fixture & Furniture Products (FNF)	1,758,698	0.74
Petroleum Products (PET)	28,428,264	12.03
Chemicals Products (CHE)	2,168,764	0.92
Metal and Non-metallic Products (MNM)	3,820,200	1.62
Electronic and Non-Electronic Products (ENE)	9,043,261	3.83
Other Manufacturing (OTM)	5,179,460	2.19
Utilities (UTI)	2,923,888	1.24
Construction (CON)	16,447,613	6.96
Wholesale and Retail Trade (WRT)	41,185,047	17.43
Accommodation, Food and Beverage (AFB)	5,169,086	2.19
Transports, Storage and Information (TSI)	12,523,375	5.30
Finance, Real Estate & Business Service (FRB)	13,744,182	5.82
Other Services (OTS)	8,384,598	3.55
Government Services (GOS)	2,615,607	1.11
Total	**236,269,436**	**100.00**

Source: Sarawak Input-Output Table 2015

For Sarawak to generate its outputs, intermediate and primary input are also required. Table 3 shows details information on Sarawak intermediate inputs. In 2015, the sector with the highest intermediate input was food manufacturing, where RM11,309 million out of RM13,517 million of total output for food manufacturing was recorded. It is also supported by imports, taxes, subsidies and value added at RM1.035 million, RM0.042 million, RM0.040 million, and RM1,172 million, respectively. Meanwhile, by being second and third, the intermediate input of wood manufacturing, and fixture and furniture product was valued at RM2,269 million out of RM2,798 million of wood manufacturing's total output, and RM1,318 million out of RM1,759 million of fixture and furniture product total output, respectively. The

total imports for wood manufacturing recorded a total of RM0.049 million, while fixture and furniture products recorded a total of RM0.348 million.

Moreover, for wood manufacturing, taxes are valued at RM0.002 million, subsidies at RM180 and value-added at RM0.479 million. In contrast, taxes, subsidies and value-added for fixture and furniture products were estimated at RM0.008 million, RM804, and RM0.085 million. This shows that both wood manufacturing and fixture and furniture products have strong backward linkages where higher input use significantly impacts final demand. However, in terms of imports in Sarawak, electronic and non-electronic products estimated the highest leakages with a total of RM4,760 million out of RM9,043 million of its total output, followed by other manufacturing (RM2,711 million) and chemical product (RM0.743 million). Therefore, higher imported products are required for these sectors to produce higher output.

Table 3
The Production of Sarawak Input

Sector	Intermediate Input	Foreign Import	Inter-region Import	Taxes	Subsidies	Value Added	Total Output
AGL	4,420,365	140,319	160,932	12,593	10,118	2,856,503	7,580,594
FOL	1,499,692	4,061	4,658	829	204	671,925	2,180,961
FIA	294,261	46,594	53,438	7,601	5,277	87,629	484,246
MIQ	13,677,780	117,875	135,190	25,439	3,064	42,363,095	56,316,316
FDM	11,308,519	481,868	552,652	41,745	39,947	1,172,030	13,516,867
WDM	2,269,212	22,629	25,953	2,137	180	478,660	2,798,411
FNF	1,317,831	162,185	186,009	8,351	804	85,126	1,758,698
PET	17,420,974	247,283	283,608	15,992	3,113	10,463,520	28,428,264
CHE	1,023,132	346,022	396,851	16,047	9,476	396,189	2,168,764
MNM	2,559,911	327,657	375,789	13,441	2,362	545,764	3,820,200
ENE	3,526,885	2,217,329	2,543,044	32,098	1,165	725,069	9,043,261
OTM	1,934,454	1,262,874	1,448,385	70,396	2,935	466,285	5,179,460
UTI	1,482,262	149,344	171,281	9,202	6,843	1,118,643	2,923,888
CON	10,268,592	846,918	971,327	62,585	13,588	4,311,779	16,447,613
WRT	17,761,373	1,662,118	1,906,275	178,548	44,607	20,818,258	42,281,966
AFB	2,950,589	208,675	239,328	33,536	10,573	1,747,531	5,169,086
TSI	6,841,835	779,617	894,139	119,822	30,797	3,918,759	12,523,375
FRB	4,782,789	527,053	685,041	147,243	20,662	6,525,798	12,647,262
OTS	4,551,381	1,149,124	1,317,925	31,192	1,501	1,336,477	8,384,598
GOS	1,472,860	68,204	78,223	11,145	1,097	986,271	2,615,607

