Projection Analysis of Small Ports on Sulawesi Island, Indonesia: A Case Study of Tanjung Silopo Port

Muhammad Arsyad[a,1*], Muh.Yusril Syam[b,2], Ainun Chandra Puspa Ningrum[c,3]

[123]Politeknik Batulicin, Jl.Malewa Raya, Batulicin, Kalimantan Selatan, Indonesia
[1*]arsyad@politeknikbatulicin.ac.id, [2]yusril@politeknikbatulicin.ac.id,[3]ainunchandrapuspaningrum@gmail.com

[*]corresponding e-mail

This is an open access article under the terms of the **CC-BY-NC** license

ABSTRACT

For the Sulawesi region's public transit and goods delivery, Tanjung Silopo Port serves as a vital maritime transportation hub. As the area continues to grow, data-driven planning is required to anticipate future needs. This study was conducted to project the development of Tanjung Silopo Port and to analyze its strategic direction. The methodology employed was a quantitative descriptive analysis using linear projections based on secondary data from the Port Authority, combined with a qualitative assessment of challenges and opportunities. The projection results indicate a steady upward trend in passenger volume and freight flow. However, further analysis revealed that the port's current service capacity is not yet sufficient to optimally accommodate this projected growth. The study concludes that the development of Tanjung Silopo Port should prioritize increasing loading and unloading capacity, expanding passenger facilities, and improving road access to the port. These policy recommendations are expected to accelerate local economic development and strengthen inter-island connectivity across Sulawesi.

Keywords: port projection, tanjung silipo port, maritime transportation, development strategy

A. Introduction

Sulawesi is an island located in the center of the Unitary State of Indonesia. Its geographical characteristics mean that the island is separated by the ocean from surrounding islands, while land-based logistics transportation in the Mamuju area remains very costly (Wardiningsih & Mokodompit, 2025). As a result, traders prefer sea routes for the delivery of goods. In West Sulawesi, most logistics entering the province originate from outside the region and even from other islands (Akhirman, 2020). Conversely, the province's products are also distributed to other provinces, islands, and even international markets.

One of West Sulawesi's leading export commodities is animal and vegetable fats and oils, which make a dominant contribution to the province's export value. For instance, in January 2025, West Sulawesi's exports reached US$48.83 million, with fats and oils contributing approximately 88.97% of the total. In March 2025, this commodity accounted for about 84.51% of the province's export value, amounting to US$46.10 million (BPS Sulbar, 2025). These figures highlight the critical role of Tanjung Silopo Port in supporting both regional trade and international market access.

Ports function as interfaces, gateways, industrial entities, and meeting points for various modes of transportation (Tri Mulyono, 2019). They play an essential and irreplaceable role in supporting regional development and progress, encompassing economic, social,

E ISSN 2442-3149 | P ISSN 2355-472X
https://journal.itltrisakti.ac.id/index.php/jmtranslog

and inter-regional connectivity aspects (Agustin & Hariyani, 2023). Consequently, port development is a strategic choice for regions seeking to advance their territorial growth (Raman & Bau, 2023). Nevertheless, the relatively high costs of port construction and operation present significant challenges, particularly in relation to physical infrastructure such as docks, basins, and breakwaters, as well as routine operational expenses, including dredging, facility maintenance, loading and unloading equipment, labor provision, energy consumption, shipping security and safety systems, and administrative management. These conditions necessitate efficient and sustainable port management to ensure the support of logistics activities and regional growth (Djamaluddin, 2023). Therefore, comprehensive analysis is required prior to construction, and subsequent development studies are essential to facilitate the flow of goods (Hidayat et al., 2024).

Tanjung Silopo Port is located in West Sulawesi Province, Polewali Mandar Regency, Binuang District, Mirring Village. Geographically, the port lies at 02°28′25″ S and 119°07′30″ E. Its designated land area (DLKRR) covers 3,333 hectares of land and 9,999 hectares of water, while the broader land area (DLKP) encompasses 30,000 hectares under the property rights of the Polman Regional Government. The port operates 24 hours per day, five days a week. The shipping channel has a width of 15 meters and a length of 2.16 miles, with depths ranging from 10 to 20 meters and a minimum depth of 6 meters (Perhubungan Laut, 2017; UPP Tanjung Silopo, 2017). The existence of Tanjung Silopo Port is expected to contribute significantly to the GDP of Polewali Mandar Regency and facilitate entrepreneurs in shipping goods (Basri et al., 2019).

However, the low level of visits from ships docked at the port is still a major obstacle, even though the infrastructure and supporting facilities have been adequately available. This condition indicates a mismatch between port capacity and market attractiveness, which has implications for operational inefficiencies and potential economic losses (Suprayitno et al., 2024). This leads to losses (FIKP-UH, 2020). Therefore, this study has strategic significance to re-evaluate the relevance of the hinterland area established at the initial planning stage to actual conditions, as well as to identify the main economic factors that influence vessel visits at the port. Furthermore, this study prepares projections for the development of the port in the next 5, 10, 15, 20, to 25 years as the basis for more adaptive and sustainable development planning. The results of the research are expected to be a policy reference in determining the direction of port management and investment so that the development carried out is in line with the potential of the region and the actual market needs (Djamaluddin, 2023).

