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Article

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Tourism's income distribution in West Papua Province

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ABSTRACT

Pioneering the construction and application of social accounting matrix (SAM) framework in West Papua Province, Indonesia in 2018, this research aims to examine tourism-induced distribution effects on various socioeconomic groups by estimating SAM multiplier and its decomposition as well elaborating tourism influences through structural path analysis. Tourism brought significant impact on the economy with utmost overall contribution on capital factor and within decomposed cross multiplier effect. Nevertheless, impact on households decreases following a decrease in the level of household income. Accommodation and food services contributed on agricultural workers' income and employment. The latter has exceptional influence on the lowest-income rural household segment transmitted through fisheries, agricultural worker, and capital factor, that is strategic to improve livelihood and reducing regional poverty.

1. Introduction

The application of the social accounting matrix (SAM) to address issues in the nexus between tourism, economic growth, poverty, and inequality are prominent in developing countries. However, they are mostly carried out at the country level with very limited studies at the subnational level, most likely due to data availability, cost (Klytchnikova & Dorosh, 2013), and the time-consuming ground for constructing SAM, especially at the regional level. To fill this gap, we initially developed a SAM using a case study in West Papua Province, Indonesia. Regional SAM is important because the economic structure of regions is different from one another—each region needs a specific policy and strategy that matches its uniqueness, rather than a nationwide policy or strategy. Moreover, the construction of the West Papua Regional SAM benefited from a common construction technique based on the regionalization of System of National Accounts (SNA; top-down approach).

To make the best use of the SAM framework, this study aims to evaluate tourism-induced distribution effects on capital, labor, enterprise, and households that cover multiplier analysis, multiplier decomposition, and structural path analysis. The SAM multiplier extends the economic contribution analysis of the input-output model by presenting it in a comprehensive flow of economy, including the income distributional effect of an injection on factors and households (Leatherman & Marcouiller, 1996b; Mainar-Causapé, Ferrari, & McDonald, 2018; Miller & Blair, 2009; Pyatt & Round, 1985). The disaggregated labor factor by

occupation category, remuneration status, and area of residence, including disaggregated households based on area of residence and income level (in decile), allowed for the elaboration of income distribution toward these segments, especially the impact of tourism industries on lower decile (poorer) household groups.

Furthermore, multiplier decomposition sheds light on the mechanism of effects transmission starting at the initial injection of certain tourism expenditures that affect output demand for other production sectors, which are consequently dispersed to factors and institutions, and distributed again backward. Eventually, structural path analysis encourages the understanding of the magnitude and directness of influences and how it travels from a specific sector to factors and households through other sectors and factors. By fully comprehending the dimension and mechanism of how tourism may benefit lower-income groups, evidence-based strategies and policies can be formulated to amend this linkage in the next stage.

West Papua Province was chosen as a case study because it is one of Indonesia's poorest regions besides Papua Province, which altogether represents the least developed area in eastern Indonesia (Resosudarmo & Jotzo, 2009). Further, the poverty and inequality situation in West Papua is worse than the national average, with intense concentration in rural areas (BPS-Statistics Indonesia, 2020b). Additionally, relevant studies related to development issues in West Papua have been intensively investigated (Mollet, 2011; Resosudarmo, Manning, & Napitupulu, 2009; Resosudarmo, Mollet, Raya, & Kaiwai, 2014; Resosudarmo,

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Napitupulu, Manning, & Wanggai, 2009). However, it still remains untouched in conjunction with tourism economics to the best of the authors' knowledge. Nevertheless, tourism in West Papua has shown an upward trend in the last decade, although somewhat unsteady (see Fig. 1); hence, a study linking tourism's role in regional economy and income distribution in this underprivileged region is essential.

Additionally, studies on the economic impact of tourism mainly focus on the overall economy without a detailed explanation on the manner of impact distribution within its economy. Using SAM-based multiplier, decomposition, and path analysis can help identify the distribution mechanism earlier, so the decision maker can understand it more comprehensively and respond accordingly. Particularly in West Papua, tourism is expected to be an alternative to improve welfare. Thus, proper tourism planning based on scientific evidence in its developing stage will ensure success in achieving its objectives.

West Papua Province is one of two easternmost provinces in Indonesia, located in the western part of New Guinea Island. As of 2018, it has a total area of 102,955 km² and is inhabited by 937,458 people that are spread out in 13 subregions (BPS-Statistics of Papua Barat Province, 2019). Manufacture of oil, petroleum, and gas (24%) as well as mining and quarrying (18%) were the two most prominent industries in terms of contribution to the gross regional domestic product (GRDP) in 2018 (BPS-Statistics of Papua Barat Province, 2020). This implies the region's strong dependency on the mineral extraction and processing sector. Furthermore, the growth rate was superior in wholesale and retail trade and repair of motor vehicles and motorcycles as well as electricity and gas, including accommodation and food service activities and transportation and storage, which are the core components of tourism industries (BPS-Statistics of Papua Barat Province, 2019).

Between 2006 and 2018, domestic visitors predominated the total number of tourists; a fluctuating trend was observed in the early years of visitor data documentation in West Papua Province, except for the last three years where a rapid steady growth took place (see Fig. 1). Specifically, the number of domestic and inbound visitors to West Papua in 2018 was 461,340 and 13,666, respectively. Tourism activities in West Papua Province are concentrated in three subregions, namely Sorong City, Manokwari, and Raja Ampat.

The rest of the paper is organized into four sections. The literature review is presented in the next section. Subsequently, theoretical ground on empirical application of SAM in the nexus between tourism and regional economy are elaborated in the data and methods. Additionally, three objectives are elaborated in the findings and discussion, which cover tourism-induced SAM multiplier analysis, its multiplier decomposition, and tourism income distribution effects on factors and

institutions explained by structural path analysis. Finally, conclusions including directions for future studies is presented.

2. Literature review

Over the past two decades, the concept of pro-poor tourism was introduced in the United Nations (UN, 1999), where tourism is perceived to have an essential role in reducing poverty and delivering inclusive growth. Relevant studies regarding pro-poor tourism conducted by government bodies and researchers have been increasing, particularly in developing countries (Blake, Arbache, Sinclair, & Teles, 2008; Croes & Rivera, 2017; Klytchnikova & Dorosh, 2013; Mahadevan, Amir, & Nugroho, 2016a, 2016b; Njoya, 2013).

