CONSTRUCTION OF INTER-REGIONAL INPUT-OUTPUT TABLE FOR NEGERI SEMBILAN TO ASSESS SOURCES OF ECONOMIC LEAKAGES

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ABSTRACT

Over the last three decades, Malaysia has been suffering from ‘middle-income trap’, among others, due to an unbalanced regional growth. The rapid growth of some industrialized states due to bias development policy has exacerbated the regional unbalanced problem, leaving economic and social disparity to be hardly resolved. This situation occurs due to absence of a regional planning database to measure the impact and linkages of economic sector at the regional level. At the national level practices, input-output tables are widely used for macroeconomic policy making, but at the state level, the use of such database is limited due to data limitation and lack of expertise. In the existing literature, there are few studies attempted to construct regional input-output tables for some states in Malaysia but none for an inter-regional input-output tables (IRIOT). This study aims to construct an IRIOT for a state in Malaysia, called the Negeri Sembilan. FLQ regionalisation technique is applied to construct the IRIOT, where data are compiled from various sources, such as National Accounts, Economic Census, Household Income and Expenditure Survey, and trade data. The constructed IRIOT consists of 13 main economic sectors with flows of intermediate demand between Negeri Sembilan and rest of the states. Standard input-output analysis such as linkages and multiplier indicators are used to measuring the potential of the economic sectors in the state. Results reveal three important findings. First, the Negeri Sembilan state is highly dependent on other states for its economic inputs and that limits for high value added production to operate in its territory. Second, six main sectors are identified as strategic sectors with high value-added multiplier and linkages effects. Third, resource-based economic sectors, particularly agricultural sector, become a stronghold for generating income for the state. In sum, these results give a strong signal for a comprehensive economic transformation within the state in order to improve the regional imbalances.

Keywords: inter-regional input-output; regional imbalances; inequality; Malaysia

INTRODUCTION

Over the past 30 years, Malaysia have been encountering a lot of challenges on becoming a high-income country. Among others, regional growth imbalance is one of main reasons that impedes further improvement in the economic condition, making hard departure from middle income status. Recently, the Malaysian government have proposed a new vision for the development of the country, which is known as the Shared Prosperity Vision 2030 (SPV2030). The main reason for this vision is to achieve decent standard of living to all Malaysians by 2030, and also to ensure that Malaysian nation achieves sustainable growth along with fair and equitable distribution, across income groups, ethnicities, regions and supply chains.

Furthermore, industrial development at the national level has achieved promising growth, to which some sectors are well-positioned in the global value chain and service-based sectors have, to a large extent, contributed to the economic growth. Whilst such progress has made significant contribution to improve economic and socio-economic conditions of the country, the disparity between regions in the country remain unknowingly evaluated, which limits regional-based targeted policy. Such limitation has caused unwanted resource misallocation that leads to unfavourable policy outcomes. Not only that, complex production networks due to economic interconnectedness has made policy making even more convoluted without a proper evaluation method.

Regional imbalances, unassessed complex production networks within the region, and limited evaluation methods motivate inception of the study. In this study, we aim at developing an economic-wide at a state-level. Despite there are several past works that devoted on assessing regional impact through regional input-output tables in Malaysia, our work attempts to develop an inter-regional input-output tables (IRIOT) for a state in Malaysia. Due to limited publicly available data, our work focuses on the state of Negeri Sembilan with a strong support from the State Government through the state's Economic Planning Unit (EPU) and the national statistical institution, Department of Statistics Malaysia (DOSM).

Based on previous works, the IRIOT were either constructed from a full-scale survey, partially-surveyed, or a fully-estimated table, each of which has its own techniques with distinct limitations and advantages. In addition, the IRIOT is vastly used, among others, in China (Li, 2010; Wang et al., 2015; Zhang et al., 2015), Indonesia (Hulu and Hewings, 1993; Resosudarmo et al., 2009), Japan (Yamada et al, 2015, Wakiyama et. al, 2020) and the United States (Boero et al., 2018). In Malaysia case, studies from Saari and Abdul Rashid (2008) and Hassan et al. (2017) were focused on regional input-output tables, with aggregated inter-regional trade flows in their works. Whilst these can help to evaluate regional or state level economic impacts, the absence of the latter information hinders further policy analysis and limits on refining inter-regional trade flows, from which regional imbalances insights would have been stemmed.

