Tourism's Economic Impact in West Southeast Nusa: Input-Output Analysis Approach

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Abstract: West Southeast Nusa has great tourism potential that should be developed to boost the macro economy which leads to increased community welfare. This study uses IO analysis to see the multiplier effect and the total effect of the tourism sector's impact on output, employment, and income. The results show that the tourism sector is one of the key sectors in the economy of West Southeast Nusa Province, significantly increasing output, employment, and income. The large contribution of the tourism sector to the West Southeast Nusa economy should be a special concern for the government. Digitalization and investment in tourism sector and human resources must be increased to unleash the full potential of this sector and significantly boost the economy in West Southeast Nusa Province.
Keywords: Input Output; Tourism Sector; NTB Province.

Abstract: Nusa Tenggara Barat memiliki potensi pariwisata yang besar yang harus dikembangkan untuk meningkatkan perekonomian makro yang berdampak pada peningkatan kesejahteraan masyarakat. Studi ini menggunakan analisis IO untuk melihat efek pengganda dan total dampak sektor pariwisata terhadap output, tenaga kerja, dan pendapatan. Hasilnya menunjukkan bahwa sektor pariwisata adalah salah satu sektor kunci dalam perekonomian Provinsi Nusa Tenggara Barat, yang secara signifikan meningkatkan output, tenaga kerja, dan pendapatan. Kontribusi besar sektor pariwisata terhadap perekonomian Nusa Tenggara Barat harus menjadi perhatian khusus pemerintah. Digitalisasi serta investasi dalam sektor pariwisata dan sumber daya manusia harus ditingkatkan untuk memaksimalkan potensi penuh sektor ini dan secara signifikan meningkatkan perekonomian di Provinsi Nusa Tenggara Barat.
Keywords: Input Output; Sektor Pariwisata; Provinsi NTB.

INTRODUCTION

Economic development has a crucial role for a country. Economic development aims to improve the economy of a region (Hawari & Kartiasih, 2017). Each region has been given autonomy since the enactment of Law No. 32 of 2004 concerning Regional Autonomy. This law allows each region to plan and control the economic growth of its own region. Each region is required to be able to explore the potential of its region in order to maximize the regional economy and can contribute a large contribution to the Indonesian economy.

Many literatures mention that the tourism sector has a role in advancing the economy in a region. This is corroborated by the opinion of most international organizations which state that tourism can be considered as a tool for economic development in many regions of the world. In addition, many literatures recognize the potential of tourism in increasing economic growth. The tourism sector is considered capable of being an effective tool to

advance the economy in many regions by receiving a large number of tourists (Naseem, 2021).

West Southeast Nusa Province has a lot of tourism potential (Fernanda, 2018). This is shown from the many types and tourist attractions in West Southeast Nusa Province, both natural and artificial tourism. This statement is reinforced on the basis of policies that have been launched by the government based on Law No. 39 of 2009, namely Mandalika is one of the areas that has been designated as a tourism Special Economic Zone (SEZ) located in West Southeast Nusa (Wulandari et al., 2018). Mandalika Special Economic Zone has a main focus on the tourism sector based on Government Regulation No. 52 of 2014. This development encourages accelerated economic growth, especially in Central Lombok Regency. Supporting facilities and infrastructure continue to be improved, including the addition of a runway at Zainudin Abdul Majid International Airport, the construction of the BIL-Mandalika Bypass Road, and the development of various facilities within the Mandalika SEZ area (Taupikurrahman & Suwandana, 2022).

West Southeast Nusa (NTB) Province is located between two major plates, the Australian Indian and Eurasian plates, which interact with each other and shape the region. This makes NTB rich in mineral and energy resources. NTB's natural resources are very diverse, including forests, rice fields and plantations, mining, livestock, marine, and tourism. With this abundant natural wealth, NTB has great potential to develop into a more developed region. In terms of geography, NTB has a very strategic location due to its proximity to the world-famous island of Bali, which has become the barometer and showcase of Indonesia's tourism industry. Foreign tourists also come to Indonesia through the Bali entrance. NTB utilizes this opportunity by developing its tourism sector (Kuswandi et al., 2018).

Although it has many leading tourist destinations, archipelago tourist visits to West Southeast Nusa Province are still less than other provinces in Indonesia. It can be seen in **Figure 1** that in 2023 NTB Province only ranks 12th in terms of the most number of domestic tourist visits compared to other provinces with a total of 12,131,368 visits. This figure is still relatively small compared to 11 other provinces. When compared to outside Java and Sumatra, NTB has a large enough difference with Bali, which is a total of 6,695,000 domestic tourist visits.
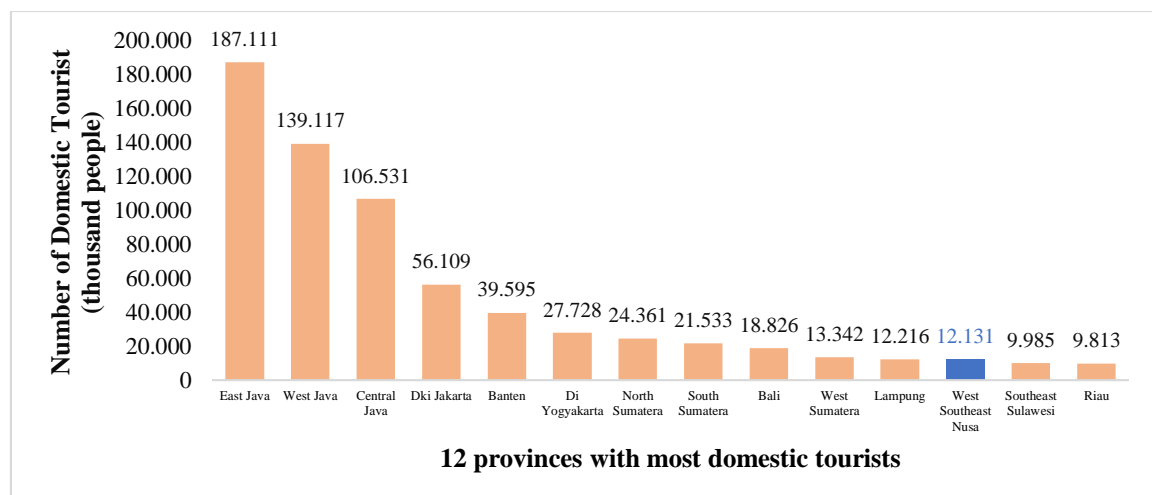

Figure 1. Number of domestic tourist trips by destination province in 2023
Source: BPS (Processed)

Figure 2 shows the development of foreign tourists to Indonesia according to the entrance of Lombok International Airport from 2017 to 2021. If you pay attention to the number of foreign tourists, it seems that the number of visits continues to decline from 2017 to 2021 with only 29 visits. The decline that occurred was due to the 2019 Covid pandemic. Then, from 2022 to 2023 it has slowly increased but is still very far compared to 2017, which attracted 123,388 tourist visits.
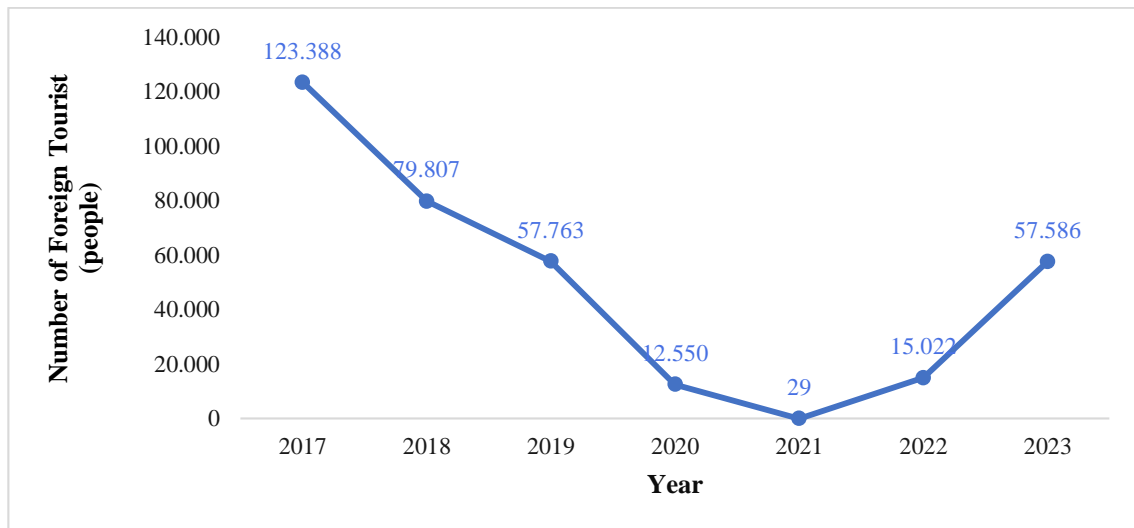