Macroeconomic approaches, such as input-output (IO), social accounting matrix (SAM), computable general equilibrium (CGE), tourism satellite account (TSA), and dynamic stochastic general equilibrium (DSGE) have been used to investigate the economic contribution and impact of tourism (Dwyer, Forsyth, & Dwyer, 2009; Hara, 2008; Liu, Song, & Blake, 2018; Liu & Wu, 2019; Song, Dwyer, Li, & Cao, 2012; Zhang & Yang, 2021). IO analysis is used to understand the contribution of tourism to the economy and interrelationship between tourism and other sectors in an economy, e.g., linkage between tourism and local wine industry in Central West Region of New South Wales, Australia (McFarlane, Grant, Blackwell, & Mounter, 2016). Despite its benefit to present direct effect of tourism demand in an economy, TSA, however, unable to capture the economy-wide impacts of tourism due to the absence of behavioral equations to respond shocks, which is possible to be solved within CGE and DSGE framework. Furthermore, CGE (World Tourism Organization, 2014) is primarily used to measure impact of an exogenous shock to a whole economy such as change in tax and tariff policies (Mahadevan et al., 2016a; Sugiyarto, Blake, & Sinclair, 2003).

Moreover, both CGE and DSGE operates under general equilibrium model and thus share some common behavioral equations. Yet, CGE contains more sectors which accommodate intersectoral analysis, while DSGE emphasizes the transmission mechanism (Liu et al., 2018). Pioneering the application of Bayesian DSGE, Liu et al. (2018) found that improving tourism productivity has positive impact on economic growth, i.e., 1% increase of tourism productivity yielded to 0.09% increment in Mauritian GDP. Later, Liu and Wu (2019) incorporated new growth theory into Bayesian DSGE and discovered that shock on tourism productivity resulted to greater impact on Spanish domestic tourism demand where a 10% increase of tourism productivity resulted to 0.61% increment in Spanish real GDP. Meanwhile, Zhang and Yang argued that a shock on inbound tourism demand elevated housing price

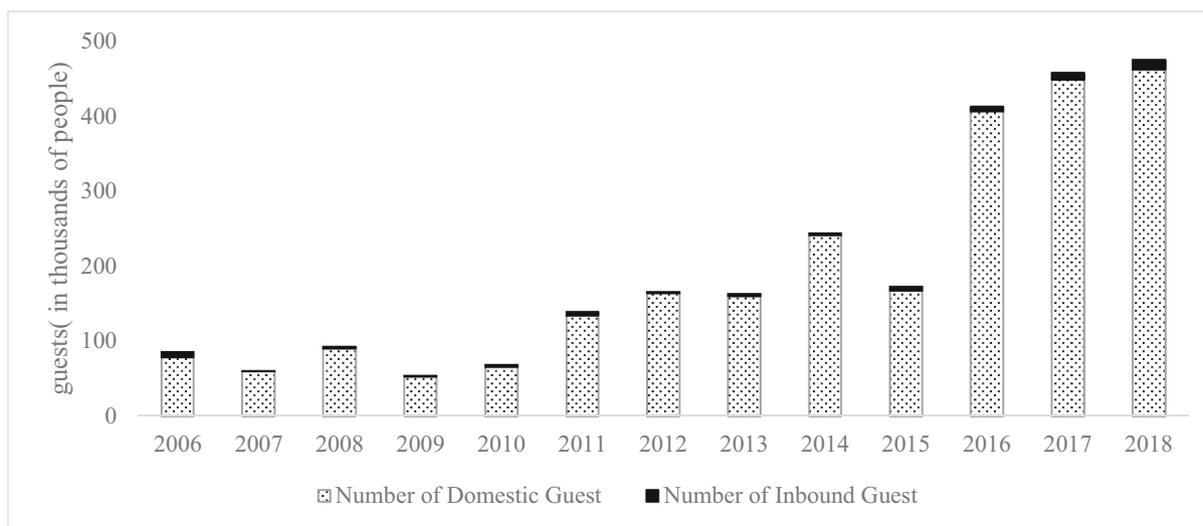


Fig. 1. Number of Domestic and Foreign Guests in Accommodation in West Papua Province in 2006–2018. Source: (BPS-Statistics Indonesia, 2020a).

and rentals in Iceland. Comparison of abovementioned methods are discussed further in Dwyer et al. (2009) and Liu and Wu (2019).

SAM that encompasses IO and serves as the main dataset for CGE and TSA, is opted in this study because its sophisticated function for income distribution analysis on various socioeconomic groups (Round, 2003), unlike conventional IO model which only provide an amalgamated labor and household. Besides, Akkemik (2012) compared SAM's competitive advantage with IO and CGE modeling whose application center on sectoral interdependence and policy simulation analysis, respectively. Moreover, structural path analysis equipped on the SAM can explain the effects transmission mechanism, providing a useful information for decision making. The SAM framework has been used widely to measure economic-wide impact and income distribution of tourism at the (multi) national (Croes & Rivera, 2017; Jones, 2010; Muchapondwa & Stage, 2013) and regional levels (Ferrari, Jiménez, & Secondi, 2018; Hara & Naipaul, 2008; Hughes, 2007; Leatherman & Marcouiller, 1996a, 1996b; Polo & Valle, 2016). This includes its multiplier decomposition (Incera & Fernández, 2015; Li & Lian, 2010; Njoya & Nikitas, 2020b) and structural path analysis (Njoya, 2013; Njoya & Nikitas, 2020a).

Njoya (2013) argued that domestic tourism has a relatively higher multiplier impact in Kenya compared to foreign tourism, where domestic tourism is identified as backward-oriented. Furthermore, transport, hotels and restaurants, finance, other manufacturing, and other services are the most affected sectors. The largest multiplier for both rural and urban non-agricultural labor was transmitted along the path of transport, followed by hotels. High-income households in urban areas received the largest benefit compared to their counterparts in rural areas, while low- or middle-income households benefit in reverse order. Poverty gap and severity improve as tourism demand increases, with the largest improvement experienced by rural low- and middle-income households.

