

DUMAI PORT AREA DEVELOPMENT AND ECONOMICS APPROACH

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ABSTRAK

Pelabuhan adalah bagian dari lingkungan perkotaan yang kompleks karena memberikan peluang ekonomi yang penting, seperti akses ke rantai pasokan global (Economics, 2021). Sebagai negara kepulauan dengan potensi maritim yang sangat besar maritim, Indonesia harus dapat memanfaatkan potensi dari aspek transportasi logistik, dalam konteks penelitian ini adalah pelabuhan (Jansen et al., 2018). Sebaran pelabuhan di Indonesia belum merata jika dilihat dari Produk Domestik Regional Bruto (PDRB) dalam hal ini Kota Dumai yang memiliki pelabuhan di jalur laut kepulauan Indonesia (ALKI 1). Meskipun berada di lokasi yang strategis, namun tidak tercermin dari PDRB kota Dumai yang dapat dikategorikan tertinggal dibandingkan dengan kota pelabuhan lainnya di Indonesia. (Putra et al., 2018). Untuk mengoptimalkan pemanfaatan pelabuhan yang ada dan meningkatkan pertumbuhan ekonomi di Kota Dumai, PT. Pelindo 1 wilayah Dumai berencana mengembangkan kapasitas pelabuhan dengan membangun segmen khusus kegiatan bongkar muat peti kemas berdasarkan semakin murah kapal peti kemas yang berlabuh di Pelabuhan Dumai (Hartono & Handinoto, 2007). Penelitian ini mengkaji mengenai pentingnya menggunakan pendekatan ekonomi dalam analisa pengembangan pelabuhan dalam ini adalah Dumai Port Area. Cost Operation-Maintenance (OM) Analysis digunakan dalam mengkaji pengembangan pelabuhan.

Kata Kunci : cost analysis, pembangunan, pemeliharaan, kota pelabuhan.

ABSTRACT

Ports are part of a complex urban environment because they provide important economic opportunities, such as access to global supply chains. (Economics, 2021). As an archipelagic country that can take advantage of maritime potential, Indonesia must take advantage of the potential from the aspect of logistics transportation, in the context of this research is the port (Jansen et al., 2018). The distribution of ports in Indonesia is not evenly distributed when viewed from the Gross Regional Domestic Product (GDP) in this case the City of Dumai which has a port on the Indonesian archipelago sea lane (ALKI 1), although it is in a strategic location, it is not reflected in the GRDP of the city of Dumai which can categorized as underdeveloped compared to other port cities in Indonesia. (Putra et al., 2018). To optimize the utilization of existing ports and increase economic growth in Dumai City, PT. Pelindo 1 Dumai region plans to develop port capacity by building a special segment of container loading and unloading activities based on the cheapness of container ships anchored at Dumai Port. is Dumai Port Area. Cost Operation-Maintenance (OM) Analysis is used in assessing port development.

Keywords: cost analysis, development, maintenance, port city.

INTRODUCTION

Indonesia is an archipelago country with the fourth number worldwide population number with of 255.5 million of total population. This country has Gross Domestic Product (GDP) of US \$859.0 (Warsewa, 2017). According to the Central Statistics Agency, the Indonesia's economic growth is 4.67% on the third quarter of 2015 (Jansen et al., 2018).

Based on the Global Competitiveness Report in 2016-2017, the competitive level of Indonesia in the rate of 41 from 138 countries with an index of 4.52. This level dropped from the last year at a rate of 37 from 138 countries. In determining the economic achievement of the country, there are 12 pillars that are the basis of assessment of the economic competitiveness of a

country. One of these pillars is quality and availability of infrastructure of the country, in which Indonesia still ranks 60 from 138 countries in the world with an index of 4.24 in the period of 2020-2021 (Economics, 2021)

Making for supporting the development of the city of Dumai as a city port, it takes a concept of development that corresponds to the existing potential that will be expected to increase the contribution PDRB Dumai City. This research will undertake the operational and maintenance cost calculations, as well as the potential revenue from design.

