

## **Analysis of 17 Sectors of East Java Province on the Java-Bali Economy in 2021: Input-Output Approach**

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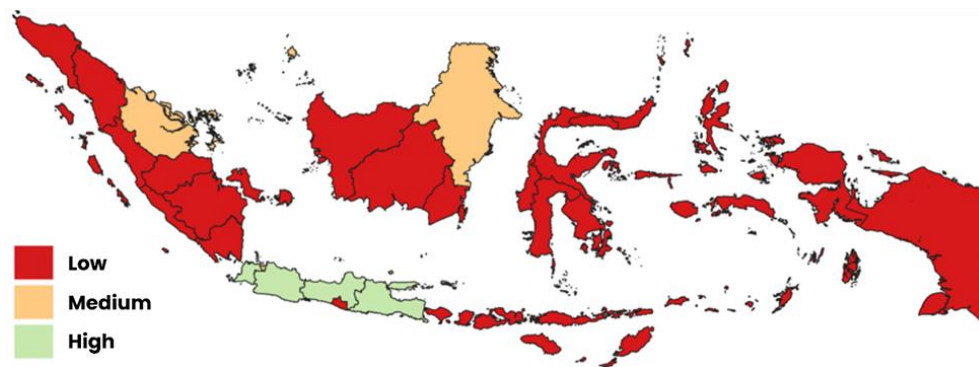
### **ABSTRACT**

This study analyzes 17 economic sectors in East Java Province within the context of Java-Bali in 2021 using the input-output approach. The objective is to identify key sectors with significant potential to drive regional economic growth. The analysis uses input-output tables to evaluate inter-sectoral relationships through backward and forward linkages. The results show that the manufacturing industry, transportation and warehousing, electricity and gas supply, information and communication, and business services sectors are strategic sectors with dispersion power index and sensitivity degree index values greater than one. These sectors exhibit high backward and forward linkages, indicating substantial potential to influence economic growth. Additionally, the economic multiplier analysis reveals that these leading sectors have higher output multipliers, household income, and employment compared to non-leading sectors. This suggests that these sectors are more effective in driving economic development and improving community welfare. Therefore, prioritizing these leading sectors can have a more significant economic impact on regional growth and community well-being. This study recommends that regional economic development policies should focus on these strategic sectors to achieve more inclusive and sustainable growth. The findings underline the importance of targeted policy measures to harness the potential of key sectors for maximizing regional economic benefits.

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### **INTRODUCTION**

Indonesia is a unitary republic that manages government authority from the central to regional levels. According to Article 18 of the 1945 Constitution, Indonesia is divided into provinces and districts/cities, where each level of government has the right to regulate its own government affairs. This handover of government affairs from the top level to the lower level is called decentralization (Kuncoro, 2004). Decentralization is one of the strategies to accelerate regional economic growth. Economic growth is an indicator that signals a region's success in its development (Asyafina, 2022). Based on Law Number 32 of 2004, regional governments are given the authority to regulate their territories in accordance with the aspirations and needs of the community. Regional autonomy allows regional governments to manage, develop and utilize the potential of their respective regions. Implementation must be based on the principles of democracy, community participation, equality and justice, as well as paying attention to the potential of the region.

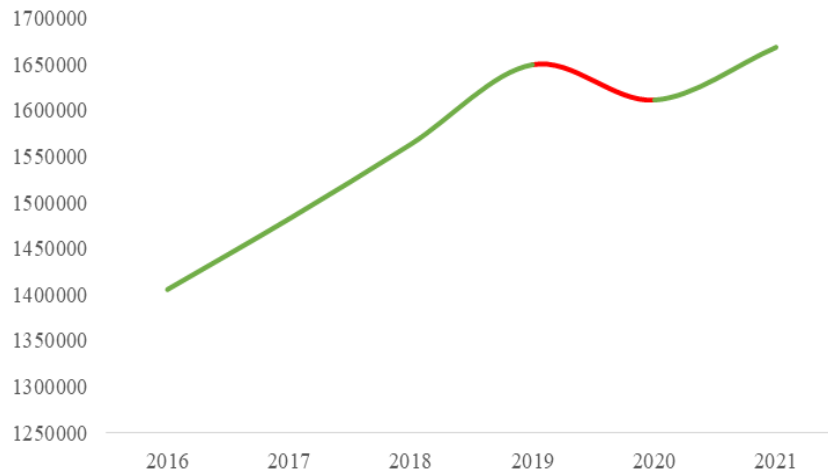


Source: BPS

**Figure 1.** Classification of Provincial Economics in Indonesia in 2021

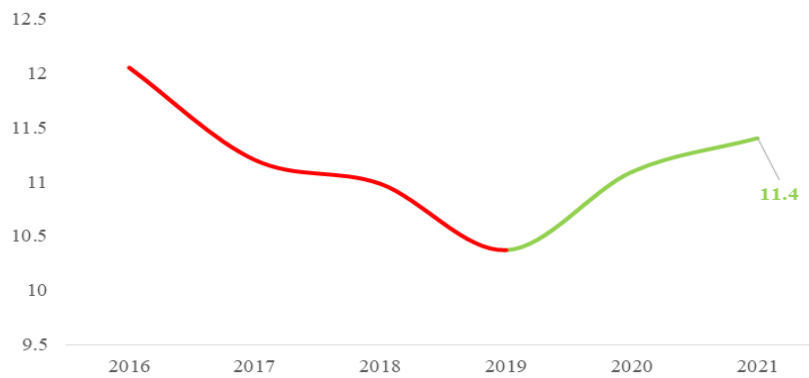
East Java is a province that is classified as having a high economy when viewed from several aspects (Figure 1). This is interesting to research considering that East Java is a province with a developing economy. The regional classification is based on the variables Average Years of Schooling (RLS), investment, Gross Regional Domestic Product (GRDP), and Information and Communication of Technology (ICT). Some of these variables are based on the theory of economic growth created by Robert Solow. This theory states that the accumulation of capital (investment), labor (average years of schooling), and technological progress (Information and Communication of Technology (ICT)) contribute to economic growth. Regions that have higher GDP, ICT, RLS and investment levels can be categorized as regions that have a more advanced economy. On the other hand, regions that have lower GRDP, ICT, RLS and investment levels can be categorized as regions that have a slower economy. This grouping is carried out in order to categorize regions with similar characteristics so that policies can be identified that will be implemented in each region.