Jones (2010) pioneered the construction of tourism-SAM in developing countries for Mozambique, where he diversified tourism commodities into foreign and domestic visitors with three subsegments each, and non-tourism commodities with the three main sectors of economic activities. He found tourism's modest contribution to gross demand and value added, despite the challenge of limited skilled labor in overall segments. Furthermore, the contribution of foreign business tourists to value added was the most outstanding, in contrast to the minor benefit of leisure tourists from the lucrative markets of Europe and North America. Although only a small contribution (10%) of tourism benefited the poorest households, it improved its strongest linkage with the agricultural sector (where most of the poor households were engaged in), which is consequentially strategic for pro-poor tourism.

Muchapondwa and Stage (2013) discovered that tourism mattered but was not profound to the economies of Botswana, Namibia, and South Africa—the overall and per-tourist economic impact as well as indirect linkages effect were dominated by South Africa, while the first two had a higher share of each economy. Moreover, the share of tourism-induced labor income in all three countries was less than its overall national income, except for tourism-induced capital and mixed income share. Furthermore, the impact of tourism on the poor segment, who mostly engaged in the primary sector and concentrated in rural areas for all three countries, was insignificant and most likely affected by weak linkages to the primary sector and the use of imported goods by tourism industries (notably in Botswana and Namibia).

Croes and Rivera (2017) found that injection in tourism demand for services and transportation significantly contributed to the Ecuador economy, where almost 60% was distributed to hotels, restaurants, and transportation, including a strong backward linkage to manufacturing, mining, and agriculture, and a higher proportion of mixed income transmitted to poor households via an informal economy. Besides, a simulation of an increase in international tourism demand yielded a relatively higher tourism distributional effect on poor households compared to higher income groups. This implies pro-poor tourism although only one-fifth was distributed to rural areas.

Meanwhile, research on regions of developed countries focused more on the linkage between tourism and agriculture, where agriculture or forest processing and tourism yielded the largest relative impacts on both high- and low-income households, as well as in each aggregated contribution, regardless of the household group in the Kickapoo Valley of Wisconsin (Leatherman & Marcouiller, 1996a, 1996b). Likewise, Hara and Naipaul (2008) found that agritourism influences the income of poor households in rural Florida. Conversely, tourism benefits for urban residents in an emerging country's region, i.e., Jiangsu Province in China, was observed to be greater in the high-income than in the low-income group (Li & Lian, 2010).

Early empirical applications of the SAM multiplier, decomposition, and structural path analysis in an Indonesian case study were initially aimed at the growth-poverty-inequality nexus (Keuning & Thorbecke, 1989; Khan & Thorbecke, 1989; Thorbecke & Jung, 1996) and impact analysis of financial shock (Azis & Mansury, 2003). Meanwhile, the effects of tourism on growth and income distribution in Indonesia have been investigated using the computable general equilibrium model (Mahadevan et al., 2016a, 2016b; Sugiyarto, Blake, & Sinclair, 2003), but very limited on the regional SAM (R-SAM) framework. Several preceding applications of R-SAM in developing countries were mainly found in Latin America and the Caribbean (Angeles, Gamez, & Ivanova, 2009; Ciczowicz, Banerjee, Morris, & Moreda, 2018; Klytchnikova & Dorosh, 2013; Wagner, 1997).

The economic impact of tourism in the economy of Panama was found to be very significant, ranging from 6 to 9% (Klytchnikova & Dorosh, 2013), where a much higher impact is yielded by foreign tourism in absolute and relative terms for Panama Province and other peripheral areas, such as Bocas del Toro. A higher tourism economic impact was encouraged by strong backward linkages anent local food product demand, which later connected it to rural households, as well as strong forward linkages of household expenditure. Ultimately, tourism was found to be an important sector to increase the income of the poor and consequently reduce poverty in Panama. Moreover, Wagner (1997) developed an R-SAM for Guaraqueçaba, Brazil, where it was found that rudimentary rural farmers and subsistence households had the greatest economic effects, although it had minor linkages with the rest of the economy. Meanwhile, a high proportion of leakage from tourism-induced business was discovered due to limited exports (only from rural entrepreneurial and manufacturing subaccounts) and heavy imports of inputs, commodities, and capital, which consequently led to a modest economic impact on tourism.

3. Data and methods

3.1. Construction of regional social accounting matrix for West Papua Province, Indonesia

The application of SAM to address issues and policies in subnational boundaries has never been more important, considering the economic gap between regions in a country. Despite the uniqueness of each region's economic structure, SAM is widely produced and employed at the national level. Notwithstanding, any evaluation and policy recommendation resulting from it might be less applicable when it comes to implementation on a regional basis. Therefore, to address this gap, it is important to conduct a study based on the R-SAM framework. However, regions in developing countries, such as Indonesia, most likely do not have their own R-SAMs, and is even worse in remote and marginal regions, such as West Papua Province. Therefore, at the initial stage of this study, an R-SAM for West Papua Province was constructed.

Furthermore, the R-SAM can be constructed in two ways: the top-down approach, which is also known as a non-survey approach (Santos, 2005, 2006), and the bottom-up approach (Gronau & Winter, 2018). Data for the former approach are mainly derived from the SNA and supported by some governmental reports and statistics, while the latter approach is benefited mainly from field surveys. Constructing a SAM is

costly and time-consuming, yet essential for any level of economy. This explains why the R-SAM is very limited. Some earlier documentations of SAM construction were found in Iran, Sri Lanka, and Swaziland (now Eswatini) in the early 1970s (Pyatt & Round, 1985) and has been growing ever since. The United Nations, World Bank, International Food Policy Research Institute, and Partnership for Economic Policy are among the international institutions that provide standard and practical assistance to develop and make the best use of it. This study employs an up-down approach to construct the West Papua R-SAM.

