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# Spatial Distribution of Multipliers in Kalimantan Island Economy: An Inter-Regional Input-Output analysis

**Muchdie**
**Universitas Muhammadiyah Prof. DR. HAMKA**
eidmuchdie@uhamka.ac.id

**Abstract**

*This paper provides the results of analysis on total multipliers and flow-on, sectoral-specific, and spatial-specific multipliers as important indicators for evaluating, planning and controlling regional development in Kalimantan Island economy. The model employed was Inter-Island Input-Output Model developed using new hybrid procedures with special attention on Island economy. The results show that firstly, the important sectors of Kalimantan Island economy could be based on total multipliers and flow-on effects of output, income and employment. Secondly, important economic sectors could be based on sector-specific multipliers effects; multipliers that occurred in own sector and other sectors. Thirdly, important economic sectors could be based on spatial-specific multipliers; multipliers that occurred both in own region and other regions. Finally, important economic sectors could be based on spatial distribution of flow-on; flow-on effects that occurred in own region as well as in other regions.*
**Keywords**: spatial distribution, inter-island input-output model, spatial-specific multipliers

**Abstrak**

*Penelitian ini bertujuan untuk menyajikan hasil analisis tentang angka pengganda total dan efek mengalir, pengganda sektor spesifik, dan pengganda spatial spesifik dalam perekonomian pulau Kalimantan, utamanya untuk keperluan evaluasi, perencanaan dan pengendalian pembangunan ekonomi. Model yang digunakan adalah Model Input-Output Antar-Pulau (MIOAP) yang dikembangkan menggunakan prosedur hibrida baru dengan perhatian khusus pada ekonomi kepulauan. Hasilnya menunjukkan bahwa, pertama sektor-sektor penting dapat didasarkan pada angka pengganda, baik total maupun efek mengalir dari output, pendapatan dan kesempatan kerja. Kedua, sektor penting juga dapat ditentukan berdasarkan pengganda spesifik sektor dengan melihat besaran angka pengganda yang terjadi pada sektor sendiri atau juga pada sektor lain. Ketiga, sektor penting juga dapat ditentukan berdasarkan pengganda spatial spesifik; yaitu pengganda yang terjadi di wilayah sendiri. Terakhir, sektor penting dan prioritas dapat ditentukan berdasarkan distribusi ruang efek mengalir; di wilayah sendiri atau di wilayah lain.*
**Kata Kunci**: distribusi spasial, model input-output antar pulau, pengganda spesifik spasial

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## INTRODUCTION

Borneo (/ˈbɔːrnioʊ/; Indonesian: *Kalimantan*, Malay: *Borneo*) is the third-largest island in the world and the largest island in Asia. At the geographic centre of Maritime Southeast Asia, in relation to major Indonesian islands, it is located north of Java, west of Sulawesi, and east of Sumatra. Kalimantan is the Indonesian portion of the island of Borneo (Britannica, 2016) which is comprises 73% of the island's area. The non-Indonesian parts of Borneo are Brunei and East Malaysia. With an area of 743,330 square kilometres, it is the third-largest island in the world, and is the largest island of Asia (the largest continent). Its highest point is Mount Kinabalu in Sabah, Malaysia, with an elevation of 4,095 m. The largest river system is the Kapuas in West Kalimantan, with a length of 1,143 km (710 mi). Other major rivers include the Mahakam in East Kalimantan (980 km long), the Barito in South Kalimantan (880 km long).

There are four provinces in Indonesian Kalimantan, namely: West Kalimantan with capital city Pontianak, Central Kalimantan with capital city Palangka Raya, South Kalimantan with Banjarmasin as capital city and East Kalimantan with Samarinda as capital city (According to Prihawantoro, S, *et. al* (2013), the main economic activities in Kalimantan Island were Sector-1 Agriculture, livestock and fishery (West Kalimantan, Central Kalimantan, and South Kalimantan), Sector-2 Mining and quarrying (South Kalimantan and East Kalimantan), and Sector-3 Manufacturing (East Kalimantan). Based on the statistical data by the year of 2013 which is released by Badan Pusat Statistik, Kalimantan Island itself contributes at about 8.7 percent of Indonesia's Gross Domestic Product. Meanwhile, Java contributes about 60 percent and Sumatra does about 23.9 percent.

