Dry Port Financial Feasibility Analysis Model

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(Received October 2, 2023; Revised November 20, 2023; Accepted November 28, 2023)

Abstract

The sea transportation system that is interconnected and provides value for loading and unloading services at the main port of Tanjung Priuk is already over capacity. The establishment of a dry port in Tangerang Regency is expected to facilitate the flow of export and import goods, streamline logistics costs, and solve the dwelling time problem that occurs. The plan to establish the Tangerang Dry Port requires an analysis of the financial feasibility of the investment. The method used to solve this problem is using the Internal Rate of Return (IRR), Net Present Value (NPV), and Payback Period. This feasibility analysis calculation was carried out during pre-construction and after construction so that these calculations can be used as reference material in every decision-making, especially those related to the finances of Tangerang Dry Port. The feasibility analysis calculation uses 3 (three) scenarios, namely for optimistic conditions the IRR value is 28.8%, for moderate conditions the IRR value is 13.6%, and for pessimistic conditions the IRR value is 7.2%. For optimistic conditions the NPV value is 1,716.7 billion, for moderate conditions the NPV value is 697 billion, for optimistic conditions the NPV value is 255 billion. For optimistic conditions the payback period is 6.87 years, for moderate conditions the payback period is 9.26 years, and for pessimistic conditions the payback period is 11.2 years. From the results above, optimistic, and moderate conditions are the most feasible scenarios for developing the Tangerang Dry Port.

Keywords: dry port, feasibility analysis, scenario

How to Cite:

Dewi, N. K., Ishak, R. F., & Ariffien, A. (2024). Dry Port Financial Feasibility Analysis Model. *Journal of Innovation and Community Engagement*, 5(1), 1-17. https://doi.org/10.28932/ice.v5i1.7533

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Introduction

In sea transportation services, one of the main facilities that supports the progress of development throughout the country is land and water areas which are used as places for ships to dock, boarding and unloading passengers and loading and unloading of goods, terminals which are equipped with safety/security service facilities and other port supporting activities as part of the process of moving intra and inter modes of transportation. Ports have an important and strategic role for the growth of industry and trade (Hasmoro et al., 2021). The maritime transportation system that is interconnected and provides added value for loading and unloading services at the main port of Tanjung Priuk is already over capacity. Dry port is a form of land-oriented shipping and loading and unloading services. The development of the dry port business is related to various stakeholders, namely: central and regional governments, sea ports, industrial businesses as upstream logistics for the production of products to be sent for both exports and imports, shipping service businesses, container depot businesses, business actors of sea cruise, trucking, and customs (Khaslavskaya & Roso, 2019). Regarding the dry port business cluster, in the future there is a big opportunity to increase logistics efficiency by reducing waiting times at Tanjung Priok Port, reducing truck queues at the port, accelerating loading and unloading, reducing delayed containers and preventing parking lots from being filled with empty trucks.

According to Jourdan and Hakim (2018), the concept of a port being a dry port is to integrate basic logistics activities with the aim of improving services and commercial financial activities (Jourdan & Hakim, 2018). In the development of dry ports, integrated development is carried out with sea port infrastructure, dry ports will be located inland or on land which can be used to provide the same services as sea ports. Initially the dry port terminology only specifically referred to ports located on land (inland) which provides inspection or custom clearance services for cargo so that this process is no longer carried out at sea ports.

Another context for a dry port is a logistics park that connects one mode of transportation of goods with another. Connecting economic activity centres between regions with domestic industry centres for national and international markets is by providing effective and efficient logistics infrastructure. Dry port is one of the logistics infrastructures that plays a role as a node in the transportation network and supports economic activities (Puspitasari, 2015).

According to Caroles (2022), dry ports in the transportation system provide various services and provide added value such as warehousing, stacking, container maintenance, intermodal integration, and customs clearance (Caroles, 2022). Improving transportation is part of integrated logistics system activities, these activities include information systems, transportation, equipment inventory, service storage, reverse logistics, and packaging with the aim of getting goods in the right quantity, at the right time, according to the expected conditions and with substantial costs appropriately so that it will contribute to profits for logistics service providers (Nugraha et al., 2017).