East Java's economic performance in the third quarter of 2021 as the province with the highest economy still stable, experiencing positive growth, although slowing compared to the previous quarter. This growth was 3.23% (yoy), slowing down 7.07% (yoy) from the previous quarter (Bank Indonesia, 2021). This decrease was caused by policies aimed at preventing the spread of the COVID-19 pandemic through the implementation of emergency PPKM at various times. Whereas the economic growth of the islands in Indonesia can show development gaps between regions. In 2021, it shows quite significant variations (Figure 4). The islands of Sumatra and Kalimantan recorded economic growth of around 3.18%, indicating stability but not significant growth. On the other hand, Java experienced slightly higher economic growth, reaching 3.66%, indicating stronger economic stability. Bali Nusa Tenggara showed very low economic growth, only 0.07%, perhaps due to the impact of limited tourism due to the pandemic. Meanwhile, Sulawesi recorded higher economic growth, at 5.67%, indicating strong growth potential in the region. Even though it is slightly higher, Java Island is still the main determinant in Indonesia's economic structure, contributing 56.48 percent with cumulative growth of 5.31 percent. The factors that influence Java Island's economic growth are its four largest provinces, namely DKI Jakarta, East Java, West Java and Central Java, which in total contribute around 51.71 percent of the national economy.



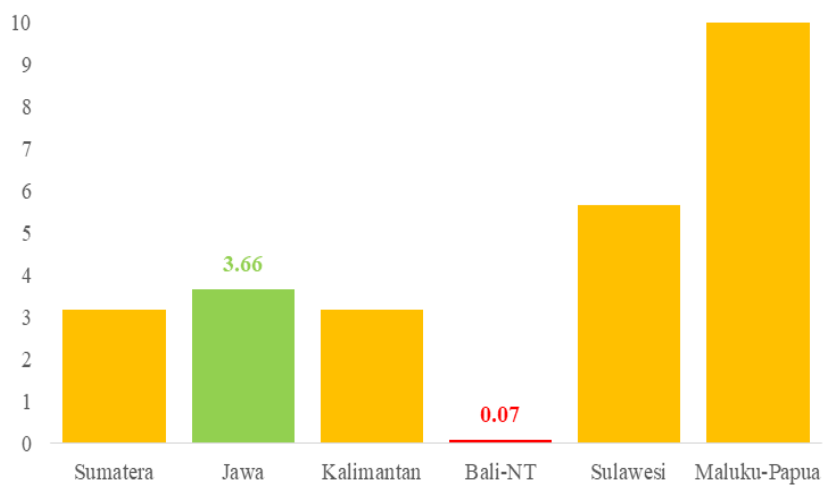
Source: BPS

**Figure 2.** East Java GRDP Trend 2016-2021



Source: BPS

**Figure 3.** East Java Poverty Percentage Trend



Source: BPS

**Figure 4.** Economic Growth Conditions for 6 Islands in 2021

Analysis of East Java GRDP data for the 2016-2021 period shows that East Java's economy was growing consistently before the COVID-19 pandemic, with GRDP increasing from 1,405,563.51 in 2016 to 1,649,895.64 in 2019. Average annual growth averaged around 5% over this period reflecting strong economic stability (Figure 2). However, in 2020, GRDP decreased to 1,611,392.55. This is most likely due to the impact of the pandemic which hampers economic activity. In 2021, GRDP increased again to 1,668,754.36, showing signs of economic recovery after the pandemic. This has the effect of decreasing supply and demand activities so that they cannot produce added value for society, the business world and all business sectors. This decline will have a direct impact on the workforce in a business sector.

Employment in Indonesia showed a negative trend in the period August to February 2020. This can be seen from the decline in the Labor Force Participation Rate (TPAK) from 71.20 percent to 10.33 percent (BPS, 2020). This decrease in TPAK caused an increase in the Open Unemployment Rate (TPT) from 3.69 percent to 5.84 percent. Increasing TPT is a serious problem because it will increase the poverty rate in the area.

The percentage of poverty in East Java in 2019-2021 experienced fluctuations (Figure 3). Initially, the poverty rate in 2016 reached 12.05%, indicating a high level. In 2017 it fell to 11.2%, and to 10.98% in 2018. 2019 recorded a more significant decline to 10.37%, which shows success in efforts to deal with poverty. However, conditions worsened in 2020 with the poverty percentage again increasing to 11.09%, due to the impact of the COVID-19 pandemic. In 2021, it fluctuated showing an increase to 11.4%, indicating the complexity of the challenges still faced in maintaining stability and reducing poverty levels in East Java.