This article is organized as follows. Section 2 discusses on the methodology used to construct the IRIOT along with the sources of data. Section 4 presents the findings of the study and Section 5 draws the conclusion.

METHODOLOGY AND ANALYSIS

This section describes the construction techniques of the IRIOT for Negeri Sembilan that involve two main components. First, we briefly explain the structure of the IRIOT. Second, we detail construction flows undertaken to develop the IRIOT based on partial-surveyed method. Third, we explain standard input-output modelling to analyse the constructed database.

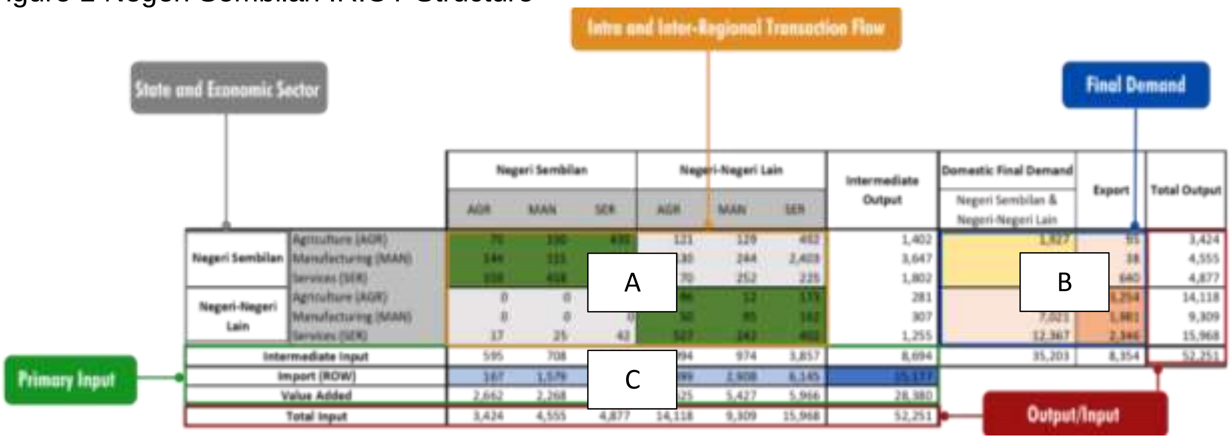
Input-Output table structure

Figure 1 illustrates the transaction flow between Negeri Sembilan and rest of the states (ROS) in an inter-regional input-output scheme. Each of these blocks consists of a series of rows and columns. The production or sales sector is described in row form and read as output. Similarly, the purchasing sector is represented in the form of a column and is known as an input.

Block A describes the flow of intra-region and inter-region input transactions. Each value in the block shows the flow of transactions selling and purchasing input from one sector to another. Intra-region transaction is a transaction between domestic economic sectors only as in green, while inter-region transaction is a transaction between economic sectors to rest of the states (grey-shaded area). Block B is the final use section or final demand. Elements of this section are private expenditure and household expenditure, government expenditure, investment and export.

Block C is the primary input component, which consists of the sum of the intermediate inputs, imports and value added. Primary inputs are used in the process of production of goods and services by the production sectors. These inputs are part of the production cost consisting of added value paid to production factors, imported raw materials and taxes on commodities purchased either domestic or imported. The input-output table is constructed in parallel with the framework of accounting table in which the total receipts of the seller must offset the total expenses of the buyer. This means that the amount of total output (sales, including final demand) is the same as the amount of total input (purchase, including primary input) for each production sector in the economy as labelled red.

Figure 1 Negeri Sembilan IRIOT Structure



Note: Authors' illustration. Figures in the table are arbitrary.