The first West Papua Province input-output (IO) Table Year 2013 (BPS-Statistics of Papua Barat Province, 2015) served as the core data for the R-SAM. Subsequently, to provide results and recommendations that can be more applicable to the current situation, the West Papua IO Table was updated from 2013 to 2018. Furthermore, by cooperation with Statistics Indonesia, the foremost West Papua R-SAM 2018 was built. Its endogenous accounts contained 17 factors, 21 institutions, and 32 production sectors, in addition to five exogenous accounts including government, capital balance, indirect tax minus subsidy, rest of Indonesia, and rest of the world. Specifically, the factors comprised labor and capital, where the former was divided into 16 categories based on occupational category (i.e., agriculture, production, operator, and manual; clerical, sales, and service; professional, technician, managerial, and non-civilian), remuneration status (i.e., paid and unpaid), and area of residence (i.e., rural and urban). The institution consists of households and enterprises, where the former was divided into 20 segments according to area of residence, wherein each is disaggregated further into deciles based on income level.

Furthermore, endogenous accounts comprised factors, households, enterprises, and production sectors, while the government and remaining accounts comprised exogenous accounts. Additionally, the compositions of R-SAM and conventional SAM are almost similar, except for the additional penultimate account of *the rest of the country* in the former. This study concentrates on how tourist expenditure drives the circular interdependence within three endogenous accounts, including the production sector, factors (labor and capital), and institutions (households and enterprises). Details of the West Papua R-SAM construction process are as follows.

First, the domestic transaction table at the purchaser's price of West Papua IO Table Year 2013 was reaggregated to 34 sectors, referring to the GRDP 2013 by industrial origin of West Papua Province. Next, the base year of the IO table was updated to 2018 to render more recent trends, and balanced using the RAS method, wherein GRDP 2018 by industrial origin and expenditure was used as a reference. The final form of West Papua IO Table 2018 served as the main source of data for the development of the West Papua R-SAM 2018. Further procedures, such as account disaggregation and measuring other derived accounts that have not been covered in the IO table are explained as follows.

The matrix of labor and households was constructed by disaggregating wage and salary (income) by sector, occupational category, remuneration status, and area of residence in the former, and by area of residence and income level delineated by deciles in the latter, based on the National Socioeconomic Survey. They were then incorporated into the R-SAM. Furthermore, balancing was performed by allocating wages and salaries to household income, with only a small portion allocated outside the region, as well as balancing income for transactions at households, enterprises, governments, and capital accounts. To fill in some of the incomplete data in the construction of the 2018 West Papua R-SAM, the 2008 Indonesian SAM was used as a proportional base, which consequentially imposes a conspicuous time gap between two datasets, yet inevitably to be compromised to conclude the R-SAM. Additionally, the newest national SAM was available only in 2008. Meanwhile, a previous study with similar motivation was also observed in the case of Portugal (Santos, 2006).

Besides, Financial Statistics of Province/Regency and Municipality/Village Government and State Budget in 2018 were also incorporated in the 2018 West Papua R-SAM. Additionally, an assumption was held in

the rest of the country, that is, the proportion of workers and their activities outside of West Papua Province in less than 6 months is equal to Indonesian nationals who work overseas for less than 6 months.

Final alteration was carried out to prepare the R-SAM fit for analysis, which includes combining activities and domestic commodity into production sectors, incorporating import commodity into the rest of the world, and re consolidating production sectors in the West Papua R-SAM 2018 to 32 sectors to adjust with sector classification in visitor spending.

3.2. Tourism-induced social accounting matrix accounting multiplier

The structure of the SAM-based accounting multiplier matrix takes after the IO-based multiplier, except for the larger magnitude captured by SAM because it covers the whole transmission in endogenous accounts, compared to IO that only considers the sectoral interdependence. Thus, the endogenous income (y_n) is obtained by multiplying the accounting multiplier matrix (M_a) by the injection, that is, total visitor expenditure (x) (see Eq. 1) (Defourny & Thorbecke, 1984; Pyatt & Round, 1985).

$$y_n = [I - A_n]^{-1}x = M_a x \tag{1}$$

Further, the accounting multiplier matrix (M_a) equals the inverse matrix of identity matrix (I) minus the matrix of average expenditure propensities (A_n), which is expressed in Eq. 2.

$$A_n = \begin{bmatrix} 0 & 0 & A_{13} \\ A_{21} & A_{22} & 0 \\ 0 & A_{32} & A_{33} \end{bmatrix} \tag{2}$$

Meanwhile, total visitor expenditure (x) comprised the sum of domestic and inbound visitor spending in 2018. It was calculated by multiplying the number of visitors by its average trip spending, where the latter is the result of the multiplication of per-night spending by the average length of stay (Sun & Styne, 2006). Furthermore, the number of domestic and inbound visitor trips was derived from the number of accommodation guests (star and non-star) in West Papua Province (BPS-Statistics Indonesia, 2020a, 2020b), the majority of which were made by domestic visitors (97%). Moreover, the regional composition of domestic visitors' average spending was obtained from domestic tourism statistics (BPS-Statistics Indonesia, 2018). However, because West Papua Province's inbound visitor average consumption record was unavailable, we assumed that it is equal to the national's inbound visitor average expenditure pattern and derived it from International Visitor Arrival Statistics 2018 (BPS-Statistics Indonesia, 2019).

Both visitor average expenditures were categorized further into nine

Table 1
Total Visitor Expenditures in West Papua, Indonesia, in 2018

Subject of Expenditure	Total Visitor Expenditure (million Rupiah)	Share (%)	Domestic (million Rupiah)	Inbound (million Rupiah)
Total	1,239,487	100	1,002,063	237,424
Wholesale and retail (exclude car and motorbike)	297,781	24	259,559	38,222
Land, sea, and inland water transport	166,810	13	136,114	30,696
Air transport	127,653	10	127,653	-
Auxiliary transport activities and storage; post and courier	9605	1	9605	-
Accommodation	151,929	12	77,551	74,378
Food services	329,555	27	285,897	43,658
Leasing and business-related services	99,373	8	75,752	23,621
Health and social service	19,879	2	19,879	-
Other services	36,903	3	10,053	26,850

industry classifications in the tertiary (service) sector (see Table 1), with two unusual conditions of reclassification: 1) leasing—all travel agent activities both domestic and inbound are included in leasing and business-related activities, instead of auxiliary transport activities and storage; post and courier; 2) other expenses in domestic refers to auxiliary transport services and transport vehicle repair. Thus, it is recognized as part of auxiliary transport activities and storage; post and courier (BPS-Statistics Indonesia, 2018), while other inbound expenses refer to other services.