Note: Agriculture and Livestock (AGL), Forestry and Logging (FOL), Fishing and Aquaculture (FIA), Mining and Quarrying (MIQ), Food Manufacturing (FDM), Wood Manufacturing (WDM), Fixture & Furniture Products (FNF), Petroleum Products (PET), Chemicals Products (CHE), Metal and Non-metallic Products (MNM), Electronic and Non-Electronic Products (ENE), Other Manufacturing (OTM), Utilities (UTI), Construction (CON), Wholesale and Retail Trade (WRT), Accommodation, Food

and Beverage (AFB), Transports, Storage and Information (TSI), Finance, Real Estate & Business Service (FRB), Other Services (OTS), Government Services (GOS)

Source: Sarawak Input-Output Table 2015

Based on the constructed input-output table, quadrant demand consists of intermediate use and final demand. The intermediate use is the demand for goods for the production process, while the final demand is the demand for goods by the consumers. Table 4 shows forestry and logging as the highest sector with the highest demand. For the forestry and logging sector, RM1,981 million (90.83%) of its intermediate use over total final demand was recorded. In contrast, private consumption was recorded at RM0.01 million, negative RM0.053 million by inventory change, and RM0.244 million by exports. This sector shows a strong capability (forward linkage) to process its output for economic activities. Other sectors such as petroleum products, wood manufacturing, mining and quarrying, utilities, and agriculture and livestock were also important sectors that recorded higher demand and generated higher output in Sarawak. Meanwhile, electronic and non-electronics products valued at RM7,934 million were the highest export recorded out of its total use. However, the result also indicated utilities have a high dependency on private and government consumption by registering the lowest export with a total of RM241.

Table 4
The Production of Sarawak Demand

Sector	Intermediate Use	Private Consumption	Government Consumption	Gross Fixed Capital Formation	Changes in Inventories	Foreign Exports	Inter-regional Exports	Total Use
AGL	4,642,563	1,678,974	-	347,570	(127,655)	875,217	163,926	7,580,594
FOL	1,980,879	9,718	-	-	(53,375)	205,288	38,450	2,180,961
FIA	22,368	448,518	-	780	(8,183)	17,488	3,275	484,246
MIQ	38,246,371	-	-	368,871	(114,987)	15,005,552	2,810,509	56,316,316
FDM	4,235,546	3,117,892	-	-	(343,433)	5,480,395	1,026,467	13,516,867
WDM	2,106,967	30,875	-	-	(13,631)	567,844	106,356	2,798,411
FNF	979,818	789,751	-	389	(53,634)	35,689	6,684	1,758,698
PET	25,577,298	2,982,863	-	-	(161,480)	24,916	4,667	28,428,264
CHE	742,768	150,878	-	-	(286,460)	1,315,237	246,341	2,168,764
MNM	1,782,477	148,319	-	145,900	4,009	1,465,087	274,408	3,820,200
ENE	218,698	499,725	-	606,999	(215,767)	6,682,068	1,251,537	9,043,261
OTM	211,610	2,073,381	-	846,781	(627,454)	2,253,135	422,008	5,179,460
UTI	1,919,988	992,349	10,433	-	877	203	38	2,923,888
CON	6,806,313	-	-	8,225,740	674,348	624,285	116,927	16,447,613
WRT	10,964,062	2,212,412	1,849	739,955	-	22,965,397	4,301,371	41,185,047
AFB	1,899,522	3,269,564	-	-	-	-	-	5,169,086
TSI	3,657,516	3,283,785	304	910,662	-	3,934,233	736,874	12,523,375
FRB	3,596,619	5,897,693	59,206	335,652	0	3,246,878	608,134	13,744,182
OTS	594,501	1,680,274	6,025,670	78,620	-	4,661	873	8,384,598
GOS	1,178,811	1,343,463	21,524	-	-	60,481	11,328	2,615,607