METHOD

A qualitative research method is a research procedure that generates descriptive data of written and spoken words of people and behaviors

observed (Putra et al., 2018). Because qualitative research was conducted in natural and invention conditions, researchers are required to have extensive theory and insight so that the interviews, analysis and construction of the researched objects can be clearer and can be viewed at Table 1.

Table 1 Research Strategic

Nu.	Research Question (RQ)	Research Strategic
1.	What is the operational value and maintenance required by the development of the city of Dumai as Port city?	Literature Study. Future Value
2.	How is the potential revenue on the development of Dumai city as port city?	Literature Study (Demand Forecasting), Dynamic Analysis

Source: research analysis, 2021

To process data that has been able to benchmarking for operational and maintenance costs is done by calculating all relevant costs and revenues during the investment period through adjustments to the time value of the money (Yu et al., 2020). Calculation of time value of money and which researchers use is a future value with the following formula:

$$F_n = [P (1 + i)] ^ n \dots\dots\dots (1)$$

Description:

- Fn : operating costs and maintenant project
- P : operational costs & maintenance before projected
- I : inflation/rate factor
- n : projection year

The phases of dynamic system usage have been described in research instruments. At the next stage, to know the success of the modelling that have been made, it should be done validation model, because the model that can simulate does not mean the model has been valid (Economics, 2021). Validation is the process of testing a dynamic system model against empirical evidence that can increase the level of confidence in the model so that the model is acceptable and valid (Putra et al., 2018). Models must be verified to avoid any logic errors that may arise. The validation process in the dynamic system is done in two respects, i.e. structure validation test and model performance/output validation test (Warsewa, 2017).

It can be concluded that the method used in this research is literature/Library study method i.e. benchmarking, simulation or modelling system as well as unstructured interviews to collect data. Then, to analyze the data that has been obtained using demand forecasting, modelling validation

and validation results. This method is used to achieve the research objectives that is to know the operational and maintenance costs, income value and investment feasibility of the development of Dumai City as port city. The problem formulation table can be seen in the table below.

Table 2 Problem Formulation

Aim	Methodology	Data Analysis
Knowing the operational value and maintenance required by the construction project of Dumai City as Port city	Literature study	Descriptive
Analyzing the potential revenue on construction project of Dumai City as port city	Literature study, modelling	Descriptive

Source: research analysis, 2021

RESULT AND DISCUSSION

The conceptual design of the Seatropolis area in Dumai port was conducted by Aryorespati (2017). Development area that made from maximizing the potential of food processing industry's raw materials in Dumai and Riau province, ranging from palm oil to cassava. After that, the capacity of the production of each industry is used as a reference for the capacity of port loading and unloading activities, resulting in an integration between the port and the industry studied. The existing condition of the Dumai port, known as Dumai Port City, can be seen in **Figure 1**.



Figure 1 Dumai Port Existing

Operation-Maintenance Analysis

Port is a means of sea transportation that has many facilities inside. Each facility has its respective cost each time it operates, each year also requires maintenance so that the port can run until it reaches the planned life age, it makes the

cost to be calculated To know the cashflow of the port. Dumai Port will be built an expansion of 71.39 Ha which most of the design looks at the operational system in Port Rotterdam. Therefore, in order to know the operational and maintenance cost plan of the expansion of Dumai port, the author performs a benchmarking fee incurred annually by Port Rotterdam, where the current port of Rotterdam has an area of of 12,606 Ha. After that the authors make the cost into the rupiah value with the exchange rate of 1 Euro equal to Rp 14,930.00 Rupiahs.

As the port construction was gradually conducted, operational and maintenance costs were calculated based on the start of the year operating and the number of construction of each stage namely 2023, 2025 and 2027. The inflation factor is also accounted for according to the year of operation, the calculated inflation factor is 5.45%. The following is the operational cost incurred in the year began to operate each phase of construction. The result abot cost-maintenance analysis calculation can be seen at **Table 3**.