Therefore, this research aims to analyze the leading sectors of East Java Province in 2021 using the Dissemination Power Index (IDP) and Sensitivity Degree Index (IDK); Analysis of the economic multiplier figures in the form of output multiplier figures, labor multiplier figures, and household income multiplier figures for East Java in 2021; Analysis of the impact of interregional and intraregional multipliers on the East Java economy in 2021. The impact of changes in economic activity in one region can affect other regions. Through this research, it is hoped that it can become a reference for the government in making policies to accelerate East Java's economic growth through the development of strategic sectors.

Apart from that, this research has several important points that are new compared to previous studies. The first point, a new perspective comes in the form of an analysis of sectors that influence each other between East Java and other provinces, namely Banten, DKI Jakarta, West Java, Central Java, DI Yogyakarta, Bali, East Nusa Tenggara and West Nusa Tenggara. The second point, this research tries to simulate the impact that will occur on the non-leading sector if there is an increase in the leading sector and vice versa.

## **LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT**

### **Economic Growth Theory**

Simon Kuznets defines economic growth as a country's ability to increase output based on technological progress accompanied by ideological adjustments. This capability is followed by developments in technology, ideology and institutional adjustments in the country. Kuznets' theory also explains that economic growth has characteristics which include high per capita income, labor productivity, economic structural transformation, social ideological transformation, the economy's ability to expand markets and limitations in the spread of economic growth (Yunianto, 2021).

Economic growth can be an indicator used to measure the quality of life and welfare of a region (Dukalang, 2021). Economic growth is defined as the process of changing a country's per capita output in the long term (Latuheru & Numbay, 2024). Increasing dynamic economic growth is characterized by increasing production output and other economic activities (Kartiasih et al., 2012). According to the Central Statistics Agency (BPS), economic growth is an increase in the economy's capacity to produce goods and services or the process of changing economic conditions that occur in a country on a sustainable basis over a certain period of time. Economic growth theory explains the factors that influence the rate of economic growth and its processes in the long term. The rate of economic growth refers to quantitative changes which are often measured using gross domestic product or per capita income data approaches.

### **Economic Sector**

The economic sector is all business fields in production units that play a role in forming GDP or GRDP. BPS explains that based on the production approach, the grouping of production units is classified into 17 economic sectors using the base year 2010. These sectors include the agriculture, forestry and fisheries sectors; mining and excavation; processing industry; electricity and gas procurement; water supply, waste management, waste and recycling; construction; wholesale and retail trade; car and motorbike repair; transportation and warehousing; provision of accommodation and food and drink; information and communication; financial and insurance services; real estate; company services; government administration, land and mandatory social security; educational services; health services and social activities; as well as other services.

Economic sectors have a big role in showing the economic base of a region. Of all these economic sectors, we will look for sectors that have comparative advantages or leading sectors in a region that can encourage the development of other sectors in a region. Comparative advantage in this case is a comparatively superior sector that has a large contribution to the formation of GRDP which drives economic growth (Eka Andri Kurniawan, 2018). Determining leading sectors is important as a basis for regional development planning in the era of regional autonomy, where each region has the authority to determine policies that are in line with the potential to accelerate regional economic development (Ismail, 2015).

### **Production Theory**

Production is an action carried out by an organization or entity using various inputs such as labor, capital, goods and/or services to create output that has higher value (Tika Meilaningsih & Widya Yuniastuti, 2022). In the production theory proposed by (Pindyck & Rubinfeld, 2013) states that production is an economic activity that converts an input into an output. Inputs are also called production factors that are used to produce goods and services. The production function shows the highest output that a company can produce for each particular combination. In general, the production function can be written as follows

$$Q = F(X_1, X_2, X_3, \dots, X_n) \dots\dots\dots (1)$$

With  $Q$  is the total output and  $X_1, X_2, X_3, \dots, X_n$  is a set of inputs used in production activities. In (Mankiw, 2017), there are 2 factors that play an important role in

production activities, namely capital (K) and labor (L). In this case the production relationship can be written as follows.

$$Q = F (K, L) \dots\dots\dots (2)$$

Where  $Q$  is the number of units produced by the company with  $K$  is the amount of capital/capital and  $L$  is the number of workers. The production function describes the relationship between input and output which will help explain how the company can maximize output or minimize costs.

**Input Output Model Theory**

The input output (IO) model is based on the theory of the relationship between input arrangement and output distribution. Table IO is a statistical description that presents information about goods and services transactions as well as links between economic sectors presented in matrix form. The IO model can be used to see the composition of the supply and use of goods and services, identify sectors that have a significant influence on economic growth, estimate the impact of final demand on output, added value, tax revenues and labor in various production sectors, and determine projections and evaluations of macroeconomic variables (BPS-Statistics Indonesia, 2021). According to BPS, there are 3 basic assumptions in preparing the IO table, including uniformity, proportionality and additivity.

The IO model consists of 4 quadrants as follows

**Table 1.** Basic framework of the input output model

Quadrant I: Transactions between activities (nxn)	Quadrant II: Final demand (nxm)
Quadrant III: Production sector primary input (pxn)	Quadrant IV: Final demand primary input (pxm)

**Source:** BPS

The IO table is a comprehensive analysis tool for observing economic sectors. Based on Table 1, the basic framework of the input output model can later be used to determine the amount of input needed to produce output values in a particular, interrelated sector. Linkages between sectors are divided into two, namely forward linkage and backward linkage. Forward linkages describe the relationship between a sector and other sectors that use the sector's output as input. Meanwhile, backward linkages describe the relationship between a sector and the sectors that supply the inputs needed for the production process.