Future logistics developments require efficiency and agility in the movement of goods from upstream to downstream both in terms of transportation costs, storage costs, and overall costs to make them cheaper. The government nationally has created jobs in the field of logistics and supply chains (2021). The job roles discussed include procurement activities, storage activities, delivery activities, and functional area work which serve as guidelines for producing quality logistics resources so that they can contribute to transportation infrastructure.

Logistics costs have a direct influence on the smooth movement of goods. The lower the logistics costs, the higher the frequency of the goods delivery process (Nugraha et al., 2017). Many things are determining factors for logistics efficiency, one of which is the development of dry ports which play a role in reducing logistics costs for exporters and importers, especially related to export-import activities through sea ports. Specifically, for the western Jabodetabek area, the dry port will function as a logistics park for industry in the Tangerang Regency, Bogor Regency, Serang Regency, and Cilegon City areas moving towards the Priok port. The role of the dry port in the short term after operation is able to reduce container queues at Tanjung Priok Port thereby increasing custom cargo service times through the dry port. Its role in the medium term is to consolidate logistics goods delivery services through export and import containers, thereby creating an integrated and harmonious logistics ecosystem.

The factoring parties for selecting a dry port location are the government, dry port service providers, dry port service users, and the community (Yulianti et al., 2020). The location of Cijambe District, Tangerang Regency, was chosen through various considerations based on the flow of container movements around the Jabodetabek area in previous research. To support the realization of dry port development, it is necessary to carry out a financial feasibility study to realize: issuance of permits for dry port construction, determination of land acquisition prices,

cross-sectoral coordination in fields related to dry port development, investment outreach, an opportunity for potential investors, a detailed dry port engineering design program has a direct and tangible impact on the productivity of all types of industry and other facilities, therefore the design must be influenced by a practical approach to environmental and traffic impacts. A financial feasibility study of a dry port certainly requires good financial accounting information from both internal and external sides, this is useful for decision makers such as shareholders, bankers and other creditors, government agencies, and other external parties (Daryanto, 2021). Financial feasibility assessment aims to ensure that the facilities being built can function as efficiently as possible possibly in supporting the performance of dry port facilities.

Dry port is a port functioning as a gateway for export and import activities, where the main factor influencing port and other logistics activities is the volume of exports and imports entering the dry port itself. Therefore, the approach taken in determining dry port investment projections is to use the volume of exports and imports produced from the Tangerang, Cilegon, to Merak areas, then add a little volume from the Bogor area and its surroundings. After obtaining Tanjung Priok's export-import growth projections, the next step is to determine the basic assumptions for calculating projected export-import volume demand for the 20-year feasibility analysis period, namely 2023 to 2042.

The results of the feasibility study that had been carried out show that the largest composition of Tanjung Priok's export-import volume comes from the East Corridor (Bekasi-Cikampek), for about 62%. Meanwhile, for the West Corridor or Tangerang, Cilegon to the Merak area, is about 14%, followed by Bogor and its surroundings at 4%.

Methods

Financial analysis is carried out for operational planning so that it will be known whether it will be profitable from a financial perspective or whether it will be unprofitable. In this financial analysis, the tools commonly used are Net Present Value (NPV), Benefit Cost Ratio (BCR), and Internal Rate of Return (IRR). Basically, financial feasibility analysis is calculating how much benefit is received compared to with the costs incurred. The benefits received must be greater than the costs incurred, so that activities can run and investors get what they aim for, namely profits. The following is the methodology for analyzing the financial feasibility of developing a dry port in the Jabodetabek Region.

The IRR (Internal Rate of Return), NPV (Net Present Value), and Payback Period methods are financial analysis tools commonly used in evaluating investment feasibility studies. These three methods provide a comprehensive picture of the potential profits, risks and return time of an investment. Using these methods together provides a holistic perspective in evaluating an investment. IRR assesses profitability, NPV focuses on present value, and payback period provides a snapshot of payback time. By using these three methods, investors will be able to make more informative and data-based investment decisions.