Note: Agriculture and Livestock (AGL), Forestry and Logging (FOL), Fishing and Aquaculture (FIA), Mining and Quarrying (MIQ), Food Manufacturing (FDM), Wood Manufacturing (WDM), Fixture & Furniture Products (FNF), Petroleum Products (PET), Chemicals Products (CHE), Metal and Non-metallic Products (MNM), Electronic and Non-Electronic Products (ENE), Other Manufacturing (OTM), Utilities (UTI), Construction (CON), Wholesale and Retail Trade (WRT), Accommodation, Food and Beverage (AFB), Transports, Storage and Information (TSI), Finance, Real Estate & Business Service (FRB), Other Services (OTS), Government Services (GOS)

Source: Sarawak Input-Output Table 2015

Value-added refers to the balance of output out of its total intermediate use. Table 5 shows that the highest value-added recorded was mining and quarrying, with a total of RM42,363 million, while the lowest was fixture and furniture products. By contrast, electronic and non-electronics was found to be the most dominant sector in import with a value of RM4,760 million, followed by wholesale and retail trade (RM3,568 million), other manufacturing (RM2,711 million), and other services (RM2,467 million). On the other hand, wholesale and retail trade taxes ranked the highest contribution, while forestry ranked last.

Table 5
The Production of Sarawak Primary Input

Sector	Foreign Imported	Inter-region Imported	Taxes	Subsidies	Value Added
AGL	140,319	160,932	12,593	10,118	2,856,503
FOL	4,061	4,658	829	204	671,925
FIA	46,594	53,438	7,601	5,277	87,629
MIQ	117,875	135,190	25,439	3,064	42,363,095
FDM	481,868	552,652	41,745	39,947	1,172,030
WDM	22,629	25,953	2,137	180	478,660
FNF	162,185	186,009	8,351	804	85,126
PET	247,283	283,608	15,992	3,113	10,463,520
CHE	346,022	396,851	16,047	9,476	396,189
MNM	327,657	375,789	13,441	2,362	545,764
ENE	2,217,329	2,543,044	32,098	1,165	725,069
OTM	1,262,874	1,448,385	70,396	2,935	466,285
UTI	149,344	171,281	9,202	6,843	1,118,643
CON	846,918	971,327	62,585	13,588	4,311,779
WRT	1,662,118	1,906,275	178,548	44,607	20,818,258
AFB	208,675	239,328	33,536	10,573	1,747,531
TSI	779,617	894,139	119,822	30,797	3,918,759
FRB	527,053	685,041	147,243	20,662	6,525,798
OTS	1,149,124	1,317,925	31,192	1,501	1,336,477
GOS	68,204	78,223	11,145	1,097	986,271
Total	**10,767,750**	**12,430,049**	**839,944**	**208,312**	**101,075,309**

Note: Agriculture and Livestock (AGL), Forestry and Logging (FOL), Fishing and Aquaculture (FIA), Mining and Quarrying (MIQ), Food Manufacturing (FDM), Wood Manufacturing (WDM), Fixture & Furniture Products (FNF), Petroleum Products (PET), Chemicals Products (CHE), Metal and Non-metallic Products (MNM), Electronic and Non-Electronic Products (ENE), Other Manufacturing (OTM), Utilities (UTI), Construction (CON), Wholesale and Retail Trade (WRT), Accommodation, Food and Beverage (AFB), Transports, Storage and Information (TSI), Finance, Real Estate & Business Service (FRB), Other Services (OTS), Government Services (GOS)

Source: Sarawak Input-Output Table 2015

The final demand of Sarawak's input-output table consists of five main segments; household expenditure; government expenditure; gross fixed capital formation; inventories changes; and exports, as shown in Table 6. In final demand, wholesale and retail trade are the most dominant sectors. A total of RM30,221 million was recorded. This was also supported by the

outstanding performance of its exports (RM27,267 million), household expenditure (RM2,212 million), gross fixed capital formation (RM0.740 million) and government consumption (RM0.002 million). Furthermore, in the performance of household consumption overall, the four sectors that recorded higher estimation were finance, real estate & business service (RM5,898 million), transport, storage, and information sector (RM3,284 million), accommodation, food and beverage (RM3,270 million), and food manufacturing (RM3,118 million).