**Previous Research**

Quantitative studies using input output (IO) analysis have been widely carried out. Research conducted by Armelli et al. (2021) with the title "Analysis of Leading Sectors of the Indonesian Economy: Input-Output Model" analyzes the role of economic sectors and the interrelationships between sectors within them. The research results showed that the processing industry sector is the leading economic sector in Indonesia. The processing

industry sector is linked to the agricultural sector, namely as a large contributor of intermediate inputs to the agricultural sector. Progress in the processing industry sector has a multiplier effect that advances the agricultural sector.

This research is also in line with research conducted by Tika Meilaningsih & Widya Yuniastuti (2022) which analyzes leading sectors and inter-regional economic linkages in East Java Province and Eastern Indonesia (KTI) provinces. The research results show that there are three leading sectors of the economy, namely the processing industry sector and the information and communication sector, which have the potential to encourage increased economic growth in East Java as a whole.

According Taufiqqurrachman (2022), analyzing the potential of leading sectors in East Java Province using SLQ (Static Location Quotient) and DLQ (Dynamic Location Quotient) analysis. The research results show that the leading sectors in East Java Province include processing industry, wholesale and retail trade; car and motorbike repairs, providing accommodation and food and drink.

Eka Andri Kurniawan (2018) his research with the title "The Role of the Tourism Sector on the Economy of East Java: Input Output Analysis". The results of this research state that the tourism sector as a large industry in East Java is linked to other sectors. The development of the tourism sector influences and is influenced by other economic sectors. The tourism sector has a significant role in the formation of NTB, employment and the structure of intermediate demand and final demand.

## **METHODS**

### **DATA**

The data used in this research is the East Java Province IO table in 2021, the result of updating the 2016 IO table. This IO table was retrieved via the East Java Province BPS website. This research also uses the 2021 Indonesian national IRIO table, updated results from the 2016 IRIO table taken via the BPS website. In this IRIO analysis, 8 provinces were taken which had varying economic growth from low to high. These provinces are DKI Jakarta, West Java, Central Java, DI Yogyakarta, Banten, Bali, West Nusa Tenggara, East Nusa Tenggara (Figure 5).



**Figure 5.** Map of the islands of Java, Bali and Nusa Tenggara

## **RESEARCH METHODS**

This research adopts a descriptive analysis method by utilizing secondary data contained in the 2016 IRIO table which has been compiled by the Central Statistics Agency

(BPS). The IRIO table involves 17 sectors or business fields and covers 34 provinces in Indonesia. The data contained in the table records transactions using producer prices and records domestic transactions in each province, taking into account the separation between export and import components, both on an inter-provincial scale and in transactions with abroad.

**Inter Regional Input-Output (IRIO) Table**

The Inter Regional Input-Output (IRIO) table is a collection of data or data system in matrix form that reflects the relationship between economic sectors and between regions in a period of time. This input-output analysis method was first developed by Wassily Leontief in 1930. The use of the IRIO table in analysis provides a more comprehensive understanding of economic conditions. The benefits include understanding the structure of input and output allocation, analyzing the impact of changes in final demand in one sector or region on other sectors or regions, as well as understanding backward and forward linkages in the economy.

Backward linkage analysis helps in understanding how increased output in one sector drives economic growth in other sectors, while forward linkage analysis explains how output in one sector spreads to other sectors. Apart from that, the IRIO table can also identify leading sectors in a region's economy. In general, the IRIO table is presented in a simple matrix format and contains information on input and output transactions between sectors and regions.

**Input-Output Analysis**

**Table 2** Input-Output Structure

	Intermediate Consumption			Final Consumption	Total Output
	Sector 1	Sector 2	Sector 3		
Sector 1	X11	X12	X13	F1	X1
Sector 2	X21	X22	X23	F2	X2
Sector 3	X31	X32	X33	F3	X3
Number of Primary Inputs	V1	V2	V3		
Total Inputs	X1	X2	X3		

**Source :** Sutomo, (2015)

Input-Output table model (Table 2) which is open and static is based on three fundamental assumptions:

1. Each economic sector produces only one type of output with the use of a single input, and there is no automatic substitution between different sectors, indicating homogeneity.
2. Every change in the output of a sector is in line with changes in the input used by that sector, or follows a proportional linear function.
3. The total effect of production activities in various sectors is the result of adding up the effects of each sector individually, without considering influences from outside the system, following the principle of additivity.



In the Input-Output table for three sectors in a region, which is illustrated in Table 2 It can be seen that sector 1 produces an output of X1. This output is allocated as input X1, X2, and X3 for other sectors, as well as F1 for final consumption. Likewise, the allocation to other sectors is described in the following equation:

$$X_{11} + X_{12} + X_{13} + F_1 = X_1 \dots\dots\dots (3)$$

$$X_{21} + X_{22} + X_{23} + F_2 = X_2 \dots\dots\dots (4)$$

$$X_{31} + X_{32} + X_{33} + F_3 = X_3 \dots\dots\dots (5)$$

**Analysis of Inter-Sector Linkages**

The linkages between sectors reflect that when there is an increase in production in a particular sector, it will drive an increase in production in other sectors. If production increases in sector A, it means that more input is needed in the production process, and this can come from sector B and other sectors. The impact is an increase in production in sector B and other sectors. This linkage analysis can be carried out using the Input-Output (IO) table, focusing on two aspects: forward linkages and backward linkages.