In macroeconomics, a multiplier is a factor of proportionality that measures how much an endogenous variable changes in response to a change in some exogenous variable (McConnell, *et. al*, 2011; Pindyck & Rubinfeld, 2012). In monetary microeconomics and banking, the money multiplier measures how much the money supply increases in response to a change in the monetary base (Krugman & Wells 2009; Mankiw, 2008). Multipliers can be calculated to analyze the effects of fiscal policy, or other exogenous changes in spending, on aggregate output. Other types of fiscal multipliers can also be calculated, like multipliers that describe the effects of changing taxes.


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Literature on the calculation of Keynesian multipliers traces back to Richard Kahn's description, which describe an employment multiplier for government expenditure during a period of high unemployment. At this early stage, Kahn's calculations recognize the importance of supply constraints and possible increases in the general price level resulting from additional spending in the national economy (Ahiakpor, 2000). Hall (2009) discusses the way that behavioral assumptions about employment and spending affect econometrically estimated Keynesian multipliers.

The literature on the calculation of I-O multipliers traces back to Leontief's work in 1951. Leontief developed a set of national level multipliers that could be used to estimate the economy-wide effect that an initial change in final demand has on an economy. Isard then applied input-output analysis to a regional economy (Muchdie, 2011). The first attempt to create regional multipliers by adjusting national data with regional data was Moore & Peterson in 1955 for the state of Utah. In a parallel development, Tiebout in 1956 specified a model of regional economic growth that focuses on regional exports. His economic base multipliers are based on a model that separates production sold to consumers from outside the region to production sold to consumers in the region. The magnitude of his multiplier is based on the regional supply chain and local consumer spending (Muchdie, 2011).

In a survey of input-output and economic base multipliers, Richardson notes the difficulty inherent in specifying the local share of spending. He notes the growth of survey-based regional input-output models in the 1960s and 1970s that allowed for more accurate estimation of local spending, though at a large cost in terms of resources (Muchdie, 2011). Beemiller (1990) of the BEA describes the use of primary data to improve the accuracy of regional multipliers. The literature on the use and misuse of regional multipliers and models is extensive. Coughlin & Mandelbaum (1991) provide an accessible introduction to regional I-O multipliers. They note that key limitations of regional I-O multipliers include the accuracy of leakage measures, the emphasis on short-term effects, the absence of supply constraints, and the inability to fully capture interregional feedback effects.

Grady & Muller (1988) argued that regional I-O models that include household spending should not be used and argue that cost-benefit analysis is the most appropriate tool for analyzing the benefits of particular programs. Mills (1993) noted


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the lack of budget constraints for governments and no role for government debt in regional IO models. As a result, in less than careful hands, regional I-O models can be interpreted to over-estimate the economic benefit of government spending projects. Hughes (2003) discussed the limitations of the application of multipliers and provides a checklist to consider when conducting regional impact studies. Harris (1997) discussed the application of regional multipliers in the context of tourism impact studies, one area where the multipliers are commonly misused. Siegfried, *et al* (2006) discussed the application of regional multipliers in the context of college and university impact studies, another area where the multipliers are commonly misused.

Input-output analysis, also known as the inter-industry analysis, is the name given to an analytical work conducted by Leontief in the late 1930's. The fundamental purpose of the input-output framework is to analyze the interdependence of industries in an economy through market based transactions. Input-output analysis can provide important and timely information on the interrelationships in a regional economy and the impacts of changes on that economy (Muchdie, 2011).

The notion of multipliers rests upon the difference between the initial effect of an exogenous change (final demand) and the total effects of a change. Direct effects measure the response for a given industry given a change in final demand for that same industry. Indirect effects represent the response by all local industries from a change in final demand for a specific industry. Induced effects represent the response by all local industries caused by increased (decreased) expenditures of new household income and inter-institutional transfers generated (lost) from the direct and indirect effects of the change in final demand for a specific industry. Total effects are the sum of direct, indirect, and induced effects.

One of the major uses of input-output information is to assess the effect on an economy of changes in elements that are exogenous to the model of that economy. The capabilities and usefulness of the Leontief inverse matrix, which is the source of analytical power of the model are well known. However, the meaning and interpretations are sometimes confusing. West & Jensen in Muchdie (2011) clarified the meaning of some of the components of the multipliers and suggested a multiplier format which is consistent and simpler to interpret but retains the essence of the conventional multipliers.


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The objective of this paper is to report the research in developing and applying a model that provides information on multipliers: total, flow-on, sectoral-specific and spatial-specific multipliers that can be used for evaluation and planning economic development in Kalimantan Island. The most significant contribution of this paper is the calculation of sector-spesific multipliers that could trace multipliers that occurs in own sector and other sectors as well as the calculation of spatial-specific multipliers; multipliers that occur in own island and other islands.

