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Contribution From East Java as the Main Gate for the New National Capital City Project (IKN)

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Abstract: *This research aims to analyze logistics and trade performance in East Java 2024 as a revitalization of Tanjung Perak Port as a hub port with the National Capital City (IKN) development. IKN development, which will continue until 2045, should be captured as a potential for economic growth and development to be used as a source of new economic growth that is resilient and sustainable. This research uses the Analytical Hierarchy Process to see the performance of Tanjung Perak Port with other large ports on the island of Java. It carries out IRIO computation analysis to see the interlinkage of sectors that have the potential to be worked on by East Java Province for IKN development. Research that uses 3 criteria, namely port performance, port productivity, and the multiplier effect with 12 variables, obtains varied results but considers that Tanjung Perak Port is the best port as a port hub with South Kalimantan Province, East Java Province, and can also encourage the Agriculture, Forestry and Fishery; Processing industry; and Wholesale and Retail Trade; Car and Motorbike Repair to provide maximum impact on the regional economy.*

Keywords: *Analytical hierarchy process; IRIO Computation; Tanjung Perak port hub*

1. Introduction

East Java Province is a region that is closely related to the Majapahit Kingdom which succeeded in managing the aglomaritime sector, even when Majapahit reached its peak it managed to control a very large area and was able to use trade and shipping as economic and diplomatic instruments. Majapahit's glory was driven by the strategic position of the Port and a strong maritime trade network so that it could act as a regional and global distribution center for various commodities (Widyawati, 2017). The success of the Majapahit Kingdom with the motto "Jalesveva Jayamahe" which means "in the waters, we triumph" must be a guide, handle, and guideline to restore the glory of East Java Province in particular and the Archipelago, in general, to direct economic growth strategies back towards the ocean.

However, East Java Province also experiences various problems regarding disparities in economic growth between districts/cities such as those that occur in big cities such as Surabaya, Malang, and main coastal areas such as Gresik and Sidoarjo. Spatially, the development pattern that occurs in East Java also adds complexity that increases inequality because it is only centered on the main cities and industrial areas so the focus of investment only occurs in these areas. These various problems are reflected in the economic growth of East Java, which only grew by 4.81 percent (YoY) below the national average of 5.11 percent (YoY) in Q-1 of 2024 (BPS Provinsi Jawa Timur, 2024). The sectors that support the economic growth of East Java Province are still only focused on transportation and trade,

the service sector but are still overshadowed by infrastructure development and improving market access in the agricultural and tourism sectors.

In terms of inflation indicators, East Java Province is a province that has succeeded in controlling inflation, namely 2.47 percent (YoY) which is still within the target of 2.5 ± 1 set by (Bank Indonesia, 2024). The Human Development Index in East Java Province has also experienced solid and consistent growth where in 2023 it was 74.65 which measures the basic components of quality of life. A very strategic position, namely connecting the West Indonesia region with Central and East Indonesia, as well as the potential for qualified economic and social capital indicators, East Java Province should be able to grow acceleratively, driven by transportation, warehousing, and trade activities which will be complementary to the growth of other sectors.

2. Literature Review & Hypotheses Development

2.1. Blue Economy

The blue economy will be an important strategy that will advance sustainable economic growth, especially in coastal areas and other island countries (Sapanli et al., 2020), but in its development, the blue economy sector is developing in several sectors such as fisheries management, marine tourism, and even to the utilization of renewable energy stored in the ocean (World Bank, 2018). Its future development requires modern and effective shipping infrastructure (UNCTAD, 2020), renewable energy development (European Commission, 2020), sustainable fisheries management (FAO, 2021), protection of marine ecosystems to maritime risk and security management (Ocean Panel, 2020).

2.2. Regional Economy

Regional economic development requires a strategy that weighs local competitive advantages integrated with the interests and dynamics of the global economy (Arniati & Nurfadillah, 2022). In supporting this integration, infrastructure, education, and innovation are needed that encourage connectivity between regions and also human capital investment (World Bank, 2020), to support regional economic growth by optimizing the use of public resources (Bartik et al., 2019; Shera, 2024). Cross-border collaboration in the development of a knowledge-based economy can spur innovation and regional economic growth (Costinot & Rodr´ıguez, 2018; Rowe et al., 2021).