Forward linkages (FL) and backward linkages (BL) in the context of economic sectors are defined as follows:

$$FL_I = \sum_{j=1}^N g_{IJ} \dots\dots\dots (6)$$

$$bl_I = \sum_{j=1}^N g_{IJ} \dots\dots\dots (7)$$

In the matrix g, where each element represents a relationship between economic sectors, two types of linkages can be observed: backward linkages and forward linkages. Backward linkages occur when an increase in demand in one sector causes an increase in demand for inputs from other sectors. On the other hand, forward linkages occur when an increase in output in one sector increases supply to other sectors.

From this relationship, we can calculate two important indices: the Spreading Power Index (IDP) and the Degree of Sensitivity Index (IDK), which can be explained by the following formula:

These two indices can indicate the main sectors of a region's economy if their values exceed one. When the IDP exceeds one, this indicates that the sector has a higher spreadability than the average of other sectors as a whole. Likewise, when IDK exceeds one, it indicates that the sector has a higher level of sensitivity than the overall average of other sectors. Therefore, sectors with IDP and IDK above one can be classified as main sectors.

The quadrants in the dispersion power index and the degree of sensitivity index are a way to group economic sectors based on backward linkages and forward linkages. This quadrant is divided into four parts based on the value of the spreading power index and the degree of sensitivity index.

**Quadrant 1: Strategic Sectoral**

This quadrant consists of sectors that have a value of the dispersion power index (backward linkages) and the degree of sensitivity index (forward linkages) which is greater than 1. This sector has high backward linkages and high forward linkages, so it has great potential in influencing economic growth.

**Quadrant 2: Developing Sectors**

This quadrant consists of sectors that have a high dispersion power index value but a low sensitivity index value. This sector has high backward linkages, but low forward linkages, so it has the potential for further development.

**Quadrant 3: Lagging Sectors**

This quadrant consists of sectors that have low dispersion power index and sensitivity index values. This sector has low backward and forward linkages, so it has relatively low potential in influencing economic growth.

**Quadrant 4: Non-Strategic Sectors**

This quadrant consists of sectors that have a low dispersion power index value but a high sensitivity index value. This sector has high forward linkages, but low backward linkages, so it has the potential to increase backward linkages.

**Analysis of Inter-Regional (Spatial) Linkages**

The Inter-Regional Input-Output Table for 34 provinces in Indonesia provides information about the relationship between the flow of economic goods and services between provinces. This spatial linkage provides multiplier value in the form of intraregional and interregional effects. Intraregional effects measure the impact of increasing output in a region due to changes in final demand from a sector in that region. Meanwhile, interregional effects measure the increase in output in one region due to changes in final demand from a sector in another region. The sum of intraregional and interregional effects produces the output multiplier.

**RESULTS**

This section presents the results of the data analysis that has been collected and analyzed. The results of this study show the main findings regarding the relationship between the variables studied. Each finding is discussed in detail to provide a deeper understanding of its implications. This discussion also includes comparisons with existing literature as well as practical implications of the research results.

**Leading Sector Analysis with IDP and IDK Values**

The 2021 East Java Province IO table can produce backward and forward linkage analysis. Backward linkage analysis is used to observe increases in output through the input demand side, while forward linkage analysis is used to observe increases in output from the output supply side. The degree of dispersion index (IDP) is a measure of the impact of backward linkages, and the degree of sensitivity index (IDK) is a measure of the impact of forward linkages. High scores on these two indices indicate the sector's ability to drive the economy. If both indices have a value of more than one, the sector can be considered a leading sector.

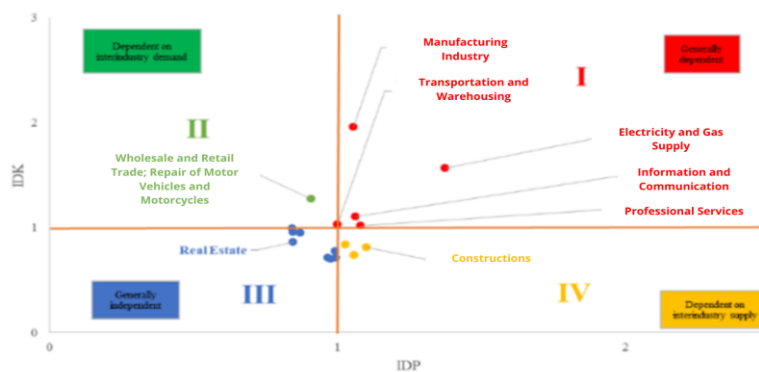
**Table 3.** IDP and IDK Values for Each Sector

<b>Economic sector</b>	<b>IDP</b>	<b>IDK</b>
Agriculture, Forestry and Fisheries	0.841134	0.997043
Mining and excavation	0.845513	0.956822
Processing industry**	1.056227	1.956575

Procurement of Electricity and Gas**	1.375032	1.562104
Water Supply, Waste Management, Waste and Recycling	0.97602	0.701229
Construction	1.100695	0.813871
Wholesale and Retail Trade; Car and Motorcycle Repair	0.908881	1.272609
Transportation and Warehousing**	1.000871	1.031757
Provision of Food and Drink Accommodation	1.027196	0.835533
Information and Communication**	1.063418	1.10505
Financial Services and Insurance	0.870626	0.94889
Real Estate	0.845672	0.863158
Company Services**	1.081029	1.016866
Government Administration, Defense, and Mandatory Social Security	0.993177	0.714979
Education Services	0.96602	0.714209
Health Services and Social Activities	1.058199	0.735188
Other Services	0.99029	0.774117