## METHODS

An inter-regional input-output model divides a national economy not only into sectors but also regions (Hulu, 1990). An industry in the Leontief model is split into as many regional sub-industries as there are regions. The table consists of two types of matrices representing the two types of economic interdependence. The first are the intra-regional matrices, which are on the main diagonal showing the inter-sectoral transactions, which occur within each region. The second are the trade matrices, termed inter-regional matrices, representing inter-industry trade flows between each pair of regions. These matrices show the specific inter-industry linkages between regions, allowing each economic activity to be identified by industry as well as by location. The inter-regional model can be expressed similar to the equations for the national as well as the single region model. In the general case:

$$ {}^{r}X_i = \sum_j \sum_s {}^{rs}X_{ij} + \sum_s {}^{rs}Y_i;\ (i, j = 1,2,...,n) \text{ and } (r, s = 1,2,...,m) \qquad (1) $$

There are ($m \times n$) equations of this type for each sector in each region showing that the output of each sector is equal to the sales to all intermediate sectors in all regions plus sales to final demand in all regions. In matrix term, the model can be expressed as:

$$ x = Ax + y \quad \text{or} \quad x = (I - A)^{-1} y \qquad (2) $$

where: x is a vector of output, A is a matrix of input-output coefficients with elements of $a_{ij}$-s and y is a vector of final demand; $(I - A)^{-1}$ is Leontief inverse matrix with elements of $b_{ij}$-s. Basically, A matrix in equation (2) contains both technical and trade characteristics, Hartwick (1971) separated these input coefficients (${}^{rs}a_{ij}$) into trade coefficients (${}^{rs}t_{ij}$) and technical coefficients (${}^{s}a_{ij}$). This separation is essentially the same as one that has been done for the single region model (Muchdie, 2011). Equation (2) can then be rewritten as:

$$ x = T(Ax + y) \quad \text{or} \quad x = (I - TA)^{-1} y \qquad (3) $$


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Method employed for constructing Indonesian Inter-regional Input-Output model was hybrid method that specified for studying Island economy of Indonesia. In this model, the regions were disaggregated into 5 regions, namely 5 big-group of Island, namely SUM for Sumatera Island, JAV for Java Island, KAL for Kalimantan Island, NUS for Nusa Tenggara Island and OTH for Other Island which includes Sulawesi, Maluku and Papua Islands. Meanwhile, economic activities were disaggregated into 9 economic sectors, namely: Sec-1 for Agriculture, livestock and fishery, Sec-2 for Mining and quarrying, Sec-3 for Manufacturing, Sec-4 for Electricity, water and gas, Sec-5 for Construction, Sec-6 for Trade, hotels and restaurants, Sec-7 for Transportation and communication, Sec-8 for Banking and other finance, and Sec-9: Other services.

**Table 1. Component Effects of Output, Income and Employment Multipliers**

| Effects | Output | Income | Employment |
|---|---|---|---|
| Initial | 1 | $h_j$ | $e_j$ |
| First-round | $\sum a_{ij}$ | $\sum a_{ij} h_i$ | $\sum a_{ij} e_i$ |
| Industrial-support | $\sum b_{ij} - 1 - \sum a_{ij}$ | $\sum b_{ij} h_i - h_i - \sum a_{ij} h_i$ | $\sum b_{ij} e_i - e_i - \sum a_{ij} e_i$ |
| Consumption-induced | $\sum (b^*_{ij} - b_{ij})$ | $\sum (b^*_{ij} h_i - b_{ij} h_i)$ | $\sum (b^*_{ij} e_i - b_{ij} e_i)$ |
| Total | $\sum b^*_{ij}$ | $\sum b^*_{ij} h_i$ | $\sum b^*_{ij} e_i$ |
| Flow-on | $\sum b^*_{ij} - 1$ | $\sum b^*_{ij} h_i - h_j$ | $\sum b^*_{ij} e_i - e_j$ |

**Source:** West, *et al* (1982; 1989).

**Note**: $h_j$ is household income coefficient, $e_j$ is employment output ratio, $a_{ij}$ is direct input coefficients, $b_{ij}$ is the element of open inverse of Leontief matrix, and $b^*_{ij}$ is the element of closed inverse Leontief matrix.