2.3. Infrastructure Economy

In the context of economics, infrastructure development is considered to be one of the important foundations in supporting the economy. Infrastructure is intended to provide services in important sectors such as industry, agriculture, and domestic, and international trade. In particular, one of the infrastructures that is closely related to industrial activities in the economy is infrastructure in the energy sector. One of the most common forms of energy that has a major impact on the economy is electrical energy. In the economy, generally, the growth in demand for electrical energy tends to be higher than economic growth (NCERT, 2015).

Research by Henckel & McKibbin (2017) explains that well-designed infrastructure can support economies of scale, reduce trade costs, and ultimately lead to a country's industrial specialization. From an economic perspective, infrastructure offers two things, namely increased productivity and technology transfer. Although it offers the benefits needed by almost all countries high-income countries and low-income countries have different focuses on infrastructure development. Low-income countries tend to focus infrastructure development on increasing access to energy, clean water, and basic transportation directly related to citizens' basic needs (Henckel & McKibbin, 2017). Therefore, this research needs to be carried out by looking at economic infrastructure to encourage the optimization of development in the National Capital City.

3. Data and Research Method

3.1. Data and Data Source

This research is a mixed methods research that uses the Analytical Hierarch Process after going through the Pre-Processing stage to measure port performance and productivity before determining which port can become the main gate for development in IKN. After that, this research also uses IRIO Table analysis to look at scenarios that measure ports on the island of Java that have optimal productivity to support the optimization of infrastructure development in IKN. The data used in this research comes from several sources such as Pelindo, BPS, and Google Earth to see traffic in the waters of Java Island and Kalimantan Island during the IKN development period in the pre-processing stage.

Table 1. Data and Data Source

NO	Data	Sumber Data
1.	Length of Wharf	Indonesian Port III (2023)
2.	The volume of Ship Flow and Tonnage	Indonesian Port III (2023)
3.	The volume of Goods Flow	Indonesian Port III (2023)
4.	Traffic Capacity	Indonesian Port III (2023)
5.	Cargo Ship Capacity	Indonesian Port III (2023)
6.	Transaction Value	BPS RI (2023)
7.	Distance	Google Earth
8.	Workforce Absorbed	Indonesian Port III (2023)
9.	Economic Impact Around the Port	Google Earth
10.	Sectoral Added Value	BPS RI (2023)
11.	Community Productivity	BPS RI (2023)
12.	Indirect Economic Value	Google Earth
13.	Inter-Regional Input-Output Table	BPS RI (2016)

Source: Various Source (processed)

3.2. Data Analysis Models and Techniques

3.2.1. Pre – Processing

Ship capacity measurement is a measurement that looks at displacement tonnage, lightweight tonnage, deadweight tonnage, gross tonnage, and net tonnage (Oregon Department of Transportation, 2005). Ship capacity is measured by carrying out the following calculations:

$$\text{C goods} = \frac{Mgoods}{Unit}$$

Description:
C goods : Capacity of goods ship (tons/vessel)
M : Number of Loads (tons)
Unit : Number of ships (unit)

Analysis used to measure the quality of container terminal services. Performance measurement of service time of goods terminal is measured through the following stages (Oregon Department of Transportation, 2005):

$$\text{St} = \frac{Cgoods}{(KL\ x\ n)} \text{ x } (1 + 0{,}20)$$

Description:
St : Service time (hour/day)
C barang : Cargo ship capacity (ton/ship)
KL : Ship capacity (ton/hour)
n : Number of work gangs (work units)

BOR measurement compares dock usage time and available time (pier ready for operation) in a certain time expressed as a percentage. Berth Occupancy Ratio (BOR) value results can be calculated using the following steps:

$$BOR = \frac{Vs\ x\ St}{(Tex\ n)} \text{ x } 100\%$$

Description:
BOR : Berth Occupancy Ratio (%)
Vs : Number of ships anchored (Unit/Year)
St : Service time (Hour/Day)
n : Number of moorings
Te : Effective time (Number of days in a year)

Bert Throughput is used as a measurement of the goods terminal that must measure the length of the dock for one ship (L1): L1 = L0a + 10% L0a

