Economic analysis of port development project (case study: Belawan Port Medan)

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Abstract. Belawan Port is one of the most important ports on the island of Sumatra. Port conditions are currently only able to load ships with a maximum draft of 8.9 m for normal water level conditions. This condition greatly limits the productivity especially for large ships. Therefore, the access channel deepening project is proposed to improved loading and unloading activities. This study was conducted to assess the benefits received from the project. The study was conducted with the parameters EIRR (Economic Internal Rate of Return), NPV (Net Present Value), and PI (Provitability Index). Furthermore, it also conducted a study to make the Port of Belawan port become sustainable. After analysis, the value of EIRR is 23.53% and NPV is 622,586,691 USD, and PI is 3.99. These results showed that the project has the proper parameters even when the sensitivity analysis I done with the benefit reduce to 70% and cost at fixed. But to get a sustainable port predicate still needed some adjustments, especially in terms of preserving the natural environment in which the parameter is still below the standard. Necessary measures such as the provision of a special budget for green port adjustment programs and policies and the provision of facilities to support the program.

1. Introduction
Indonesia is a maritime country whose territory is dominated by the sea. Such conditions make transportation between islands becomes crucial for the economic development of Indonesia. This makes the presence of the port became one of the infrastructure that must be considered. The sea conditions for the ports in Indonesia are categorized shallow making it less suitable as transshipment port. This condition is not so influential for the local shipping activities, yet powerful enough to export and import of international shipping. This is because the international shipping activities generally involve mass goods logistics activities, so the larger cargo ships that used the smaller the logistics costs incurred. Based on the research it has been found that in doing the cruise transportation, cargo ships with larger more cost-efficient than using smaller vessels [1]. In addition, large ships are also more resistant to weather often a constraint in marine transportation. This obstacle in the form of risk sea storms that can damage the boat or even sink the ship. Bad weather too often result in small vessels reluctant to sail for smaller ships are more vulnerable to the weather risk. Thus the government issued a policy that will help the marine highway mapping Indonesian marine logistics distribution lines.

Belawanis the main port on the island of Sumatra located in the province of North Sumatra. With the sea toll policy, the commercial shipping lanes in Indonesia to follow the principle of the pendulum, where there are a feeders port and the main port. Belawan Port is one of the five main port with its hinterland covering Jambi, Aceh, West Sumatra and Riau. Thus it is necessary to study whether Belawan port capable of servicing requests can continue servicing the needs of incoming ships.

This paper is a continuation of research [2] has discussed the financial review of the project development Belawan port groove. Deepening the groove becomes -12 mLWS and additional crane failitas economically discussed and reviewed by the forecast traffic increase dilakayan ship. The result
showed that the financial indicators are above standard and otherwise feasible. There are two ports which used the access channel of Belawan. They are Port of Belawan which is operating for local vessels and Port of Belawan International Container Terminal (BICT) which operating for international vessels.

In this paper will be examined further on benefit-benefit obtained from the procurement project for the owner of the port and port services are the owners of the ship carrier. Furthermore, this project will also be examined in sustainability. Study of sustainable port is not a new thing. Already, there are many studies on the definition of such a sustainable port [2] which concluded that there are four main Key Performance Indicators in implementing sustainable port including; environmental, social, economic, and organizational management. Also based on the results of Environmentally Sustainable Transport forum in Asia for the ASEAN region have formulated several aspects that define a sustainable port including; water quality, climate change, water quality, waste handling, dredging, energy conservation and renewable energy, natural resources, sustainability, and environmental management systems [3].

The virtues of sustainable port is to establish a sustainable industry ecosystem harbor and effects that do not harm the environment. Port green concept is a concept that has long been applied to developed countries. This concept promotes the port management with environmentally friendly systems include pegelolaaan dredging, waste, and emissions from ships calling at ports [2]. However, such a concept is still rare in Asia, especially Indonesia, the focus is still just a smooth port operations and economical.