Several methods are used for financial investment appraisal considerations, namely:

a. Net Present value (NPV) method

Calculating Net Present Value (NPV) uses the following formula:

$$NPV = \sum_{t=0}^{n} \frac{At}{(1+K)^{t}}$$

Identification:

k = the desired discount rate

At = the amount of cash flow in period t

n = end period expected cash flow

b. Internal Rate of Return Method

The Internal Rate of Return is found using trial and error, the formula usually used to calculate it is as follows:

$$\sum_{t=0}^{n} \left[\frac{\operatorname{At}}{(1+r)^{t}}\right] = 0$$

Identification:

- r = the interest rate that makes the Present Value of income the same as the Present Value of expenses
- At = the amount of cash flow in period t
- n = end period of expected cash flow

c. Repayment method (Payback Period)

The calculation for the Payback Period uses the following formula:

 $Payback Period = \frac{Net Cash Investment}{Annual net cash inflow}$

Results and Discussions

1. Tangerang Dry Port Financial Recapitulation

Below is a recapitulation of the Tangerang Dry Port financial calculations, the following is the table and the data:

Financial Tangerang Dry Port								
No	Description	Short Term Medium Term		Long Term				
	-	(2023-2027)	(2023-2032)	(2023-2042)				
1	Land Area (Ha)							
1	Land Area	425.583	528,056	792,500				
2	Land Acquisition Costs (IDR)							
	Land Costs	IDR 63,837,500,000	IDR 79,208,333,333	IDR 109,875,000,000				
	Construction Cost for Dry Port	IDR 1,015,843,611,590	IDR 1,280,580,682,489	IDR 1,702,804,828,991				
	Total Cost Of Land	IDR 1 079 681 111 590	IDR 1 359 789 015 823	IDR 1 812 679 828 991				
	Acquisition and Construction	IBR 1,079,001,111,590	IDIC 1,559,769,015,625	1151(1,012,079,020,991				
	Equipment							
	Amount (units)							
	Reach Stacker	7	13	23				
	RTG	4	5	12				
	Reefer Plug	7	10	19				
2	Forklift Diesel	4	8	14				
5	Procurement Cost (IDR)							
	Reach Stacker	IDR 54,670,000,000	IDR 101,530,000,000	IDR 179,630,000,000				
	RTG	IDR 82,360,000,000	IDR 102,950,000,000	IDR 247,080,000,000				
	Reefer Plug	IDR 6,461,000,000	IDR 9,230,000,000	IDR 17,537,000,000				
	Forklift Diesel	IDR 1,533,600,000	IDR 3,067,200,000	IDR 5,367,600,000				
	Total Equipment Cost	IDR 145,024,600,000	IDR 216,777,200,000	IDR 449,614,600,000				
	Costs							
4	Variable Cost	IDR 2,231,918,483,364	IDR 9,047,847,135,837	IDR 29,002,593,196,228				
	Fix Cost	IDR 126,387,523,891	IDR 358,601,934,812	IDR 1,100,536,547,820				
	Depreciation	IDR 134,686,505,203	IDR 472,622,900,151	IDR 1,404,351,369,743				
	Loan Interest	IDR 189,147,932,909	IDR 228,178,458,747	IDR 228,178,458,747				
	Corporate Tax	IDR 206,462,597,746	IDR 998,151,662,010	IDR 3,095,841,705,467				
	Total Cost	IDR 2,888,603,043,112	IDR 11,105,402,091,558	IDR 34,742,501,278,005				

Table 1. Tangerang dry port financial recapitulation

Table 1 above explains the Tangerang Dry Port financials seen from 3 (three) time periods with a total cost for each short term of IDR 2,888,603,043,112, Medium term Rp. 11,105,402,091,558, and long term IDR 34,742,501,278,005. Choosing these three investment time periods can give investors an idea of how much it will cost to invest in the Tangerang Dry Port.

Internal Rate of Return (IRR)

The cash flow projection above shows that the IRR value of the Tangerang Dry Port obtained is 28.8%. Based on the initial assumption where the expected MARR is 12%, the IRR value is greater than the MARR value, meaning that this dry port investment is feasible to run.

Net Present Value (NPV)

The NPV result for the Tangerang Dry Port is IDR 1,716,750,987,213 or IDR 1,717,000,000,000 (one trillion, seven hundred and seventeen billion rupiah) is an NPV value that is not minus, indicating that this investment is very feasible.