Data preparation and construction flow

In general, the construction of the Malaysian input-output table is carried out by the Department of Statistics Malaysia (DOSM) by using industry data observations through the Economic Census conducted every five years. However, input-output tables at a smaller spatial unit is not officially constructed, typically due to cost limitations. Thus, the construction of input-output tables at the regional level usually involves an estimation process that is cost- and time-saving. For our study, we use the so-called hybrid technique in constructing the Negeri Sembilan interregional input-output table. In particular, we employ Flegg Location Quotient (FLQ) method to estimate the inter-regional flows.

a) Estimation of intra and inter-regional trade flows

The intra- and inter-regional trade flow estimation is divided into four main components which are explained as follows:

1) Estimation of intra-regional transaction flows

The location quotient (LQ) method is used to estimate the region's internal input-output transaction. This refers to the input transaction of production used in economic activities in the Negeri Sembilan, which is the first quadrant in Figure 1. Based on the literature, the Flegg Location Quotient (FLQ) deemed to generate better estimates for an IRIOT construction. The FLQ method can be defined as follows:

$$FLQ_{ij}^{r} = \left[\frac{SLQ_i^r}{SLQ_j^r}\right] \times \lambda^r$$

$$SLQ_i^r = \left[\frac{Q_i^r/_{Q^r}}{Q_i/_{Q}}\right];\ SLQ_j^r = \left[\frac{Q_j^r/_{Q^r}}{Q_j/_{Q}}\right];\ \lambda^r = \left[log_2\left(1 + {}^{Q^r}/_{Q}\ \right)\right]^{\delta}$$

where Q_i^r (Q_j^r) is the output of Negeri Sembilan for sector *i* (*j*); while $Q_i$is the output of Malaysia for sector *i* (*j*). $Q^r$is the total output for Negeri Sembilan and Q is the total output for Malaysia. λ^r is a parameter that determines the size of the economy in Negeri Sembilan compared to the economy in Malaysia ($0 \leq \lambda^r \leq 1$). δ is the parameter that influence the import density of the region ($0 \leq \delta \leq 1$), where if the value is higher than δ, then the import density adjustment is higher.

The diagonal section on the domestic transaction flows part is estimated using the method SLQ. This is because on this diagonal section, the unitary ratio of $\frac{SLQ_i^r}{SLQ_j^r}$=1, *i*=*j* is expected to ensure that the value of the domestic transaction flow in the diagonal section is parallel to the IRIOT as adapted from Jahn (2017). Then, the estimation for the diagonal section in the domestic transaction flow using the SLQ method. This method is applied to quadrant I and IV, for their diagonal section.

The information from the above steps will be used to estimate the input coefficients of the sectors in Negeri Sembilan. This can be defined as follows:

$$r_{ij} = \begin{cases} a_{ij} & FLQ_{ij} \geq 1 \\ FLQ_{ij} \times a_{ij} & FLQ_{ij} < 1 \end{cases}$$

r_{ij} is the input coefficient from sector *i* to sector *j* in Negeri Sembilan. While a_{ij} is the input coefficients generated from the national input-output table.

2) Estimation of inter-regional transaction flows

The method of estimating the flow of input-output transactions between regions will produce input-output transactions on quadrants II and III. Quadrant II flow refers to the export flow of intermediate inputs from Negeri Sembilan to the rest of the states. Meanwhile, quadrant III refers to the flow of imports of intermediate inputs obtained by economic sectors in Negeri Sembilan. To estimate the two quadrant flows, the inter-regional transaction estimation technique as adopted from Jahn (2017) is used. The following formula is used:

$$z_{ij}^{sr} = g_{ij}^{sr}(z_{ij} - \sum_r z_{ij}^{rr})\ if\ r \neq s$$

where z^{sr} refers to the input flow from Negeri Sembilan to rest of the states. g_{ij}^{sr} is the scale value that has been estimated from the value-added parameter for transactions between regions, $(z_{ij} - \sum_r z_{ij}^{rr})$ is the result of subtracting the total estimated transaction between region and the number of national intermediate input transactions, z_{ij}. The total number of input flow transactions of each region (i.e. Negeri Sembilan and Rest of the State) is equal to the number of national inputs as follows:

$$\sum_{r,s} z_{ij}^{rs} = z_{ij}^{N}$$

3) Estimating the primary input

The primary input consists of total intermediate input, imports, and value-added. Each of these components has controlled variables derived from economic census reports and national accounts data. Since most of the data are aggregated, the sector breakdown of the data are estimated using below formula:

$$V_{ij}^{r} = \frac{V_{ij}^{r}}{V_{ij}} * V_{ij}$$

Where V_{ij}^{r} is the value-added of Negeri Sembilan by sector and V_{ij} is the Malaysia's value-added by sector from the Malaysian IO Table.

4) Estimation of domestic final demand, imports and exports

Domestic final demand consists of private consumption, government consumption, and investment. In the section below, we first explain the construction flow of the respective domestic final demand components. Then, we decribe the construction of imports and exports components, respectively.

Private consumption

The raw data from the HIES is published in Classification of individual consumption by purpose (COICOP). Then, we analyzed and matched the data according to the industrial classification in accordance to MSIC (Malaysia Standard Industrial Classification) code. The matching technique was done using the *countseed-RAS* approach, by Cai and Rueda-Cantuche (2019).

After the data had been matched, the value of regional private consumption data by sector is calculated using the following fractional technique:

$$PC_{j}^{r} = \left(\frac{c_{j}^{r}}{\sum c^{r}}\right) \times \left(\left[\frac{HIES^{r}}{HIES^{N}}\right] \times PC_{j}\right)$$

where PC_{j}^{r} is the private expenditure for region *r* by sector *j*, whereas $\frac{c_{j}^{r}}{\sum c^{r}}$ is the HIES percentage value that had been classified by sector *j* through the *countseed*-RAS method for region *r*. Meanwhile $\left[\frac{HIES^{r}}{HIES^{N}}\right]$ is the ratio of household expenditure from the raw HIES data by region to the national household expenditure. PC_{j} is the value of national private consumption obtained from the national input-output table.

Government consumption

The Negeri Sembilan government expenditure data was obtained from the Negeri Sembilan State Government Account Report. The data is used to estimate the Negeri Sembilan government consumption component in the final demand block. The ratio of Negeri Sembilan expenditure from total national government expenditure is used as the basis for obtaining expenditure data by input-output sector. The formula used to estimate the government consumption flow is as follows:

$$GC_j^r = \left(\left[\frac{GC^r}{GC^N}\right] \times GovIOT\right) \times \frac{GovIOT_j}{\sum_j GovIOT_j}$$

GC_j^r is a government expenditure for the region *r* according to sector *j*, $\left[\frac{GC^r}{GC^N}\right]$ is the ratio of region *r* government expenditure to the national government expenditure. Meanwhile, the $GovIOT$ and $GovIOT_j$ are the total government consumption and the government consumption by sector *j*, respectively, that are obtained from the national input-output table

Investment

The final component of domestic final demand is investment. The value of the investment from the national input-output table is taken by the sum of the gross fix capital formation (GFCF) and changes in inventory. Regional investment data is calculated through the fraction of national investment data to the total final demand component, then multiplied by the total output of the region, as adopted from Yamada (2015). At the sectoral level, the calculation is done as follows:

$$I_j^r = \frac{I_j}{FD_j} \times X_j^r$$

whereas I_j^r is the investment value for sector *j* in region *r*, while $(\frac{I_j}{FD_j})$ is the ratio of the value of Malaysia's investment to the total value of final demand for sector *j* obtained from the national input-output table. X_j^r is the output value for region *r*.