After measuring the length of the dock for one ship, the calculation is carried out to measure the BTP as follows:

$$BTP = \frac{H.BOR.J.G.P}{L1}$$

Description:
BTP : Berth Throughput (ton/m/year)
H : Number of working days in one year
BOR : Berth Occupancy Ratio (%)
J : Working hours per day
G : Number of gangs at one time
P : Productivity (ton/hour)
L1 : Length of dock for one ship
Loa : Length of ship (m)

Pier Length Measurement, It can be measured through data on ship arrival flows with goods flows in the following equation:

$$L = \frac{K_D}{BTP}$$

Description:
L : Length of the pier for one ship
K_D : Pier Capacity
BTP : Berth Throughput (ton/m/year)

3.2.2. Analytical Hierarchy Process Analysis

In this study, there are several indicators used in conducting the analysis using the Analytical Hierarchy Process (AHP), namely First, port performance indicators measured through service time, berth occupancy ratio, berth throughput, pier capacity, and pier length. Second, port productivity indicators are measured through the volume of visitor flow, volume of goods flow, highway capacity, transaction value, and distance. Third, multiplier impact indicators are measured through absorbed labor, economic impact around the port, sectoral added value, community productivity, and indirect economic value.

Table 2: AHP Criteria Ranking and Weighting

Indicator	Ranking	Value	Score
Port Performance			
Service Time	4	7	0,058
Berth Occupancy Ratio	1	10	0,083
Bert Throughput	2	9	0,074
Dock Capacity	3	8	0,066
Length of Pier	5	7	0,058
Port Productivity			
Volume of Visits	4	7	0,058
Volume of Goods	2	9	0,074
Traffic Capacity Data	5	6	0,050
Transaction Value	1	10	0,083
Distance to South Kalimantan Port	3	8	0,066
Multiplier Effect			
Labour Impact	3	8	0,066
Economic Impact Around the Port	4	7	0,058
Sectoral Value Added	1	10	0,083
Productivity	2	9	0,074
Indirect Economic Value	5	6	0,050

The three indicators are arranged according to the study of Kurniadi & Prasetya (2015) which will be analyzed using the AHP non-questionnaire method using a scale of 1-5 and forming a systematic decision analysis and decision-making in the context of the supply of

raw materials for the Indonesian Capital City (IKN) from 3 main ports on Java Island as the main gate with South Kalimantan (Ramdani, 2024).