Table 3 Operation-Maintenance Analysis Stages

Nu	Development Stage	Operation year	Percentage of development (%)	Unit Price (Rp/Ha)	Area (Ha)	Cost O&M (Rp)
1	Stage I	2010	40%	697.578.867,67	28,56	19.920.062.145,19
2	Stage II	2015	70%	775.686.947,88	49,97	38.763.403.846,30
3	Stage II	2020	100%	862.540.809,35	71,39	61.576.788.379,74

Source: Writer Analysis, 2021

Table 3 explains that operational and maintenance costs of the expansion of Dumai port which is based on development phase. For stage I, the built area is 28.56 Ha, which will begin operations in 2010. The unit price for the cost of Operation-Maintenance is adjusted for the price of 2010 and the price is priced at Rp 697.578.867/Ha, so at the cost of Operation-Maintenance Port Dumai after the stage I operate is worth Rp 19,920,062,145.19. For phase II, the total area that has been built is 49.97 Ha, which will begin operating in the year 2015. The unit price for the cost of Operation-Maintenance is adjusted for the price of 2015 and the price is priced at Rp 775.686.947,88/Ha, so the cost of Operation-Maintenance port Dumai after phase II operates is worth Rp 38,763,403,846. For stage III, the whole area of the Dumai port development plan has been

constructed so that the standing area is 71.39 Ha, which will start operating in the year 2020. The unit price for the cost of Operation-Maintenance is adjusted for the price of 2020 and the price is worth Rp 862.540.809/Ha, so the cost of O&M Port Dumai after stage III operates is worth Rp 61,576,788,379.

Operation-Maintenance Development

The operational and maintenance costs of the Seatropolis area to be built in Dumai port are taken from the cost of each area function that has been calculated by the researcher. The operational and maintenance costs can be for the years 2023, 2025 and 2027 in accordance with the development phase. The overall costs for the industrial area can be seen in **Table 4**.

Table 4 Operation-Maintenance Analysis During Development

Nu	Explanation	Operation Year (Rp)		
		2010	2015	2020
1	Port Area	49.800.155.362,97	55.376.291.209,00	61.576.788.379,74
2	Industry Area	142.537.811.169,09	277.371.159.660,25	440.612.111.071,71
3	Supporting Infrastructure	79.660.488.857,63	155.015.163.992,75	246.246.072.369,72
4	Residential	48.642.805.262,37	94.656.366.574,53	150.364.376.577,10
Total Cost		320.641.260.652,05	582.418.981.436,52	898.799.348.398,27

Source: Writer Analysis, 2021

Table 4 explains that Dumai port which is adjusted to the construction phase of Dumai expansion plan. In 2023, the development began to operate factories that coincided with the operation of the expansion, the cost of operation-

maintenance for the Seatropolis area to be built in Dumai amounted to Rp 320,641,260,652. For the year 2015, the operation-maintenance costs Rp 82,418,981,436 and for 2020, the operation-maintenance fee of Rp 898,799,348,398. Along with the development of industrial areas, there are government regulations that require to build the support infrastructure of industrial areas, namely

power plants, water supply and sewage treatment. Each of the products of the infrastructure is sold and an additional revenue Seatropolis. Each income from the project was developed into the total revenue area of Seatropolis. Revenue will give a tax donation that will affect the GDP Dumai city, GDP growth will influence on economic growth, economic growth will increase the work and regional population.

Port Area Development

As explained in the previous subsection, the industrial area needs supporting infrastructure for its economy. This infrastructure function consists of 3 infrastructure that is power generation, for the procurement of clean water and waste water treatment facilities. In the revenue simulation this infrastructure is a source of income derived from

the sales of products produced by each infrastructure. The number of requests for the use of the infrastructure is derived from the consumption of industrial areas every day, which will accumulate requests for the annual request as described in the previous subchapter. The demand for the products of each infrastructure continues to grow with the addition of production results in the industrial area. The addition is described in the form of a pulse on the stock and flow diagrams for supporting infrastructure functions. The existing production capacity and each year's upgrades are then adjusted at the planned fare for each supporting infrastructure. The rate is certainly adjusted to the inflation factor also depicted on the income modelling of supporting infrastructure function.