**Information:** \*\* (indicates leading sector in East Java)

**Source:** Processed Results



**Source:** Processed result

**Figure 6.** Leading Sector Quadrant of East Java Province

**Table 4.** Sector Description for Each Quadrant

Quadrant	Sector
I	Processing industry, transportation and warehousing, electricity and gas procurement, information and communications, and corporate services
II	Wholesale and Retail Trade; Car and motorbike repairs
III	Agriculture, Forestry and Fisheries, Mining and excavation, water supply, waste management, waste and recycling, financial and insurance services, real estate, government administration, defense and mandatory social security, educational services and other services
IV	Construction, provision of food and drink accommodation, health services and social activities

**Source:** Processed Results

The results of grouping economic sectors based on the Degree of Distribution Index (IDP) and Degree of Sensitivity Index (IDK) provide an in-depth picture of the contribution of each sector to the economy (Figure 6, Table 3, Table 4). The manufacturing, transportation and warehousing, electricity and gas procurement, information and communications, and corporate services sectors, which have more than one IDP and IDK, show strong backward and forward linkages. This means that these sectors contribute significantly through input demand and output supply, making them leading sectors capable of driving economic growth effectively. In contrast, the wholesale and retail trade and car and motorbike repair sectors, with an IDP of less than one and an IDK of more than one, have strong forward linkages but are weak in terms of input demand. These sectors are important in influencing output in the market but do not move much upstream sectors.

The agriculture, forestry and fisheries, mining and quarrying, water supply, waste, waste and recycling management, financial and insurance services, real estate, government administration, defense and mandatory social security, education services and other services sectors have IDP and IDK less than one. This shows that the contribution of these sectors to input demand and output supply is relatively low, even though these sectors are important in their respective specific functions. These sectors are not considered to be the main drivers of overall economic growth. Finally, the construction sector, providing accommodation and food and drink, as well as health services and social activities, with an IDP of more than one and an IDK of less than one, shows strong backward linkages but weak forward linkages. These sectors are important in supporting demand in upstream sectors but less so in driving downstream sectors. This grouping helps identify sectors with great potential to boost the economy as well as sectors that need to be strengthened so that the sector's contribution can be more optimal.

**Analysis of Economic Multipliers**

In this analysis, the focus is on the output multiplier, household income multiplier, and employment multiplier. The output multiplier measures the change in total output produced by a particular economic sector relative to the initial change in final demand, while the household income multiplier measures the impact of changes in output on household income in that area. On the other hand, the employment multiplier describes the relationship between an increase in the output of a sector and its impact on the required workforce.

**Table 5** Multiplier Values for Leading and Non-Leading Sectors

Multiplier Number	Leading Sector	Unfavorable Sector
Outputs	1,545 **	1,383
Household Income	1,749 **	1,278
Labor	1,398	1,844 **

**Information:** \*\* (indicates the highest multiplier number)

**Source:** Processed Results

With the output multiplier for the leading sector reaching 1.5445 and the non-leading sector at 1.383 (Table 5), this picture illustrates the difference in the relative impact of output growth in the two sectors. Leading sectors, which have a higher output multiplier, indicate that any additional production or investment in this sector will produce a greater overall

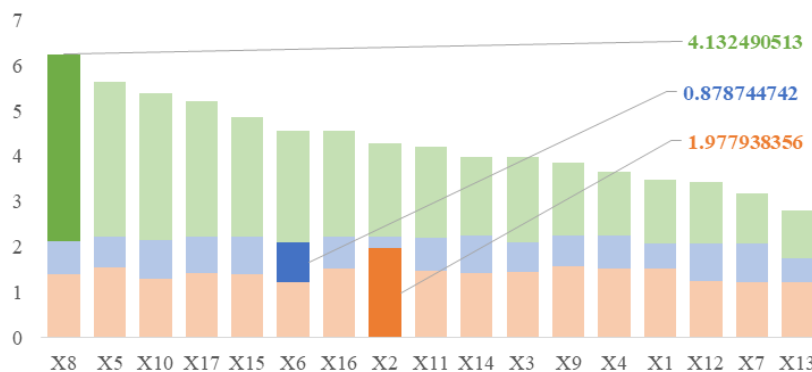
economic impact. In contrast, sectors with lower output multipliers, although important, may require additional efforts to increase their impact on regional economic growth.

In this situation, the household income multiplier value for the leading sector which reached 1.749 indicates that every increase of one unit of output in that sector will result in an increase of around 1.749 units in household income (Table 5). Meanwhile, the household income multiplier value for the non-leading sector of 1.278 indicates a lower effect; meaning, every increase in one unit of output in this sector will only contribute around 1,278 units to household income. From this comparison, it can be concluded that leading sectors have a greater impact on household income in the region compared to non-leading sectors. This shows that growth or changes in leading sectors have more significant potential in improving household welfare and encouraging overall economic growth.

In the context of the labor multiplier, a value exceeding 1 indicates that the sector requires more labor to produce the same amount of output. This indicates that sectors with high labor multipliers will absorb more workers. In this situation, if the leading sector has a labor multiplier of 1.398 while the non-leading sector has a value of 1.844, it can be interpreted that the non-leading sector requires more labor than the leading sector to achieve equivalent production (Table 5). This could be due to various factors, such as the adoption of higher levels of automation in leading sectors, or better production efficiencies that reduce the need for additional labor. From an economic policy perspective, this information can be used as a basis for allocating human resources efficiently. For example, focusing on sectors with high employment multipliers can help in planning training programs or policies that improve the workforce skills required by those sectors.