Figure 2. Development of the Number of Foreign Tourist Trips to Indonesia According to the Entrance of Lombok International Airport in 2017-2023
Source: BPS (Processed)

Not only domestic tourist visits, **Figure 3** shows that foreign visits are not so high as seen from the number of visits through Lombok International Airport only reaching 57,586 visits. Of course, this figure is still relatively small compared to the number 1 ranked most visits occupied by Ngurah Rai International Airport, Bali with 5,248,113 visits followed by Soekarno-hatta airport with 1,953,005 visits. With natural beauty that is no less attractive than Bali, NTB should also be able to attract greater foreign tourist visits and keep up with Bali Province as the main destination for tourist destinations.
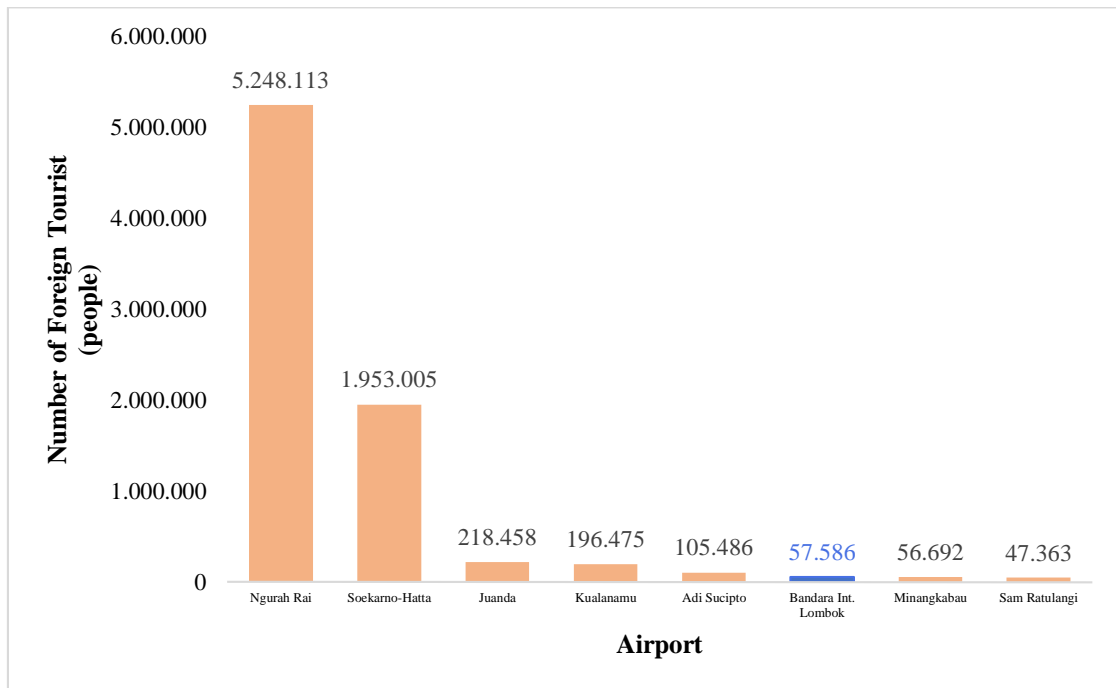
Figure 3. Number of Foreign Tourist Trips to Indonesia in 2023 by Air Entrance
Source: BPS (Processed)

In **Figure 4**, it is known that the tourism sector of West Southeast Nusa Province contributed more than twenty percent in NTB from 2016 to 2023. This contribution is still smaller than other provinces such as North Sulawesi, Yogyakarta, and Bali as provinces that also have great tourism potential (BPS). Based on Figure 4, the tourism sector of NTB Province should receive greater attention to develop more rapidly in order to maximize the potential and economy of the region. Tourism business development has been a topic of intensive study lately. This sector not only adds to foreign exchange earnings, but also creates jobs, stimulates the growth of the tourism industry, and ultimately drives overall economic growth (Zhou, 2022).
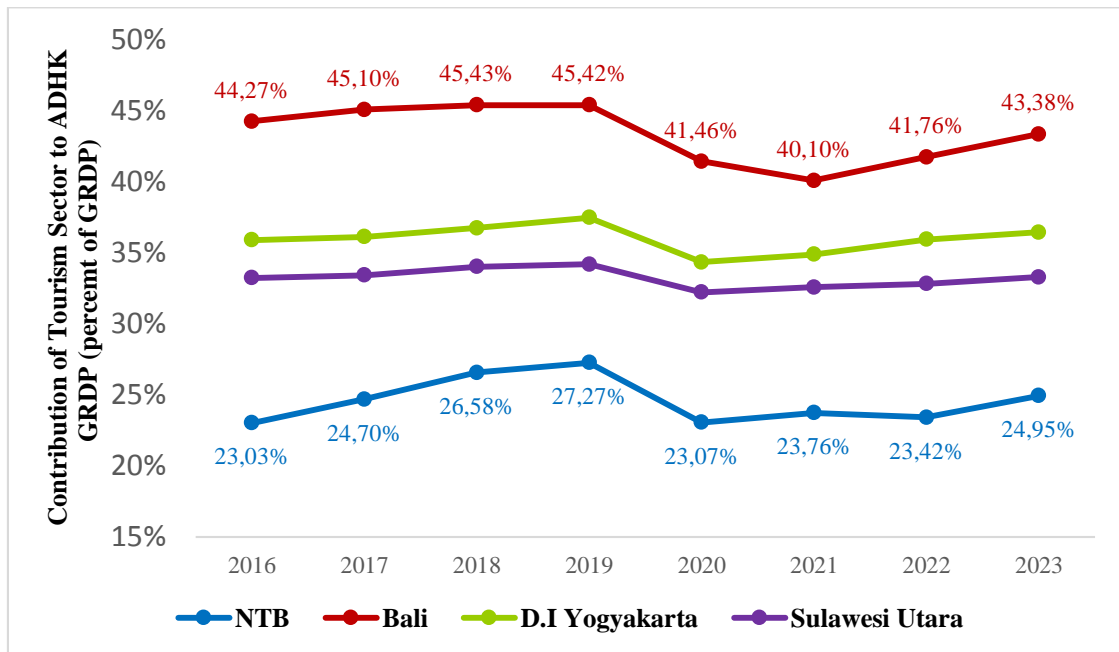
Figure 4: Contribution of Tourism Sector to ADHK GRDP by Province, 2016-2023
Source: BPS (Processed)