Export and import

Similar to the technique used for estimating the investment component for region *r*, we estimate the export (import) component likewise. At this point, we assume that the structure of export (import) ratio for each sector is similar to the national input-output table. Then, export (import) for Negeri Sembilan is calculated as follows:

$$E_j^r = \frac{e_j}{FD_j} \times X_j^r$$

where E_j^r is the export value of sector *j* for the region *r*, $\frac{e_j}{FD_j}$ is an export ratio for sector *j* to the final demand of sector *j* from the national input-output table, while the X_j^r is the region *r* output value of sector *j* that had been estimated previously.

Balancing

The final stage of the IRIOT is the balancing step. We adopt bi-proportional balancing technique or RAS method to balance the intermediate input block.

Data Collection and Preparation

In this study, the Malaysian input-output table for year 2015 published by the Department of Statistics Malaysia (DOSM) is used as a benchmark table before the estimation of the IRIOT. Table 1 summarizes the data requirement for our work.

Table 1 Data Requirements for developing Negeri Sembilan IRIOT

Data	Classification	Source of Data
Value Added	3 digit MSIC	Economic Census 2015
Total Output	3 digit MSIC	Economic Census 2015
Intermediate input	3 digit MSIC	Economic Census 2015
Household Final Demand	4 digit COICOP	Household Income and Expenditure Survey 2016
Gross Fixed Capital Formation	3 digit MSIC	Economic Census 2015
Export	2 digit SITC	Trade statistics
Import	2 digit SITC	Trade statistics

Data Harmonization

The national input-output table is constructed using the industry classification code, namely, the Malaysian Standard Industry Classification (MSIC) 2008 version 1. However, the data obtained for our work are available at different classification nomenclature. To ensure that the classification code of each data is consistent, data harmonisation procedure is need. Apart from that, the national input-output table is published with 124 sector. Due to limited data available the regional level, some of the data must be aggregated. After the data harmonization process is completed, we identify 13 economic sectors for the Negeri Sembilan IRIOT.

Input-Output Modelling

The input-output table constructed is based on a demand-driven relationship which shows the interaction of output, intermediate flow and final demand. Such relationship can be described by the following equation:

$$\mathbf{x} = \mathbf{Zi} + (\mathbf{c} + \mathbf{s} + \mathbf{g} + \mathbf{e})$$
$$\mathbf{x} = \mathbf{Zi} + \mathbf{f} \qquad \textbf{(1)}$$

where **x** is the total output, **Z** is the intermediate input matrix where **i** represents the addition vector in terms of sector *n* columns, and **f** is the final demand vector. Thus, equation (1) shows that the total output is equal to the sum of the value of the intermediate input and the value of the final demand. The demand model in equation (1), is also referred to as the Leontief model where the intermediate input is assumed to be an endogenous variable (internal factor) while the final demand component is exogenous (external factor). Therefore, equation (1) can be converted into Leontief's input-output model as follows:

$$\mathbf{x} = \mathbf{Ax} + (\mathbf{c} + \mathbf{s} + \mathbf{g} + \mathbf{e})$$
$$\mathbf{x} = \mathbf{Ax} + \mathbf{f} \qquad \textbf{(2)}$$

where **A** is a matrix of input-output coefficients showing the amount of inputs purchased by one sector from another sector per unit of its own output. The input-output coefficient matrix can be generated by dividing sector-*n* by the intermediate transaction matrix between sector (**Z**) and sectoral output vector (**x**) as follows:

$$\mathbf{A} = \mathbf{Z}\hat{\mathbf{x}}^{-1} \qquad \textbf{(3)}$$

where $\hat{\mathbf{x}}^{-1}$ is a diagonal matrix with non-zero in the diagonal and zero elsewhere. Equation (2) can be solved as follows:

$$\mathbf{x} = (\mathbf{I} - \mathbf{A})^{-1}\mathbf{f}$$

$$\mathbf{x} = \mathbf{Lf} \tag{4}$$

where **I** is the identity matrix, and $(\mathbf{I} - \mathbf{A})^{-1}$ is known as the Leontief inverse matrix (**L**) which represents the total production for each sector that must be produced to meet the final demand. Each element in Leontief's inverse matrix reflects the direct and indirect input requirements of any sector *j* to meet each unit of the sector's final demand.