**Analysis of Multiplier Figures for Each Sector**

Economic multipliers are an essential tool in economic analysis used to understand the effect of changes in a sector on the overall economy. This analysis includes the output multiplier, household income multiplier, and employment multiplier. The output multiplier calculates the total change in output that results from a change in a sector's final demand. The household income multiplier evaluates the impact of changes in output on household income in a region. The labor multiplier shows the relationship between an increase in output and the amount of labor required.



**Source:** Processed Results

**Figure 7.** Output Multiplier Figures, Household Income, and Labor for Each Sector

**Note:**

Orange: Output Multiplier

Blue: Household Multiplier

Green: Labor Multiplier

**Table 6.** Description of the Code for Each Sector

Code	Commodity
X1	Agriculture, Forestry and Fisheries
X2	Mining and excavation
X3	Processing industry
X4	Procurement of Electricity and Gas
X5	Water Supply, Waste Management, Waste and Recycling
X6	Construction
X7	Wholesale and Retail Trade; Car and Motorcycle Repair
X8	Transportation and Warehousing
X9	Provision of accommodation and food and drink
X10	Information and Communication
X11	Financial Services and Insurance
X12	Real Estate
X13	Company Services
X14	Government Administration, Defense and Mandatory Social Security
X15	Education Services
X16	Health Services and Social Activities
X17	Other Services

**Source:** BPS

**Remarks:** Sector codes adapt to the analysis process

The results of the output multiplier analysis show that the mining and quarrying sector has the largest output multiplier of 1.978 (Figure 7). This figure means that changes in final demand in this sector result in a greater increase in total output compared to other sectors. In contrast, the construction sector has the smallest output multiplier with a multiplier value of 1.21. This shows that changes in final demand in this sector result in a smaller increase in total output. For the household income multiplier, the construction sector has the highest value of 0.879, indicating that changes in output in this sector have a significant impact on household income. This may be because the construction sector is more labor intensive and directly linked to household income. In contrast, the mining and quarrying sector has the smallest household income multiplier of 0.258, indicating that changes in output in this sector have a smaller impact on household income, possibly because this sector is more capital intensive and less directly linked to household income. In terms of the employment multiplier, the transportation and warehousing sector has the largest value at 4.132, indicating that this sector absorbs a lot of labor for every increase in output, making it important for job creation. On the other hand, the corporate services sector has the smallest labor multiplier in the range of 1.040, meaning that increasing output in this sector requires little additional labor, perhaps due to high efficiency or a greater degree of automation.

**Simulate increasing the output of leading and non-leading sectors**

**Table 7.** Simulation of Increasing Leading Sectors Against Non-Leading Sectors

Sector	Output Change
Agriculture, Forestry and Fisheries	11.27
Mining and excavation	22.66
Processing industry**	150.68
Procurement of Electricity and Gas**	184.25
Water Supply, Waste Management, Waste and Recycling	0.10
Construction	1.06
Wholesale and Retail Trade; Car and Motorcycle Repair	31.44
Transportation and Warehousing**	117.20
Provision of Food and Drink Accommodation	5.49
Information and Communication**	132.79
Financial Services and Insurance	10.17
Real Estate	7.56
Company Services**	120.93
Government Administration, Defense, and Mandatory Social Security	1.67
Education Services	0.22
Health Services and Social Activities	1.79
Other Services	2.89

**Source:** Processed Results

**Information:** \*\* (indicates leading sector in East Java)

The simulated increase in final output in leading sectors will have an impact on several sectors that are classified as non-leading (Table 7). The results above show that the wholesale and retail trade sectors; Car and motorbike repair has the highest increase in final output of other non-leading sectors. The sectors that have the smallest impact on increasing the output of the leading sectors are the water supply, waste management, waste and recycling sectors. Apart from that, the educational services sector also has the smallest impact on the simulations carried out.

**Table 8.** Simulation of Increasing Non-Leading Sectors Against Leading

Sector	Output Change
Agriculture, Forestry and Fisheries	132.15
Mining and excavation	114.98
Processing industry**	130.77
Procurement of Electricity and Gas**	40.45
Water Supply, Waste Management, Waste and Recycling	100.77
Construction	116.01
Wholesale and Retail Trade; Car and Motorcycle Repair	151.62
Transportation and Warehousing**	31.21
Provision of Food and Drink Accommodation	114.70
Information and Communication**	26.16

Financial Services and Insurance	126.33
Real Estate	116.60
Company Services**	25.35
Government Administration, Defense, and Mandatory Social Security	101.18
Education Services	102.52
Health Services and Social Activities	103.97
Other Services	108.46

**Source:** Processed Results

**Information:** \*\* (indicates leading sector in East Java)

The simulated increase in final output in non-leading sectors will have an impact on several sectors that are classified as leading (Table 8). The results above show that the processing industry sector has the highest increase in final output compared to other leading sectors. The sector that has the smallest impact on increasing the output of the non-leading sector is the corporate services sector. Apart from that, the information and communication sector also has the smallest impact on the simulation of increasing final output in the non-leading sector.

If the main sector experiences growth and this results in an increase in the non-leading sector which also experiences an increase, it shows that there is a connection between the two in influencing overall economic dynamics. An increase in the main sector can trigger growth in sectors related to or dependent on it, including non-leading sectors. This shows that although the main focus may be on the prime sector, the impact extends to the non-prime sectors of the economy. This indicates that growth or change in one sector can have a broad impact on non-leading sectors, creating a larger growth spiral in the economy.