2. Method
The main focus of this study is the study of the benefits of the development project of the access channel pf Belawan felt by the organizers ports and port service users. The data shown in this study was obtained from the Pelabuhan Indonesia I that acts as the manager of Flow Belawan and various literature for other data. Conditions of benefits with the project and without the project will be shown to find out the benefits gained. The method of calculating the benefits of projects carried out with the formulation:

\[
\text{Project benefits} = \text{Benefits Direct} + \text{Indirect benefits} - \text{Investment Value}
\]

Calculation of the direct benefits gained from comparison of the company's revenues with or without the project. This calculation is used to view the company's revenue difference with their project and without the project. Differences port conditions without the project and the project can be seen in Table 1.

| No. | Condition              | Unit | without Project | with Project | without Project | with Project |
|-----|------------------------|------|-----------------|--------------|-----------------|--------------|
| 1   | Total Crane            | unit | 6               | 9            | 11              | 12           |
| 2   | Wharf Length           | meter| 3,167.96        | 3,167.96     | 550             | 900          |
| 3   | Channel Depth          | m-LWS| -9.3            | -12          | -9.3            | -12          |
| 4   | Maximum Unloading Capacity | Ton or Box | 23,887,206 | 23,887,206 | 848,925         | 926,100     |

Table 1 shows that there is no change in productivity maximum unloading capacity at the ports of Belawan, as well as Port BICT that they offer little change. This is because the capacity of the dock in the port of Belawan not depend on increasing the number of cranes because, in general, ships load and unload at the dock has had a crane aboard the ship to reduce operational costs. The use of cranes belonging to the port is only used if the owner of the vessel has a crane, crane ships damaged or for some other reason, then the vessel owner must apply for the use of port cranes.

Unlike the ports of Belawan that does not depend on the number of harbor cranes, Port BICT is very much dependent on the number of cranes owned port. This is due to the dedicated port containers, which
work is fully crane Port. Generally, one ship is served by two cranes. Thus the length of the dock does not give effect to the port of loading and unloading capacity BICT.

Ship cost is the actual cost incurred by the vessel owner in its operations. The actual costs are those costs incurred by the shipowner includes fixed costs such as crew costs (ship's men), lubricants, harbor, claims, marketing, plus vessel operating costs is the cost of the supply of fresh water, generators, and the consumption of ship’s crew. The costs of the vessel is calculated from the research data Study on the Development of Domestic Sea Transportation and Maritime Industry in the Republic of Indonesia (STRAMINDO) [3]. These costs are converted into future value assuming an increase of 5% annually costs. Cost per GT vessel is shown in Table 2.

### Table 2. Cargo ship cost per GT (gross tonnage) boat.

| Boat Type       | Vessel Size (DWT) | Load (Box or Ton) | Fixed Cost (USD) | Fixed Cost per day (USD) | Distance Cost (USD) | Cargo Cost (USD) | Call Cost (USD) |
|-----------------|-------------------|-------------------|------------------|--------------------------|---------------------|------------------|-----------------|
| Containers      |                   |                   |                  |                          |                     |                  |                 |
| 5000           | 300               | 768,451           | 2,105            | 2.68                     |                     |                  |                 |
| 10000          | 600               | 863,763           | 2,366            | 4.02                     |                     |                  |                 |
| 15000          | 1000              | 959,075           | 2,628            | 5.36                     |                     |                  |                 |
| 20000          | 1300              | 1,054,387         | 2,889            | 6.70                     |                     |                  |                 |
| 25000          | 1700              | 1,149,698         | 3,150            | 8.04                     |                     |                  | Adjusted to the port tariffs |
| 30000          | 2100              | 1,245,010         | 3,411            | 9.38                     |                     |                  | Adjusted to the port tariffs |
| 5,000          | 5,000             | 222,493           | 610              | 1.34                     |                     |                  |                 |
| Cargo / Dry bulk / Tankers | 7,000             | 7,000             | 333,740          | 914                      | 1.61                |                  |                 |
| 10,000         | 10,000            | 667,480           | 1,829            | 2.68                     |                     |                  |                 |
| 15,000         | 15,000            | 1,112,467         | 3,048            | 5.36                     |                     |                  |                 |
| 20,000         | 20,000            | 1,557,454         | 4,267            | 8.04                     |                     |                  |                 |