Furthermore, total visitor expenditure (x) reflects an injection into the economy whose transmission initially started in production sectors, and then proceeds to other accounts, which creates a flow that is elaborated as follows. A change in demand driven by tourist spending on goods and services consequently affects production sectors to readjust its demand for intermediate input from other production sectors and factors (i.e., labor and capital). This further explains the influence of production sectors on other production sectors, which takes place internally and in an intersectoral manner (A_{33}), as well as the factors (A_{13}). Since factors belonging to households and enterprises, tourism-induced influence received by factors earlier is transformed into influence on institutions (A_{21}) and transferred among institutions (A_{22}). Finally, the influence back to production sectors appear as institutions expenditure (A_{32}). A better understanding of the quantitative analysis of each influence is enhanced by decomposing the multiplier. Moreover, the present work adopts SAM multiplier decomposition and structural path analysis that introduced earliest in Defourny and Thorbecke (1984).

3.3. Tourism-induced social accounting matrix accounting multiplier decomposition

The current study employs Stone’s additive SAM multiplier decomposition that enables the multiplier to be partitioned into the initial injection (I), net contribution of transfer multiplier effects (T), net contribution of open-loop or cross-multiplier effects (O), and net contribution of circular or closed-loop effects (C) (Defourny & Thorbecke, 1984). Further, details on the calculation for these sub-multipliers are expressed in Eq. 3. Consequently, it enhances the understanding of the round consecutive distribution of tourism’s influence on endogenous accounts in an economy. Nevertheless, the above-mentioned decomposition can explain the transmission within an account and among those three endogenous accounts as a sum of effects only, without detailed explication on each influence contained therein. Furthermore, these influences can be elucidated through structural path analysis.

$$M_{\alpha} = \underbrace{I}_I + \underbrace{(M_{\alpha 1} - I)}_T + \underbrace{(M_{\alpha 2} - I)M_{\alpha 1}}_O + \underbrace{(M_{\alpha 3} - I)M_{\alpha 2}M_{\alpha 1}}_C \quad (3)$$

3.4. Structural path analysis (SPA)

The path origin, path destination, global influence, elementary paths, direct influence, path multiplier, total influence, and ratio of total influence divided by global influences are several attributes in showcasing the SPA results (Defourny & Thorbecke, 1984; Khan & Thorbecke, 1989), that are described as follows.

Direct influence is transmitted from origin pole (i) to destination pole (j) through a given path, which can be in the form of an arc (see Eq. 4) and/or elementary path (see Eq. 5), where the quantity of arcs in the latter is referred to as length. Additionally, a_{ji} in the former is defined as the element of the average expenditure propensity matrix (A_n).

$$(I_{(i \rightarrow j)}^D = a_{ji}) \quad (4)$$

$$(I_{(i \rightarrow j)_p}^D = I_{(i,x,y,j)}^D = a_{xi}a_{yx}a_{jy}) \quad (5)$$

Total influence accumulates direct influence incorporated in the

elementary path and indirect effects of adjacent circuits (i.e., feedback and loop) in the same path as the former and is calculated by multiplying the direct influence by the path multiplier (M_p) (see Eq. 6).

$$I_{(i \rightarrow j)_p}^T = I_{(i \rightarrow j)_p}^D M_p \quad (6)$$

Global influence resembles accounting multiplier (M_{α}), which gathers the effects of all circuits in a similar path; thus, it is equal to the sum of the total influences of all elementary paths linking poles i and j (see Eq. 7). Further, global influence is used to state the appreciation of output and income in production sectors as well as factors and institutions, respectively.

$$I_{(i \rightarrow j)}^G = m_{\alpha_{ji}} = \sum_{p=1}^n I_{(i \rightarrow j)_p}^T = \sum_{p=1}^n I_{(i \rightarrow j)_p}^D M_p \quad (7)$$

Structural path analysis has an extremely wide coverage. Thus, only some preeminent and extraordinary paths are explained in detail by emphasizing the transmission related to tourism industries and lower-class groups. The definition of the tourism industry is grounded in tourism industries from a supply perspective at the International Recommendations for Tourism Statistics 2008 (United Nations, 2010), and tourism and transport services at the Development Economics and Indicators Division Aggregation Level 1 in Economic Indicators for Southeast Asia and the Pacific (Asian Development Bank, 2018). In this respect, five industries are selected for further elaboration: 1) accommodation 2) food services; 3) land, sea, and inland water transport; 4) air transport; 5) auxiliary transport activities and storage, post, and courier.

The tourism-led influences of production sectors on other production sectors, factors, and institutions, as well as the influence of households on production sectors and the path multiplier for every chosen path are explored in detail in the next section. An analysis of the influence of production sectors on other production sectors is essential to identify the potential of poles in adjacent circuits to transmit the influence, where a higher ratio of total influence to global influence means a stronger potential in transmitting influence, and vice versa. The influence of production sectors on factors accommodates the multiplier decomposition analysis for three specific questions, as follows:

- Decomposition of a single accounting multiplier: in which sectors will additional employment of a specific type of labor occur consequent upon increased tourist expenditure in the given sector? ($i \rightarrow j$)
- Decomposition of multiple accounting multipliers for a given column: in which sectors will the additional employment of various types of labor occur as a result to increased tourist expenditure in given sectors? ($i \rightarrow j_n$)
- Decomposition of multiple accounting multipliers along a row: which sectors should be stimulated to increase the employment of given skill groups in given sectors? ($i_n \rightarrow j$)

The above-mentioned circumstances are also applied to the influence of production activities on enterprise and socioeconomic household groups in terms of income. Further, the influence of socioeconomic household groups on production activities sheds light on which sectors and to what extent the income change of given household groups affects the production sectors. Finally, path multiplier (M_p) measures the degree of amplification conferred to these paths by adjacent circuits, where the higher the path multiplier, the longer the influence to be fully grasped. Additionally, the acceleration of the influence transmission can be estimated by the ratio of direct influence to total influence (immediate effects).