Figure 5 shows that the percentage of poor people in West Southeast Nusa Province is above the national percentage. This indicates that there are still many poor people in NTB. With great tourism potential, NTB is expected to be able to make the tourism sector a means of supporting the economy so that it can reduce the percentage of poverty to below the national figure. By attracting many foreign tourists, tourism can contribute significantly to the economic growth of a destination by collecting foreign exchange earnings, providing employment opportunities, and improving infrastructure so as to improve welfare. Tourism is widely regarded as an important impetus for promoting export trade and economic growth in many countries (Li et al., 2018).
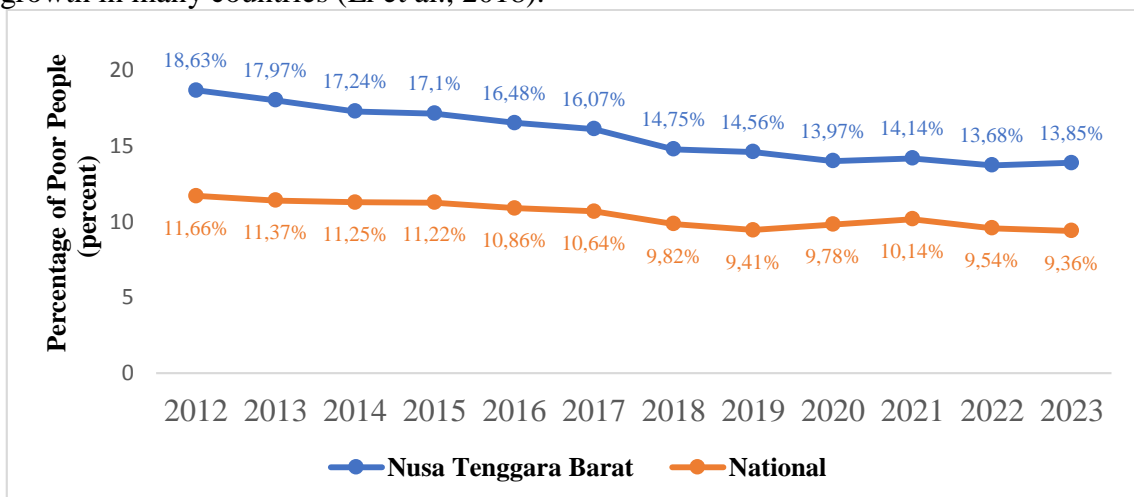

Figure 5. Percentage of Poor People in West Southeast Nusa Province, 2021-2023
Source: BPS (Processed)

Several studies have been conducted about the influence of tourism on local income and economic growth. Putri (2019) studied the impact of government spending on the

tourism sector on economic growth in West Southeast Nusa Province between 2011 and 2015 using panel data methodologies. The results indicate that the economic growth of NTB is not significantly impacted by government spending in the tourism sector. Furthermore, Taufikurrahman & Suwandana (2022) used secondary data in the form of the 2016 Indonesia IRIO table to study the tourism industry in West Southeast Nusa and the effects of the Mandalika MotoGP. It was determined that even though the tourist sector in NTB Province currently plays a little role, it has the capacity to grow into a major one.

Previous studies have not provided comprehensive analysis of the indirect impact of the tourism sector on the economy in NTB Province. Most studies focuses on the direct economy impact. Meanwhile, this research will examine how the tourism sector can influence the NTB economy which includes output, income, and employment as well as indirect impacts related to the relationship between the main sectors in NTB using IO table analysis. The IO table used is the 2016 IO 52 industry table which has been compiled *update* and concordant into 12 sectors, where one of the sectors is the tourism sector. Apart from that, this research will also look at the impact of investment plans on the NTB tourism sector using impact simulation analysis. Thus, "the economic impact of tourism sector in West Southeast Nusa Province using input-output analysis approach" is the subject of this study.

THEORITICAL REVIEW

Tourism Sector. Traveling or a portion of it, tourism is the act of people or groups going to specific places for leisure, personal development, or to momentarily take in the distinctiveness of tourist attractions. The Tourism Law Number 10 of 2009 of the Republic of Indonesia serves as the foundation for this definition. Siswahto & Muryani (2020) defines "industry" or "sector" as the act of processing or processing goods using specific tools and machines to make certain products. Siswahto & Muryani (2020) also restricts the scope of tourism as a business or subsector to include only travel-related activities. As such, the notion of the "tourism sector" is more focused on enhancing appeal in order to establish tourism as a significant economic driver in a given area. Producing goods with a market value that can boost the economy is a must for every industry. A multiplier effect's presence influences the majority of an industry's effects. Subsequently, this propels the travel sector.

Economic Growth. GDP is a metric that can be used to estimate growth at the regional level and to gauge a nation's economic growth (GRDP). The country's overall economic expansion is closely associated with the growth of the regional economy. The overall growth of the economy is influenced by the economic development of a nation's regional areas. Economic growth is a good indicator of a nation's welfare and progress. Economic growth indicates a nation's capacity to boost productivity and create jobs, which eventually raises living standards. Economic growth has both quantitative and qualitative components. Therefore, policies that support equitable distribution of income, combat poverty, strengthen public safety, and generally raise people's quality of life must be implemented in tandem with sustainable economic development.

Relationship of the Tourism Sector to the Economy. One of the emerging economic sectors, tourism, is said to have the capacity to quickly propel economic growth by producing high living standards, jobs, income, and other stimulants (Siswahto & Muryani, 2020). Through national currency receipts, balance of payments, regional income, and regional development, the tourism industry contributes significantly to sector development. It also attracts investment, hires labor, and fosters the growth of businesses. The

development of roads, public transportation, cultural facilities, health and hygiene campaigns, environmental sustainability projects, and maritime ports (by air or sea) can all be facilitated by the tourism sector, both directly and indirectly. Three effects of the tourism industry on a region's economy are direct, indirect, and induced, according to Stynes (2019). Sometimes, secondary impacts refers to the combined effects of indirect and induced effects.

According to Stynes (2019), changes related to tourism expenditure and production are called direct impacts. For example, an increase in the number of visitors staying at a hotel will affect changes in the amount of taxes, salaries, and wages paid, as well as changes in hotel sales. In contrast, the indirect effect of changes in hotel sales is the change in production caused by the repeated rounds of reinvestment of the hotel industry. Indirect effects of fluctuations in hotel sales include changes in income, employment, and sales in the linen supplier sector. In addition, Stynes (2019) states that changes in household spending on tourism-related income, either directly or indirectly, have an induced impact on economic activity. For example, hotel employees and linen sellers, with the help of the tourism industry, spend their money locally on accommodation, food, transportation, and other household goods and services. The induced effect consists of wages, salaries, or income of owners in addition to sales, income, and employment generated by household spending. Changes in visitor spending have the potential to impact almost every area of the economy, either directly or indirectly.

Input-Output Analysis. A reliable method for gauging productivity growth is the input-output (IO) framework (Tarancón et al., 2018). This framework has the advantage of classifying the sources of TFP growth into endogenous and exogenous factors, which allows productivity growth to be studied within the broader economic context. In the meantime, the input-output table, according to (Malik et al., 2021), gives an overview of how different economic sectors interact and provides details on the inputs needed by one sector in order to produce output in another. Furthermore, according to Mendoza (2023), input output analysis describes the linear relationship between industries in the economy and how aggregated data can be used to analyze general equilibrium in the economy.

Multi-regional or national input-output (IO) tables are available. Financial flows between the various economic sectors are detailed in national IO tables. Then, in order to show the connections between sectors in multiple regions, multi-regional input-output (MRIO) tables are created. The creation of national accounting is influenced by these input-output tables. Input-Output tables that are a result of imports, exports, domestic final demand, and technology can also be used to explain the origin and direction of changes in the economy's structure. Economic analysis can also see how policies affect overall output because of changes in government spending, for example, thanks to input-output analysis. Since it can examine how one industry depends on other sectors of the economy, input-output analysis is a popular technique in economics. This approach also allows the relationship between the various economic sectors to be expressed in a linear fashion, with the amount of output generated by each sector being utilized as an intermediate input by other sectors, or occasionally internally by the producer sector, the final demand sector, or both.

Multiplier **Analysis**. The multiplier coefficient shows how much a given sector or subsector can produce from changes in demand for its outputs, including output, income, and employment. The effect of a specific shift in final demand on the overall economy can be demonstrated using multiplier values. Three types of impacts can be distinguished from these: induced, indirect, and direct impacts. Then, according to Benedek et al. (2020), there

are four different kinds of multipliers. Initially, the multiplier of output: This calculates the change in local sales as an increase in demand for a given sector's output expressed in monetary units, such as one USD. Stated differently, one can approximate the effect of heightened demand on the production of all nearby industries. Next, we have the employment multiplier, which quantifies the number of new jobs generated in response to the elevated demand (e.g., 1 USD) for the output of the focal sector, which is relocalized food. Full-time equivalents (FTEs) are a common way to express it. Third, the income multiplier calculates the total change in income that employees in a specific industry receive in the local economy if there is a one-dollar increase in demand for relocated food. The fourth is the value added multiplier, where a sector's performance is assessed based on value added rather than total output (a state's gross national product is equal to the sum of the value added by all of its businesses).