TEU conversion factor into Box 1 Box used is equivalent to 1.5 TEUs. This means, if the size of 10,000 DWT container ship can accommodate 600 Box containers, means that the cost of ships are:

\[
\text{Container Ship Costs} = 600 \text{ TEUs Box} \times 1.5 \times 4.5 \text{ USD} \times 30 \text{ Hours} \\
= 121,500 \text{ USD}
\]

This calculation is counted for when the ship is unmoving, hover on the sea waiting for the adequate tides. This means that every 30 hours the ship would need 121,500 USD for the operational cost. This calculation will be used as the benefit of cost the shipping company would save when they don’t need to wait for tide.

2.1. Direct benefits
The immediate benefits are direct benefits perceived by the organizers of the project as the main objectives of the project. Direct benefit on the implementation of this project is the company's revenues increase due to an increase in service at the Port BICT and Belawan. The immediate benefits are calculated based on earnings per hour waiting time and the opportunity cost on request can be served. Revenue per hour is the hourly earnings of companies based on annual revenue forecasting results [4]. While the opportunity cost is the company's revenues lost due to the lack of port capacity and the waiting time.

Without the project, the large vessels used in the study can not go into the port without waiting for the tide because the groove depth is insufficient to pass. To be able to enter the port, the minimum depth of the groove should be 1 meter deeper than the draft of the ship. Therefore, on the condition without the project, the ships with a draft of> 8.4 meters will be charged timeout is the opportunity cost of magnitude port is the port hourly earnings by year. Due to data limitations, the data directly on the waiting time of large ships which had stopped at the port can not be obtained. Therefore, the waiting
time used is the average waiting time of the data port productivity. Taking into account these conditions, the waiting time will be calculated using the following formula:

\[
\text{Waiting times for vessels} = ((\text{Total number of call} \times \text{the average waiting time}) + (\text{number of large vessels call at low tide} \times \text{time (random number \(0.1 - 1\)})) \quad (3)
\]

2.2. **Indirect benefits**

The indirect benefits are benefits perceived by service users or agencies involved. In this study, only limited benefit to users of port services which are shipping companies (shipping line). Values calculated indirect benefits to users of port services, among others:

1. The benefits of saving on transport costs due to reduced waiting time flow of the tide.
2. Reduced costs with their opportunity cost project. Costs are calculated opportunity cost includes costs due to loss of income due to the wait and the cargo can not be transported due to limited port facilities.

2.3. **Study of sustainable ports**

The current condition of the aspects of environmental, social, economic, and organizational management port will be assessed to determine the aspects that must be met by the port to achieve sustainable port category. Sustainable question is perlabuhan who not only think about the operational implementation at this time, but also consider the impact on the natural and social environment in the future.

Especially in the economic aspect, the result of the total benefit will also be scrutinized for value investment criteria by using the parameters of Economic Internal Rate of Return (EIRR), Economic Net Present Value (ENPV) and Profitability Index (PI). The discount factor used is 12%. In total benefit calculation will be carried out a comparison of costs and benefits. The benefit derived from direct and indirect benefits, while the costs derived from the investment costs and annual fees that have reduced taxes, this is because the economic calculations, taxes do not count [5]. After that the sensitivity analysis will be done to make sure the profitability of the project.

3. **Results and discussions**

Results will be divided into three parts, namely the direct benefits, indirect benefits, and studies sustainable port.