4. Findings and discussion

4.1. Accounting multipliers and its decomposition

The total output contribution of visitor expenditure in West Papua Province’s economy is 4.65 trillion Rupiah (326.66 million USD). The capital factor is the most influenced by all accounts, accounting for 18.7% of the total output (see Table 2). Furthermore, tourism influences the labor factor, particularly on paid clerical, sales, and service workers in urban areas (2.3%). This is plausible because major touristic establishments such as accommodation, food services, and transport service providers are mostly concentrated in urban areas wherein jobs are related to blue-collar service workers. Furthermore, the impingement of tourist spending on households is particularly prominent in the region’s richest household (i.e., decile 10) in urban areas (2.3%), followed by rural areas (1.6%). Some above-average impacted production sectors in descending order include livestock (9.3%); wholesale and retail (excluding cars and motorbikes; 8.1%); food services (7.6%); land, sea, and inland water transport (4.3%); fisheries (4.1%); accommodation (3.4%); air transport (3.1%); leasing and business-related services (2.3%); government administration, defense, and social insurance (1.7%).

To understand the tourism ripple effect more comprehensively, the SAM’s accounting multiplier is decomposed into initial injection as well as transfer-, cross-, and circular-multiplier effects based on additive multiplier decomposition, with contributions of 26.65%, 21.09%, 38.59%, and 13.67%, respectively. Cross-multiplier effects are identified to have the largest ratio, which implies a higher advantage to factors, households, and enterprises—the main concerns of this study. The four elements of the SAM accounting multiplier are discussed in detail as follows:

The initial injection worth 1.24 trillion Rupiah is equal to total visitor expenditures (see Table 1). It is composed of food services (27%); wholesale and retail (excluding cars and motorbikes) (24%); land, sea, and inland water transport (13%); accommodation (12%); air transport (10%); leasing and business-related services (8%); other services (3%); health and social services (2%); auxiliary transport activities and storage, and post and courier (1%).

Next, transfer multiplier effects worth 980.68 billion Rupiah allocate more than half of its yields to livestock (39%) and fisheries (16%). Additionally, food crops as well as annual horticulture and others are other agriculture-related sectors whose impact is above average. Manufacture of oil, petroleum, and gas as well as furniture and forestry products are the only two secondary sectors whose contributions are above par, which are also recognized as native to the region. Furthermore, apart from the two highly touristic industries identified within the

Table 2
Above-Average Tourism-Induced Contributions on West Papua Economy.

Accounts	Contributions (million Rupiah)	Share (%)
Total	4,650,679	
Capital factor	871,185	18.7
Livestock	432,527	9.3
Wholesale and retail (exclude car and motorbike)	378,316	8.1
Food services	352,032	7.6
Land, sea, and inland water transport	198,934	4.3
Fisheries	192,624	4.1
Accommodation	157,096	3.4
Air transport	141,913	3.1
Paid clerical, sales, and service workers in urban	108,504	2.3
Household in urban (decile 10)	107,009	2.3
Leasing and business-related services	104,978	2.3
Government administration, defense, and social insurance	79,359	1.7
Household in rural (decile 10)	73,248	1.6

initial injection, referred to as wholesale and retail (excluding car and motorbike) as well as land, sea, and inland water transport, the impact on other service industries (i.e., government administration, defense, and social defense; information and technology; finance) are superior (see Table 3).

Cross-multiplier effects worth 1.79 trillion Rupiah are comprised of 1.12 trillion Rupiah (63%) contribution on factors and 670.13 billion Rupiah (37%) on households and enterprise. Capital represents roughly two-thirds of the overall factors, while the remaining one-third is distributed to labor, which suggests that tourism benefits in the region are more capital-oriented. The cross-multiplier effects on the labor are distinguished as 65% in urban and 35% in rural, as well as 63% in paid and 37% in unpaid categories. Moreover, the impact distribution based on occupational category is dominated by clerical, sales, and service workers (49%), followed by production, operators, and manual workers (24%), professional, technician, managerial, and non-civilian workers (15%), and agricultural workers (12%). Details of the cross-multiplier effects on these factors are presented in Table 4.

Compared to enterprise that only received about 7% (45.4 billion Rupiah) of non-factorial cross-multiplier effects, households are significantly advantaged by about 93% (624.7 billion Rupiah), where the largest distributional effect within the latter lies on the highest income household segment. Moreover, the impact decreases following a decrease in household income level, which entails the unfavorable impact of tourism on inequality (see Table 5 for details). Specifically, about a quarter of the total contribution to households is distributed to the richest household, whereas only 4% goes to the poorest household.

Finally, circular-multiplier effects made up about 635.77 billion Rupiah, with excellent impact on capital factor (20%), followed by food-related sectors, such as livestock (7.9%), fisheries (5.9%), and manufacture of food, beverage, and tobacco (5.5%). Apart from other above-average accounts that are also identified in previous above-average multiplier effects, real estate and education also received significant circular-multiplier effects (see Table 6).

4.2. Structural path analysis on tourism industry

Several outstanding transmissions of effects that stimulated by tourism industries to other production sectors, factors, households, and enterprises are elaborated next.

4.2.1. Influence of tourism industry on other production sectors

In this subsection, livestock and fisheries were specifically chosen as destination poles for other sectors, considering their considerable benefits. Further, the transmission of influence between the tourism industry and livestock and fisheries is examined individually as follows.

Overall, the largest global effects were identified for food services on

Table 3
Above-Average Tourism-Induced Transfer Multiplier Effects.

Accounts	Transfer Multiplier Effects (million Rupiah)	Share (%)
Total	980,676	
Livestock	382,196	39
Fisheries	155,129	16
Government administration, defense, and social insurance	69,451	7
Wholesale and retail (exclude car and motorbike)	52,146	5
Information and technology	40,943	4
Manufacture of oil, petroleum, and gas	30,739	3
Food crops	28,540	3
Furniture and forestry products	28,380	3
Finance	23,124	2
Land, sea, and inland water transport	20,624	2
Annual horticulture and others	17,438	2

Table 4
Cross-multiplier effects on factors.