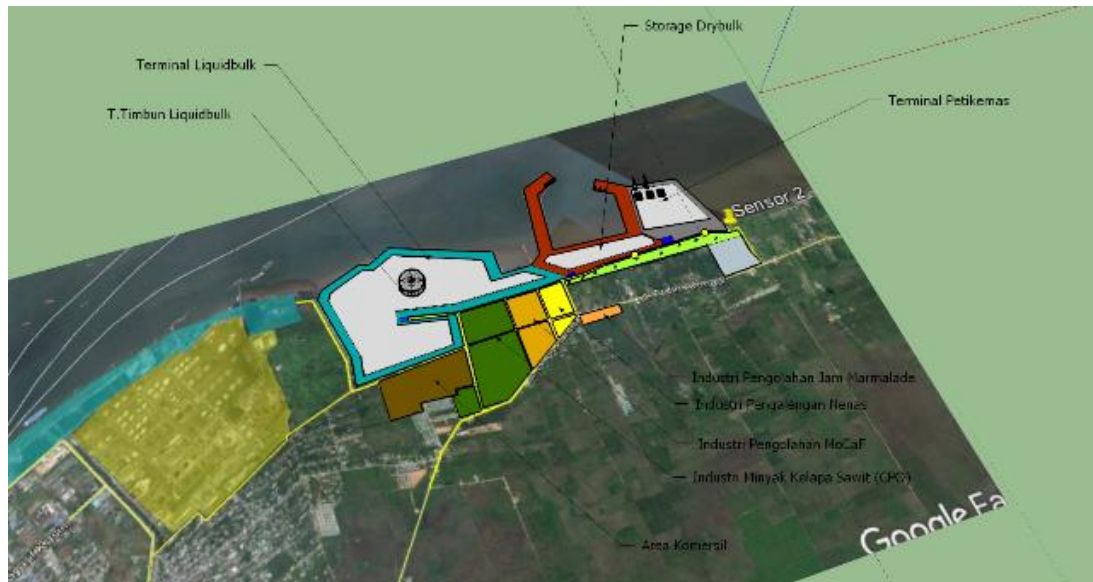


Figure 2 Port Area Zoning Function Development

In the Dumai Port Area, several zoning areas have been developed, such as the liquibulk terminal, drybulk storage as a zone for fuel. As for the industrial area, the processing industry, canning industry and palm oil industry will be developed. Do not forget to also develop a commercial area around the Port Area. In the future, real estate will also be developed in the Port Area for settlements, supermarkets, educational areas and restaurants.

Port Area Landuse

Landuse development is developed in accordance with the development of zoning functions for each area. The development of the waterfront also became the chance to recover the relationships between the city and the port. In some cases, waterfront redevelopment is largely an aesthetic undertaking where the extent to which the projects can revitalize urban areas remains unproven. Also landuse will also be affected by this development. However, even then, they represent a shift from industrial to post-industrial land use. (Economics, 2021).

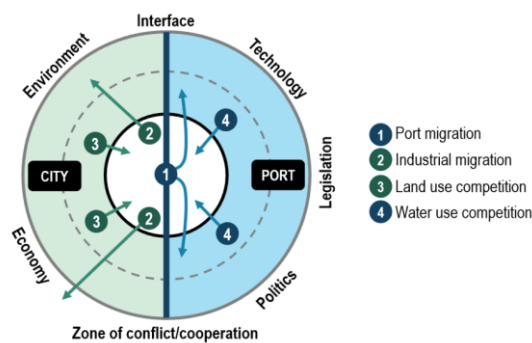


Figure 3 Port Area Landuse

CONCLUSION

The conclusion of this study are The Total revenue/revenue of each function in the Seatropolis area in the port of Dumai began to be seen in the year 2020, where in that year the building of each Seatropolis area has been completed and seen also revenue in the end of the year Building divided into 3, adjusting to the operation year plan of each phase of the expansion of the port divided into 3 stages.

Infrastructure development really needs to be developed in the Dumai Port Area. This begins with the development of zoning and also the addition of infrasttucture. Sseveral zoning areas have been developed, such as the liquibulk terminal, drybulk storage as a zone for fuel. As for the industrial area, the processing industry, canning industry and palm oil industry will be developed.

ACKNOWLEDGEMENTS

Many thanks to person, institution, and/or other party having contributed in the completion of this study can be especially for literature and Dumai Government. Everyone who has provided data and journals and references such as friends at the Esa Unggul University institution

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