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The Impact of East Java Electricity Investment on Indonesian Economy: (IRIO)

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Abstract: *This study aims to analyze the impact of investment in the electricity sector in East Java using the Interregional Input-Output (IRIO) method. There are several data used for employment data, public income data and IRIO tables sourced from the Central Statistics Agency. The electricity sector is one of the leading sectors in East Java, which shows that it is able to increase the development of the upstream and downstream industries in the electricity sector itself, both directly and indirectly. The influence of the role of electricity sector activities in East Java has made the government's attention to increase electricity investment after the Covid-19 pandemic. The impact of electricity investment on other sectors in East Java occurred in the Mining and Quarrying sector in terms of increasing output and income, the Wholesale and Retail Trade sector; Repair of Motor Vehicles and Motorcycles in terms of increasing the workforce. In addition, it also has an impact on other regions that are the most dominant, namely in South Sumatra and East Kalimantan and the majority still affect other provinces on the island of Java.*
Keywords: Electricity; Interregional Input-Output (IRIO) model; Multiplier Effect, Invesment

JEL: R15, R31, R53

1. INTRODUCTION

Electrical energy is one of the main factors driving economic development that affects various aspects of the production and consumption of goods and services in the economy (Payne, 2010). Currently, electricity is considered one of the energy sources used in the economic activities of the Indonesian people. Economic activities related to the production of goods and services are largely supported by electricity as the source of energy. Therefore, there is a causal relationship that electricity utilization is still considered to have a significant contribution to increasing economic development and vice versa (Bazán Navarro et al., 2024; Mutumba & Otim, 2025). In addition, it is an undeniable fact that the increase in electricity consumption is also influenced by the availability of infrastructure to facilitate access and meet the electricity needs of the community supported by investment in the electricity sector (Eldowma et al., 2023). In addition, the trend of increasing electricity utilization has also prompted various studies on the identification of the impact of electricity utilization and investment on economic development.

PT PLN (Persero) East Java Distribution Main Unit (UID) recorded that electricity sales performance throughout 2024 reached 44.3 Twh or experienced a growth of around 6 percent compared to 2023 which was 41.8 Twh, a positive signal for electrical energy consumption of as many as 14.2 million customers as of December 2024, an increase from the previous year which reached 13.7 million in 2023 (Dinas Kominfo, 2025). Increasing the need for electrical energy supply in East Java, PLN East Java & Bali Transmission Main Unit (UIT JBM) added two conductors to the Sidoarjo Substation (GI) with an investment value of IDR 11.7 billion and PT PLN (Persero) succeeded in restoring 100 percent of the electricity system in Madura which was affected by the transmission disruption of the 150 kilovolt (kV) High Voltage Cable Line (SKTT) Ujung - Bangkalan.

Increased spending (investment) in the provision of electricity infrastructure will encourage the acceleration of renewable energy ecosystem policies and support economic growth that increases income (Asaleye et al., 2025). One form of electricity infrastructure investment by PR PLN (Persero) UID East Java is to ensure the availability of Public Electric Vehicle Charging Stations (SPKLU) in 77 which are divided into 33 provided by PLN and 44 by the private sector (Kominfo, 2023).

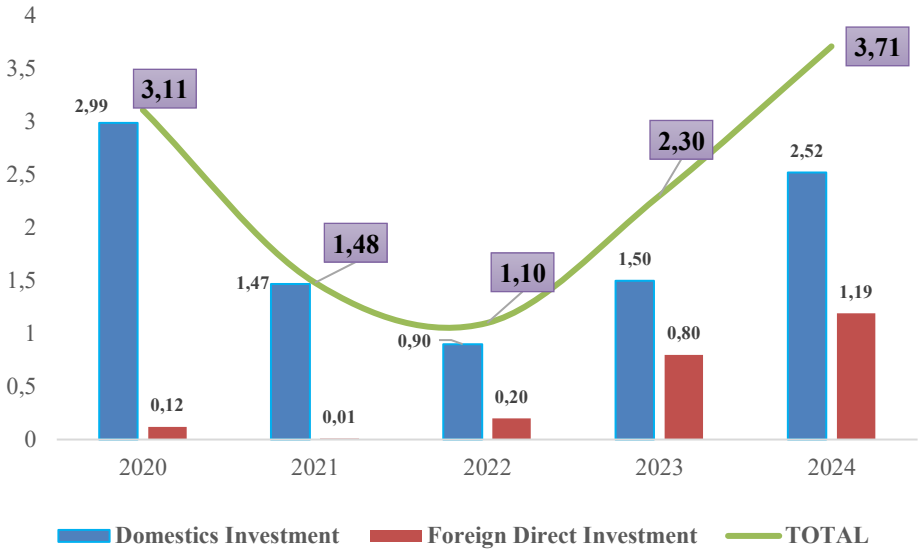


Figure 1. Realization of Electricity Investment in East Java Province (Rp - Billion)
Source: Dinas Penanaman Modal dan Pelayanan Terpadu Satu Pintu Provinsi Jatim 2020-2024

Based on figure 1, it shows the realization of total investment in the East Java electricity sector during the 2020-2024 period, which experienced an increase in total investment after the Covid-19 pandemic from 1.10 trillion to 3.71 trillion. The increase in electricity investment also coincided with domestic investment and foreign direct investment (Nurtina & Mahadi, 2025). Electricity investment that aims to maintain sustainable electricity availability is also expected to have an impact between regions (Schulte & Wahle, 2024). Electricity investment will not only have an impact on the availability of electricity supply between regions, but will also have an impact on the availability of jobs, income and increased output to other regions as well (Vasconcellos & Caiado Couto, 2021).