Payback Period (PP)

The calculation results show that the payback period for the Tangerang Dry Port is 6.87 or 6 years and 10 months.

Risk Assessment

Risk management or managing investment risk are efforts made to minimize the possibility of risks that cause losses. We certainly do not want to lose when investing. Risk is unavoidable, but that doesn't mean it can't be anticipated. The risks in investing are:

- a. The length of the payback period
- b. Fluctuations in demand from an uncertain business
- c. The depreciation value of equipment and land and building assets is too short
- d. Low NPV value
- e. Changes in government policies that have the potential to hinder business development
- f. Community rejection and resistance to business investment

No	Description	2023	2024	2025	2026	2027	2028	2029	•••	2041	2042
1	Total Revenue	242.6	416.6	683.9	877.9	1,287	1,726.7	2,081.2		3,295.4	3,699.7
2	Total Variable Costs	(151.8)	(266.6)	(443.1)	(581)	(789.5)	(1,081.9)	(1,33.3)		(2,318.9)	(2,423.8
	Total Fix Costs	(18.6)	(20.6)	(24.5)	(29.1)	(33.6)	(39.3)	(44.5)		(74.8)	(77.6)
	Depreciation	(16.7)	(19.0)	(28.6)	(33.5)	(36.9)	(60.5)	(65.6)		(105)	(109.1)
	Loan Interest	(48)	(44.3)	(38.3)	(32.3)	(26.3)	(20.3)	(14.3)		-	0
	Corporate Tax	(1.9)	(16.5)	(37.4)	(50.5)	(100.2)	(131.2)	(156.4)		(199.2)	(272.3)
	Total Costs	2,882.9	2,697.9	2,597	2,507.3	2,423.1	2,325.8	2,170.6		36,752.6	237
3	Cumulative Cash	16.1	170.6	77.6	48.7	495.1	74.3	55.8		52.6	-
4	Net Profit	5.6	49.6	112.1	151.5	300.6	393.6	469.2		597.6	816.8
5	Cumulative Cashflow	(649.6)	(707.4)	(606)	(437.3)	(568.7)	(168.7)	324.6		7,336	9,217.3

Table 2. Recapitulate the financial Tangerang dry port project (in billion IDR)

Table 2 above explains the investment value if calculated from 2023 to 2042. The basis for this calculation is to show the cash flow from the Tangerang Dry Port so that investors can get data about how much their investment funds will be in the future.

The calculation of the rate of return has an important point in terms of ideally analyzing the

investment level of a new project. If the results of calculating the rate of return are much greater than the rate of return on investment in other projects, then the results are very good. The calculation of net present value is the difference between expenses and income after calculating the cost benefit of the opportunity social capital discount factor. The meaning of the statement above is that net present value is a cash flow estimate made for the future and adjusted to current conditions. The simplest explanation is that the present value is the difference between the present value of a number of cash inflows and the present value of outflows within a certain time period.

2. Proposed Scheme

a. Optimist Scheme

In the following table is a scheme for optimistic conditions:

Table 3. Results of the optimist scheme				
Value IRR	28.8%			
Payback Period	6.87	Year		
Net Present Value	1,716.7	Billion		

Table 3 above explains the values of IRR, Payback Period, and Net Present Value for optimistic conditions.

Figure 1 below shows the dry port financial graph and shows the midpoint for the Break Event Point (BEP) value at 6.87 years. With the results of the assessment above, the investment risk in developing a dry port is still within safe and profitable limits, with a payback period of 6.87 years, while with a dry port technical period of at least 20 years, things that need to be considered are projections based on market share amounting to 40% of the potential market, so that if there is a decline in the potential market, it is still safe to operate according to investment targets.