In contrast, other sectors contributed less than 10% of household expenditure. For the estimation recorded by the government, expenditure was led by other services with a total of RM6,026 million. Moreover, gross fixed capital formation shows construction sector had the most significant investment in 2015, with a total of RM8,226 million, followed by transport, storage and information, other manufacturing, and wholesale and retail trade. Meanwhile, the investment in other sectors of the Sarawak economy was less than 5%. In addition, only metal and non-metallic products; utilities, construction; finance, real estate, and business service recorded positive entries, while other sectors in Sarawak had negative entries. Nevertheless, the highest estimation recorded by exports were wholesale and retail trade (RM27,267 million), mining and quarrying (RM17,816 million), and electronic and non-electronic products (RM7,934 million). At the same time, other sectors in Sarawak contributed less than 10%.

Table 6
The Production of Sarawak Final Demand

Sector	Private Consumption	Government Consumption	Gross Fixed Capital Formation	Changes in Inventories	Foreign Exports	Inter-regional Exports
AGL	1,678,974	-	347,570	(127,655)	875,217	163,926
FOL	9,718	-	-	(53,375)	205,288	38,450
FIA	448,518	-	780	(8,183)	17,488	3,275
MIQ	-	-	368,871	(114,987)	15,005,552	2,810,509
FDM	3,117,892	-	-	(343,433)	5,480,395	1,026,467
WDM	30,875	-	-	(13,631)	567,844	106,356
FNF	789,751	-	389	(53,634)	35,689	6,684
PET	2,982,863	-	-	(161,480)	24,916	4,667
CHE	150,878	-	-	(286,460)	1,315,237	246,341
MNM	148,319	-	145,900	4,009	1,465,087	274,408
ENE	499,725	-	606,999	(215,767)	6,682,068	1,251,537
OTM	2,073,381	-	846,781	(627,454)	2,253,135	422,008
UTI	992,349	10,433	-	877	203	38
CON	-	-	8,225,740	674,348	624,285	116,927
WRT	2,212,412	1,849	739,955	-	22,965,397	4,301,371
AFB	3,269,564	-	-	-	-	-
TSI	3,283,785	304	910,662	-	3,934,233	736,874
FRB	5,897,693	59,206	335,652	0	3,246,878	608,134
OTS	1,680,274	6,025,670	78,620	-	4,661	873
GOS	1,343,463	21,524	-	-	60,481	11,328
Total	**30,610,435**	**6,118,986**	**12,607,918**	**(1,326,826)**	**64,764,054**	**12,130,173**

Note: Agriculture and Livestock (AGL), Forestry and Logging (FOL), Fishing and Aquaculture (FIA), Mining and Quarrying (MIQ), Food Manufacturing (FDM), Wood Manufacturing (WDM), Fixture & Furniture Products (FNF), Petroleum Products (PET), Chemicals Products (CHE), Metal and Non-

metallic Products (MNM), Electronic and Non-Electronic Products (ENE), Other Manufacturing (OTM), Utilities (UTI), Construction (CON), Wholesale and Retail Trade (WRT), Accommodation, Food and Beverage (AFB), Transports, Storage and Information (TSI), Finance, Real Estate & Business Service (FRB), Other Services (OTS), Government Services (GOS)

Source: Sarawak Input-Output Table 2015

Conclusion

Sarawak must have a dynamic transformation to boost its economy to become an advanced, systematic, and developed state. Sarawak Corridor of Renewable Energy (SCORE) and the digital economy are one of the state government initiatives to develop the economics of this region. The development could increase the standard of living and stimulate the industrial sectors. By using the non-survey based method, namely RAS technique, the input-output table for Sarawak was estimated by using Malaysia input-output table 2015. Miller and Blair's model was used during the estimation. The result of this study concluded Sarawak's total output in 2015 was RM391,998 million, dominated by mining and quarrying (RM56,316 million), wholesale retail and trade (RM41,185 million), and petroleum products (RM28,428 million). These sectors also recorded a huge value of value-added and showed great potential for the economic productivity of Sarawak.

Sarawak economy is relatively different, as Sarawak economic structure is focusing more on resource-based sector compared to other state in Malaysia. Thus, this paper suggests that the constructed input-output table to be considered as an alternative tool for policymaking in Sarawak. The result of the analysis can be used to identify the potential and leading sectors for the development of the state. It can also be used to examine the fiscal policy's effect at the regional level and compare it with the national and international levels. This table could show the dependency of every sector in the economy and how it impacts one another.

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