The urgency of research that discusses electricity investment due to the increase in the use of various electricity facilities also encourages various studies on the identification of the impact of electricity utilization and investment on economic development in East Java Province. Investment is able to provide a multiplier effect to other sectors, such as foreign investment (Hernández Soto & Martinez-Cobas, 2024), market, air transport and cargo (Merzlikin et al., 2022), agglomeration and manufacturing (Kim et al., 2018), agriculture (Wang et al., 2024) and industry (He et al., 2024) and urban green (Zhang et al., 2024). In addition, electricity has a positive impact on increasing the human development index (Maqin & Sidharta, 2017), however, the future challenge in the development of renewable energy must be able to provide electricity without fossil materials (Erdiwansyah et al., 2021). In the previous study, it only discussed intervariables using an econometric approach that was concentrated on one region/region only, but in this study it used the approach of inter-sector linkages and inter-regional linkages as seen from the impact of a policy carried out by the government (Allo et al., 2022) However, a more detailed update will discuss the impact of electricity investment on output, income and labor from 17 business fields and 34 other provinces. Therefore, this study aims to help estimate how the multiplier effect of electricity investment policies in East Java on the economy in Indonesia by using the Interregional Input-Output Table (IRIO) approach method.

2. LITERATURE REVIEW

Several cities are pursuing sustainable development by providing environmentally friendly energy, one of which is encouraging the switch to the use of electric vehicles so that investment in electric charging stations is needed (Chen et al., 2024), In research conducted in Gorontalo, electricity infrastructure is one of the aspects needed to support economic development. Gorontalo Province is one of the provinces with the electricity and gas procurement sector which is the leading sector that provides the greatest impetus to other business fields if the increase in demand finally increases and has the highest output response if there is an increase in final demand in other sectors, therefore, investment in the electricity and gas procurement sector needs to be made. This study aims to determine the role of

the electricity and gas procurement sector in Gorontalo Province, the linkages between sectors and regions, and the impact of investment in the electricity and gas procurement sector in Gorontalo Province on the Indonesian economy (Rahmah, 2023).

Energy policy goals often depend on investment in technology to support sustainable energy, one of which is electricity investment (Gross et al., 2010). The high cost of energy subsidies has encouraged the government and the private sector to invest (Bigerna et al., 2019) However, it is also necessary to understand the main factors that influence investors' choice of technology mix in the electricity market during the transition period. Key findings of the analysis include: the high cost of energy subsidies has encouraged the government and the private sector to invest in the main reasons behind reforms; the characteristics of electricity reform; The impact of electricity market reform on electricity prices, as well as factors related to electricity market reform and non-reform that affect investors' choice of certain generation technologies or technology mix (Streimikiene & Siksnelyte, 2014).

Classification of 4 Quadrants Based on Backward Linkage and Forward Linkage coefficients (< / >; 1) (Taufiqqurrachman, 2022) namely: **Leading Sectors:** Sectors that are able to increase the growth of upstream industry output (backward linkage) and forward linkage more than (> 1); **Mainstay Sectors:** Sectors that are unable to increase the growth of their upstream industry output (backward linkage; < 1) but are able to contribute to increasing the growth of their downstream industry output (forward linkage; >1); **Potential Sectors:** Sectors that are able to increase the growth of their upstream industry output (backward linkage; > 1) but are unable to contribute to increasing the growth of their downstream industry output (forward linkage; < 1); **Lagging Sectors:** Sectors that are unable to increase the growth of upstream industry output (backward linkage) and their (forward linkage) less than (<1).

Table 1 Quadrant Backward Linkage and Forward Linkage

Backward Linkage / Forward Linkage	Backward Linkage > 1	Backward Linkage < 1
Forward Linkage > 1	**Leading Sectors**	**Mainstay Sectors**
Forward Linkage < 1	**Potential Sectors**	**Lagging Sectors**

Source: (Taufiqqurrachman, 2022)

3. METHOD

This study uses a secondary type of data using data using the IRIO Indonesia table on the basis of producer prices in 2016 with calcification of 17 sectors and 34 provinces. IRIO Table data was obtained from BPS Indonesia and construction investment data from the Ministry of Investment. The type of transaction used is domestic transactions, which means that the import and export components both interprovince and foreign in transactions in each province have been separated. The IRIO table is used to analyze the relationship of the impact of investment in the construction sector in East Java on the analysis of the relationship between the front and the back and consists of the coefficient of distribution to output, income and labor. Interregional Input-Output (IRIO) model. This model was first introduced by Walter Isard in 1951, so it became known as the "Isard Model". This model was later developed by (Miller & Blair, 2009) with the basic structure as shown in the following table, Table 2 IRIO Indonesia in Appendix).