Fig. 1. Tangerang Dry Port graphic chart of optimistic scenario

b. Moderate Scheme

The second scheme is a moderate scheme which is projected based on volume growth of 7% per year in Table 4 as follows:

Table 4. Moderate scheme result				
Value IRR	13.6%			
Payback Period	9.26	Year		
Net Present Value	697	Billion		

Table 4 above explains the values of IRR, Payback Period, and Net Present Value for Moderate conditions.

c. Pessimistic Scheme

Next is the third scheme, namely the pessimist scheme with the assumption that the Tangerang Dry Port volume growth is 5% per year, see Table 5 as follows:

Table 5. Results of the optimist scheme				
Value IRR	7.2%			
Payback Period	11.2	Year		
Net Present Value	255	Billion		

According to Utami (2015), the condition of port infrastructure in Indonesia is not managed well, thus triggering a high increase in logistics costs, the lack of support in the logistics sector

e-ISSN: 2776-0421

will have an impact on the distribution of goods, resulting in less efficient services at customs, causing long loading and unloading times for goods at the port (dwelling time) (Utami, 2015). Port activities cannot be separated from the role of freight forwarding companies which are originally consumer-oriented with logistics transportation services, where this service is generally carried out by sea freight expeditions (EMKL). These companies must be aware of the existence of dry ports as an effort to handle documents and work related to receiving and delivery of cargo transported by sea. Export and import activities cannot be separated from the need for transportation facilities and infrastructure. According to Samekto & Soejanto (2014), in export and import activities there are several options available, namely by sea, air, land, and train. Currently sea routes are still considered the most effective and efficient so facilities and infrastructure need to be built to encourage the growth of the shipping industry and increase the routes it serves (Febriana & Hartanto, 2021).

Port transportation usually uses trucks to move commodities or products, freight forwarding service companies provide goods delivery services from sea to land and vice versa (Sahara & Silitonga, 2022). Reducing the level of congestion around Jakarta by diverting container transport traffic out of the capital city of Jakarta (Fauzi et al., 2023). Congestion around sea ports by moving the flow of container movements to other ports that are smaller and close to industrial areas that use logistics services (Nuraeni et al., 2014).

As a loading and unloading service facility, dry port is a form of logistics and transportation system innovation. By having land port facilities (dry port) in areas far from sea ports, partners can have a positive impact. First, the dry port will speed up the goods distribution process because of its strategic location, thereby shortening travel time from the sea port to the final destination. These two dry ports increase partners' operational efficiency, with good storage and handling facilities at the dry ports, so partners can manage inventory more effectively, reduce storage costs and increase delivery accuracy.

Partner contributions to implementation can be seen from increased connectivity. Dry ports function as distribution centers that are integrated with various modes of transportation, including ships, trains, trucks, and planes. Partners can utilize dry port infrastructure to optimize partner supply chains, achieve wider market reach, and increase partner competitiveness. Dry ports for partners can increase efficiency, better inventory management, and increase connectivity, thereby having a positive impact on partner innovation and

contribution in the global supply chain.

This research needs to be implemented in industrial areas in Jabodetabek. The following is the distribution of industries that need to know the financial potential if the Tangerang Dry Port facility is built. Figure 3 shows the position of the Tangerang Dry Port location around the industrial areas of Tangerang City, Tangerang Regency, South Tangerang Regency, Bogor Regency, Bogor City, Depok Regency, South Jakarta and West Jakarta. Figure 4 is a picture explaining the distribution map of industry in the Jabodetabek area as input for Tangerang Dry Port activities.



Fig. 2. Map of regional proximity to industrial distribution



Fig. 3. Image of industry distribution map in the Jabodetabek area

In the picture below is the implementation of the information sharing of the Tangerang Dry Port development plan. In the implementation of the information sharing, the financial potential of the three proposed schemes was explained so that it gives an idea to decision makers in industrial areas which are included in the potential industrial distribution in this research study area, about the benefits of dry ports for the sustainability of industry in the region.

The financial feasibility of building a dry port is a consideration in carrying out sustainable development. This transportation infrastructure is adapted to local conditions and characteristics such as traffic flow, road conditions, bridges, ports, terminals and transportation facilities (Caroles, 2022).

Figure 4 is an example of an investment proposal sent to the industrial area around the Tangerang Dry Port and Figure 6 shows the discussion event during the implementation of the Tangerang Dry Port development plan seen from financial analysis, at the Millennium Industrial Estate area.