3.1. **Direct benefits**

The waiting time in Belawan Port ranged from 0.85 hours to 2.73. While in Port BICT waiting time ranged from 0.88 hours to 1.24 hours. The timeout period is used for provision of port facilities are not much different from current conditions. The wait time is not quite long because in practice, when the great ship will be docked to the port when the flow conditions insufficient, the ship will leave most of his luggage to another boat that also will lean to the port. Thus, large ships can lean back safely to the harbor because of the draft waterlogged be smaller than when the load is full. In other words, the value of waiting time is only an administrative wait time includes the time of reporting the arrival of the ship to wait for tugs came before entry into the port access channel. But in this study, ships with a draft of >8.4 meter height of the tide will wait in accordance with its draft. Service demand forecasting calculation results shown in Table 3.

### Table 3. The result of demand forecasting.

| Year | Belawan | BICT |
|------|---------|------|
|      | Call (Ships) | Load (Ton) | Waiting Time for Administration (Hours) | Call (Ships) | Load (Box) | Waiting Time for Administration (Hours) |
| 2017 | 3,618 | 10,132,652 | 2.26 | 514 | 407,498 | 1.13 |
| 2023 | 2,968 | 13,050,054 | 2.58 | 576 | 595,117 | 1.09 |
| 2029 | 2,725 | 14,124,672 | 2.21 | 618 | 710,312 | 1.21 |
| 2035 | 2,194 | 16,472,040 | 1.38 | 673 | 873,424 | 1.09 |
| 2041 | 1,698 | 18,675,906 | 1.92 | 735 | 1,056,948 | 1.20 |
| 2046 | 1,319 | 20,346,677 | 1.47 | 797 | 1,234,469 | 1.05 |
Preliminary data used in forecasting Table 3 have been shown in [4]. The forecasting of the ships and cargo are consist of all kind of load such as dry bulk, liquid bulk, and general cargo for Port of Belawan and container only for Port of BICT. The forecasting results will then become the basis for calculating the performance of the port in the condition of the project and without the project. Call is the number of ships visiting the port. As for the waiting time came from the average waiting time for each ship to be picked up by tugs boat from the port management. The results of these calculations are shown in Tables 4 and 5.

Table 4. The results of direct benefit calculations with the project and without project.

| Year | Without Project | With Project |
|------|-----------------|--------------|
|      | Belawan | BICT | Belawan | BICT |
|      | (Hour) | (Ton) | (USD) | (Hour) | (Ton) | (USD) | (Hour) | (Ton) | (USD) | (Hour) | (Ton) | (USD) |
| 2017 | 2   | 100% | 2,523 | 8,892 | 6,795,427 | 100% | 2,523 | 20,682,510 | 100% | 8,892 | 5,251,806 |
| 2023 | 4   | 100% | 2,911 | 15,086 | 6,795,427 | 100% | 2,911 | 22,285,320 | 100% | 9,856,748 |
| 2029 | 3   | 100% | 3,518 | 21,235 | 6,795,427 | 100% | 3,518 | 21,185,288 | 100% | 21,235 | 16,611,812 |
| 2035 | 5   | 100% | 4,114 | 21,364 | 6,795,427 | 100% | 4,114 | 21,185,288 | 100% | 21,364 | 16,611,812 |
| 2041 | 1   | 100% | 5,083 | 30,604 | 6,795,427 | 100% | 5,083 | 30,604,168 | 100% | 30,604 | 16,611,812 |
| 2046 | 6   | 100% | 6,547 | 30,682 | 6,795,427 | 100% | 6,547 | 30,682,900 | 100% | 30,682 | 16,611,812 |

Information:
A: The waiting time for each large ship
B: Percent of load served
C: Income / hour
D: Opportunity Cost

Table 5. The results of direct benefit calculations.