The GIRIOT (Generation Inter-Regional Input-Output Tables) procedures proposed and developed by Muchdie (1998) and have been applied using Indonesian data for the year 1990 (Muchdie, 1998; 2011). The GIRIOT procedure consists of three stages, seven phases and twenty four steps. Stage I: Estimation of Regional Technical Coefficients, consists of two phases, namely Phase 1: Derivation of National Technical Coefficients and Phase 2: Adjustment for Regional Technology. Stage II: Estimation of Regional Input Coefficients, consists of two phases, namely Phase 3: Estimation of Intra-regional Input Coefficients, and Phase 4: Estimation of Inter-regional Input Coefficients, and Stage III: Derivation Transaction Tables, consists of three phases, namely Phase 5: Derivation of Initial Transaction Tables, Phase 6: Sectoral Aggregation, and Phase 7: Derivation of Final Transaction Tables. These procedures have been revisited, evaluated and up-dated by Indonesian data 2015 (Muchdie, 2017).


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One of the major uses of input-output information is to assess the effect on an economy of changes in elements that are exogenous to the model of that economy. The capabilities and usefulness of the Leontief inverse matrix, which is the source of analytical power of the model are well known. However, the meaning and interpretations are sometimes confusing.

As a measurement of response to an economic stimulus, a multiplier expresses a cause and effect line of causality. In input-output analysis the stimulus is a change (increase or decrease) in sales to final demand. Similar to those in the single-region model, in the inter-regional model West *et.al*, in Muchdie (2011) defined the major categories of response as: initial, first-round, industrial-support, consumption-induced, total and flow-on effects. Formulas of such effects are provided in Table1.

**Table 2. Inter-regional Sector-Specific and Region-Specific Multipliers**

| | Output | Income | Employment |
|---|---|---|---|
| Sector-Specific | $\sum {}^{rs}b^*_{ij}$; r = 1,..m | $\sum {}^{rs}b^*_{ij}\ {}^{s}h_i$; r = 1,..m | $\sum {}^{rs}b^*_{ij}\ {}^{s}e_i$; r = 1,..m |
| Region-Specific | $\sum {}^{rs}b^*_{ij}$; i = 1,..n | $\sum {}^{rs}b^*_{ij}\ {}^{s}h_i$; i = 1,..n | $\sum {}^{rs}b^*_{ij}\ {}^{s}e_i$; i = 1,..n |

**Source:** DiPasquale & Polenske (1980).

**Note** : *r* and *s* are the *m* origin and destination regions, *i* and *j* are the n producing and purchasing sectors, ${}^{rs}b^*_{ij}$ is the element of closed inverse of Leontief matrix, m is the number of regions and n is the number of sectors.

DiPasquale & Polenske in Muchdie (2011) specify four types of multipliers, in which two of them are relevant in the context of the inter-regional input-output model; sector-specific and region-specific multipliers. Table 2 provides formula for the calculation of both sector-specific and region-specific multipliers for output, income and employment. The inter-regional sector-specific multiplier expresses the inputs required from the whole economy to satisfy a unit expansion of a named sector's exogenously determined final demand. The inter-regional region-specific multiplier quantifies the inputs required from all sectors in a specified region to satisfy the unit demand expansion in a given region. Formula provided in Table 1 and Table 2 were used to calculate total and flow-on multipliers, sector-specific multipliers and spatial-specific multipliers.

## RESULT AND DISCUSSION

Table 3 presents total output, income and employment multipliers and flow-on effects in Kalimantan Island. In term of output, the highest output multipliers was KAL-


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4 (Electricity, water and gas), 2.829. It means that an increase of final demand of the sector by 1.000 would increase total output by 2.829 including the initial increase of 1.000. It was followed by KAL-9 (Other services), 2.808 meaning that an increase of final demand of that sector by 1.000 would increase total output by 2.808 including the initial increase of 1.000. The lowest total multipliers was in KAL-2 (Mining and quarrying), 1.722. An increase of final demand of that sector by 1.000 units would increase total output by 1.722 including the initial increase of 1.000. The flow-on effects of output were the difference between total increase and initial increase. Flow-on effect is summation of direct, indirect and induced effects of an economic activity. In case of highest total multipliers (KAL-4) the flow-on effect was 1.829, meaning the impact of increase of final demand of KAL-4 (Electricity, water and gas) to total output was 1.829 as the initial effect was not included. The rank of total output multipliers might be different than that of output flow-on effects. The evidence from Kalimantan Island economy showed that the rank of total multipliers were the same as flow-on effects where KAL-4 (Electricity, water and gas) had the highest output flow-on effects, followed by KAL-9 (Other services) and the lowest value of output flow-on effects was KAL-2 (Mining and quarrying).