Fig. 4. Proposal for financial assessment of dry port facilities



Fig. 5. Dry port financial outreach at Millennium Industrial Estate



Fig. 6. Dry port financial outreach in the Purati Kencana Estate area



Fig. 7. Dry port financial outreach in the region Sentul Industry and Cibinong Center Industrial Estate

Figure 7 shows the event of the discussion when the team mapped out plans for developing the industrial area with the construction of the Tangerang Dry Port and Figure 8 describes the discussion event with the owners of the Sentul and Cibinong Center industrial areas regarding dry port finances following presentations using the 3 proposed scenarios.

When the dry port in Tangerang Regency is built, it could have a significant positive impact in various aspects. Economically, the construction of a dry port can increase efficiency in the distribution of goods because of its strategic location. This can reduce logistics costs and delivery times which in turn can increase company productivity and regional competitiveness. Another positive impact may occur in the employment sector. Infrastructure development such as dry ports usually creates new jobs, both in the construction and operation of these facilities. This can provide employment opportunities for local people and increase income levels in the region. Socially, the construction of a dry port can also strengthen connectivity between Tangerang Regency and other areas. This can trigger local economic growth and open the door to new investment. Apart from that, the existence of sophisticated logistics facilities can increase the accessibility of goods in Tangerang Regency and its surroundings.

Of course, it is also necessary to consider the negative impacts that may arise, such as environmental changes and the possibility of relocation of local residents. Therefore, there needs to be a wise and sustainable policy in managing the impacts of this development.

The feasibility of a dry port depends on several factors. First, the location must be strategic, close to production centers and have easy access to main transportation routes, such as roads, railways and sea ports. The availability of good infrastructure is very important, so that goods can be smoothly moved between dry ports and production or consumer locations.

Dry port feasibility research has a strategic role in increasing the efficiency of the transportation and distribution system of goods. Several reasons why this research is very important are logistics efficiency where dry ports help optimize supply chains by facilitating the movement of goods from one mode of transportation to another, local economic development where dry ports become a driver of economic growth in the surrounding area, optimizing transportation connections that can help determine optimal location of dry ports to be well connected to all major transport networks, cost and benefit analysis that will help governments, companies, and other stakeholders to understand whether investment in dry ports will generate long-term economic benefits, environmental sustainability that can help identify ways to manage these impacts and encourage environmentally friendly practices and increase regional competitiveness.

This research confirms that dry ports are designed to contribute to regional competitiveness.

Conclusion

- Internal Rate of Return (IRR) from Tangerang Dry Port is the result of an indicator of the level of efficiency of an investment to be made, where the indicator is in the form of an interest rate (discount). From the scenario used in optimistic conditions the IRR value is 28.8%, in medium conditions the IRR value is 13.6%, and in pessimistic conditions the IRR value is 7.2%.
- Results of Net Present Value (NPV) calculations for Tangerang Dry Port. The results of the scenarios applied are for optimistic conditions with an NPV value of 1,716.7 billion, moderate conditions with an NPV value of 697 billion, and optimistic conditions with an NPV value of 255 billion.
- 3. The results of the payback period calculation from the applied scenario results show that for optimistic conditions the payback period is 6.87 years, for moderate conditions the payback period is 9.26 years, and the pessimistic payback period is 11.2 years.

From the results above, it can be seen that the results of the feasibility study using the three scenarios are financially feasible. If investors want to obtain certainty about their investment, then optimistic conditions have the greatest opportunity and success in investing. In the moderate scenario, the feasibility value shows that the investment is still at a reasonable stage and has the opportunity to provide profits, while in the pessimistic scenario, the feasibility value is very risky, seen from the IRR value which is below the current bank interest rate, even though the NPV value is positive, the payback period is long enough, this scenario has no appeal for investors.

Further research needs to be done regarding sophisticated and crucial information systems. Efficient dry ports utilize information technology to track and manage inventory well, providing smooth facilitation between various related parties. There is also a need for an analysis of government policies regarding re-regulation that supports dry port operations, so that it can increase the feasibility and success of dry ports in the long term.

Acknowledgements

Acknowledgments to the University of Logistics and International Business, the Ministry of Transportation, the Jabodetabek Transportation Management Agency, the Indonesian Women Is Transport & Logistics Community, and Maranatha Christian University for giving the authors the opportunity to publish their research.

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