### **Analysis of the impact of interregional and intraregional multipliers**

Interregional and intraregional multipliers are vital concepts in regional economic analysis that are used to understand how changes in economic activity in one region can affect other regions, as well as the impacts that occur within those regions. This analysis helps identify economic linkages between regions, both within one province and between provinces. With the multiplier model, we can measure the direct, indirect, and induced effects of economic changes such as investment or government spending on output, income, and employment in various regions.





**Source:** Processed Results

**Figure 8.** Interregional and Intra-regional Impact on the East Java Economy

The results of the multiplier analysis show that other service sectors have the highest intraregional multiplier figure of 1.998, while the transportation and warehousing sector has the smallest figure of 1.212 (Figure 8). The high intraregional multiplier figures in other service sectors indicate that every increase in economic activity in this sector almost produces a double impact in the East Java region. This indicates that other service sectors have strong economic links within the East Java region, so changes in this sector can have a significant effect on the East Java economy. In contrast, the transportation and warehousing sector with an intraregional multiplier of 1.212 shows that each increase in economic activity only produces slightly more than a double impact within the East Java region. This shows that this sector has a more limited impact on the East Java economy compared to other service sectors.

For the interregional multiplier, the mining and quarrying sector has the highest figure at 0.071, while the transportation and warehousing sector has the smallest figure at 0.011. The highest interregional multiplier figure is in the mining and quarrying sector, indicating that every increase in economic activity in this sector has a relatively small but significant impact on other regions outside East Java. This reflects that the mining and quarrying sector has economic links with other regions, although the impact is not as large as the intraregional multiplier. In contrast, the transportation and warehousing sector with an interregional multiplier of 0.011 indicates that the increase in economic activity in this sector has almost no impact on other regions outside East Java. This indicates that this sector operates more within its own territorial boundaries and has very low economic linkages with other regions. This multiplier figure proves that East Java's economy is still dependent on the surrounding area. These regions are DKI Jakarta, West Java, DI Yogyakarta, Central Java, Banten, Bali, East Nusa Tenggara and West Nusa Tenggara.

## DISCUSSION

Results from the Leading Sector Analysis conducted on the 2021 East Java Province Input-Output (IO) Table show a significant relationship between the Degree of Dispersion Index (IDP) and the Degree of Sensitivity Index (IDK) with regional economic growth. Sectors such as manufacturing, transportation and warehousing, electricity and gas supply, information and communication, and corporate services, which have an IDP and IDK greater

than one, have been proven to have strong linkages both from the input demand and output supply sides. This indicates that these sectors act as leading sectors capable of effectively driving economic growth.

On the other hand, sectors such as wholesale and retail trade and the repair of motor vehicles and motorcycles, despite having an IDK greater than one, show that they are more dominant in influencing output supply but weak in input demand, thus not functioning as primary economic drivers.

In comparison, sectors like agriculture, forestry, fisheries, and financial services and insurance, with IDP and IDK values of less than one, show relatively low contributions to input demand and output supply, although these sectors remain important in their specific functions. These sectors are not considered the main drivers of overall economic growth. Sectors such as construction, provision of accommodation and food services, and health services and social activities show strong backward linkages but weak forward linkages, meaning they support upstream sector demand more but are less effective in driving downstream sectors.

This analysis provides an in-depth picture of sectors with great potential to drive the economy and those that need to be strengthened for more optimal contributions. This discussion highlights the importance of a comprehensive understanding of sectoral dynamics in regional economic planning, considering the role of each sector both in terms of contribution to input demand and output supply.

## **CONCLUSION**

The results of the analysis of leading sectors in East Java show that the processing industry, electricity and gas procurement, transportation and warehousing, information and communications, and corporate services have a significant positive impact on regional economic growth. This is proven by the Positive Impact Index (IDP) and Overall Impact Index (IDK) values which exceed 1 in these sectors, indicating that increasing economic activity in these sectors has a strong positive impact on the East Java economy as a whole. Through the output multiplier figures, household income and employment, it can be concluded that all leading sectors have a very large impact in increasing output, household income or employment. However, if we look at the distribution of sectors, it shows that the mining sector has a large impact on increasing output, the construction sector has an impact on increasing household income, and the transportation and warehousing sectors have an impact on increasing employment. All leading sectors in East Java are also Indonesia's mainstay sectors for fulfilling final demand in several provinces, namely DKI Jakarta, West Java, Central Java, Yogyakarta, Banten, Bali, NTB and NTT.

The increase in leading sector output has an impact on non-leading sectors, such as wholesale trade, car repair, and prominent motorbikes. The education services and waste management sectors have the least impact. On the other hand, increasing output from non-leading sectors affects leading sectors, especially the processing industry. This linkage shows that growth in one sector can have a broad impact on other sectors, creating greater economic growth.

The government needs to take strategic steps after analyzing these results. First, strengthening key sectors such as processing industry, energy and gas procurement, transportation, and corporate services by providing attractive investment incentives and

supporting adequate infrastructure. Furthermore, focusing on developing construction and property sectors that have comparative advantages must be a priority, with efforts to improve regulations and infrastructure that support the growth of these sectors. It is also important to invest in education and health, as improving the quality of human resources will have a positive impact on regional economic productivity and competitiveness. Apart from that, the government must also pay attention to developing infrastructure and increasing market access to support the expansion of local businesses, while encouraging inter-regional cooperation to strengthen economic links between East Java and West Java. With these steps, it is hoped that the government can encourage regional economic growth in a sustainable and inclusive manner.

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