B. Methods

The method used in the research is a quantitative descriptive approach supported by qualitative analysis, including the variables of the research analyzed and data collection techniques through secondary data from port authorities and related agencies and sampling techniques, as well as data analysis methods in the form of linear projections to predict the development of the port in a certain period of time. In addition, this section also presents other relevant supporting information to ensure the traceability of the method and the clarity of the research analysis framework (Rachmad et al., 2024).

This research was conducted at Tanjung Silopo Port, which is located on Jl. Dusun, Mirring Village, Mirring District, Polewali Mandar Regency, West Sulawesi Province. Geographically, this port is located at the coordinates of 02°28'25" South Latitude and 119°07'30" East Longitude and is located in strategic waterways that connect the West Sulawesi region with the South Sulawesi region and the eastern part of Indonesia.

Tanjung Silopo Port is a regional feeder port that functions as the main distribution

node for logistics and sea transportation for Polewali Mandar Regency and the surrounding hinterland area. The main activities of the port include loading and unloading services, especially basic necessities, building materials, and agricultural and plantation products, as well as commercial ship and pioneer ship services that serve inter-regional transportation. In addition, this port also supports passenger mobility on a limited scale.

The facilities available at Tanjung Silopo Port include a docking dock, a cargo stacking field, a simple warehouse, shipping channels, and supporting facilities for port safety and administration. In terms of management, the Port of Tanjung Silopo is operated by the Port Operating Unit (UPP) under the authority of the Ministry of Transportation of the Republic of Indonesia, through the Directorate General of Sea Transportation, which is responsible for aspects of safety, service, and port operational arrangements.

The initial data collection in this study was carried out in April 2022 and then continued in the period from March 2023 to July 2023, including port operational data and ship and freight flows, as well as the condition of facilities and services. With these characteristics, the Port of Tanjung Silopo is a relevant research object to be studied in the context of projecting long-term port development and planning in the West Sulawesi region.

The data in this study was obtained from the results of secondary data collection. Secondary data collection was obtained from related agencies by taking literature and reports such as the Report on Tanjung Silopo Port Operation Activities, Central Statistics Agency of West Sulawesi & Polman Regional Government, West Sulawesi Bapedda & Polman Regional Government, and the Port Master Plan in 2016.

This study is qualitative descriptive research that aims to describe the actual condition and projection of the development of Tanjung Silopo Port based on the processed secondary data. The analysis methods used include the gravity method, time series analysis with the compound interest formula, and multiple linear regression. (Rachmad et al., 2024)

The gravity method is used to analyze the spatial interaction between ports and hinterland–foreland regions based on economic potential and mileage, thus reflecting the level of accessibility and attractiveness of ports in regional logistics networks. Time series analysis (Widodo et al., 2021) is used to estimate the average growth rate of goods, ships, and passenger flows as the basis for medium- and long-term projections (Hoiriyah & Ekawati, 2024; Putri, 2024). Furthermore, multiple linear regression was used to measure the influence of demographic, economic, and accessibility variables on port performance (Hoiriyah & Ekawati, 2024; Putri, 2024). The combination of these three methods is expected to produce a comprehensive projection and be able to identify the main factors driving the development of Tanjung Silopo Port (Adiwibowo & Karyana, 2022).

Gravity Method (Fitriani & Nusriah, 2025)

$$I_{1-2} = k\frac{P_1 * P_2}{(J_{1-2})^2} \qquad (2.1)$$

Description:
$I1_{-2}$: The Interaction Strength of Regions 1 and 2
K : Empirical Constant; 1
P1: Total Population of Region 1
P2 : Total Population of Region 2
Day 1-2: Absolute Distance Between Regions 1 and 2

Population Growth Rate (Desviandini & Karyana, 2022)

$$r = \left(\frac{P_t}{P_1}\right) - 1 \qquad (2.2)$$

E ISSN 2442-3149 | P ISSN 2355-472X
https://journal.itltrisakti.ac.id/index.php/jmtranslog

Where:
Pt : Last Year's Population Projection
Pl : Population Numbers of the Latest Year
R : Annual Growth Rate

GDP Growth Rate (Yunianto, 2021)

$$r = \frac{PDBrt - (PDBt - 1)}{PDBt} - 1x100\% \quad (2.4)$$

Where:
R : GDP Growth Rate
Pdbrt : The Amount of GDP for the Next Year
Pdrbt : Total GDP of the Previous Year

Growth Projections (Amalia et al., 2022)