| Year | Benefit | Difference for Belawan | Difference for BICT | Total |
|------|---------|------------------------|---------------------|-------|
|      | (USD)   | (USD)                  | (USD)               | (USD) |
| 2017 | 1,815,836| 1,543,621              | 3,359,457           |
| 2023 | 4,177,859| 1,957,255              | 6,135,113           |
| 2029 | 4,334,512| 18,733,629             | 23,068,141           |
| 2034 | 4,910,121| 63,047,837             | 67,957,958           |
| 2041 | 5,345,583| 152,287,005            | 157,632,588          |
| 2046 | 29,933,249| 265,248,964            | 295,182,213          |

Table 5 shows that the difference between the conditions with and without the project the project is positive which indicates that there is a profit benefits. These profits means that the company could get more profit with the project compare to no project. Such also means that in the next 30 years, the demand will exceed the port capacity and there will be a disturbance in the local logistics. These condition indicating that the project is needed to be done.

3.2. Indirect benefits
The indirect benefits are calculated based on the cost of operational vessels which have been shown in Table 2. Table 6 shows the results of forecasting the waiting time and the cost of the vessel. The waiting time referred to herein include waiting time for large ships and the waiting time to reach a height of ocean tide that boats can get into the access channel of the port. Ship cost is calculated based on Table 2 for the entire load in one period.

The difference from the waiting time for the direct benefit is that there is a waiting time for the tidal current. The tidal current waiting time is exist because the large ships need to wait for adequate tide to get to the access channel or accident could happen because the buoyance is not enough. The formulation for the total waiting time is shown in formula (3). For the waiting cost per hour formula (2) is used but the factor 1.5 TEUs is not used for the load from Port Belawan since it is not serving containers. The results show varied waiting time because the simulation also showed a controlled variations of vessel
sizes to minimized biased. As for the waiting cost per hour is increasing each year because the load is increasing too.

Data forecasting results will then be calculated their indirect benefits as shown in Tables 7 and 8. Calculations in Table 7 is done with the assumption that 1 Box equivalent to 1.5 TEUs. Tariff ships in the Port BICT is 500 USD and at the Port of Belawan is Rp. 500,000 per Ton or about 38.46 USD per Ton. Rates are assumed to increase by 20% every 5 years.

Table 6. Results forecasting waiting times for vessels and vessel waiting costs.

| Year | Admistration Waiting Time (Hours) | Admistration Waiting Time (USD) | Wait Cost per Hour (USD) |
|------|---------------------------------|---------------------------------|-------------------------|
| 2017 | 2.26                            | 1.13                            | 411,045                 |
| 2023 | 2.58                            | 1.19                            | 577,879                 |
| 2029 | 2.21                            | 1.21                            | 663,569                 |
| 2035 | 1.38                            | 1.09                            | 869,450                 |
| 2041 | 1.47                            | 1.05                            | 2,128,010               |
| 2046 | 1.47                            | 1.05                            | 2,128,010               |

Table 7. The result of the calculation of indirect benefit to the project and without project.

| Year | Belawan Port Without Project | BICT Port Without Project | Belawan Port With Project | BICT Port With Project |
|------|-------------------------------|----------------------------|----------------------------|-------------------------|
|      | A (Box)                       | B (USD)                   | C (USD)                   | D (USD)                 | A (Box)                       | B (USD)                   | C (USD)                   | D (USD)                 |
| 2017 | 367,558,125                   | 3,112,614                  | 407,498                   | 6,056,947               | 4,598,032                   | 353,001,625               | 2,920,525                 | 407,498                 |
| 2023 | 567,682,171                   | 5,406,451                  | 595,117                   | 7,932,845               | 5,455,862                   | 509,605,338               | 3,094,934                 | 595,117                 |
| 2029 | 565,728,956                   | 5,048,086                  | 710,312                   | 75,111,812              | 22,000,839                  | 506,103,868               | 3,057,380                 | 710,312                 |
| 2035 | 586,777,136                   | 9,255,264                  | 780,000                   | 155,286,177             | 22,775,265                  | 339,194,433               | 2,299,663                 | 873,424                 |
| 2041 | 506,096,710                   | 5,046,364                  | 780,000                   | 498,421,971             | 155,286,177                 | 133,253,407               | 7,932,845                 | 217,803                 |
| 2046 | 970,433,655                   | 17,267,001                 | 780,000                   | 498,421,971             | 155,286,177                 | 133,253,407               | 7,932,845                 | 217,803                 |