Multipliers are frequently computed using input-output (I-O) tables, also known as transaction matrices. These are accounting depictions of local or national economies that illustrate the movement of goods and services between different industries or sectors (Benedek et al., 2020). One can compute the cumulative impact of a unit of money on the local economy due to re-spending by knowing how much money is spent on local inputs (i.e., how money flows from one local industry to another).

Linkage **Analysis.** Linkage analysis is important for an economy to show the importance of sectors that produce goods and services. Linkage analysis, which is used to test whether or not there is an interdependent relationship between production structures, was introduced by Rasmussen, Chenery & Watanabe, and Hischman (KUL GELAL, 2021). One of the well-known methods to analyze the interdependence relationship between economic sectors is *backward linkage* and *forward linkage* analysis. The number of columns of the Leontief-inverse matrix of intermediate demands in the input-output table is known as backward linkage. The number of rows in the input-output table representing the intermediate demand in the Leontief-inversus matrix is known as forward linkage. Rasmussen and Chenery-Watanabe developed the two methods used in this linkage analysis. Backward linkage calculates how a unit increase in final demand affects supplier industries. A backward linkage estimate of direct and indirect increases in output will result from inverse Leontief if it is not weighted. In contrast, the weighting of forward linkage is determined by the sector's share of the value-added component. Four categories were used to collect linkage indicators across sectors. Key sectors are defined as sectors where both the forward and backward linkage values are greater than average. Strong backward linkages are formed when sectors exceed the average size. Weak connections are represented by the fourth group. The forward and backward *link* values in this example are both less than one.

Aggregation of 12 Industry Sectors into One Tourism Sector. Four categories were used to collect linkage indicators across sectors. Key sectors are defined as sectors where both the forward and backward linkage values are greater than average. Strong backward linkages are formed when sectors exceed the average size. Weak connections are represented by the fourth group. The forward and backward *link* values in this example are both less than one.

NESPARNAS (2017) states that the following industry details are included in the tourism sector: accommodation, food and beverages, travel packages, car rental, transportation (water, rail, road, and water), entertainment and recreation, sightseeing and shopping, health and beauty, etc. The treatment of various wastes and waste materials, such as solid waste from industrial and residential sources, which may harm the environment, is

one of the economic and commercial activities related to water supply, waste management. To maintain environmental sustainability, the tourism industry - regardless of location - will generate waste, garbage and water. These materials must be treated first before disposal.

The Construction industry covers both general construction (including civil buildings and buildings) and specialized construction. Temporary buildings or structures may be built on project sites, along with new works, modifications, additions, and other improvements. The tourism sector will require construction to build new attractions or renovate existing ones. The Rail Freight Industry covers rail transportation activities that transport people and goods, including inter-city and intra-city passenger and freight transportation, as well as sleeper or dining car operations.

The Land Transportation industry includes school and staff bus operations, as well as short- and long-distance bus transportation, and schedule or charter buses for visitors and tourists. The Marine Transportation industry includes the transportation of people or products by vessels built for sea and coastal waters, but excludes the operation of floating structures. The River Lake and Crossing Transportation industry covers the transportation of people or products via inland waterways, such as lakes, rivers, and crossings; it also includes cruise ship crews for inland waterways. The Air Industry covers air or space transportation of people or goods; it excludes airport operations, aerial advertising, aerial photography, aircraft activities that spray crops or plants, and aircraft or machinery inspections. The Accommodation Supply industry includes offering short-term accommodation to travelers, as well as long-term housing options such as cottages, dormitories, or workers' lodges for workers, students, and other groups.

Establishments that provide food or beverages for direct consumption through reservations are included in the food and beverage supply industry. These businesses can be *take-out*, traditional restaurants, business restaurants, or *self-service establishments* operating in permanent or temporary spaces with or without seats. Renters, brokers, agents, or intermediaries in the purchase or sale of property are included in the property industry. It also includes rental services and the provision of additional property services, such as managing property and acting as an appraiser or testator's representative. Such as lodging or villa rental, this is a common practice in the tourism sector. Everything related to the provision of social services and healthcare, whether performed by public or private entities, falls under the Health Services and Social Activities sector. Visitors staying in accommodation provided by the tourism industry will have access to health services. The activities of other international and non-international bodies, both public and private; the arts, entertainment, and recreation sector; other services; and the services of individuals who serve households and create goods and services for their own use are the other four service industries.

METHODS

The analysis method in this study is the analysis of the input output table and analysis of leading sectors in West Southeast Nusa Province in 2016. Broadly speaking, the steps taken in this research are preparing data, tourism sector aggregation, concordance of IO table 52 industries into 12 sectors, calculating the technology matrix, updating with the RAS method, calculating the leontief matrix, linkages and leading sector analysis, calculating output, income, and labour multipliers, and the last is impact simulation analysis.

Preparing Data. The study utilized data from the 2016 input-output table of West Southeast Nusa Province, sourced from the official website of the West Southeast Nusa

Provincial Statistics Agency. This 2016 IO table is the latest edition issued by BPS NTB Province. In addition to input-output data, the research incorporated other data for labor multiplier analysis and updating the IO table using the RAS method. Labor data included the number of people employed over the past 15 years in NTB Province. Economic growth data per business field from 2016 to 2023 was processed from the publication on the state of Indonesia's workforce. Additionally, data on the draft realization of the investment budget in tourism for 2023 was included.

Tourism Sector Agregating. Aggregating the 12 industries aims to create the tourism sector, which will be analyzed as a distinct sector.

Table 1. Industry Names in the Tourism Sector

Industry Name	Code
Water Supply, Garbage, Waste and Recycling Treatment	I-30
Construct	I-31
Rail Transportation	I-34
Land Transportation	I-35
Navy	I-36
River, Lake and Ferry Transportation	I-37
Air Transportation	I-38
Accomodation Provision	I-40
Provision of Food and Drink	I-41
Real Estate	I-47
Health Services	I-51
Other Services	I-52

Source : Nesparnas Publication

Furthermore, **Table 1** shows the names of the industries that have the greatest influence on tourism and are aggregated into the tourism sector.

Concordance of IO table. The Leontief input-output model is based on economic activities (output production processes) recorded for each sector/industry in a geographic area and specific time/year (Aoun et al., 2024). The input-output table illustrates the activities of interconnected industries/sectors, functioning as both producers and consumers in the output production process (Suryani, 2023). The first step in this study was consolidating the industry-level input-output table from 52 industries into 12 sectors. These sectors are: Agriculture, Forestry and Fisheries (1), Mining and Quarrying (2), Manufacturing Industry (3), Electricity and Gas Procurement (4), Wholesale and Retail Trade; Car and Motorcycle Repair (5), Warehousing (6), Information and Communication (7), Financial and Insurance Services (8), Corporate Services (9), Government Administration, Compulsory Social Security (10), Educational Services (11), and Tourism Sector (12).

Table 2. 12 Sector Input-Output Table Concordance

| | Sector | Code | OUTPUT | | | Consumption | FDI | Export | Total Output |
			Agriculture S-01	....	Tourism S-12	3020	3030	3080	3100
	Agriculture,	S-01	... .						
INPUT	....	....	....	... .	....	....	....	....	....
	Tourism	S-12	... .						
Total Intermediate Inputs		1900	... .						
Gross Value Added		2090	... .						
Total Intermediate Inputs		2100	... .						

Source: Processed

In **Table 2**, the shaded section indicates the exchange of goods and services between industries/sectors. The advanced column represents final demand for each sector, including final consumption expenditure, government sales, and net exports, along with the total output produced by each sector. The advanced row includes value-added entries such as labor compensation, gross business surplus, and taxes, as well as total intermediate inputs.