Based on the average population growth rate, the projected population for the next 25 years can be calculated with the formula:

$$P_n = P_t(1 + r)n \quad (2.3)$$

Where:
Pn : Projected Population for the Coming Year
Pt : Last Year's Population
R : Growth Rate
N : Difference of Projected Year with Current Year

$$V_n = (1 + r)^n V_0 \quad (2.5)$$

Linear Regression Method (Lusiana et al., 2021; Sa'adah et al., 2023)

$$y = a_0 + a_1x_1 + a_2x_2 + \cdots .. + a_mx_m \quad (2.6)$$

C. Results and Discussion

1. Hinterland Area Analysis

In determining the analysis area, the author took 3 ports that became a comparison; this was done to avoid unilateral claims in adjacent areas. Using equation 2.1 and the accessibility assumption (Garcia-Alonso et al., 2019). Therefore, the comparative port and city district are obtained, which will be analyzed as Table 1.

The strong value of the interaction will be corrected by the classification graph method, where the port with the smallest interaction value will be given a correlation value of 1 and the highest 4. The results of the correlation value are accumulated and weighted so that the correlation value is obtained as in Table 2.

Using correlation value table 2 and table 3, hinterland regionscan be classified. Based on the results of the correction in the area that becomes the hinterland of Tanjung Silopo Port as shown in Table 4.

The correlation results will be classified into 6 categories where the correlation value is perfect, very strong, or strong, which is selected as the hinterland area. For the perfect correlation area, it means that this is a hinterland area , while for a very strong and strong correlation, it is a tightly knitted hinterland area where it is estimated that around 30-50% of the shipment is through Tanjung Silopo.

2. Economic Factors

Based on the results of *the hinterland* analysis, various economic factors can be identified that affect the performance and level of ship visits at Tanjung Silopo Port. These factors in principle reflect the dynamics of economic activities in port supporting areas that play a role in shaping the demand for port services. However, in this study, the scope of analysis is limited to two main variables, namely the size of the population and the Gross Regional Domestic Product (GDP).

Table 1 Name of Regency/City and Distance to Port

Districts	Mileage (KM)			
	P. Makassar	P. Tanjung Silopo	P. Interest	Fr. Pare-Pare
Pare-Pare	147,7	78	330,8	1,47
Barru	102,2	138,5	391,4	59,4
Sidrap	219,3	117,8	358	67,4
Stuttgart	182,3	51,9	304,5	29,7
Tana Toraja	310	182,8	355	162,3
North Toraja	335,6	199,2	451,8	184
Squirt	371,3	213,7	552,9	220,3
Südü	340	239,8	492,4	189,8
Luwu North	525,3	371,9	624,5	375,1
East Luwu	550,4	397	452,2	400,2
Enrekang	222,6	90,3	379,8	111,9
Wajo	188,1	135,9	377,2	74,6
Bone	131,4	200,9	452,7	146,7
Soppeng	159,9	143,7	396	90,9
Polewali Mandar	275,6	45,6	228,3	94
Stuart	378	68,4	185,2	147,1
Mamasa	338,2	99,3	125,5	186,8
Stuttgart	421	186,5	70,1	265,1
Towards the Middle	599,9	369,8	70,9	401
Install Wood	683,6	453,6	197,1	527,3

Source: Results of tabulation of BSP data in South Sulawesi and West Sulawesi

By using equation 2.1, if the value of K=1 and distance values are known as Table 1 and the values of P1 and P2 of Table 2, we can find out the strength of the interaction of each region with the existing ports as follows.