Interregional Input-Output Impact Analysis

1. Backward Linkage (BL)

- Backward Linkage for region P sector *j*

$$IDP_j^P = p\,\frac{m_j^P}{\sum_{j=1}^{n} m_j^P + \sum_{j=1}^{n} m_j^Q}$$

- Backward Linkage for region Q sector *j*

$$IDP_j^Q = p\,\frac{m_j^Q}{\sum_{j=1}^{n} m_j^P + \sum_{j=1}^{n} m_j^Q}$$

Information:

IDP_j^P : Sector *spread coefficient j* region P
IDP_j^Q : Sector *spread coefficient j* region Q
m_j^P : Backward linkage of sector *j* region P
m_j^Q : Backward linkage of sector *j* region Q
p : Matrix size

If:

$IDP_j^P > 1$: Sector j region P has a strong ability to attract the growth of production in the upstream sector
$IDP_j^P < 1$: Sector j of region P has a weak ability to attract production growth in the upstream sector

2. Forward Linkage (FL)

- Forward Linkage for region P sector *i*

$$IDK_i^P = p\,\frac{h_I^P}{\sum_{i=1}^{n} h_i^P + \sum_{i=1}^{n} h_i^Q}$$

- Forward Linkage for region Q sector *i*

$$IDK_i^Q = p\,\frac{h_i^Q}{\sum_{i=1}^{n} h_i^P + \sum_{i=1}^{n} h_i^Q}$$

Information:

IDK_i^P : Sector *distribution coefficient i* region P
IDK_i^Q : Sector *spread coefficient i* region Q
h_i^P : Forward Linkage of sector *i* region P
h_i^Q : Forward Linkage of sector *i* region Q
p : Matrix size

If:

$IDP_i^P > 1$: Sector I region P has a strong ability to attract the growth of production in the downstream sector
$IDP_i^P < 1$: Sector I of the P region has a weak ability to attract production growth in the downstream sector

3. Policy Impact (Shock) on Output

- Changes in output in region P sector *i*

$$\Delta X_i^P = \sum_{j=1}^{n} k_{ij}^{PP}\,\Delta Y_j^P + \sum_{j=1}^{n} k_{ij}^{PQ}\,\Delta Y_j^Q$$

- Changes in output in region Q sector *i*

$$\Delta X_i^Q = \sum_{j=1}^{n} k_{ij}^{QP}\,\Delta Y_j^P + \sum_{j=1}^{n} k_{ij}^{QQ}\,\Delta Y_j^Q$$

Information:

ΔX_i^P : Changes in output sector *i* region P
ΔX_i^P : Changes in income in sector *i* region Q
k_{ij}^{PP} : The value element of the Leontief inverse matrix of sector *i* of region P to sector *j* of region P
k_{ij}^{PQ} : The element of the Leontief inverse matrix value of sector *i* of region P to sector *j* of region Q
k_{ij}^{QP} : Element of the Leontief inverse matrix of sector *i* of region Q to sector *j* of region P
k_{ij}^{QQ} : Element of the Leontief inverse matrix of sector *i* of region Q to sector *j* of region Q

ΔY_j^P : Changes in final demand in sector *j* region P
ΔY_j^Q : Changes in final demand in sector *j* region Q

4. Policy Impact (Shock) on Income

- Changes in income in region P sector i

$$\Delta W_i^P = w_i^P \left(\sum_{j=1}^{n} k_{ij}^{PP} \Delta Y_j^P + \sum_{j=1}^{n} k_{ij}^{PQ} \Delta Y_j^Q \right)$$

- Changes in income in region Q sector i

$$\Delta W_i^Q = w_i^Q \left(\sum_{j=1}^{n} k_{ij}^{QP} \Delta Y_j^P + \sum_{j=1}^{n} k_{ij}^{QQ} \Delta Y_j^Q \right)$$

Information:

ΔW_i^P : Changes in income in sector i region P
ΔW_i^Q : Changes in income in sector i region Q
w_i^P : Sector I income coefficient of region P
w_i^Q : Sector I income coefficient of region Q
k_{ij}^{PP} : The value element of the Leontief inverse matrix of sector *i* of region P to sector *j* of region P
k_{ij}^{PQ} : The value element of the Leontief inverse matrix of sector *i* of region P to sector *j* of region Q
k_{ij}^{QP} : Element of the Leontief inverse matrix of sector *i* of region Q to sector *j* of region P
k_{ij}^{QQ} : Element of the Leontief inverse matrix of sector *i* of region Q to sector *j* of region Q
ΔY_j^P : Changes in final demand in sector *j* region P
ΔY_j^Q : Changes in final demand in sector *j* region Q

5. Policy Impact (Shock) on Labor

- Changes in labor in region P sector i

$$\Delta T_i^P = t_i^P \left(\sum_{j=1}^{n} k_{ij}^{PP} \Delta Y_j^P + \sum_{j=1}^{n} k_{ij}^{PQ} \Delta Y_j^Q \right)$$

- Changes in labor region Q sector i

$$\Delta T_i^Q = t_i^Q \left(\sum_{j=1}^{n} k_{ij}^{QP} \Delta Y_j^P + \sum_{j=1}^{n} k_{ij}^{QQ} \Delta Y_j^Q \right)$$

Information:

ΔT_i^P : Changes in income in sector i region P
ΔT_i^Q : Changes in income in sector i region Q
t_i^P : Sector I income coefficient of region P
t_i^Q : Sector I income coefficient of region Q
k_{ij}^{PP} : The value element of the Leontief inverse matrix of sector *i* of region P to sector *j* of region P
k_{ij}^{PQ} : The value element of the Leontief inverse matrix of sector *i* of region P to sector *j* of region Q
k_{ij}^{QP} : Element of the Leontief inverse matrix of sector *i* of region Q to sector *j* of region P
k_{ij}^{QQ} : Element of the Leontief inverse matrix of sector *i* of region Q to sector *j* of region Q
ΔY_j^P : Changes in final demand in sector *j* region P
ΔY_j^Q : Changes in final demand in sector *j* region Q

4. RESULTS AND DISCUSSION

4.1 Direct and Indirect Linkages (Backward and Forward Linkage)

Table 3 shows the results of direct and indirect relationships in 17 sectors to the upstream (backward linkage) and downstream (forward linkage) industries. Analysis of the direct linkage in a sector of Rp (million) will show that every elevation of 1 output will increase the output of other sectors derived from the output of that sector, as an intermediate input in the production process of Rp (million). This will trigger an increase in the use of output in other sectors as inputs (indirect linkages in the future) of Rp (million). Therefore, it is assumed that an increase in final demand of 1 output of the sector will directly and indirectly encourage the development of the downstream industry by Rp (million).

Tabel 3 Direct and Indirect Linkage (Backward Linkage)

Sector Codes	Direct Linkage	Backward Linkage (BL)			Froward Linkage (FL)		
		Indirect Linkage	Value	Coefficient /Impact of Spread	Indirect Linkage	Value	Coefficient /Impact of Spread
A.	1.06	0.16	1.21	0.84	0.39	1.44	1.00
B.	1.01	0.21	1.22	0.85	0.39	1.40	0.97
C.	1.23	0.30	1.53	1.06	1.61	2.84	1.96
D.	1.59	0.41	2.00	1.38	0.67	2.26	1.56
E.	1.01	0.40	1.41	0.98	0.00	1.01	0.70
F.	1.04	0.55	1.59	1.10	0.13	1.17	0.81
G.	1.02	0.29	1.31	0.91	0.82	1.84	1.27
H.	1.05	0.39	1.45	1.00	0.43	1.49	1.03
I.	1.01	0.47	1.48	1.03	0.19	1.20	0.83
J.	1.19	0.34	1.53	1.06	0.40	1.59	1.10
K.	1.06	0.20	1.25	0.87	0.31	1.37	0.95
L.	1.01	0.21	1.22	0.84	0.23	1.24	0.86
M.N.	1.07	0.49	1.56	1.08	0.39	1.47	1.02
O.	1.00	0.43	1.43	0.99	0.03	1.03	0.71
P.	1.01	0.38	1.39	0.96	0.01	1.03	0.71
Q.	1.01	0.51	1.53	1.06	0.04	1.06	0.73
R.S.T.U.	1.01	0.41	1.43	0.99	0.10	1.11	0.77

Source: Data processed (2025)

At the same time, this will encourage an increase in the use of output from other sectors as inputs (indirect backward linkage) of Rp (million). The condition will also increase the final demand for 1 output using other sector outputs as inputs, then directly or indirectly will encourage the development of the upstream industry by Rp (million). Based on table 3, it shows that all sectors are able to show positive results that are able to encourage the added value of the number of output additions from direct linkage, as is the case in the electricity and gas sector of 1.58 million, indicating that every increase of 1 output will increase the sector's output demand by 1.59 million as an intermediate input in the production process.

This will simultaneously trigger an increase in demand for output from other sectors as intermediate inputs to indirect backward linkages of 0.41 million, so that there will be an increase in final demand for 1 direct and indirect output will encourage the development of the upstream industry by 2 million. As well as there is an increase in demand as an intermediate input in the future indirect linkage of 0.67 million, so that the increase in final demand for direct and indirect output will encourage the development of downstream industries by 2.26 million. The impact of the linkage on the electricity and gas sectors is dominated by downstream industries compared to upstream industries in these sectors ($2.00 < 2.26$).

Table 4 shows the classification in the 4 quadrants using the results of the coefficients on backward linkage and forward linkage. The impact of the spread (Backward Linkage) shows that the coefficient is more than (>1) that the sector can attract the development of its upstream industry and stimulate the growth of other sectors when there is an increase in output, namely there are 8 sectors

including: **C.** manufacturing, **D.** electricity and gas, **F.** construction, **H.** transportation and storage, **I.** accommodation and food service activities, **J.** information and communication, **M.N.** business activities and **Q.** human health and social work activities. Meanwhile, a coefficient of less than (<1) indicates that the sector is not able to attract the development of its upstream industry and contributes to the growth of other sectors when there is an increase in output, namely there are 9 other sectors out of a total of 17 sectors.

The Degree of Sensitivity (Forward Linkage) shows that the coefficient is more than (>1) that the sector can attract the development of its downstream industry and stimulate the growth of other sectors when there is an increase in output, namely there are 6 sectors including: **C.** manufacturing, **D.** electricity and gas, **G.** wholesale and retail trade; repair of motor vehicles and motorcycles, **H.** transportation and storage, **J.** information and communication and **M.N.** business activities. Meanwhile, a coefficient of less than (<1) indicates that the sector is not able to attract the development of its downstream industry and contributes to the growth of other sectors when there is an increase in output, namely there are 11 other sectors out of a total of 17 sectors.