In term of household income, the highest total income multiplier was in KAL-9 (Other services), 0.829. It means that an increase of final demand of KAL-9 (Other services) by 1.000 units would increase initial household income by 0.593 and then would increase total income by 0.829. It was followed by KAL-8 (Banking and other finance) with total income multipliers of 0.489. The lowest total income multiplier was in KAL-6 (Trade, hotel and restaurant) with total income multipliers of 0.338.

Income flow-on effects were the difference between total income multipliers and initial income effects from the increase of final demand in that sector. It is the summation of direct, indirect and induced effects of an economic activity. For instance, in KAL-9 (Other services), the increase of final demand by 1.000 would have initial income effects by 0.593, resulting total income of 0.829. The income flow-on effect of KAL-9 (Other services) was 0.335. The highest income flow-on effect was in KAL-9 (Other services), followed by KAL-4 (Electricity, water and gas). The lowest income flow-on effect was in, again, KAL-2 (Mining and quarrying).


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**Table 3. Total Multipliers and Flow-on Effects: Output, Income and Employment**

| | Output | | | Income | | | Employment | | |
|---|---|---|---|---|---|---|---|---|---|
| SECTOR | Initial | Flow-on | Total | Initial | Flow-on | Total | Initial | Flow-on | Total |
| **KAL-1** | 1.000 | 1.047 | 2.047 | 0.197 | 0.192 | 0.389 | 0.363 | 0.217 | 0.580 |
| **KAL-2** | 1.000 | 0.722 | 1.722 | 0.204 | 0.136 | 0.340 | 0.091 | 0.144 | 0.235 |
| **KAL-3** | 1.000 | 1.221 | 2.221 | 0.119 | 0.224 | 0.343 | 0.097 | 0.271 | 0.368 |
| **KAL-4** | 1.000 | 1.829 | 2.829 | 0.091 | 0.296 | 0.387 | 0.091 | 0.289 | 0.380 |
| **KAL-5** | 1.000 | 1.561 | 2.561 | 0.165 | 0.291 | 0.456 | 0.092 | 0.335 | 0.427 |
| **KAL-6** | 1.000 | 0.876 | 1.876 | 0.175 | 0.163 | 0.338 | 0.147 | 0.201 | 0.348 |
| **KAL-7** | 1.000 | 1.223 | 2.223 | 0.182 | 0.242 | 0.424 | 0.092 | 0.228 | 0.320 |
| **KAL-8** | 1.000 | 1.253 | 2.253 | 0.243 | 0.246 | 0.489 | 0.091 | 0.240 | 0.331 |
| **KAL-9** | 1.000 | 1.808 | 2.808 | 0.593 | 0.335 | 0.928 | 0.206 | 0.402 | 0.608 |

In term of employment, the highest total employment multiplier was in KAL-9 (Other services), 0.608. It means that an increase of final demand of in KAL-9 (Other services) by 1.000 units would increase initial employment of in KAL-9 (Other services) by 0.206 and then would increase total employment by 0.608. It was followed by KAL-1 (Agriculture, livestock and fishery) with total employment multipliers of 0.580. The lowest total employment multiplier was in KAL-2 (Mining and quarrying) with total employment multipliers of 0.160.

Employment flow-on effects were the difference between total employment multipliers and initial employment effects from the increase of final demand in that sector. It is the summation of direct, indirect and induced effects on employment from an economic activity. The highest employment flow-on was in KAL-9 (Other services), followed by KAL-5 (Construction). The lowest income flow-on effect was in, again, KAL-2 (Mining and quarrying).

Table 4 provide sector-specific multipliers for output, income and employment in Kalimantan Island economy. In term of output, there were 3 sectors in which multipliers occurred in own sector were less than 50 percent, namely KAL-4 (Electricity, water and gas), KAL-5 (Construction), and KAL-9 (Other services). Meanwhile, other 6 sectors in which multipliers occurred in own region were more than 50 percent. These were: KAL-1 (Agriculture, livestock, and fishery), KAL-2 (Mining and quarrying), KAL-3 (Manufacturing), KAL-6 (Trade, hotel and restaurant), KAL-7 (Transportation and Communication) and KAL-8 (Banking and other finance).