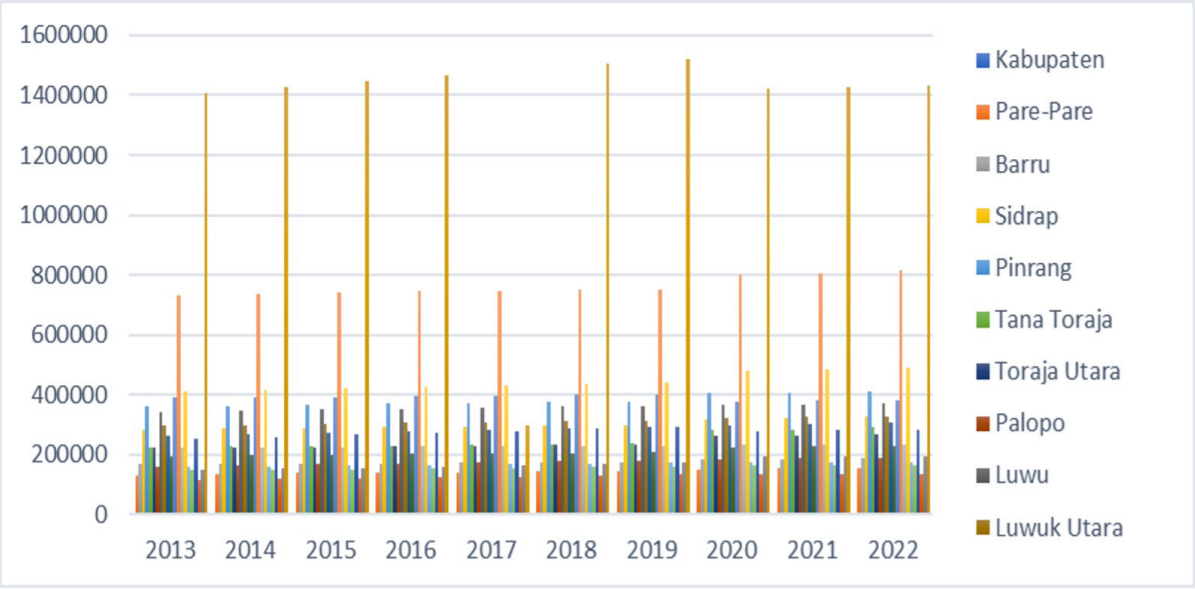

Figure 1. Number of Population of City Regencies in 2013-2014
(Source of tabulation results of BPS data in West Sulawesi and South Sulawesi).

E ISSN 2442-3149 | P ISSN 2355-472X
https://journal.itltrisakti.ac.id/index.php/jmtranslog

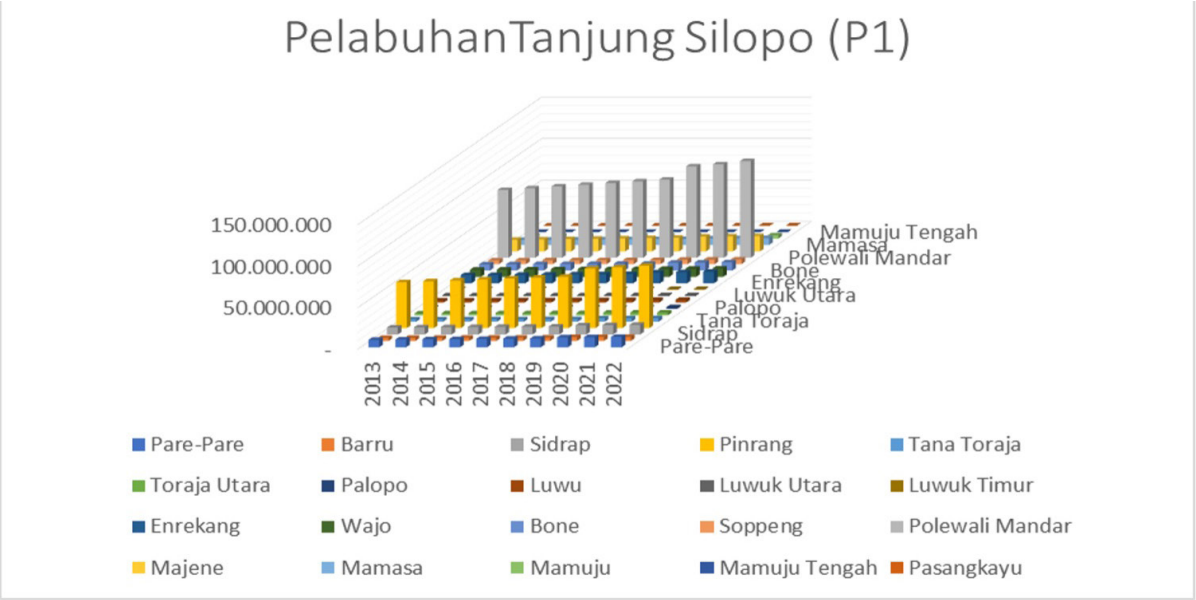

Figure 2. The value of the port's interaction with the existing city districts

Description:
P1: Tanjung Silopo Port,
P2: Pare-Pare Port,
P3: Port of Makassar,
P4: Port of Mamuju

Table 2 Interaction Correlation Values

Districts	Interaction Correlation Values				Districts	Interaction Correlation Values			
	P1	P2	P3	P4		P1	P2	P3	P4
Pare-Pare*	0,8	1	0,5	0,3	Wajo	0,5	0,8	0,9	0,3
Barru	0,5	0,8	1	0,3	Bone*	0,8	0,5	1	0,3
Sidrap	0,9	0,9	0,6	0,3	Soppeng *	0,8	0,5	1	0,3
Pinrang*	0,8	0,9	0,6	0,3	Polewali Mandar	1	0,5	0,7	0,3
Tana Toraja *	0,7	0,5	1	0,3	Stuart	1	0,4	0,7	0,5
Toraja Utara *	0,9	0,5	0,9	0,3	Mamasa	1	0,3	0,5	0,7
Palopo *	0,9	0,5	0,9	0,3	Stuttgart	0,7	0,3	0,5	1
Luwu *	0,8	0,5	1	0,3	Towards the	0,5	0,3	0,7	0,9
Luwuk Utara *	0,8	0,5	1	0,3	Middle	0,5	0,3	0,7	1
Luwuk Timur *	0,8	0,3	1	0,5	Install Wood	0,5	0,8	1	0,3
Enrekang	1	0,5	0,7	0,4	São Paulo				