Table 4 Quadrant Backward Linkage and Forward Linkage

Backward Linkage / Forward Linkage	**Backward Linkage > 1**	**Backward Linkage < 1**
Forward Linkage > 1	**Leading Sectors** **C.** Manufacturing; **D.** Electricity and Gas; **H.** Transportation and Storage; **J.** Information and Communication; **M.N.** Business Activities.	**Mainstay Sectors** **F.** Construction; **I.** Accommodation and Food Service Activities; **Q.** Human Health and Social Work Activities.
Forward Linkage < 1	**Potenstial Sectors** **G.** Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles.	**Lagging Sectors** **A.** Agriculture, Forestry and Fishing; **B.** Mining and Quarrying; **E.** Water Supply, Sewerage, Waste Management and Remediation Activities; **K.** Financial and Insurance Activities; **L.** Real Estate Activities; **O.** Public Administration and Defence; Compulsory Social Security; **P.** Education; **R.S.T.U.** Other Services Activities.

Source: Data processed (2025)

The results of the 4 quadrants classification in table 4 show that the electricity and gas sector is in the category of leading sectors where the activities that occur in the electricity and gas industry are able to attract the growth of other industrial outputs as intermediate inputs and final demand in fulfilling the supply chain of the industry from upstream to downstream. The relationship of industry in the production process is not only influenced by the use of output from other industries as inputs in the production process of that sector by the market, but also influenced by government intervention by implementing policies to influence changes in output, namely by way of investment. One of the programs from the East Java government is investment in the electricity sector with the aim of improving infrastructure and equitable distribution of electricity. Investment in the electricity sector in East Java will have an impact including changes in output, income and labor placement in other sectors in East Java. However, in this study using Interregional Input-Output (IRIO) analysis, it will also look at the impact of changes that occur in all other provinces in Indonesia.

4.2 Analysis of the Impact of Investment in the Electricity and Gas Sector

The analysis of the impact of investment in this study was carried out to see the extent of changes in output, income and labor in the economic sectors of East Java Province as well as other sectors and regions in Indonesia after the investment shock of Rp 3.71 trillion in the electricity and gas sector of East Java Province, with the hope that it will increase the high growth potential and affect improvements in other sectors (Endey et al., 2022).

The Impact of Electricity Investment on Output

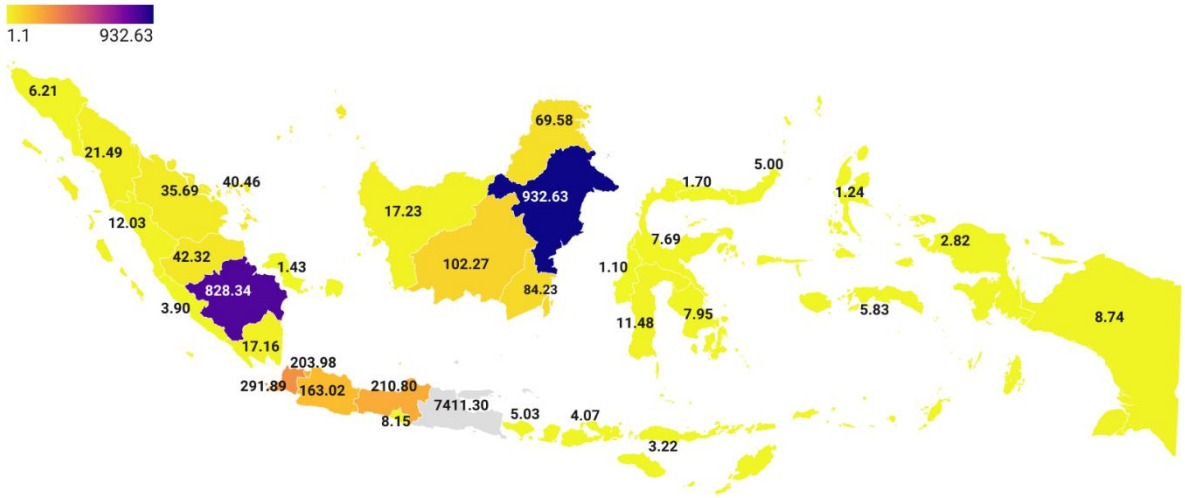
The impact of East Java's electricity investment policy is able to increase output in the province according to the table 5 showed the most significant increase occurred in the Electricity and Gas sector of 5.8 trillion or 79.48% as the sector that received the largest impact in East Java Province. Furthermore, the impact of the increase also occurred in the Mining and Quarrying sector of 714 billion or 9.64%, the Wholesale and Retail Trade sector; Repair of Motor Vehicles and Motorcycles amounted to 224 billion or 3.03%. Meanwhile, Water Supply, Sewerage, Waste Management and Remediation Activities were the sectors least affected by the electricity investment policy of 1.14 billion or 0.02%.