Calculating the technology Matrix. If the economy in a region is categorized into 12 sectors, the total output produced by sector i is denoted as x_i, and f_i is the final demand for products in sector i. A simple sum equation can be written to show the distribution of output in sector i to other sectors and to final demand as follows:

$$x_i = z_{i1} + \ldots + z_{ij} + \ldots + z_{i12} + f_i = \sum_{j=1}^{12} z_{ij} + f_i \ldots\ldots\ldots(1)$$

If written in a matrix, the following form is obtained

$$x = \begin{bmatrix} x_1 \\ \vdots \\ x_{12} \end{bmatrix}, \quad Z = \begin{bmatrix} z_{1,1} & \cdots & z_{1,12} \\ \vdots & \ddots & \vdots \\ z_{12,1} & \cdots & z_{12,12} \end{bmatrix}, \quad dan \quad f = \begin{bmatrix} f_1 \\ \vdots \\ f_{12} \end{bmatrix}$$

Matrix x is a matrix containing the output from industry/sector i to sector n. Matrix Z contains the value of monetary transactions between n sectors, and matrix f is the final demand matrix. Therefore, the form of equation (1) can be changed (in matrix form) with the following notation:

$$\mathbf{x = Z + f} \ldots\ldots\ldots(2)$$

in equation 1 has been written the form of output in the i-th sector which consists of Z matrix (the composition of inputs needed to produce output in sector i) and f matrix which contains the value of final demand. if defined $a_{ij} = z_{ij}/x_j$ then equation (1) can be changed into

$$x_i = a_{i1}x_{i1} + \ldots + a_{ij}x_{ij} + \ldots + a_{i12}x_{i12} + f_i = \sum_{j=1}^{12} a_{ij}x_j + f_i \ldots\ldots\ldots(3)$$

or in vector and matrix form can be written as follows

$$\mathbf{x} \; = \; \mathbf{Ax} + \mathbf{f} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(4)$$

Each column of matrix A represents the use of inputs in sector j to produce one unit of output in sector i. The technology matrix is crucial as it is used in various input-output analyses, including multiplier analysis, linkage analysis, and identifying leading sectors.

Updating with the RAS Method. The RAS method is used to modify input-output table elements to align with predefined row and column totals. This method estimates the coefficients in the IO table (Cai & Rueda-Cantuche, 2019). The result is an estimated coefficients matrix with information from 2023. The RAS method can be formulated as follows:

$$\mathbf{A_{2023}} \; = \; \mathbf{RA_{2016}}S \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(5)$$

In equation 5, A_{2023} is the Input Coefficient Matrix for the year 2023, R is the Diagonal matrix of simultaneous effect (by row), and S is the Fabrication Influence Diagonal Matrix (by column).

In the first iteration of the RAS updating process, the rows of the original table are multiplied to match the row totals, followed by column multiplications to match the column totals. However, column multiplication may cause discrepancies with the row totals and vice versa, necessitating several iterations until the row and column totals are balanced. The matrix must also maintain a suitable zero element structure. If all matrices are strictly positive and the totals are consistent, convergence is ensured (Holý & Šafr, 2017).

Calculating Leontief Matrix. The output multiplier matrix, also known as the Leontief matrix, can be derived by modifying the equation:

$$x - Ax \; = \; f$$
$$(I - A)x \; = \; f$$
$$x = (I - A)^{-1}f$$
$$x \; = \; Lf \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(6)$$

In vector and matrix form, this can be written as follows:

$$x = \begin{bmatrix} x_1 \\ \vdots \\ x_{12} \end{bmatrix} \begin{bmatrix} (1 - a_{1,1}) & \dots & -a_{12,1} \\ \vdots & \ddots & \vdots \\ -a_{1,11} & \dots & (1 - a_{12,12}) \end{bmatrix}^{-1} \begin{bmatrix} f_1 \\ \vdots \\ f_{12} \end{bmatrix}$$

The **L** matrix, also known as the Leontief inverse matrix, is the output multiplier matrix (Suryani, 2023). The magnitude of the predicted changes in output, caused by exogenous variables (final demand), is strongly influenced by the Leontief inverse matrix.

Calculating Output, Income and Labor Multipliers. The total output multiplier for each sector j is obtained by summing all the coefficients in the Leontief inverse matrix:

$$o_j = \sum_{i=1}^{12} l_{ij}$$

where o_j is the total output multiplier, and l_{ij} is an element of the Leontief matrix.

The household income multiplier matrix explains the additional income earned by households in sector i due to an increase in final demand (Pfunzo, 2024). To obtain the income multiplier, the houseold income coefficient is needed. The household income coefficient matrix, a diagonal matrix containing the proportion of wages/salaries to total output:

$$H = \begin{bmatrix} h_1 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & h_{12} \end{bmatrix}$$

Salary wages in the form of labor compensation use 2016 labor compensation data. To get the income multiplier matrix using the following equation

$$i = H(I - A)^{-1} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(7)$$

To obtain a simple income multiplier, sum the column coefficients of the income multiplier matrix for each sector.

$$i_j = \sum_{i=1}^{12} h_i l_{ij}$$

The labour multiplier matrix indicates the amount of labor absorbed when final demand in a sector increases (Miernyk, 2020). to obtain the labor multiplier, the labor coefficient matrix is needed. The labor coefficient matrix is a diagonal matrix with the number of workers per output:

$$W = \begin{bmatrix} w_1 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & w_{12} \end{bmatrix}$$

The labor approach used is data on the number of workers in 2016. Then the labor multiplier matrix is obtained using the following equation.

$$t = W(I - A)^{-1} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(8)$$

To obtain the total simple labour multiplier, sum the column coefficients of the labour multiplier matrix for each sector.

$$t_j = \sum_{i=1}^{12} w_i l_{ij}$$

Linkages and Leading Sector Analysis. There are two types of linkages: backward linkages, which show how influential a sector is in spurring increased output in other sectors, and forward linkages, which show how sensitive a sector is in distributing output if there is an increase in demand in other sectors. Forward linkage is calculated by summing the coefficients in each row of the Leontief inverse matrix, while backward linkage is calculated by summing the coefficients in each column. The forward linkage index (IDK) and backward linkage index (IDP) can be determined using the following formulas:

$$IFL_i = \frac{\sum_{j=1}^{12} l_{ij}}{\frac{1}{12}\sum_{j=1}^{12}\sum_{j=1}^{12} l_{ij}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(9)$$

$$IBL_j = \frac{\sum_{i=1}^{12} l_{ij}}{\frac{1}{12}\sum_{i=1}^{12}\sum_{j=1}^{12} l_{ij}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(10)$$

Leading sectors are the main sectors that significantly influence an economy by producing output and providing intermediate inputs to other sectors. Based on IDK and IDP, sectors can be classified into four types (Ferreira et al., 2024).

Table 3. Classification of Leading Sectors

| | | Total Forward Linkage | |
		Low (less than 1)	High (more than 1)
Total Backward Linkage	Low (less than 1)	(1) Generally Independent	(2) Dependent on interindustry demand
	High (more than 1)	(3) Dependent on interindustry supply	(4) Generally Dependent

Based on **Table 3.** Sectors are classified into four sections, namely as (1) generally independent of (not closely linked to) other sectors, (2) dependent on inter-industry demand (only forward linkages are greater than 1), (3) generally dependent on other sectors (both measures of linkages are greater than 1), and (4) dependent on inter-industry supply (only backward linkages are greater than 1).

Impact Simulation Analysis. To determine the increase in output, income, and labor absorption, multiply the multiplier matrix by the increase in exogenous variables according to the planned amount. These values can be calculated using the following formulas: simulation of increase in output due to increase in final demand