Input-output multiplier and linkages

Common practice in input-output analysis is to focus on the measurement of the multiplier effect and the linkages effect. The multiplier effect measures the likely effect of a particular indicator such as the value-added multiplier effect on the economy, which is produced as a result of changes in final demand in a sector. For example, the growth in exports of the agricultural sector will result in changes in value added to the agricultural sector as well as other related sectors in the value chain of the sector, including the manufacturing and services sectors.

To obtain a value-added multiplier, Leontief's input-output model in equation (4) can be used. The first step is to calculate the value-added coefficient vector **r** as follows:

$$\mathbf{r} = \mathbf{v}\mathbf{x}^{-1} \tag{5}$$

Each element of the value-added coefficient *r* in the vector **r** indicates the value added per unit of output produced by each sector. Then, the vector **r** is multiplied by equation (4), as shown as follows:

$$\mathbf{v} = \hat{\mathbf{r}}(\mathbf{I} - \mathbf{A})^{-1}\mathbf{f} \tag{6}$$

where $\hat{\mathbf{r}}$ is the value-added coefficient expressed in the form of a diagonal matrix.

The input-output linkages effects between sectors can be divided into two indicators, namely backward linkages and forward linkages. Both indicators can be calculated using the following equation:

Backward linkages

$$\boldsymbol{B_i} = \left({(\mathbf{1}/\boldsymbol{n}) \sum_i \boldsymbol{l_{ij}}} \Big/ {(\mathbf{1}/\boldsymbol{n^2}) \sum_i \sum_j \boldsymbol{l_{ij}}} \right) \tag{7}$$

Forward linkages

$$\boldsymbol{F_i} = \left({(\mathbf{1}/\boldsymbol{n}) \sum_j \boldsymbol{g_{ij}}} \Big/ {(\mathbf{1}/\boldsymbol{n^2}) \sum_i \sum_j \boldsymbol{g_{ij}}} \right) \tag{8}$$

where *n* is the total number of sectors in the input-output table; $\sum_i l_{ij}$ $(\sum_j g_{ij})$ is the sum of the columns in the Leontief (Ghosh) inverse matrix and $\sum_i \sum_j l_{ij}$ $(\sum_i \sum_j g_{ij})$ is the sum of all the cells in the Leontief (Ghosh) inverse matrix. The Ghosh inverse matrix calculation method will be described in the following section.

Ghosh inverse matrix calculation method

The Ghosh input-output model is a supply-driven model used to assess supply factor issues. It provides an alternative interpretation that links sectoral gross production with key inputs at the beginning of the production process (Saari et al., 2017). Technically, the Ghosh input-output model shifts the vertical view (columns) to the horizontal view (rows). Instead of dividing each row element by the associated sectoral input, each column element is divided by the gross sectoral output.

In matrix operations, a Ghosh inverse matrix can be written based on the following equations:

$$\mathbf{x}' = \mathbf{i}'\hat{\mathbf{x}}\mathbf{B} + \mathbf{d}'$$

$$\mathbf{x}' = \mathbf{x}'\mathbf{B} + \mathbf{d}' \quad \textbf{(9)}$$

where $\mathbf{i}'\hat{\mathbf{x}} = \mathbf{x}'$, $\mathbf{B}(\mathbf{B} = \hat{\mathbf{x}}^{-1}\mathbf{Z})$ is the output coefficient matrix and $\mathbf{d}'$ is the principal input vector (i.e., value added, imports and indirect taxes). Each element of the matrix reflects the transmission z_{ij} of commodity sector *i* to the sales revenue of sector *j*. The solution to equation (9) is:

$$\mathbf{x}' = (\mathbf{I} - \mathbf{B}')^{-1}\mathbf{d}$$
$$\mathbf{x}' = \mathbf{G}'\mathbf{d} \quad \textbf{(10)}$$

where $\mathbf{G}'$ is the Ghosh inverse matrix.