Table 5 Impact of Electricity Investment on Output (Billions)

Sectors	Output	(%)
A. Agriculture, Forestry and Fishing	14.22	0.19
B. Mining and Quarrying	714.78	9.64
C. Manufacturing	148.14	2.00
D. Electricity and Gas	5.890.82	79.48
E. Water Supply, Sewerage, Waste Management and Remediation Activities	1.14	0.02
F. Construction	2.98	0.04
G. Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	224.53	3.03
H. Transportation and Storage	88.33	1.19
I. Accommodation and Food Service Activities	20.04	0.27
J. Information and Communication	53.23	0.72
K. Financial and Insurance Activities	138.66	1.87
L. Real Estate Activities	16.55	0.22
M.N. Business Activities	74.97	1.01
O. Public Administration and Defence; Compulsory Social Security	5.22	0.07
P. Education	1.28	0.02
Q. Human Health and Social Work Activities	2.61	0.04
R.S.T.U. Other Services Activities	13.81	0.19
Total	**7411.30**	**100**

Source: Data processed (2025)

Based on the results of figure 2, the map shows that the impact of investment policies on the electricity sector in East Java will provide an increase in output in all sectors of the East Java region and other regions. The existence of East Java's electricity investment policy has a major impact on increasing output by 7.4 trillion or 70.12% of total national output. The distribution of the impact of electricity investment on output was spread across East Kalimantan of 932 billion or 8.82%, South Sumatra of 828 billion or 7.84%. The majority of the impact was on the island of Java, namely Banten by 291 billion or 2.76%, Central Java by 210 billion or 1.99%, DKI Jakarta by 203 billion or 1.93% and West Java by 163 billion or 1.54%.



Source: Data processed (2025)

Figure 2 Distribution of the Impact of Electricity Investment on Output

The Impact of Electricity Investment on Income

The impact of East Java's electricity investment policy is able to increase income in the province according to the table 6 showed the most significant increase occurred in the electricity and gas sector of 281 billion or 39.95% as the sector that received the largest impact in East Java Province. Furthermore, the impact of the increase also occurred in the Mining and Quarrying sector of 213 billion or 30.36%, the Wholesale and Retail Trade sector; Repair of Motor Vehicles and Motorcycles amounted to 77 billion or 10.89%. Meanwhile, Water Supply, Sewerage, Waste Management and Remediation Activities are the sectors that are least affected by the electricity investment policy of 22 million billion or 0.03%.

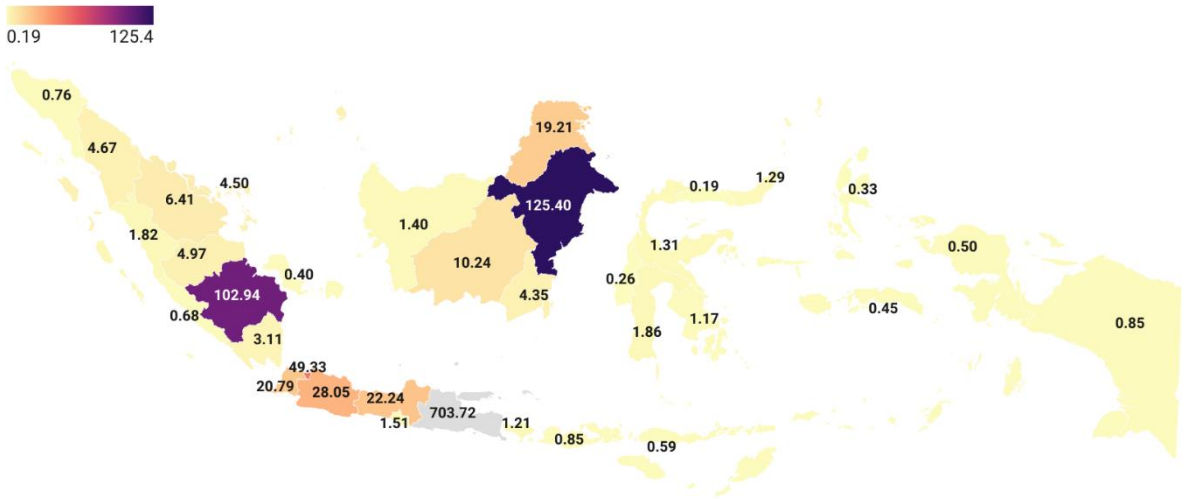
Table 6 Impact of Electricity Investment on Income (Billions)

Sectors	Income	(%)
A. Agriculture, Forestry and Fishing	5.31	0.75
B. Mining and Quarrying	213.65	30.36
C. Manufacturing	21.77	3.09
D. Electricity and Gas	281.13	39.95
E. Water Supply, Sewerage, Waste Management and Remediation Activities	0.22	0.03
F. Construction	0.72	0.10
G. Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	76.61	10.89
H. Transportation and Storage	16.74	2.38
I. Accommodation and Food Service Activities	5.90	0.84
J. Information and Communication	14.12	2.01
K. Financial and Insurance Activities	39.33	5.59
L. Real Estate Activities	0.90	0.13
M.N. Business Activities	18.64	2.65
O. Public Administration and Defence; Compulsory Social Security	2.59	0.37
P. Education	0.59	0.08
Q. Human Health and Social Work Activities	0.66	0.09
R.S.T.U. Other Services Activities	4.83	0.69

Sectors	Income	(%)
Total	**703.72**	**100**

Source: Data processed (2025)

Based on the results of figure 4, the map shows that the impact of investment policies on the electricity sector in East Java will provide an increase in income in all sectors of the East Java region and other regions. The existence of East Java's electricity investment policy has a major impact on increasing revenue by 703 billion or 62.42% of total national income. The distribution of the impact of electricity investment on income was spread across East Kalimantan by 125 billion or 11.12%, South Sumatra by 102 billion or 9.13%. The majority of the impact was on the island of Java, namely DKI Jakarta by 49 billion or 4.38%, West Java by 28 billion or 2.49%, Central Java by 22 billion or 1.97% and Banten by 20 billion or 1.84%.