$$\Delta x = L \Delta f \quad \text{..(11)}$$

simulated increase in revenue due to increase in final demand

$$\Delta i = IL \Delta f \quad \text{..(12)}$$

simulation of increase in labor absorption due to increase in final demand

$$\Delta i = IL \Delta f \quad \text{..(13)}$$

RESULTS

Overview of the Impact of the Tourism Sector on the Economy in the Province of West Southeast Nusa. The tourism sector has a considerable impact on the economy of a region. This impact can be seen from job creation, increased regional income, infrastructure development, and multiplicative effects on other sectors. In general, from 2016 to 2023, **Figure 6** provides information on the growth of GRDP in the tourism sector, which turned out to be greater than the growth of total GRDP. However, in 2020, the Covid-19 pandemic resulted in a drastic decline in tourism sector GRDP. The decline in GRDP in the sector is the result of activity restrictions by the government.
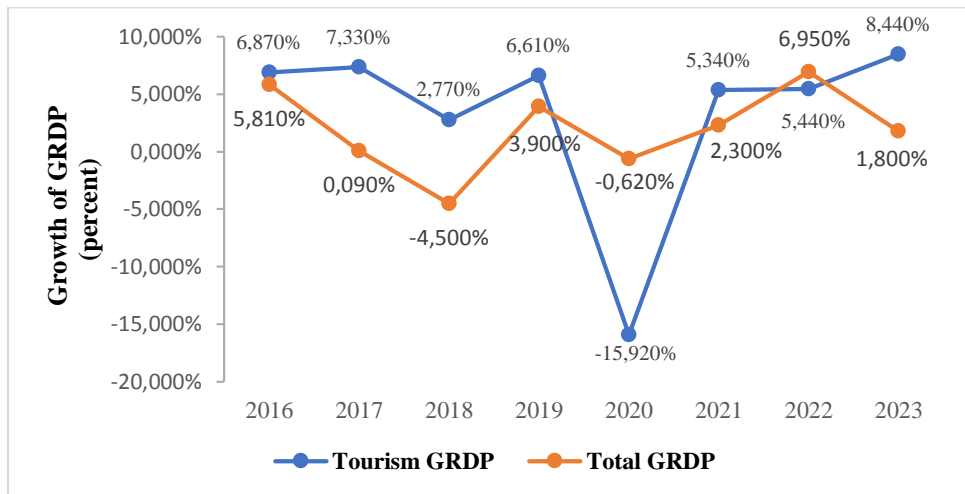
Figure 6. Growth of Tourism Sector GRDP and Total GRDP of
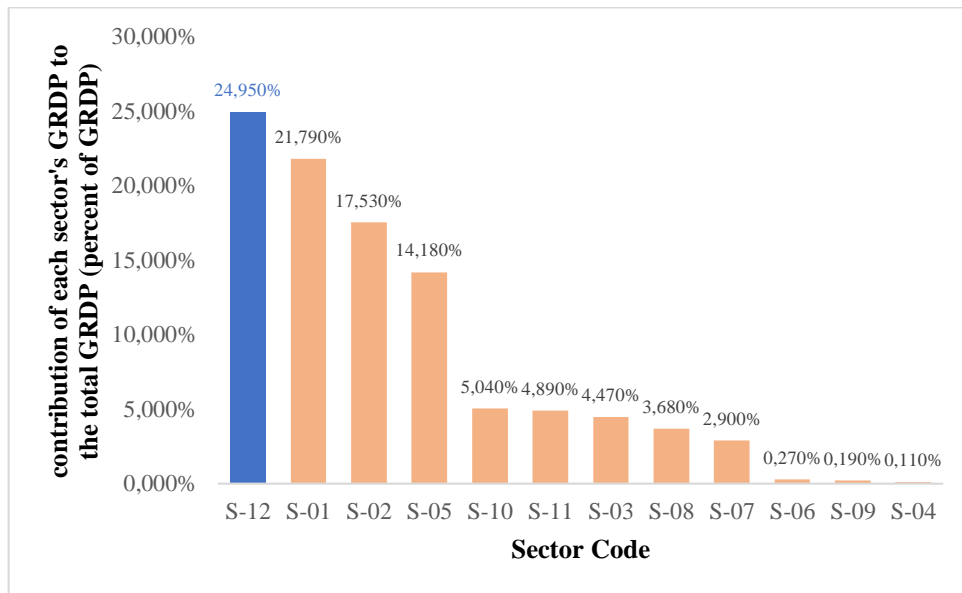West Southeast Nusa Province 2016-2023
Source: BPS (Processed)

Meanwhile, **Figure 7** presents the contribution of each sector's GRDP to the total GRDP of West Southeast Nusa Province in 2016 (7a) and 2023 (7b). In 2016, the tourism sector was the second largest contributor to the GRDP of West Southeast Nusa Province after the mining and quarrying sector. While in 2023, the tourism sector has occupied the first position as the largest contributor to the GRDP of West Southeast Nusa Province.
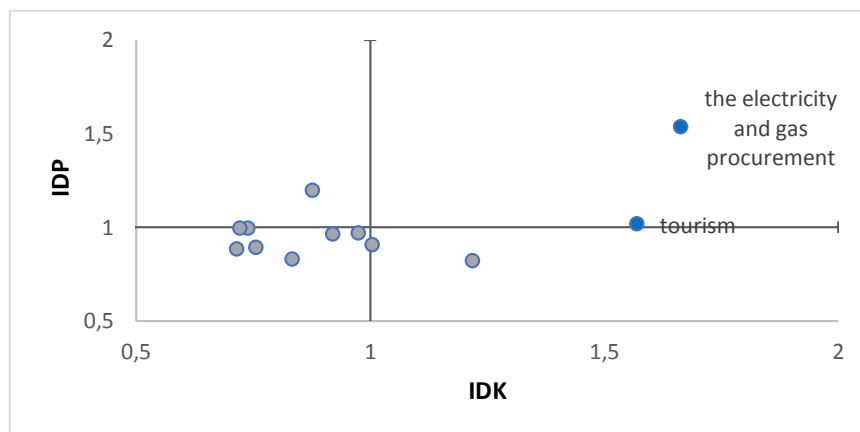

(7a) 2016

(7b) 2023

**Figure 7**. GRDP Contribution per Sector in West Southeast Nusa Province
Source: Data Processing Results

Inter-sector Linkage Analysis. The scatter plot between the IDP and IDK values before *updating the* IO table shows that there are two leading sectors, namely the electricity and gas multiplication sector and the tourism sector. After *updating the* IO table, there is no significant difference. In other words, the leading sectors before and after *updating the* IO table show the same sectors.

Based on **Figure 8**, there are two leading sectors in West Southeast Nusa Province, namely the electricity and gas procurement sector and the tourism sector. The electricity and gas procurement sector is an important input for all other sectors. Many sectors are highly dependent on a stable supply of electricity and gas. The availability of electricity and gas affects productivity and the economy as a whole, so maintaining the availability of energy (electricity and gas) is paramount. The electricity and gas procurement sector has strong linkages with the tourism sector.
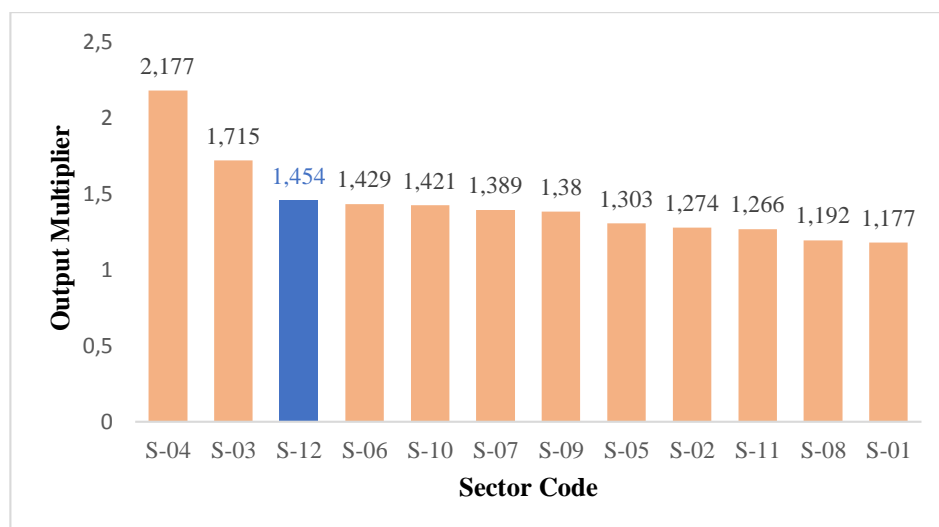

(8a) 2016
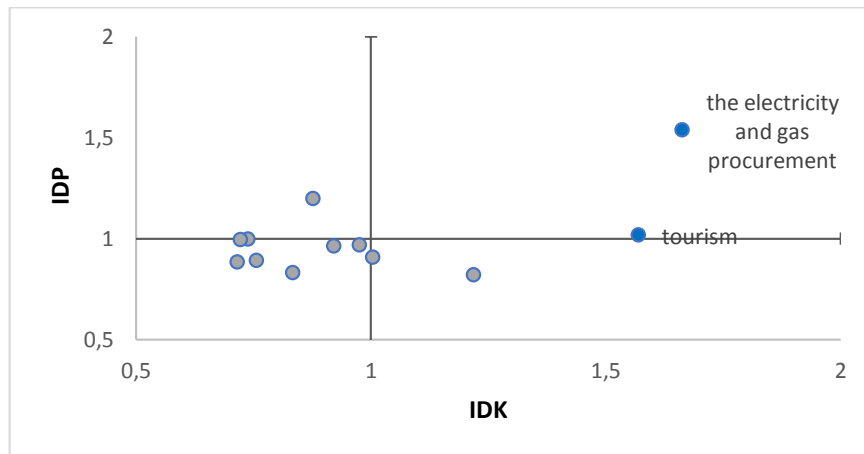
(8b) 2023

**Figure 8**. Scatter Plot of IDP and IDK Per Sector of West Southeast Nusa Province
Source: Data Processing Results

On the other hand, increased demand in the tourism sector will drive increased demand for various local goods and services such as food and beverages, transportation, accommodation, handicrafts and anything related to this sector. Not only that, the increasing tourism industry will create direct jobs in hotels, restaurants, travel agencies and tourist attractions as well as indirect jobs in supporting sectors such as agriculture, livestock, and local manufacturing. The tourism sector also encourages the development of culture, arts, sports, and entertainment that can characterize the region thus offering opportunities for economic diversification.