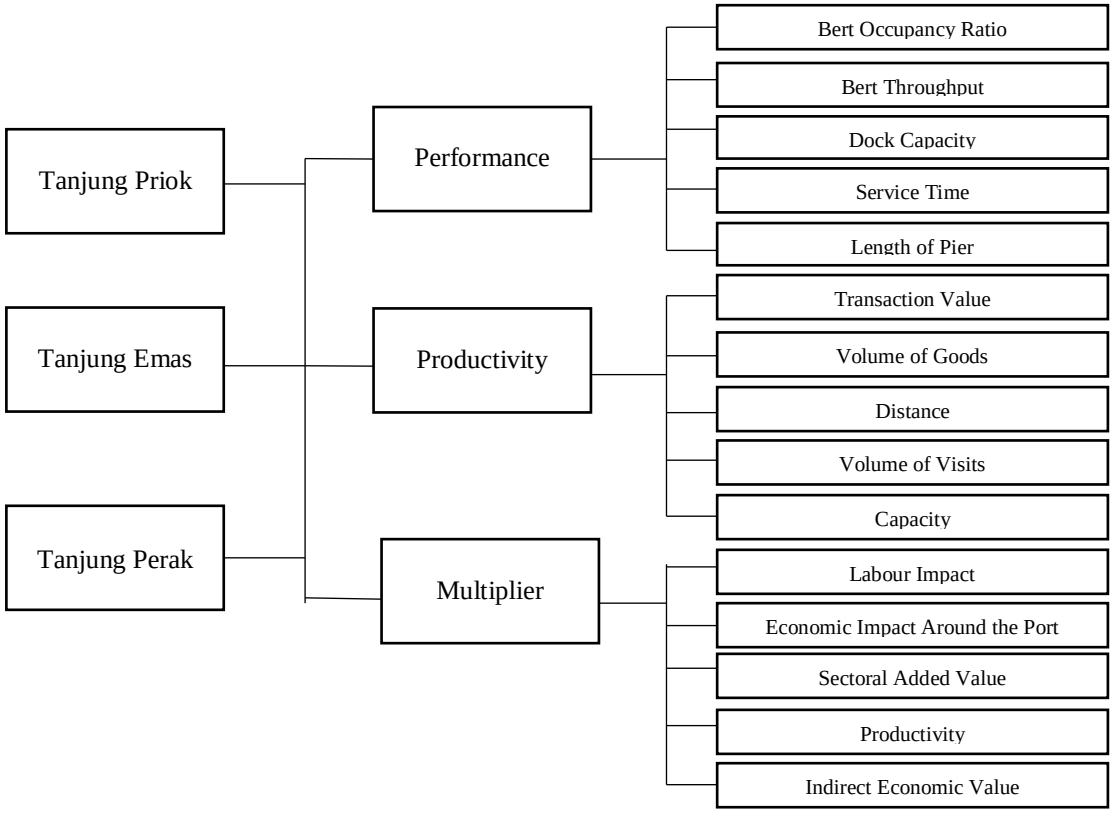

Figure 1. Conceptual Thinking Framework of AHP Analysis

After obtaining the score from the AHP analysis results, to see the sectoral performance of the economy between Java and Kalimantan, an IRIO calculation was carried out using the 2016 Inter-Regional Input-Output (IRIO) Table published by BPS RI (2016) based on the island to map the potential sectors driven by East Java Province, with the assumption that until 2045, the development of the IKN still requires input from Java.

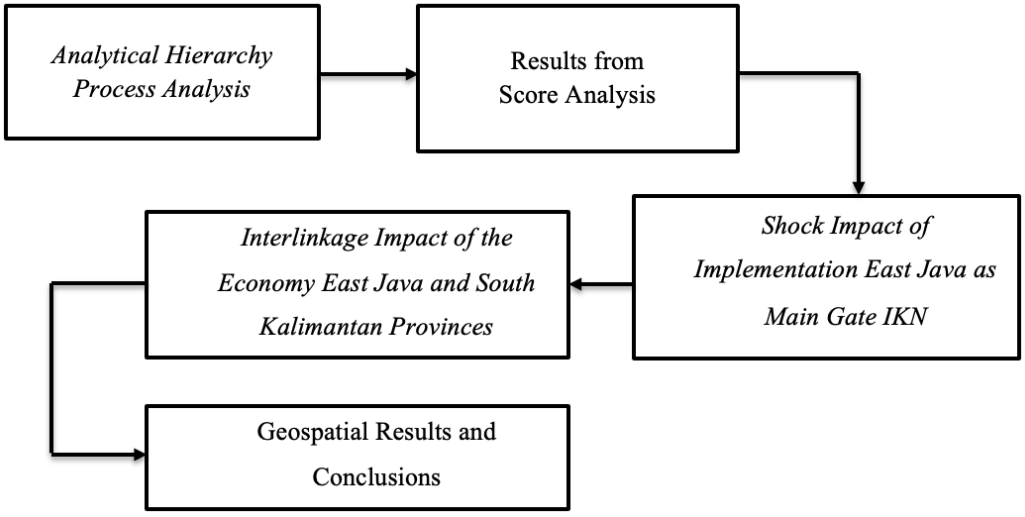

Figure 2. Research Flow Chart

Based on the results of the AHP analysis and IRIO computation that have been made, it will produce research results and conclusions that are applied based in the form of a port that can be encouraged by the Government as the main gate with the IKN and also for the East Java Government regarding the economic sector that can be encouraged to supply raw materials in the development of the IKN.

3.2.3. IRIO Computational Analysis

In this study, IRIO computation will refer to the publications Badan Pusat Statistik (2016) and Hewings (2013). The general form of the IRIO table can be formulated in four quadrants (Hewings, 2013).

Table 3. General Form of IRIO Table

	Industry 1	**Industry *i***	**Industry *N***	**Final Demand**	**Total**
Industry 1	·	Quadrant 1	·	Quadrant 2	x_1
Industry i	·	Z_{ij}	·	y_{iq}	x_i
Industry N	·	·	·	·	x_N
Import	·	Quadrant 3	·	Quadrant 4	M
Value Added	·	V_{pj}	·	y_{pq}	Y
Total	x_1	x_j	x_N	C I G E	

Description: Z_{ij}: direct linkage of industry i to industry j; y_{iq} : final linkage of industry i to final demand q; x_i: total output/input of industry i; V_{pj} : primary input purchased by industry j; y_{pq} : input purchased by final demand q; C: household consumption; I: investment; G: government spending; E: export; M: import; Y: value-added market price (Hewings, 2013).