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**Table 4. Sector-Specific Multipliers: Output, Income and Employment**

| SECTOR | Output | | | Income | | | Employment | | |
|---|---|---|---|---|---|---|---|---|---|
| | Own Sector | Other Sector | Total | Own Sector | Other Sector | Total | Own Sector | Other Sector | Total |
| **KAL-1** | 1.289 | 0.758 | 2.047 | 0.254 | 0.135 | 0.389 | 0.486 | 0.094 | 0.580 |
| **KAL-2** | 1.047 | 0.675 | 1.722 | 0.210 | 0.130 | 0.340 | 0.095 | 0.140 | 0.235 |
| **KAL-3** | 1.257 | 0.964 | 2.221 | 0.149 | 0.194 | 0.343 | 0.130 | 0.138 | 0.368 |
| **KAL-4** | 1.258 | 1.571 | 2.829 | 0.114 | 0.273 | 0.387 | 0.115 | 0.265 | 0.380 |
| **KAL-5** | 1.017 | 1.544 | 2.561 | 0.168 | 0.288 | 0.456 | 0.095 | 0.332 | 0.427 |
| **KAL-6** | 1.067 | 0.809 | 1.876 | 0.188 | 0.150 | 0.338 | 0.157 | 0.191 | 0.348 |
| **KAL-7** | 1.188 | 1.035 | 2.223 | 0.216 | 0.208 | 0.424 | 0.110 | 0.210 | 0.320 |
| **KAL-8** | 1.225 | 1.028 | 2.253 | 0.298 | 0.191 | 0.489 | 0.116 | 0.215 | 0.331 |
| **KAL-9** | 1.104 | 1.704 | 2.808 | 0.650 | 0.278 | 0.928 | 0.231 | 0.377 | 0.608 |

In term of income, there were 4 sectors in which multipliers occurred in own region were less than 50 percent, KAL-3 (Manufacturing), KAL-4 (Electricity, water and gas), KAL-5 (Construction) and KAL-7 (Transportation and communication). Meanwhile, other 5 sectors in which multipliers occurred in own region were more than 50 percent. These sectors were: KAL-1 (Agriculture, livestock and fishery), KAL-2 (Mining and quarrying), KAL-6 (Trade, hotel and restaurant), KAL-8 (Banking and other finance) and KAL-9 (Other services).

In term of employment, there were 8 sectors in which multipliers occurred in own sector were less than 50 percent, namely KAL-2 (Mining and quarrying), KAL-3 (Manufacturing), KAL-4 (Electricity, water and gas), KAL-5 (Construction), KAL-6 (Trade, hotel and restaurant), KAL-7 (Transportation and communication), KAL-8 (Banking and other finance) and KAL-9 (Other services). Meanwhile, only 1 sectors in which multipliers occurred in own sectors were more 50 percent multipliers, namely KAL-1 (Agriculture, livestock, and fishery).

Table 5 provide spatial-specific multipliers of output, income and employment multipliers in Kalimantan Island. In term of output, all sectors had more than 50 percent of multipliers that occurred in own region; in Kalimantan Island. All sectors had less than 50 percent of multipliers that occurred in other regions; the rest of Indonesia. It applied for income. All sectors had more than 50 percent of multipliers that occurred in own region; Kalimantan Island. All sectors had less than 50 percent of multipliers occurred in other regions; the rest of Indonesia. In term of employment, all sectors had more than 50 percent of multipliers that occurred in own region;


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Kalimantan Island. Again, all sectors had less than 50 percent of multipliers that occurred in other regions; the rest of Indonesia.

**Table 5. Spatial-Specific Multipliers: Output, Income and Employment**

| SECTOR | Output | | | Income | | | Employment | | |
|---|---|---|---|---|---|---|---|---|---|
| | Own Region | Other Region | Total | Own Region | Other Region | Total | Own Region | Other Region | Total |
| **KAL-1** | 1.668 | 0.379 | 2.047 | 0.325 | 0.064 | 0.389 | 0.483 | 0.097 | 0.580 |
| **KAL-2** | 1.423 | 0.299 | 1.722 | 0.288 | 0.052 | 0.340 | 0.164 | 0.071 | 0.235 |
| **KAL-3** | 1.808 | 0.413 | 2.221 | 0.279 | 0.064 | 0.343 | 0.265 | 0.103 | 0.368 |
| **KAL-4** | 2.169 | 0.660 | 2.829 | 0.293 | 0.094 | 0.387 | 0.242 | 0.138 | 0.380 |
| **KAL-5** | 1.845 | 0.716 | 2.561 | 0.327 | 0.129 | 0.456 | 0.230 | 0.197 | 0.427 |
| **KAL-6** | 1.453 | 0.423 | 1.876 | 0.264 | 0.074 | 0.338 | 0.241 | 0.107 | 0.348 |
| **KAL-7** | 1.845 | 0.378 | 2.223 | 0.361 | 0.063 | 0.424 | 0.226 | 0.094 | 0.320 |
| **KAL-8** | 1.545 | 0.708 | 2.253 | 0.357 | 0.132 | 0.489 | 0.178 | 0.153 | 0.331 |
| **KAL-9** | 1.827 | 0.981 | 2.808 | 0.760 | 0.168 | 0.928 | 0.365 | 0.243 | 0.608 |