Output Multiplier Analysis. As can be seen in **Figure 9**, the electricity and gas procurement sector has the largest output multiplier compared to other sectors in West Southeast Nusa Province, followed by the manufacturing industry sector and the tourism sector. In 2023, the three sectors remained the sectors with the largest *output multipliers* and experienced a slight increase, while the *output multipliers of* other sectors remained relatively constant. The output multiplier in the tourism sector is 1.462 in 2023, which means that every increase in final demand in the tourism sector by 1 billion rupiah will increase output in all sectors by 1.462 billion rupiah.

(9a) 2016
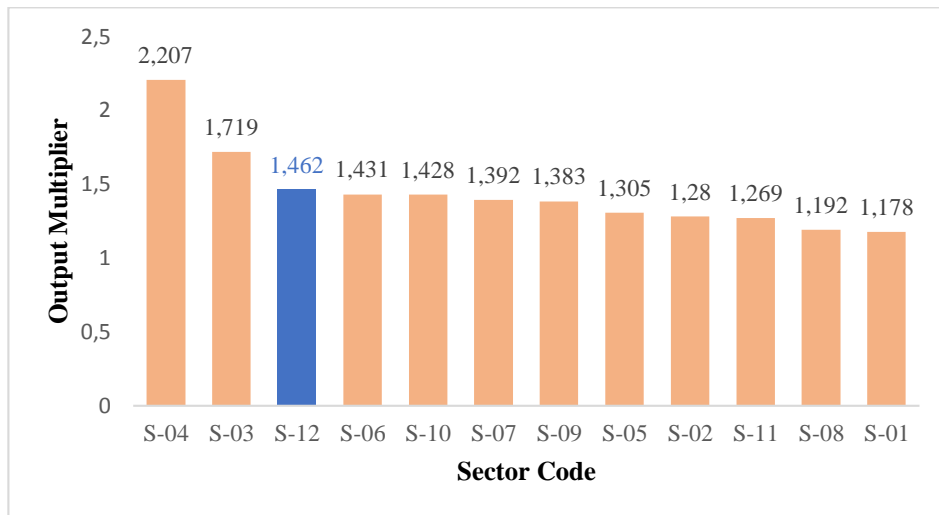
(9b) 2023
Figure 9. Output Multipliers Per Sector of West Southeast Nusa Province
Source: Data Processing Results

Household Income Multiplier Analysis. Based on **Figure 10**, in 2023 in West Southeast Nusa Province, the financial services and insurance sector has the largest household income multiplier compared to other sectors. While the tourism sector is in 4th place out of 12 sectors, with an income multiplier of 0.468, which means that every increase in final demand in the tourism sector by 1 billion rupiah will increase household income in all sectors by 0.468 billion rupiah.
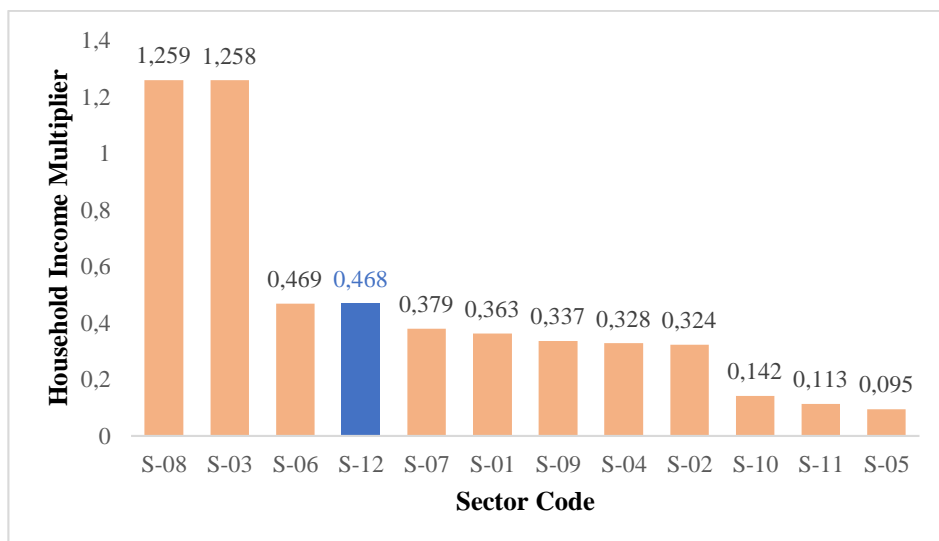

Figure 10. Household Income Multipliers Per Sector of West Southeast Nusa Province in 2023
Source: Data Processing Results

Labor Multiplier Analysis. Based on **Figure 11**, in 2023 in West Southeast Nusa Province, the manufacturing industry sector has the largest labor multiplier compared to other sectors. Meanwhile, the tourism sector is in 5th place out of 12 sectors, with a labor multiplier of 0.013, which means that every increase in final demand in the tourism sector by 1000 million rupiah or 1 billion rupiah will increase the number of workers in all sectors
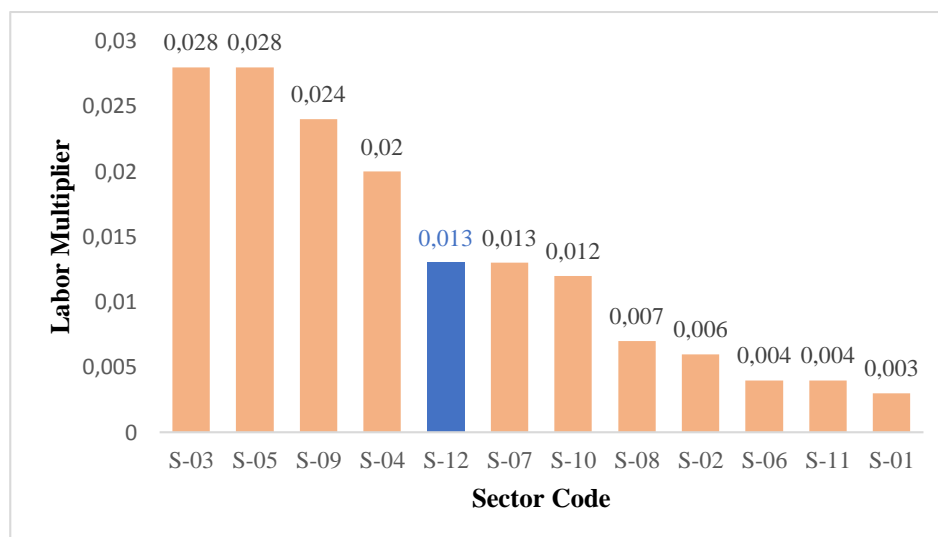
by 13 workers.

Figure 11. Labor Multipliers Per Sector of West Southeast Nusa Province in 2023
Source: Data Processing Results

Simulation of the Impact of Investment in the Tourism Sector on the Economy, Household Income, and the Number of Workers in West Southeast Nusa Province.
At this stage, we will simulate the impact of investment in the tourism sector on the economy in West Southeast Nusa Province in 2023. In 2021, the planned investment value for the tourism sector in West Southeast Nusa Province is 2,843.595 billion rupiah, while the realization is 3,013.927billion rupiah (5.990 percent more than the investment plan). If the real investment value is set in 2023 and has been abjusted to existing inflation, then the nominal value of the planned investment in that year is 3,078.585 billion rupiah and the realization is 3,262.992 billion rupiah (more than 5.990 percent of the investment plan).