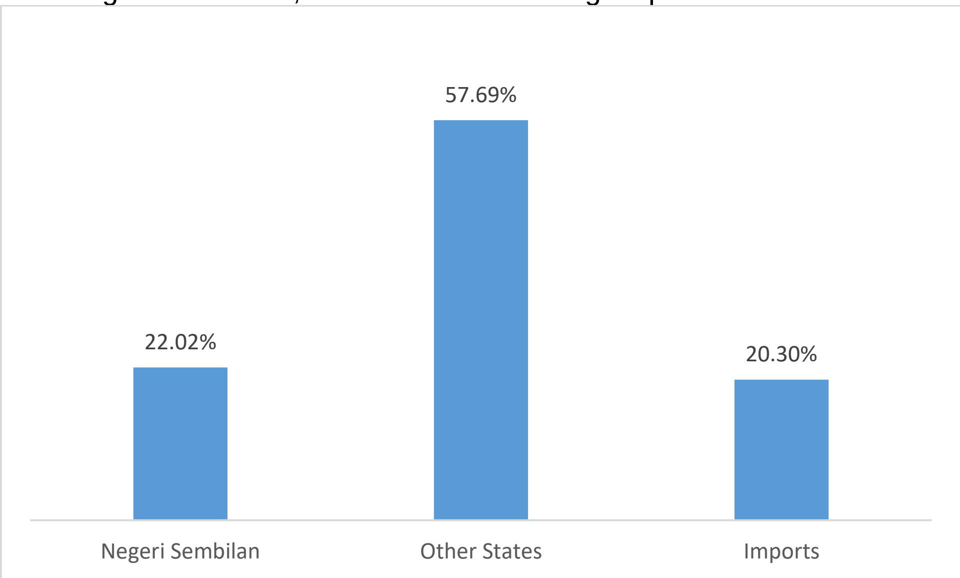
RESULTS AND DISCUSSION

This section describes the findings of the Negeri Sembilan IRIOT containing 13 sectors. This section is divided into two sub-divisions. First, a brief discussion was made to explain the structure of the economic sector and the supply chain between Negeri Sembilan and rest of the states. Second, sectoral impact analysis is described based on value-added multiplier and sectoral linkages effects, which allow us to identify sector development prospects for the state.

Structural analysis

Based on the Negeri Sembilan IRIOT, a structural analysis was conducted to obtain an overview of the sectoral input structure in Negeri Sembilan. The findings of the analysis found that most of the inputs were imported from outside Negeri Sembilan compared to the domestic industry in order to support domestic industry production needs. This is evidenced in Figure 2, of which 57.69% of inputs are purchased from other states, and only 22.02% of inputs are taken from Negeri Sembilan. The rest is imported from abroad to support output production in the Negeri Sembilan economy. The input requirements from outside the state border show a high leakage effect which can reduce the potential of the Negeri Sembilan economic sector.

Figure 2 Percentage of domestic, other states and foreign inputs for the overall economy



Sources: Authors' calculation

Economic Sectoral Prospects of Negeri Sembilan

Based on Table 2, there are two conclusions that can be made based on the value-added multiplier and linkages effects between economic sectors. Firstly, there are six high value-added and strategic economic sectors in Negeri Sembilan. Secondly, the resource-based economic sector is capable of generating the state outcomes.

Table 2 Value Added and Linkage Indices, 2015

	Sector	Value Added Multiplier (RM)	Backward Linkage	Forward Linkage
1	Agriculture	0.80	0.91	0.91
2	Mining and Quarrying	0.60	0.94	0.89
3	Oil and Fat from Vegetables & Animals, Food Processing, Beverages & Tobacco Product	0.51	1.14	1.01
4	Petroleum Product, Chemical, Rubber & Plastic	0.21	1.19	1.13
5	Electric Product, Electronic & Optical	0.30	0.93	0.80
6	Other Manufacturing	0.47	1.17	1.09
7	Building Construction	0.44	1.21	0.56
8	Civil Engeneering and Special Construction Activities	0.39	1.23	0.58
9	Utilities, Transportation & Storage and Information & Communication	0.58	1.04	1.28
10	Wholesale & Retail Trade, Food & Beverage and Accommodation	0.75	0.83	1.07
11	Finance and Insurance, Real Estate and Business Services	0.81	0.77	1.29
12	Other Services	0.78	0.84	0.80
13	Government Service	0.78	0.83	1.18
	Overall	0.55	-	-