***Spatial Distribution of Flow-on***

Flow-on effects are the difference between total effects (total multipliers) and initial effect. It consists of direct effects, indirect effect and induced effects of a change in final demand. Table 6 presents spatial distribution of flow-on effects in Kalimantan Island economy. In term of output, 7 sectors had more than 50 percent of flow-on occurred in own region. It means that, in 7 sectors, flow-on effects that occurred in other regions were less than 50 percent. The highest output flow-on effect that occurred in other regions was in KAL-8 (Banking and other finance), followed by KAL-9 (Other services) and KAL-6 (Trade, hotel and restaurant). The lowest output flow-on effect that occurred in other regions was in KAL-7 (Transportation and communication).

In term of income flow-on effects, 8 sectors had flow-on effects that more than 50 per cent of the flow-on occurred in own region. In that sector, the flow-on effects that occurred in other regions were less than 50 per cent. The highest income flow-on effect that occurred in other regions was in KAL-9 (Other services), KAL-8 (Banking and other finance), KAL-5 (Construction) and KAL-6 (Trade, hotel and restaurant). The lowest income flow-on that occurred in other regions was in KAL-7 (Transportation and communication).


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**Table 6. Spatial Distribution of Flow-on: Output, Income and Employment**

| SECTOR | Output | | | Income | | | Employment | | |
|---|---|---|---|---|---|---|---|---|---|
| | Own Region | Other Region | Total | Own Region | Other Region | Total | Own Region | Other Region | Total |
| **KAL-1** | 64% | 36% | 1.047 | 67% | 33% | 0.192 | 56% | 44% | 0.217 |
| **KAL-2** | 59% | 42% | 0.722 | 62% | 38% | 0.136 | 51% | 49% | 0.144 |
| **KAL-3** | 66% | 34% | 1.221 | 71% | 29% | 0.224 | 63% | 38% | 0.271 |
| **KAL-4** | 64% | 36% | 1.829 | 68% | 32% | 0.296 | 53% | 47% | 0.289 |
| **KAL-5** | 54% | 46% | 1.561 | 56% | 44% | 0.291 | 41% | 59% | 0.335 |
| **KAL-6** | 52% | 48% | 0.876 | 56% | 44% | 0.163 | 47% | 53% | 0.201 |
| **KAL-7** | 69% | 31% | 1.223 | 73% | 27% | 0.242 | 60% | 40% | 0.228 |
| **KAL-8** | 44% | 57% | 1.253 | 47% | 53% | 0.246 | 37% | 63% | 0.240 |
| **KAL-9** | 46% | 54% | 1.808 | 51% | 50% | 0.335 | 39% | 61% | 0.402 |

In term of employment, 4 sectors had employment flow-on that occurred in own region more than 50 per cent. It means that in that 4 sectors with employment flow-on in other region were less than 50 per cent. The highest employment flow-on effect that occurred in other regions was in KAL-8 (Banking and other finance), KAL-9 (Other services) and KAL-5 (Construction) and the lowest employment flow-on that occurred in other regions was in KAL-3 (Manufacturing).

## CONCLUSION

The conclusions could be drawn were: Firstly, the important sectors of Kalimantan Island economy could be based on total multipliers of output, income and employment. Based on total output multipliers, three important sectors in Kalimantan Island economy were KAL-4, KAL-9 and KAL-5. Based on total income multipliers, three important sectors were KAL-9, KAL-8 and KAL-5. Based on total employment multipliers, three important sectors were KAL-9, KAL-1, and KAL-4. Based on output flow-on effects, three important sectors were KAL-4, KAL-9, and KAL-5. Based on income flow-on effects, three important sectors in Kalimantan Island economy were KAL-9, KAL-4, and KAL-5. Based on employment flow-on effects, three important sectors were KAL-9, KAL-5, and KAL-4.

Secondly, important economic sectors could be based on sector-specific multipliers effects. It could be based on the highest multipliers that occurred in own sectors. Based on output sector-specific multipliers that occurred in own sector, three important sectors were KAl-1, KAL-2, KAL-3 and KAL-6. Based on income sector-specific multipliers that occurred in own sectors, three important sectors were KAL-9,


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KAL-1, and KAL-2. Based on employment sector-specific multipliers that occurred in own sector, three important sectors were KAL-1, KAL-6, and KAL-2.