Source: Data processed (2025)

Figure 4 Distribution of the Impact of Electricity Investment on Income

The Impact of Electricity Investment on the Workforce

The impact of East Java's electricity investment policy is able to increase the absorption of labor in the province according to the table 7 showed the most significant increase occurred in the electricity and gas sector by 300 people or 33.16% as the sector that received the largest impact in East Java Province. Furthermore, the impact of the increase also occurred in the Wholesale and Retail Trade sector; Repair of Motor Vehicles and Motorcycles was 259 people or 28.66% and Mining and Quarrying was 74 people or 8.13%, while Construction and Real Estate Activities were the sectors least affected by the electricity investment policy of 1 person.

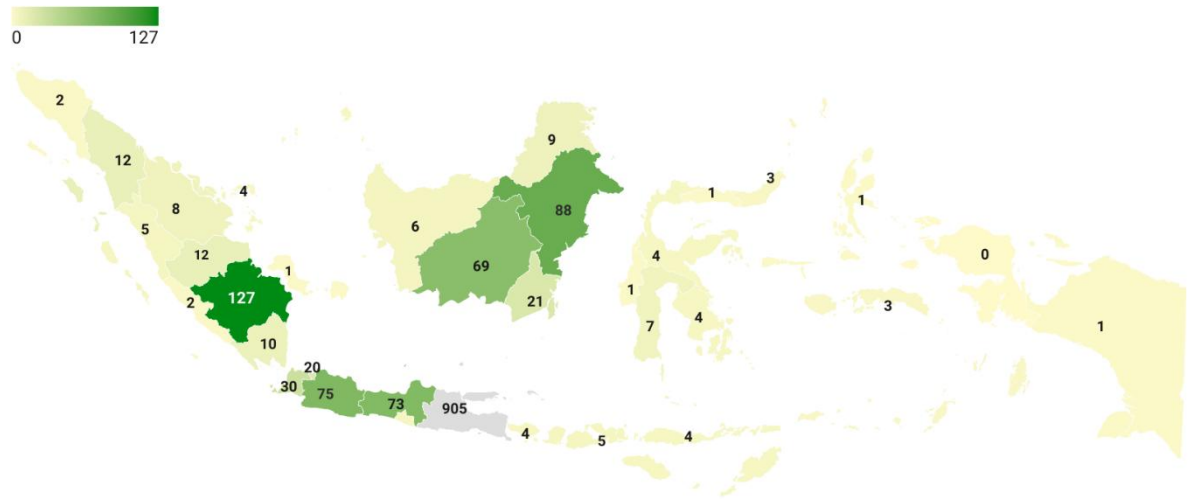
Table 7 Impact of Electricity Investment on Labor (people)

Sectors	Labor	(%)
A. Agriculture, Forestry and Fishing	38	4.15
B. Mining and Quarrying	74	8.13
C. Manufacturing	42	4.69
D. Electricity and Gas	300	33.16
E. Water Supply, Sewerage, Waste Management and Remediation Activities	4	0.41
F. Construction	1	0.13
G. Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	259	28.66
H. Transportation and Storage	42	4.62

Sectors	Labor	(%)
I. Accommodation and Food Service Activities	25	2.73
J. Information and Communication	5	0.56
K. Financial and Insurance Activities	42	4.62
L. Real Estate Activities	1	0.09
M.N. Business Activities	46	5.08
O. Public Administration and Defence; Compulsory Social Security	4	0.44
P. Education	2	0.21
Q. Human Health and Social Work Activities	2	0.23
R.S.T.U. Other Services Activities	19	2.08
Total	**905**	**100**

Source: Data processed (2025)

Based on the results of figure 5, the map shows that the impact of investment policies on the electricity sector in East Java will provide an increase in labor in all sectors of the East Java region and other regions. The existence of East Java's electricity investment policy has a great impact on the increase in the workforce of 905 people or 59.30% of the total increase in the national workforce. The distribution of the impact of electricity investment on the workforce was spread across South Sumatra as many as 127 people or 8.36%, East Kalimantan as many as 88 people or 5.75% and Central Kalimantan as many as 69 people or 4.55%. The majority of the impact was on the island of Java, namely DKI Jakarta as many as 20 people or 1.28%, West Java as many as 75 people or 4.90%, Central Java as many as 73 people or 4.81% and Banten as many as 30 people or 1.98%.



Source: Data processed (2025)

Figure 5 Distribution of the Impact of Electricity Investment on Labor

5. CONCLUSION AND SUGGESTION

CONCLUSION

The electricity sector is one of the leading sectors based on the coefficient of backward and forward linkage both directly and indirectly, so this indicates that the electricity sector is able to increase the development of its upstream and downstream industries both in terms of production processes and outputs. Electricity investment in East Java not only has an impact on the sector itself, but also contributes to other sectors, namely the Mining and Quarrying sector in increasing output and income and in the Wholesale and Retail Trade sector; Repair of Motor Vehicles and Motorcycles on increasing the workforce. However, the impact of the benefits of the electricity investment policy can not only be

enjoyed by the electricity sector itself and other sectors in East Java, but will also affect the sector and the total in 34 provinces in Indonesia, including East Kalimantan, South Sumatra and the majority are in the province of Java.