Table 7 Information:
A: Opportunity Cost
B: Ships Waiting Cost
C: Freight / Year

Opportunity cost in Table 7 refers to the loss of profit because they need to spend it on the operational cost when waiting to be allowed to enter the access channel and the cargo they can't carry because it exceed the port capacity. Ship waiting cost refer to the total of the operational cost for the large ship to wait for the tide to enter the access channel. Table 8 bellow shows the difference between the conditions with project minus without project. These number is the real benefit that can be gain by the shipping company by the existence of the project.

Table 8. The result of the calculation of indirect benefit.

| Year | Belawan Difference (USD) | BICT Difference (USD) | Total Difference (USD) |
|------|---------------------------|-----------------------|------------------------|
| 2017 | 15,372,590                | 4,135,626             | 19,508,216             |
| 2023 | 60,388,350                | 80,849                | 60,469,198             |
| 2029 | 61,615,795                | 74,195,584            | 135,811,379            |
| 2035 | 254,538,304               | 144,643,875           | 399,182,179            |
| 2041 | 52,675,786                | 316,997,217           | 369,673,003            |
| 2046 | 647,948,310               | 489,763,665           | 1,137,711,975          |
Based on the calculation, all of the indirect benefits have the positive values. The forecast calculations show that the difference is varied but overall positives. Total benefits tend to increase with the increase in years. These indicated that these condition will boost shipping companies urgency to increase their performance to schedule their ships in the Belawan and BICT port. Which in turn also will improve the trade atmosphere in the related region because the convenience of shipping.

3.3. Study of sustainable ports
Sustainable port has several criteria that must be met, namely environmental, economic, social, and organizational management [4]. The results of the analysis of each aspect of the study are as follows:
1. Environment
Covering the environmental aspects of waste management, dredging sedimentation in the flow and quality of water, air and noise.
Based on the study results, it is known that to do the dredging, the company conducts periodic dredging is generally 1-3 years by way of auctioning dredging project to third parties who have a license and a good SOP and measurable in terms of the implementation of the dredging and handling dredged.
The air quality is continuously measured since 2006-2011 and the results showed that the dust index is above the standards. However, other parameters such as CO₂, NO₂, SO₂ and H₂S levels are still below the quality standard for each monitoring period. These gases can cause air pollution that can disrupt the human respiratory system.
From the results of sea water quality monitoring conducted by PT Pelabuhan Indonesia I (Persero) year period from 2006 to 2011, it is known that the water quality of the waters of the Port of Belawan not meet the required quality standards. With the reclamation activities, the estimated accumulation of contaminants into larger contribution to reduce water quality Belawan waters [6].
Thus, a solution is needed to repair and air and water quality in the port of Belawan. One solution that can be done is a policy enforcement emission tests for vessels transiting. So that the amount of pollution controlled bias.
2. Economy
The economic aspect is calculated based on the calculation in [4] and the results of calculation of direct and indirect benefits. Based on previous studies it is known that the port will be increased demand in the future, and therefore required the addition facilities. Studies have been done and the financial keuyakandinyatan project financially feasible to be done.
Recapitulation of the economic benefits derived from these investments are shown in Table 9.