Thirdly, important economic sectors could be based on spatial-specific multipliers. It could be based on the highest multipliers that occurred in own regions; in Kalimantan. Based on output spatial-specific multipliers that occurred in own region, three important sectors were KAL-7, KAL-2, KAL-1, and KAL-3. Based on income sector-specific multipliers that occurred in own region, three important sectors were KAL-2, KAL-7 and KAL-1. Based on employment spatial-specific multipliers that occurred in own region, three important sectors were KAL-1, KAL-3 and KAL-7.

Fourthly, important economic sectors could be based on spatial distribution of flow-on. It could be based on the highest flow-on that occurred in own regions; in Kalimantan Island. Based on output spatial distribution of low-on that occurred in own region, three important sectors were KAL-7, KAL-3 and KAL-1. Based on income spatial distribution of low-on that occurred in own region, three important sectors were KAL-7, KAL-3 and KAL-1. Based on employment spatial distribution of flow-on that occurred in own region, three important sectors were KAL-3, KAL-7 and KAL-1.

## REFERENCES

Ahiakpor, J.C.W. (2000). Hawtrey on the Keynesian Multiplier: A Question of Cognitive Dissonance? *History of Political Economy*. 32 (4): 889-908.

Beemiller, R.M. (1990). Improving Accuracy by Combining Primary Data with RIMS: Comment on Bourque. *International Regional Science Review*, 13 (1-2): 99-101.

Coughlin, C. & T.B. Mandelbaum. (1991). A Consumer's Guide to Regional Economic Multipliers. *Federal Reserve Bank of St. Louis Review*. January/February 1991.19-32.

Grady, P. & R.A. Muller. (1988). On the use and misuse of input-output based impact analysis in evaluation. *The Canadian Journal of Program Evaluation*. 2 (3): 49-61.

Hall, R. E. (2009). By How Much Does GDP Rise if the Government Buys More Output? *NBER Working Paper 15496*. National Bureau of Economic Research.

Harris, P. (1997). Limitations on the use of regional economic impact multipliers by practitioners: An application to the tourism industry. *The Journal of Tourism Studies. 8(2)*: 1-12.


DOI: 10.15408/sjie.v6i2.4736

Hughes, D.W, (2003). *Policy Uses of Economic Multipliers and Impact Analysis*. Choices Publication of the American Agricultural Economics Association, Second Quarter.

Hulu, E (1990). *Model Input-Output: Teori dan Applikasinya (Input-Output Model: Theory and Its Applications)*. Jakarta: Pusat Antar Universitas- Universitas Indonesia.

Krugman, P & R. Wells. (2009). *Economics*. New York: Worth Publisher.

Mankiw, N. G (2008), *Macroeconomics*. New York: South-Western Publishing.

McConnell, C., S. Brue, & S. Flynn. (2011). *Macroeconomics*. New York: McGraw-Hill.

Mills, E. C. (1993). The Misuse of Regional Economic Models. *Cato Journal*, 13(1): 29-39.

Muchdie. (1998). Spatial Structure of Island Economy of Indonesia: An Inter-Regional Input-Output Study. (*Unpublished Dissertation*). Quensland: the University of Queensland, Australia.

Muchdie. (2011). *Spatial Structure of Island Economy of Indonesia: A New Hybrid for Generation Inter-regional Input-Output Tables*. Germany: Lambert Academic Publishing.

Muchdie. (2017). GIRIOT revisited, up-dated and evaluated, *International Journal of Social Science and Economic Researc*h. 2(02): 2377-2396.

Pindyck, R & Rubinfeld, D (2012). *Macroeconomics*. London: The Pearson Series in Economics.

Prihawantoro, S., I. Suryawijaya., R. Hutapea., U. Sugarmansyah., Alkadri., W. Rusiawan., & M.Y. Permana. (2013). *Peranan Teknologi Dalam Pertumbuhan Koridor-Koridor Ekonomi Indonesia: Pendekatan Total Factor Productivity (The Role of Technology in Economic Growth in Indonesian Economic Corridors: Total Factor Productivity Approach)*. Jakarta: Badan Pengkajian dan Penerapan Teknologi.

Siegfried, J, R. Allen., A.R. Sanderson., & P. McHenry. (2006). The Economic Impact of Colleges and Universities. *Working Paper No. 06-W12*.


http://journal.uinjkt.ac.id/index.php/signifikan
DOI: 10.15408/sjie.v6i2.4736