The selection of the two variables is based on the consideration that the population represents the potential demand for logistics and consumption, while the GDP reflects the level of economic activity and production capacity of the *hinterland* region, which is directly related to the flow of goods and *ship calls*. With these variables, the economic influence on the development of Tanjung Silopo Port can be calculated, although it does

Table 3 Correlation Test Value Table

0	There is no correlation between two variables.
>0 – 0,25	Correlation is very weak.
>0,25 – 0,5	Sufficient Correlation
>0,5 – 0,75	Strong Correlation
>0,75 – 0,99	Very strong correlation
1	Perfect Correlation

Table 4 Region Hinterland Tanjung Silopo Port

Port Master Plan	**Analysis Results**	
Polewali Mandar	Polewali Mandar	Pare-Pare**
Masasa	Masasa	Luwu**
Stuart	Stuart	North Luwu**
Stuttgart	Enrekang	East Luwu**
	Sidenreng Rappang*	Bone **
	North Toraja*	Soppeng**
	Sigh*	Stuttgart
	S**	North Toraja

Description: * Very Strong 0.9 **Very Strong 0.85 Very Strong, 0.75

Table 5 Population Growth.

Year	**Population (Soul)**	**Growth (%)**
2013	3.298.720	-
2014	3.335.997	1,13%
2015	3.370.641	1,04%
2016	3.409.659	1,16%
2017	3.444.267	1,02%
2018	3.478.096	0,98%
2019	3.511.802	0,97%
2020	3.712.476	5,71%
2021	3.747.841	0,95%
2022	3.792.015	1,18%
Average Annual Growth Rate		1,57%

Source: Results of BPS South Sulawesi-West Sulawesi Data Tabulation

not include all economic factors that may have an effect.

Total Population
Table 5 Population Growth
Table 6 Projected Population of City Regencies in 2023-2046.

PDRB
Table 7 Hinterland Regional GDP Growth
Table 8 Hinterland Regional GDP Projection

3. Port Projection

Table 9 There are 4 columns, namely the Year column, *Call* ships, multiple management projections, and growth. *Call* Kapal Shows the number of ship visits (in units) recorded

E ISSN 2442-3149 | P ISSN 2355-472X
https://journal.itltrisakti.ac.id/index.php/jmtranslog

Table 6 Projected Population of City Regencies in 2023-2046.

Year	Population (Soul)	Population Projection (Soul)			Growth (%)
		Trend Analysis	Growth	Moderate	
2013	3.298.720	-	-	-	-
2017	3.444.267	-	-	-	1,02%
2022	3.792.015	-	-	-	1,18%
2027	-	3.698.444	3.973.541	3.835.993	1,57%
2032	-	4.008.481	4.295.599	4.152.040	1,57%
2037	-	4.344.507	4.643.761	4.494.134	1,57%
2042	-	4.708.702	5.020.141	4.864.421	1,57%
2047	-	5.103.427	5.427.027	5.265.227	1,57%

Table 7 Hinterland Regional GDP Growth

Year	PDRB (Billion)	Growth (%)
2013	80.846	
2014	93.262	15,36%
2015	103.941	11,45%
2016	112.841	8,56%
2017	124.221	10,09%
2018	137.212	10,46%
2019	147.796	7,71%
2020	150.434	1,79%
2021	162.785	8,21%
2022	181.181	11,30%
Average Annual Growth Rate		9,44%

Source: BPS data of South Sulawesi Province

Table 8 Hinterland Regional GDP Projection

Year	Data	Projected GDP (Billions)			Growth (%)
		Growth	Linier	Moderate	
2013	80.846	-	-	-	-
2017	124.221	-	-	-	10%
2022	181.181	181.181	181.181	181.181	11%
2027	-	284.388	229.627	257.008	9%
2032	-	446.387	282.352	364.369	9%
	-	700.665	335.077	517.871	9%
2037					
2042	-	1.099.790	387.802	743.796	9%
2047	-	1.726.271	440.527	.083.399	9%

each year. This data provides an overview of activity at the port in the specified years. Multiple regression projections show the projected number of ship visits based on multiple regression analysis. It is a statistical model used to forecast future trends based on historical data. The projection figures for the coming years start from 2027 to 2047. The

Table 9 Forecast of Ship Visit Traffic at Tanjung Silopo Port

Year	Ship Call Data (Unit)	Multiple Regression Projections (Unit)	Growth (%)
2013	-	-	-
2017	356	-	-
2022	81	81	-45,64%
2027	-	314	-1,59%
2032	-	382	8,64%
2037	-	699	14,97%
2042	-	1429	15,44%
2047	-	2838	14,26%

Table 10 Forecast of Ship Visit Traffic by Type of Cruise at Tanjung Silopo Port

Year	Call Ship by Cruise (Unit)			Growth (%)		
	Samudra	Nusantara	Rakyat	Samudra	Nusantara	Rakyat
2013	-	-	-	-	-	-
2017	7	28	324	-	-	-
2022	0	19	62	-100,00%	-57,78%	-39,81%
2027	105	33	164	2,84%	3,65%	-6,87%
2032	117	34	191	3,09%	3,45%	12,50%
2037	132	34	451	3,44%	3,32%	21,00%
2042	152	35	1103	3,91%	3,22%	18,62%
2047	182	35	2397	4,50%	3,16%	15,83%

Growth column (%) displays the percentage growth or decrease in the number of ship visits compared to the previous year. A negative value indicates a decrease, while a positive value indicates growth.