4. Result

4.1. AHP Analysis Results

In the results of the pre-processing analysis and AHP calculations, the results obtained varied on the variables of port performance, port productivity, and also the multiplier impact of the main gate for the transfer of the IKN. Based on the results of the port performance analysis, it was found that Tanjung Emas Port is the most effective and efficient port with a score of 1.10 compared to Tanjung Priok Port and Tanjung Perak Port. Port productivity, which also influences the determination of the main gate for the IKN, obtained different results, namely that Tanjung Priok Port is the most productive and dense port with a score of 1.08 compared to Tanjung Emas Port and Tanjung Perak Port. Different results were obtained on the multiplier effect variable that Tanjung Perak Port is a port that has a direct and indirect impact on the local economy with a score of 1.15 compared to Tanjung Priok Port and Tanjung Emas Port (Muchdie et al., 2020).

After conducting a comprehensive analysis, Tanjung Perak Port is the most feasible port to become a port hub with the main gate of the IKN through South Kalimantan Province, with the note that it can improve aspects of port performance and port productivity to provide optimization of the economic impact for East Java Province with a score of 3.28 (Widyawati, 2017). Based on the results of the AHP analysis, the following results were obtained:

Table 4. AHP Analysis Results

Indicator	Tanjung Priok Port		Tanjung Emas Port		Tanjung Perak Port	
	Value	Score	Value	Score	Value	Score
Port Performance						
Service Time	4	0,23	3	0,17	4	0,23
Berth Occupancy Ratio	3	0,25	4	0,33	3	0,25
Bert Throughput	3	0,22	3	0,22	3	0,22
Dock Capacity	3	0,20	3	0,20	3	0,20
Length of Pier	3	0,17	3	0,17	3	0,17
TOTAL	16	1,07	13	1,10	16	1,07
Port Productivity						
Volume of Visits	3	0,17	3	0,17	3	0,17
Volume of Goods	4	0,30	3	0,22	3	0,22
Traffic Capacity Data	3	0,15	3	0,15	3	0,15
Transaction Value	4	0,33	3	0,25	3	0,25
Distance to South Kalimantan Port	2	0,13	3	0,20	4	0,26
TOTAL	16	1,08	15	0,99	16	1,06
Multiplier Effect						
Labour Impact	3	0,20	3	0,20	3	0,20
Economic Impact Around the Port	3	0,17	3	0,17	3	0,17
Sectoral Value Added	3	0,25	3	0,25	4	0,33
Productivity	3	0,22	3	0,22	4	0,30
Indirect Economic Value	3	0,15	3	0,15	3	0,15
TOTAL	15	0,99	15	0,99	17	1,15
TOTAL AGREGAT	**47**	**3,15**	**46**	**3,08**	**49**	**3,28**

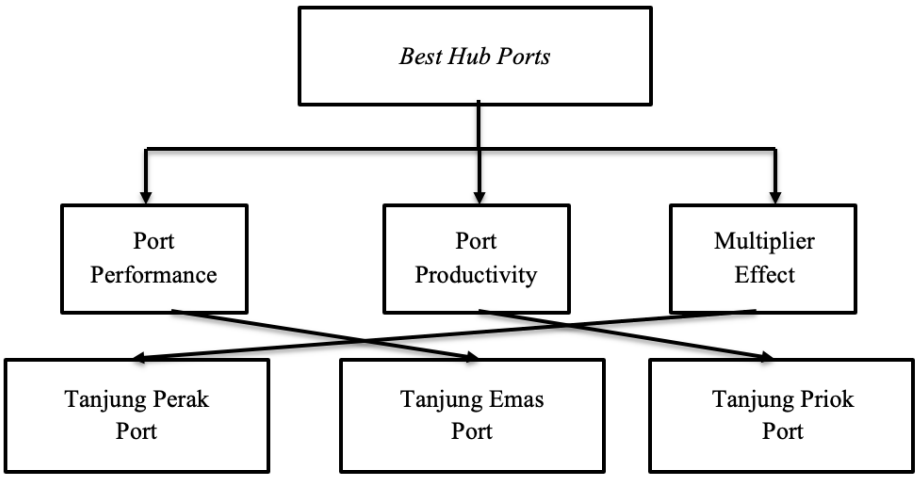

Figure 3: Conceptual Results Hierarchy

4.2. IRIO Computational Analysis Results

Based on the results of the IRIO Computation analysis, the following results were obtained:

Table 5. IRIO Computation Results (million rupiah)

Sector	Java	Borneo
Agriculture, Forestry, and Fisheries	14.935,06	210,65
Mining and Quarrying	5.227,11	597,14
Processing Industry	47.210,60	555,91
Electricity and Gas Supply	3.362,81	25,522
Water Supply, Waste Management, Waste and Recycling	118,44	0,95
Construction	9.809,59	22,58
Wholesale and Retail Trade; Car and Motorcycle Repair	24.787,83	104,31
Transportation and Warehousing	7.514,00	159,10
Provision of Accommodation and Food and Beverages	6.381,69	13,46
Sector		
Information and Communication	7.691,18	38,93
Financial Services and Insurance	5.683,86	46,19
Real Estate	2.925,26	5,23
Corporate Services	3.840,36	18,58
Government Administration, Defense and Compulsory Social Security	2.343,42	3,99
Education Services	2.573,79	0,72
Health Services and Social Activities	849,54	1,18
Other Services	1.916,96	4,87

Based on the output multiplier results, it was found that there is a potential increase of IDR 147,171,500,000 for Java and IDR 1,809,324,940 for Kalimantan due to the construction of the IKN in 2024. The analysis results also stated that the Manufacturing Industry sector is the leading sector of the economy in Java and the mining and excavation sector is the leading sector in Kalimantan due to the construction of the IKN. However, when viewed, the impact of the output multiplier on the economy of both Java and Kalimantan due to the construction of the IKN is still very small, this is because the impact of the construction of the IKN is a project that will be felt in the future. Therefore, East Java Province needs to focus on developing the Agriculture, Forestry, and Fisheries sectors; Manufacturing Industry; and Wholesale and Retail Trade; Car and Motorcycle Repair which are priority sectors for revitalizing logistics and trade in East Java Province (Dhingra et al., 2017).

5. Conclusion and Policy Recommendation

Based on the results of the Analytical Hierarchy Process (AHP) analysis, it can be concluded that Tanjung Perak Port is the best port that can be used as a port hub for the supply of development and basic needs of the Indonesian Capital City (IKN) with South Kalimantan Province. Still, it is necessary to improve the port performance variables that are lagging,

superior to Tanjung Emas Port with a score of 1.10, and the port productivity variable that is inferior to Tanjung Priok Port with a score of 1.08 (Rowe et al., 2017).

The impact of IKN development is still weak on output is IDR 147,171,500,000 for Java Island and IDR 1,809,324,940 for Kalimantan Island, but East Java Province must not lose growth momentum by focusing on working on the Agriculture, Forestry, and Fisheries sectors; Processing Industry; and Wholesale and Retail Trade; Car and Motorcycle Repair which are priority sectors for revitalizing logistics and trade in East Java Province. The Indonesia Government needs to re-evaluate (revitalize and evaluate) the paradigm of the development of the Indonesian Capital City by involving leading sectors in 38 Provinces so as not to create new economic disparities due to the development of the IKN and provide a multiplier effect for all Provinces and make Tanjung Perak Port a port-hub supply for the development of the IKN for efficiency and effectiveness of development.

The government also needs to invite the private sector (KPBU) which is more viable and feasible in the development of the IKN so that it can provide an optimal socio-economic impact on the relocation of the capital city because the economic impact due to the development of the IKN is still low by providing measurable incentives and attracting investors. The East Java Provincial Government can invite the South Kalimantan Province to collaborate as the main gate in the development of the IKN by improving and providing infrastructure, especially to accommodate logistics and trade routes to get an optimal impact from the development of the IKN (Muchdie, 2017; Muchdie & Kusmawan, 2018).

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