Factors	Total (million Rupiah)	Paid (million Rupiah)		Unpaid (million Rupiah)	
		Rural	Urban	Rural	Urban
Labor	380,531	64,652	176,387	66,869	72,624
Agricultural workers	45,382	14,468	6265	20,882	3768
Production, operator, and manual workers	91,695	16,141	36,899	17,948	20,708
Clerical, sales, and service workers	188,225	20,437	96,455	27,215	44,117
Professional, technician, managerial, & non-civilian workers	55,229	13,607	36,769	823	4030
Capital	744,082				

Table 5
Cross-Multiplier Effects on Households and Enterprise.

Institution	Total (million Rupiah)	Rural (million Rupiah)	Urban (million Rupiah)
Households	624,729	244,377	380,352
Decile 10	155,109	62,363	92,746
Decile 9	89,539	33,695	55,845
Decile 8	70,793	27,827	42,966
Decile 7	61,630	23,513	38,118
Decile 6	55,048	20,807	34,241
Decile 5	48,785	19,436	29,349
Decile 4	43,096	17,152	25,944
Decile 3	38,730	14,887	23,843
Decile 2	34,749	13,812	20,937
Decile 1	27,249	10,886	16,363
Enterprise	45,399		

Table 6
Above-Average Circular-Multiplier Effects.

Accounts	Circular-Multiplier Effects (million Rupiah)	Share (%)
Total	635,775	
Capital factor	127,103	20.0
Livestock	50,331	7.9
Fisheries	37,496	5.9
Manufacture of food, beverage, and tobacco	35,243	5.5
Wholesale and retail (exclude car and motorbike)	28,390	4.5
Manufacture of oil, petroleum, and gas	23,078	3.6
Household in urban (decile 10)	14,263	2.2
Food services	14,004	2.2
Real estate	13,884	2.2
Education	13,555	2.1
Paid clerical, sales, and service workers in urban	12,049	1.9
Information and technology	11,902	1.9
Land, sea, and inland water transport	11,500	1.8
Household in rural (decile 10)	10,885	1.7
Finance	9920	1.6
Government administration, defense, and social insurance	9908	1.6

livestock and accommodation for fisheries. Specifically, an increase of 1000 Rupiah in tourist spending for food service leads to an increase of 946 Rupiah in the output of livestock, where 96.93% of this additional output is directly yielded by food services' demand for livestock input, and 0.63% indirectly through the manufacture of food, beverages, and tobacco. Likewise, an increase of 1000 Rupiah results in an increase of 351 Rupiah in the output of fisheries, with 87.18% yielded by direct demand of accommodation for fisheries input, followed by indirect demand through food services (3.13%); manufacture of food, beverages and tobacco (2.28%); livestock then manufacture of food, beverages, and tobacco (1.14%).

Despite the significant effect of direct transmission, other elementary paths containing significant indirect transmission are identified at air

transport demand on livestock via food service (12.25%) and accommodation (6.12%), and on fisheries via accommodation (9.09%) and food services (3.03%), respectively. Additionally, auxiliary transport activities and storage, and post and courier have indirect demand for fisheries (8.57%) and livestock (6%) through accommodation. Meanwhile, land, sea, and inland water transport has no effect on livestock and fisheries, whereas air transport has a higher coefficient of indirect advantage on livestock and fisheries, probably with respect to time-saving for shipping these perishable products.

4.2.2. Influence of tourism industries on factors

The results show that accommodation and food services are the only two tourism industries that have an impact on agricultural workers' income and employment regardless of remuneration status and area of residence. The highest global effect is found at the elementary path of food services on unpaid (informal) agricultural workers in rural areas (0.05), where an increase of 1000 Rupiah in food services results to an increase of 50 Rupiah in compensation to unpaid (informal) agricultural workers in rural areas, with the additional employment indirectly exerted through livestock (36%), fisheries (30%), livestock then annual horticulture and others (12%), livestock, food crops (8%), and forestry (2%). Overall, the influence of tourism industries on agricultural workers is indirectly transmitted via the agricultural sector alone.

Next, the global effect of tourism industries on production, operators, and manual workers is exceptionally high in three transport-related sectors, but weaker on accommodation and food services whose coefficients do not exceed 0.02. Specifically, elementary paths with the largest influence are identified at land, sea, and inland transport (0.07), auxiliary transport activities and storage, and post and courier (0.07), both on paid production, operators, and manual workers in urban areas. The major difference between those two paths lies in the higher direct employment of the former path origin (88.57%), which is opposite to the latter, whose employment effect is higher when exercised indirectly via construction (50%) than its direct employment (18.57%).

Furthermore, the global effect for elementary paths of each tourism industry on paid clerical, sales, and service workers in urban areas are prominent, particularly in air transport (0.126), auxiliary transport activities and storage, post and courier (0.091), and accommodation (0.089), whose influence on direct employment are also significant valued at 80.95%, 32.97%, and 58.43%, respectively. It is worth noting that the former path origin has the largest global effect among all elementary paths of tourism industries to factors, where an increase of 1000 Rupiah spent in air transport generates 126 Rupiah increase on the income of paid clerical, sales, and service workers in urban areas, with considerable employment exercised directly (80.95%), and indirectly over government administration, defense, and social insurance (9.52%), manufacture of oil, petroleum, and gas (0.79%), and a loop centered at air transport (0.79%).

Significant influences were transmitted by auxiliary transport activities, post and courier (0.049), and air transport (0.047) on paid professional, technician, managerial, and non-civilian workers in urban areas. The additional employment in the latter is affected directly (44.68%) and indirectly through government administration, defense, and social insurance (34.04%). However, the employment effect of the

former path origin is higher when exercised indirectly through government administration, defense, and social insurance (40.82%), followed by its direct path (10.2%); through information and technology, government administration, defense, and social insurance (10.2%), through information and technology (8.16%), construction (8.16%), auxiliary transport activities and storage, post and courier, government administration, defense, and social insurance (4.08%). Meanwhile, limited effects (not exceeding 0.006) are observed on unpaid professional, technician, managerial, and non-civilian workers in urban areas, as well as zero effects on rural areas.