Sources: Authors' calculation

Firstly, the findings show that there are six economic sectors identified as high-value sectors. This is calculated based on the value-added multiplier that exceeds the average value-added multiplier of the overall economic sector in Negeri Sembilan, which is RM0.57. The 6 sectors are: (i) Agriculture (RM0.80); (ii) Mining and quarry (RM0.76); (iii) Utility, storage transportation and communication information (RM0.58); (iv) Retail wholesale trade, drinks and accommodation (RM0.75); (v) Finance and Insurance, Real Estate and Business Services (RM0.81); and (vi) Other services (RM0.78). From the point of view of the regional's economic growth, these sectors are important to ensure higher returns of investment. In addition, the strategic sector should also be taken into account to ensure that investment is dedicated to sectors that can have a high impact on other economic sectors.

In addition, there are five economic sectors classified in strategic clusters and have a high impact on other economic sectors. The Finance and Insurance, Real Estate and Business Services have the highest multiplier impact, where for each increase in one ringgit of final demand can create RM0.81 of value-added. The sector also has a strong integration between sectors compared to other sectors in the economy. Other strategic sectors that can be encouraged by the state are the (i) Agriculture; (ii) Quarrying and Mining; (iii) Wholesale & Retail Trade, Food & Beverage and Accommodation and (iv) Other Services. These sectors are found to be able to support the supply of inputs for the production of other sectors in the economy of Negeri Sembilan.

Secondly, the findings demonstrate that 3 out of 13 economic sectors are resource-based sectors that are highly contributing to the GDP generation in Negeri Sembilan. These sectors are (i) Agriculture sector (RM0.80); (ii) Mining and Quarrying sector (RM0.60); and (iii) Oil and Fat from Vegetables & Animals, Food Processing, Beverages & Tobacco Product (RM0.51). As referred to the contribution aspect to the percentage of Negeri Sembilan GDP, the Agricultural sector; and Oil and Fat from Vegetables & Animals, Food Processing, Beverages & Tobacco Product as a whole accounted for 10.6%. This further reinforces the findings that both sectors can continue to be developed to enhance the growth of the state's economy. In addition, these sectors are also classified as strategic and key sectors respectively, both of which have a high forward linkages effect to assist on the growth of other economic sectors.

CONCLUSION

In this paper, an inter-regional input-output (IRIOT) was constructed for Negeri Sembilan, one of the states in Malaysia, using a hybrid method. Based on the newly developed Negeri Sembilan IRIOT, the findings show that most of the production inputs needed by the economic sectors in the Negeri Sembilan require imported sources from outside the state border. This is undeniable as the location of Negeri Sembilan is near to other states such as Selangor and Johor. Moreover, the inability of input producers in Negeri Sembilan to meet input demand from domestic producers is also a factor that can result in limiting the availability of required production inputs. Next, the potential sectors that could give higher returns in terms of investment in Negeri Sembilan are the resource-based sectors such as (i) Agriculture, (ii) Mining & Quarrying, and (iii) Oil and Fat from Vegetables & Animals, Food Processing, Beverages & Tobacco Product. Through the linkages and multipliers analysis, the results demonstrate that (i) Wholesale & Retail Trade, Food & Beverage and Accommodation;(ii) Other Services and, (iii) Finance and Insurance, Real Estate and Business Services are the key sectors that play an important role in the development strategy of Negeri Sembilan economy. Therefore, policymakers will be able to design a better regional planning in the future by using IRIOT in order to identify potential sector for economic stimulus.

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