Table 4. Impact of Investment in the tourism sector on the economy of West Southeast Nusa Province (billion rupiah)

Code	Sector	Direct Impact	Indirect Impact	Total Impact	Per cent of total Output Increase
S-12	Tourism	3,262.992	359.308	3,622.301	75.933
S-01	Agriculture. Forestry and Fisheries	0	208.627	208.627	4.373
S-02	Mining and Quarrying	0	123.427	123.427	2.587
S-03	Processing Industry	0	195.285	195.285	4.094
S-04	Electricity and Gas Procurement Wholesale and	0	129.489	129.489	2.714
S-05	Retail Trade; Repair of Cars and Motorcycles	0	246.840	246.840	5.174

S-06	Warehousing	0	48.303	48.303	1.013
S-07	Information and Communication	0	63.667	63.667	1.335
S-08	Financial and Insurance Services	0	44.092	44.092	0.924
S-09	Company Services	0	64.297	64.297	1.348
S-10	Government Administration. Compulsory Social Security	0	22.298	22.298	0.467
S-11	Education Services	0	1.744	1.744	0.037

Source: Data Processing Results

Table 4 provides an overview of economic changes in West Southeast Nusa Province when given an investment of 3,262.992 billion rupiah in the tourism sector. The results show that the tourism sector provides an increase in output of 3,622.301 billion rupiah or 75.933 percent of the increase in total output. While the change in output increase in other sectors does not reach 5 percent of the total output increase, except only in the wholesale and retail trade sector; repair of cars and motorcycles.

Table 5. Impact of Investment in the tourism sector on household income in West Southeast Nusa Province (billion rupiah)

Code	Sector	Additional Household Income	Per cent of Total Additional Income
S-12	Tourism	702.704	65.715
S-01	Agriculture. Forestry and Fisheries	69.017	6.454
S-02	Mining and Quarrying	47.490	4.441
S-03	Processing Industry	23.287	2.178
S-04	Electricity and Gas Procurement	2.052	0.192
S-05	Wholesale and Retail Trade; Repair of Cars and Motorcycles	69.856	6.533
S-06	Warehousing	53.764	5.028
S-07	Information and Communication	65.496	6.125
S-08	Financial and Insurance Services	11.189	1.046
S-09	Company Services	23.507	2.198
S-10	Government Administration. Compulsory Social Security	0.875	0.082
S-11	Education Services	0.081	0.008

Source: Data Processing Results

Table 5 provides an overview of additional household income in West Southeast Nusa Province when given an investment of 3,262.992 billion rupiah in the tourism sector. The results show that the tourism sector provides additional household income of 702.704 billion rupiah or 65.715 percent of additional total household income. While additional household income in other sectors did not reach 10 percent of additional total household income.

Table 6. Impact of Investment in the tourism sector on the number of workers in West Southeast Nusa Province (billion rupiah)

Code	Sector	Additional Labor	Percent of Additional Total Workforce
S-12	Tourism	5,827	27.627
S-01	Agriculture. Forestry and Fisheries	5,153	24.433
S-02	Mining and Quarrying	183	0.868
S-03	Processing Industry	2,557	12.124
S-04	Electricity and Gas Procurement	112	0.530
S-05	Wholesale and Retail Trade; Repair of Cars and Motorcycles	5,442	25.799
S-06	Warehousing	446	2.114
S-07	Information and Communication	176	0.833
S-08	Financial and Insurance Services	249	1.180
S-09	Company Services	691	3.277
S-10	Government Administration. Compulsory Social Security	225	1.067
S-11	Education Services	31	0.147

Source: Data Processing Results

Table 6 illustrates the additional labor in West Southeast Nusa Province when given an investment of 3,262.992 billion rupiah in the tourism sector. The results show that the tourism sector provides an additional workforce of 5,827 people or 27.627 percent of the total additional workforce. Not only that. the wholesale and retail trade sector; repair of cars and motorcycles and the agriculture. forestry and fisheries sector also received a considerable additional workforce amounting to 5,153 (24.433 percent) and 5,442 (25.799 percent) people respectively.

DISCUSSION

In West Southeast Nusa Province, it was discovered that an increase in aggregate demand within the tourism sector resulted into an upliftment of all layers of the economy. It is essential for indicating substantial part that tourism contributes to total output and at the same time stressing its significance in regional economic progress. This research noted a linked growth of jobs particularly within agriculture, forestry, fishing, wholesale and retail trade alongside vehicle and motorcycle repairs. This is enough evidence supporting that overall economic sector and employment rate are directly improved by tourism sector.

The positive impact of tourism on the economy can be attributed to several factors. First, it increases final demand stimulating production and services in related sectors, generating a multiplier effect within the economy. For example, when tourists spend more in the area, this may result to increased demand for local goods and services thus increasing production and jobs in those sectors. This is in line with the theory of economic linkages where growth in one sector results to growth of other sectors through interconnected supply chains and services (Khan, 2020).

This research highlights that the tourism sector is an important driver of economic progress. Local governments should concentrate on policies that support sustainable tourism development, infrastructure improvement and conservation of natural, and cultural resources. By investing in these areas, they can attract more tourists to their homeland, thereby spurring economic growth. The results of this study indicate that there are considerable prospects for companies engaged in tourism-related fields. Businesses can take

advantage of the growing demand by providing customized products and services such as local food, guided trips, and cultural encounters. New avenues also open up in hospitality, retail or transportation with increased tourism levels. Additional insights to maintain the required standard of living come from the creation of employment opportunities and the stimulation of business units as opposed to entering into an upward horizontal movement along local developments. Nonetheless, it should be noted that there is a need for equity among community members while ensuring that no negative socio-cultural or environmental side effects arise due to tourism expansion.

The study's findings are consistent with previous research, such as Wijesekara et al. (2022), which analyzed the relationship between tourism an economic growth in 105 nations over 17 years. Their results showed a positive effect of tourism on economic growth, similar to the findings in West Southeast Nusa Province. Likewise, Manzoor el al. (2019) found that the tourism sector positively impacts employment and economic growth in Pakistan, corroborating the study's conclusion that tourism boosts job creation. Not only that, investment in the tourism sector will increase economic growth (Nguyen, 2021).

However, not all studies uniformly support the positive impact of tourism. For instance, while other studies emphasize the economic benefits of tourism, such as tourism is an increasingly attractive alternative to increase local economic activity (Raso & Cherubini, 2024), stimulating local economies and improving living standards (Liu et al., 2023; Rasool et al., 2021). Conversely, the research identifies potential shortcomings like excessive dependence on tourism that could lead to a vulnerable economy during external shocks (e.g., pandemics, geopolitical tensions, etc). In addition, Sekarani & Widiandari (2023) research states that overtourism in Japan has a negative impact on the envirointment in major cities, and it is not impossible that this could happen in West Southeast Nusa Province. This highlights the need for a balanced approach to tourism development, ensuring sustainable and diversified economic growth.

CONCLUSION

Based on the results and discussion of the study, it was found that an increase in final demand within the tourism sector has a significant impact on increasing output across all sectors of the economy. Tourism proved to be a major catalyst that not only increased revenue in the sector but also triggered growth in other sectors through economic linkages and integrated supply chains. This discovery affirms earlier studies demonstrating that tourism has beneficial effects on the growth of economies in different nations. On the other hand, it must be emphasized that although tourism can enhance local economic activities, there is a pressing call for a balanced and sustainable tourism development plan. This is necessary to ensure that the economic gains are of a long-term nature and not just short-lived so as to prevent evils like overtourism, destruction of ecosystems, and reliance on a single sector too heavily.

The implications of this study are highly relevant for policymakers, businesses, and local residents. Policymakers should formulate plans that encourage increased tourism and diversification of the local economy to make it less vulnerable to changes in tourism demand. On the other hand, industry players should practice responsible business methods that minimize negative impacts on the environment and society. Communities living in areas that benefit directly or indirectly should be part of the decision-making process to ensure equitable and all-encompassing development. Finally, this paper firmly establishes integrated tourism development with an emphasis on long-term sustainability.

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