In 2013 and 2017 there was no data available. In 2022, there were 81 ship visits, which represents a decrease of 45.64% compared to the previous year, which may have data not listed. The projections for 2027 show a significant increase to 314 visits, albeit with negative growth (-1.59%) from the previous year. Furthermore, the projections show a positive growth trend in the following years: 382 visits in 2032, 699 in 2037, 1429 in 2042, and 2838 in 2047, with each growth increasing every decade. These projections indicate that the port is expected to experience substantial growth in the number of vessel visits in the next two decades, reflecting the potential for increased port capacity and activity.

The ship call projection table shows the dynamics of port operational performance based on the type of shipping (ocean, archipelago, and people) in the period 2013–2047. In the initial phase (2017–2022), there was a significant decrease in shipping activities, marked by a contraction in the number of ship calls in all segments, reflecting operational limitations and the influence of external factors. Starting in 2027, port activity enters a phase of recovery and growth, with ocean and archipelago shipping showing a steady upward trend with an average growth rate of around 3–4 percent per period, indicating an increasing port connectivity in regional and national transportation networks.

In the medium to long term, projections show a significant shift in the function of the port. This can be seen from the growth of ship calls dominated by people's shipping with a very significant increase until 2047, while

E ISSN 2442-3149 | P ISSN 2355-472X
https://journal.itltrisakti.ac.id/index.php/jmtranslog

ocean and archipelago shipping grew more moderately and sustainably. This condition emphasizes the need for a port development policy direction that focuses on increasing capacity and service efficiency, especially to serve the volume of small-medium scale ship visits, through adjusting the capacity of docks, port pools, and supporting operational systems to ensure smooth ship flows and the sustainability of port functions.

The table presents a comparison between the results of the projected unloading/loading flow (B/M) based on the latest data analysis with the projections listed in the 2016 Port Master Plan (RIP). In the early period, there was a significant difference between the two projections. The 2016 RIP projected a very high surge in freight flows in 2017 with growth of 447.7 percent, while the results of the research projections showed a larger value of freight flows in absolute terms, but reflected more realistic operational conditions. Furthermore, in 2022, the latest projection results show a sharp decrease in unloading/loading flows of up to 276 tons, experiencing a contraction of 96.18 percent, which is not accommodated in the 2016 RIP projection, which actually estimates positive growth. This difference indicates that the 2016 RIP assumptions are not yet fully able to capture the actual dynamics and operational disruptions that occur in the development of the port.

Entering the medium- and long-term projection period, the results of the latest analysis show a pattern of recovery and growth of unloading/loading flows that increase gradually and sustainably until they reach around 668 thousand tons in 2047, with a growth rate that tends to be moderate. In contrast, the 2016 RIP sets a relatively high and constant growth rate until 2042 and does not provide a follow-up projection until 2047. This condition shows that the results of this research projection provide a more adaptive and contextual picture of the current market conditions and hinterland regions. Therefore, the comparison of the two projections emphasizes the importance of updating port planning to be more in line with actual developments and can be used as a basis for policy adjustments and stages of development of Tanjung Silopo Port in the future.

Table 12 presents a comparison between the results of the Tanjung Silopo Port passenger traffic projection obtained through the multiple linear regression model and the projections listed in the Port Master Plan (RIP) in 2016. In the early period, especially in 2013, the number of passengers projected was still relatively comparable to the projected RIP. However, in 2017 there was a very significant decrease in the results of the research projection, namely to 789 people, or a contraction of 92.09 percent. This decline is

Table 11 Traffic Forecast for Loading and Unloading Goods at Tanjung Silopo Port

Year	Projection Results		RIP 2016 Projections	
	B/M (Ton)	Growth (%)	B/M (Ton)	Growth (%)
2013	-	-	2783	-
2017	36.414	-	15.243	447,7%
2022	276	-96,18%	17.057	11,9%
2027	338.849	2,68%	19.094	11,9%
2032	389.645	2,95%	21.379	12,0%
2037	455.510	3,34%	23.943	12,0%
2042	544.245	3,83%	26.821	12,0%
2047	668.034	4,43%	-	-