Finally, the global effects of tourism industries on the capital factor are led by demand for accommodation (0.77), followed by land, sea, and inland water transport (0.744), food services (0.732), auxiliary transport activities and storage, post and courier (0.665), and air transport (0.568). Most elementary paths are found at accommodation (36), followed by auxiliary transport activities and storage, post and courier (35), food services (32), air transport (17), and land, sea, and inland water transport (6). Moreover, almost all of the transmission of tourism industries on capital factors are exerted directly, such as land, sea, and inland water transport (86.16%), air transport (73.06%), accommodation (34.42%), auxiliary transport activities and storage, and post and courier (27.97%), except for food services whose indirect transmission through fisheries (25.68%) is higher than its direct path (22.68%).

Finally, the strongest elementary paths of each tourism industry on employment are identified as follows: land, sea, and inland water transport on unpaid (informal) professional, technician, managerial, and non-civilian workers in urban areas (100%); air transport on unpaid (informal) production, operators, and manual workers in rural areas (90%); auxiliary transport activities and storage, and post and courier on paid production, operators, and manual workers in rural areas via construction (75%); food services on unpaid (informal) clerical, sales, and service workers in urban areas (75%); and accommodation on paid agricultural labor in urban areas through fisheries (69.23%).

4.2.3. Influence of tourism industries on enterprise and households

The global effect of accommodation on enterprises stands out as the highest among tourism industries, where an increase of 1000 Rupiah in tourist expenditure for accommodation yields an increase of 47 Rupiah in the income of accommodation enterprises. This implies a strategic opportunity to gain financial benefits through the regional accommodation business. Specifically, this influence is transmitted indirectly through capital (34.04%), as well as via other sectors prior and in addition to capital, i.e., fisheries (23.4%), livestock (6.38%), finance (2.13%), and wholesale and retail excluding cars and motorbikes (2.13%). Food services have similar elementary paths as accommodation, except for finance.

As expected, transmission paths originating from transport-related sectors such as air as well as land, sea, and inland water transport are delivered through the manufacture of oil, petroleum, and gas, which is

plausible because fuel plays an essential role in transport operations. Meanwhile, transmissions through government administration, defense, and social insurance are observed in air transport and auxiliary transport activities, storage, post, and courier. Additionally, transmissions of the latter group are also engaged in construction, information, and technology, and its own self in the form of a circular circuit. Overall, influences from tourism industries toward enterprises are transmitted through the capital factor, which as a matter of course implies enterprise possession of capital in production. The details of the global effects of each tourism industry mentioned earlier are stated in Table 7.

In general, there are 12 two-arc and 27 three-arc transmissions between the tourism industry and households. All five tourism industries influence all households, both in rural and urban areas, and are transmitted via capital factors. Furthermore, transmissions through labor within the two arcs are led by clerical, sales, and service workers. However, the number of transmissions decreases following a downward household income level, with the fewest and sole transmission at food services on the poorest household (decile 1) in urban area via unpaid (informal) clerical, sales, and service workers. It is followed by production, operator, and manual workers, and professional, technician, managerial, and non-civilian workers, except for agricultural workers. Moreover, there are nine production sectors that serve as the second pole of transmission: livestock; fisheries; manufacturing of oil, petroleum, and gas; construction; wholesale and retail (excluding cars and motorbikes); auxiliary transport activities and storage, and post and courier; information and technology; finance; government administration, defense, and social insurance. Additionally, one circular loop was recognized for auxiliary transport activities and storage.

An interesting discovery is observed in the manufacture of oil, petroleum, and gas, and wholesale and retail (excluding cars and motorbikes)—the influences are continuously transmitted through capital factor alone. This entails disengaging labor, which only benefit the richest households regardless of area. However, transmission through livestock and fisheries translates the demand into income and employment of agricultural workers, which persist to spread wider from rural to urban areas following the downward household income level. Additionally, the influence started at accommodation and food services. It is then transmitted subsequently through fisheries and continuously through agricultural workers. Ultimately, capital factor has the most three-arc transmission channels on the 20% lowest-income household (deciles 1–2), both in rural and urban areas.

The influence of tourism industries is exceptional in highest-income households (decile 10), which decreases following a decrease in household income level (see Table 7). Auxiliary transport activities and storage and post and courier had the highest effect on the richest urban (0.089) and rural (0.064) households (decile 10). However, its effect on the next higher income household (decile 9) is equal to two transport-related industries in urban areas (0.054), as well as food services in rural areas (0.034). Furthermore, the remaining households (deciles

Table 7
Global Effect of Tourism Industries on Enterprise and Households.

Institution	Accommodation		Food services		Land, sea, and inland water transport		Air transport		Auxiliary transport activities and storage; Post and courier	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Enterprise	0.047		0.044		0.045		0.035		0.041	
Households										
Decile 10	0.058	0.087	0.060	0.080	0.059	0.088	0.054	0.088	0.064	0.089
Decile 9	0.031	0.050	0.034	0.047	0.033	0.054	0.029	0.054	0.034	0.054
Decile 8	0.026	0.037	0.029	0.036	0.027	0.043	0.024	0.042	0.028	0.042
Decile 7	0.022	0.032	0.026	0.032	0.023	0.039	0.020	0.037	0.023	0.038
Decile 6	0.021	0.028	0.024	0.029	0.020	0.035	0.017	0.032	0.020	0.034
Decile 5	0.019	0.024	0.022	0.025	0.019	0.031	0.016	0.027	0.018	0.028
Decile 4	0.018	0.021	0.021	0.022	0.016	0.029	0.014	0.024	0.016	0.026
Decile 3	0.016	0.020	0.019	0.021	0.014	0.027	0.012	0.022	0.014	0.023
Decile 2	0.015	0.018	0.017	0.019	0.013	0.023	0.011	0.018	0.012	0.020
Decile 1	0.012	0.014	0.014	0.015	0.010	0.019	0.008	0.014	0.010	0.016

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