SUGGESTION

This study provides recommendations, especially for policy-making in improving the quality of electricity procurement infrastructure and equitable distribution of electricity in 38 districts/cities of East Java by increasing domestic investment and foreign investment in the electricity sector, both domestic and foreign investment. With the hope that increased investment in the electricity sector will contribute more to other sectors and because the electricity sector is included in the category of leading sectors, it will have an impact on the supply chain between industries either as intermediate inputs or as final demand for other industries. In addition to strengthening the local economy of East Java, it can be done by developing interaction with other provinces that are able to provide an increase in the multiplier effect of the regions that are still dominated by provinces on the island of Java, this is supported by closer and more efficient access integration. As well as attention to the interaction of economic activities also outside the island of Java, including East Kalimantan and South Sulawesi.

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Appendix

Table 2 IRIO Indonesia Domestic Transactions on the Basis of Producer Prices According to 34 Provinces and 17 Sectors

Interregional Input-Output (IRIO) Indonesia				Intermediate Demand									Final Demand					Total Final Demand	Export	Total Output
				1. Aceh Province				-	34. Papua Province				1. Aceh Province							
				Industry				-	Industry				Domestic Final Demand							
				1	2	-	17	-	1	2	-	17	a	b	c	d	e			
Intermediate Input	1. Aceh Province	Industry	1	Z^{rr}_{11}	Z^{rr}_{12}	-	$Z^{rr}_{1\,17}$	-	Z^{rs}_{11}	Z^{rs}_{12}	-	$Z^{rs}_{1\,17}$	Y^{p}_{1a}	Y^{p}_{1b}	Y^{p}_{1c}	Y^{p}_{1d}	Y^{p}_{1e}	F^{g}_{1}	X^{k}_{1}	O^{m}_{1}
			2	Z^{rr}_{21}	Z^{rr}_{22}	-	$Z^{rr}_{2\,17}$	-	Z^{rs}_{21}	Z^{rs}_{22}	-	$Z^{rs}_{2\,17}$	Y^{p}_{2a}	Y^{p}_{2b}	Y^{p}_{2c}	Y^{p}_{2d}	Y^{p}_{2e}	F^{g}_{2}	X^{k}_{2}	O^{m}_{2}
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			17	$Z^{rr}_{17\,1}$	$Z^{rr}_{17\,2}$	-	$Z^{rr}_{17\,17}$	-	$Z^{rs}_{17\,1}$	$Z^{rs}_{17\,2}$	-	$Z^{rs}_{17\,17}$	Y^{p}_{17a}	Y^{p}_{17b}	Y^{p}_{17c}	Y^{p}_{17d}	Y^{p}_{17e}	F^{g}_{17}	X^{k}_{17}	O^{m}_{17}
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	34. Papua Province	Industry	1	Z^{sr}_{11}	Z^{sr}_{12}	-	$Z^{sr}_{1\,17}$	-	Z^{ss}_{11}	Z^{ss}_{12}	-	$Z^{ss}_{1\,17}$	Y^{q}_{1a}	Y^{q}_{1b}	Y^{q}_{1c}	Y^{q}_{1d}	Y^{q}_{1e}	F^{h}_{1}	X^{j}_{1}	O^{n}_{1}
			2	Z^{sr}_{21}	Z^{sr}_{22}	-	$Z^{sr}_{2\,17}$	-	Z^{ss}_{21}	Z^{ss}_{22}	-	$Z^{ss}_{2\,17}$	Y^{q}_{2a}	Y^{q}_{2b}	Y^{q}_{2b}	Y^{q}_{2b}	Y^{q}_{2b}	F^{h}_{2}	X^{j}_{2}	O^{n}_{2}
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			17	$Z^{sr}_{17\,1}$	$Z^{sr}_{17\,2}$	-	$Z^{sr}_{17\,17}$	-	$Z^{ss}_{17\,1}$	$Z^{ss}_{17\,2}$	-	$Z^{ss}_{17\,17}$	Y^{q}_{17a}	Y^{q}_{17b}	Y^{q}_{17c}	Y^{q}_{17d}	Y^{q}_{17e}	F^{h}_{17}	X^{j}_{17}	O^{n}_{17}
Total Intermediate Input				J^{g}_{1}	J^{g}_{2}	-	J^{g}_{17}	-	J^{h}_{1}	J^{h}_{2}	-	J^{h}_{17}								
Import				M^{k}_{1}	M^{k}_{2}	-	M^{k}_{17}	-	M^{j}_{1}	M^{j}_{2}	-	M^{j}_{17}								
Total Input				I^{m}_{1}	I^{m}_{2}	-	I^{m}_{17}	-	I^{n}_{1}	I^{n}_{2}	-	I^{n}_{17}								

Note*: There are 2 regions of Aceh and Papua where there are 3 sectors in the Aceh and Papua regions. Notation Z^{rr} and Z^{ss} is an intraregional linkage (intra-regional trade), while Z^{sr} and Z^{rs} is an interregional flow (inter-regional trade) (Miller & Blair, 2009), a. Household Consumption, b. Consumption of Non-Profit Institutions Serving Households, c. Government Consumption, d. Gross Fixed Capital Formation, e. Inventory Change.