Table 12 Passenger Traffic Forecast at Tanjung Silopo Port

	Projection Results		RIP 2016 Projections	
Year	**Reg. Berganda (Soul)**	**Growth (%)**	**Projections (Soul)**	**Growth (%)**
2013	8.980	-	8,98	
2017	789	-92,09%	9,302	3,6%
2022	1.041	-104200,00%	10,283	10,5%
2027	69.050	4,95%	10,542	2,5%
2032	88.572	5,24%	10,809	2,5%
2037	115.648	5,66%	11,082	2,5%
2042	154.486	6,17%	-	-
2047	211.681	6,72%	-	-

not reflected in the 2016 RIP projection, which actually shows a positive growth of 3.6 percent. Similar conditions were also seen in 2022, where the results of the research projections still showed a low passenger rate compared to the RIP projection. This discrepancy indicates that the 2016 RIP has not fully considered the actual dynamics of passenger traffic as well as external factors that affect people's mobility in that period.

Entering the medium and long-term projection period, which is from 2027 to 2047, the results of the research analysis show a very significant pattern of recovery and increase in passenger traffic. The number of passengers is projected to increase gradually from around 69,050 people in 2027 to more than 211,000 people in 2047, with a growth rate that continues to increase from 4.95 percent to 6.72 percent. On the other hand, the 2016 RIP projection shows relatively low and stable growth, at around 2.5 percent until 2037, and does not provide a follow-up projection after 2042. This difference shows that the results of this study's projections are more responsive to the potential growth of population mobility and the development of the hinterland region in the future. Thus, this table emphasizes the need to update passenger traffic planning at Tanjung Silopo Port to be more in line with actual potential and long-term projections, especially in planning the capacity of passenger terminal facilities and other supporting services.

The Tanjung Silopo Port Planning Master Plan shows 4 city districts that are the port's hinterland area. However, the results of the recalculation show indications of the expansion of the hinterland area of Tanjung Silopo Port, where this port serves as an alternative option after the Port of Parepare and the Port of Makassar. Logistics interaction with the North Toraja, Sidenreng Rappang, and Palopo City areas was identified as quite strong, which is reflected in the intensity of goods movement and economic linkages between regions, thus confirming Tanjung Silopo's strategic role in supporting the regional distribution system as a buffer port. In addition, the results of the projected accumulation of ship *calls* showed an increase in ship visits of around 14% per year with 3.85% of ocean shipping ships, 3.45% of archipelago shipping ships, and 16.82% of people's shipping ships.

The realization of annual growth can fluctuate, experiencing higher increases in certain years and slowing down in others. However, in the projection analysis, the growth is assumed to be gradual and consistent on average according to the time series approach with the compound interest formula, so that the growth figures shown represent medium- and long-term trends, not stagnant or linear increases every year. Meanwhile, embarkation

E ISSN 2442-3149 | P ISSN 2355-472X
https://journal.itltrisakti.ac.id/index.php/jmtranslog

increased by 6.72% per year and debarkation by 0%. The value of 0% on debarkation is due to the length of time the ship docks at the port of Majene so that passengers choose to get off at the port and continue by land.

D. Conclusion

The Port of Tanjung Silipo is a strategic asset with bright growth prospects but critical operations. The growth projection of ship visits is positive, but this is influenced by traditional ships, while national and ocean shipping ships are constant and tend to be negative. Until 2047, it shows an average growth of around 14 percent per year, with the largest contribution coming from people's shipping, followed by ocean and archipelago shipping, which grew more moderately and stably. The application of gravity methods, time series analysis with compound interest formulas, and multiple linear regression provides a comprehensive picture of the port's growth pattern and its driving factors. The Port of Tanjung Silipo in the future will not only meet the increasing demand but will also be a catalyst for economic growth and equitable development in the West Sulawesi Province. Therefore, the results of this research can be the basis for planning and policymaking for the development of Tanjung Silopo Port, especially in adjusting infrastructure capacity and improving service efficiency to accommodate the increase in ship visits in the future.

E. References

Adiwibowo, F., & Karyana, Y. (2022). Proyeksi penduduk Indonesia dengan menggunakan metode campuran. *Bandung Conference Series: Statistics*, *2*(1), 1–10.

Agustin, I. W., & Hariyani, S. (2023). *Pengelolaan infrastruktur kota dan wilayah*. Universitas Brawijaya Press.

Akhirman. S. Sos.MM. (2020). *Study Ekonomi Maritim* (1st Ed.). Press Umrah Indonesia,.

Amalia, L. R., Ramdhan, W., & Kifti, W. M. (2022). Penerapan Metode Trend Moment Untuk Memprediksi Jumlah Pertumbuhan Penduduk. *Build. Informatics, Technol. Sci*, *3*(4), 566–573.

Basri, Sahabuddin, C., & Atawuwur, F. G. (2019). Konektifitas Pelabuhan Tanjung Silopo Menuju Lahad Datu dalam Analisis Potensi Dampak Sosial-Ekonomi. *JPCS(Peqguruan : Conference Series)*, *1*(2), 235–240.