**Table 9. Recapitulation of the benefits of development investment projects Belawan.**

| Year | Benefit (USD) | Cost (USD) | Project Benefit | df = 12% | PV | NPV |
|------|--------------|------------|-----------------|---------|----|-----|
|      | Directly     | Indirectly |                 |         |    |     |
| 2016 | -            | -          | (155,921,278)   | 1.0000  |    |     |
| 2017 | 3,359,457    | 19,508,216 | (44,645,522)    | 0.8929  |    |     |
| 2023 | 6,135,113    | 60,469,198 | (57,593,620)    | 0.4523  |    |     |
| 2029 | 23,068,141   | 135,811,379| (63,397,556)    | 0.2292  |    |     |
| 2035 | 63,019,250   | 399,182,179| (71,733,641)    | 0.1161  |    |     |
| 2041 | 157,632,588  | 369,673,003| (82,376,088)    | 0.0588  |    |     |
| 2046 | 295,182,213  | 1,137,711,975| (82,015,110) | 0.0334  |    |     |

With df = 12%, then;
EIRR = 23.53%
ENPV = 622,586,691
PI = 3.99
The value of EIRR equal with 23.53% is higher than discount factor (12%) which means that the project is economically feasible. Such also shown by the parameter of ENPV which shows positive value and PI which is bigger than 1. These parameters indicates that the project is economically feasible. To further confirm the probability of the project, sensitivity analysis is calculated in table 10.

| No | Parameter Changes                  | df =12% |
|----|-----------------------------------|---------|
| 1  | Cost up 20%, benefit fixed        | 21.20%  |
| 2  | Costs fixed, benefits down 20%    | 19.23%  |
| 3  | Costs up 20%, benefit down 20%   | 17.11%  |
| 4  | Costs up 30%, benefit fixed      | 20.13%  |
| 5  | Cost fixed, benefits down 30%    | 16.99%  |
| 6  | Costs up 30%, benefits down 30%  | 14.04%  |

The sensitivity analysis shows that the project will safely profitable as long as the worst case scenario don’t happen such as when the cost increase to 30% and benefit is reduce up to 30%. These indicated that the engineering analysis on economic benefits of investment projects to develop the access channel and the facilities of Port Belawan and BICT are feasible.

3. Social
Social aspects include Corporate Social Responsibility (CSR) awareness, gender equality in the workplace, education and training of employees, the prohibition of underage labor and forced labor, etc. As one of the state-owned enterprises, of course PT. Pelindo I has met the CSR criteria, gender equality, and education and training of employees. But for the forced labor problem, there are several cases found in the last 10 years regarding labor wages stevedoring conduct demonstrations because of the late payment or demand of wage increase. This situation should not have occurred if the management of the organization is well done and well planned such as there is a regulation for each subcontract company or partners to have a minimum wage for the labor.

4. Organization management
These aspects include top industry position, organization and structure, risk management processes, strategically partnering, and budget on green performance, including promotion campaign. This aspect involves not only internal but also the partnership relationships with related parties. Such as building a good relationship with the top industry which is an industry that has the most frequent service demand as well as partnerships with shipping companies and related government departments such as customs and trade and industry department. The condition of these things are not so clearly known because there is no related literature available yet. While the procurement budget to run the port green program specially prepared yet until 2018. However Belawan port green start program launched in 2019 showed that there should be a special budget to ensure the implementation of green port. The most urgent decision to be made is the budget that can be allocated to procure the special facilities that can guarantee the “green” objection of the port such as a modern design of the wharf that will reduce uncontrolled waste from the ship.

4. Conclusions
Based on calculations, this harbor plot development projects declared to be economically viable because of the NPV is positive and EIRR indicator worth of 23.53% and PI worth 3.99. But to get the title of a sustainable port, it still needs some adjustments. Such adjustments mainly lies in the provision of budget for implementation of the green ports, as well as procurement policy adjustments and support facilities.
that are environmentally friendly. It was concluded that a sustainable Belawan feasible because of the economic potential of the port project is still quite high up to 30 years.

Acknowledgments
The authors gratefully acknowledge to my student Ratih Sulastri for her efforts to collect data for the purposes of this research.

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