BPS sulbar. (2025). *Perkembangan Ekspor dan Impor Provinsi Sulawesi Barat Januari 2025*.

Desviandini, R. A., & Karyana, Y. (2022). *Proyeksi Penduduk Indonesia sampai Tahun 2060 dengan Data Dasar Sensus Penduduk 2020 dan Asumsi Laju Pertumbuhan Penduduk*.

Djamaluddin, A. (2023). *Desain rekayasa: perencanaan pelabuhan*. Unhas Press.

FIKP-UH. (2020). *Studi Kelayakan Pemanfaatan Pelabuhan Tanjung Silopo Kabupaten Polewali Mandar Provinsi Sulawesi Barat*.

Fitriani, F., & Nusriah, A. M. (2025). Kajian Interaksi Wilayah Berbasis Model Gravitasi dan Analisis Ketimpangan Wilayah di Provinsi Sulawesi Tenggara. *Jurnal Peweka Tadulako*, *4*(2), 169–189.

Garcia-Alonso, L., Monios, J., & Vallejo-Pinto, J. Á. (2019). Port competition through hinterland accessibility: the case of Spain. *Maritime Economics & Logistics*, *21*(2), 258–277.

Hidayat, A., Gustang, A., Riska, R. M. R., Prasetyo, B. E., Masgode, M. B., & Gusty, S. (2024). *Revolusi maritim di Indonesia (infrastruktur, investasi dan ekonomi berkelanjutan)*. Tohar Media.

Hoiriyah, H., & Ekawati, F. (2024). Prediksi, Arima, Kapal Prediksi Jumlah Arus

Penumpang Kapal Di Pelabuhan Banjarmasin Menggunakan Metode Arima. *JOISIE (Journal Of Information Systems And Informatics Engineering)*, *8*(2), 285–292.

Lusiana, F. O., Fatma, I., & Windarto, A. P. (2021). Estimasi laju pertumbuhan penduduk menggunakan metode regresi linier berganda pada BPS Simalungun. *Journal of Informatics Management and Information Technology*, *1*(2), 79–84.

Mulyono T. (2019). *Pelabuhan 1* (M. Pd. Prof. Dr. Muchtar Asmawi, Ed.; 1st ed.). UNJ Press.

Perhubungan Laut. (2017). *Kepmen No.KP 432 Tahun 2017 Tentang Rencana Induk Pelabuhan Nasional* .

Putri, C. T. (2024). Forecast Analysis Of The Number Of Marine Passenger Levels Seen From Trend Components Using Time Series Data At Pt. Citrabaru Adinusantara. *Balance: Journal Of Islamic Accounting*, *5*(2), 113–133.

Rachmad, Y. E., Rahman, A., Judijanto, L., Pudjiarti, E. S., Runtunuwu, P. C. H., Lestari, N. E., Wulandari, D., Suhirman, L., Rahmawati, F. A., & Mukhlis, I. R. (2024). *Integrasi metode kuantitatif dan kualitatif: Panduan praktis penelitian campuran*. PT. Green Pustaka Indonesia.

Raman, L., & Bau, S. O. (2023). Sejarah kota pelabuhan Ambon tahun 1602-1942: Dari pelabuhan monopoli menuju kota pelabuhan bebas. *Agastya: Jurnal Sejarah Dan Pembelajarannya*, *13*(1), 47–57.

Sa'adah, A. N., Sunge, A. S., & Zy, A. T. (2023). Prediksi Pertumbuhan Penduduk Dengan Modell Clustering Metode Regresi Linear. *JTT (Jurnal Teknologi Terpadu)*, *11*(2), 270–277.

Suprayitno, D., Kushariyadi, K., Nasution, U. B., Raza, E., Wanda, S. S., & Susilawati, S. (2024). *Buku Ajar Pengantar Manajemen Logistik*. PT. Sonpedia Publishing Indonesia.

UPP Tanjung Silopo. (2017). *Penetapan Rencana Induk Pelabuhan Pengumpan Regional Tanjung Kabupaten Polewali Mandar Silopo* .

Wardiningsih, H., & Mokodompit, E. A. (2025). Logistik Maritim Dan Konektivitas Kawasan Kepulauan Studi Kasus Kabupaten Muna. *Journal of Economic and Business*, *8*(1), 11–16.

Widodo, K. H., Soemardjito, J., Nugroho, D. P., Basalim, S., Agriawan, J. I., Riyadi, I. P., Gunawan, H. E., Kurniawan, D. A., & Harmanto, J. P. (2021). *Perencanaan Terminal Barang dalam Perspektif Logistik*. UGM PRESS.

Yunianto, D. (2021). Analisis pertumbuhan dan kepadatan penduduk terhadap pertumbuhan ekonomi. *Forum Ekonomi*, *23*(4), 688–699. https://doi.org/10.30872/jfor.v23i4.10233

E ISSN 2442-3149 | P ISSN 2355-472X
https://journal.itltrisakti.ac.id/index.php/jmtranslog