Feasibility Analysis of Indonesian Traditional Shipping Industry to Strengthen Domestic Maritime Logistic System

Wegit Triantoro
Department of Industrial Engineering
Faculty of Engineering, Universitas Indonesia
Depok, Indonesia
wegitrian@gmail.com

Rahmat Nurcahyo
Department of Industrial Engineering
Faculty of Engineering, Universitas Indonesia
Depok, Indonesia
rahmat@eng.ui.ac.id

Abstract—Indonesian traditional shipping industry is an industry which engaged in the field of transport-goods from one to another site using traditional ship called Phinisi sailing motor ship. By maximizing the role of traditional shipping, it could help Indonesia to increase the strength of 3 main pillars, politics, economy and culture on ASEAN Economic Community at once. The increasing number of traditional shipping fleet will assists the monitoring of Republic Indonesia marine areas. As it will support more local economic opportunities by open many areas that difficult to reach. In culture-wise, the existence of traditional shipping can bring the spotlight to Indonesian heritage, which is the great Phinisi. Financial and technical analysis are used in this study. The goal of the financial analysis is to find out the feasibility of traditional shipping industry, based on 4 factors; NPV, IRR, Profitability Index, and Payback Period. The sources is obtained by interviewing several companies located at Sunda Kelapa port. The scope of the problems revered to the 496 GT ship, sails through Jakarta-Palembang trading route which brings cement for 20 years old aged project. According to the positive results of the indicators, it is safe to say that traditional shipping industry is prosperous.

Keywords— Indonesian Traditional Shipping, LVL and Feasibility Study

I. INTRODUCTION

As the biggest archipelagic country in the world with 13,466 islands, Indonesia has 5.8 millions km² sea area which consists of territorial area, 3.2 millions km² and Indonesian Exclusive Economic Zone area, 2.7 million km² (Ambarwati, 2014). The problems that occur due to this geographical state are less effective and efficient of domestic logistic system. The World Bank had ranked Indonesia on 53rd of 160 countries in Logistic Performance Index that had been released on 2014 (The World Bank Group, 2014). According to Mr. Gita Wirajawan, Indonesia Minister of Trade in 2013 said that Indonesia logistic cost had reached 24.6% from its GDP (Gross Domestic Product). This state was relatively higher than any other country. Surely, it didn’t affect directly to the economic growth, but if this condition still continue, it will significantly affect to the economic stability in the future, especially for international trade problems. As archipelagic country, the solution for this matter should be tackle under maritime perspective and focusing on sea transportation aspect. Merely, not all ships in Indonesia are able to move to difficult area, due to lack of supporting infrastructures on the destination port. Indonesian traditional shipping or known in local language as pelra (pelayaran rakyat) is one of the shipping industry that has a function as a feeder for mother ship to carry goods from one island to another island and vice versa, to carry goods from mother ship to certain island which difficult to reach and lack of infrastructures.

The ship was made from wood, particularly just sort of woods that can be made as raw material. One of them is iron wood or ulin timber, this type of wood is categorized in class I from its strong and durability (Martawijaya, et.al). Ulin timber is strong enough to defend itself against termites that make it suitable for ship building. However, illegal logging which happened intensively in Indonesia made ulin timber scarce. This phenomenon made the number of Indonesian traditional shipping or pelra is on the critical point. According to statistical data from Ministry of Transportation of Indonesia, until 2012 there were only 1,329 units of traditional shipping fleet spreading all of Indonesia. Since 2008 to 2012 there was gradual increase of Indonesian traditional shipping fleet, averagely the growth rate within that period was only around 3.16% per year (Ministry of Transportation, 2012). In addition, until this very moment, Indonesian traditional ship has no standardize design-building and construction. Consequently, it can’t be insured by insurance company, thus make the situation even worse because it affects on the types of cargo which can be delivered (Sunaryo, 2010). An option to build a ship with other material had been offered, one of them is by using laminated lumber because laminated lumber is kind of wood that can be produced by custom. But, beside...
the material problem, there is another problem that made the growth rate of traditional ship fleet is low. That is the management of traditional shipping company is also run off in traditional way. Usually, the people who run this business has a blood relation or still include as family. It caused traditional shipping industry is hard to compete with another common shipping industry. In other point, there are no many player that interested in this business sector that make this business isn’t prosperous in the beginning. Thus, making restoration on whole aspects including management aspect is needed. The goal is to strengthen traditional shipping company in order to compete with others.

This research will observe the traditional shipping company in running their business. While the scope of the problems will be limited by using the data of 496 GT (Gross Tonnage) ship that sailing through Jakarta-Palembang trading route and carrying cement as main cargo. All of data related to incomes and expenses from the traditional ship will be examined and prospected into forecasting cash flow model by using financial feasibility indicators such as NPV (Net Present Value), IRR (Internal Rate of Return), profitability index, etc. All of these are done to know whether the operation of traditional shipping business is prosperous or not. By knowing its financial feasibility, hopefully it can support the government or another related stakeholder to come up with real actions in empowering traditional shipping industry. Furthermore, this research has another issue, by bringing many parties that interested in investing and joining to this sector. Therefore, the increasing of traditional shipping fleet most likely will affect on improvement of domestic logistic system. It will also increases Indonesia economic growth, promotes Indonesia maritime heritage and helps monitoring marine areas from other countries’ threats.

II. LITERATURE REVIEW

A. Traditional Shipping Knowledge

Traditional shipping or pelra in Bahasa Indonesia, is sea-trading activity on micro-economic scale held by low level economic group. Usually this business is running by group of people that still has blood relation. So, there is no strict rule in it. The main role from this business is traditional ship itself which made by wooden and built traditionally. The ship is often called by Phinisi sailing motor which has technology with limited operation range area. Since years ago, traditional shipping business were well-known to transport any kind of goods such as agricultural products, plantation production, cattle and passengers from the remote areas with limited volume. In obtaining the cargoes, usually the owner of cargoes communicated directly with the owner of the ship. Sometimes when the charging volume is very limited, the owner of the cargoes was willing to give a commission to the ship crews about 1% up to 5% of common tariffs that apply (Jinca, 2001).

In the shipping world to determine volume of a charging room used a unit of cubic feet (cft) or m3 or gross tons (GT). With a standard of measure of each unit is as follows:

\[ 1 \text{ GT} = 100\text{Cft} = 2.83 \text{ M}^3 \]  

(1)

For example a large ship with 6,000 GT is equivalent to the m3 or 16,980,600,000 Cft. Whereas the problems of safety, health issues, and also security of valuable things possessions in the ship have been set in several international convention and state legislation. The ship must be fulfilled the requirements so it can be seaworthy that means the ship is safe for loading-unloading and sailing activities.
B. Incomes and Expenses of Traditional Shipping Industry

In addition, knowledge on the equipment and machines of traditional ship is also needed, considering the operational costs which might be appeared. Engkos and Hananto (2012: 26), said that beside main engine and power plants, generally large ships are equipped with equipment as follows: pumps, boiler, fresh water generator, deck equipment, anchor machines, a winch, cargo winch, safety equipment, ballast tank, etc. The type of company income can be classified as follows (Susanty, 1982):

1. Freight earnings  3. Agency earnings
2. Charter earnings    4. Terminal earnings

Most of owners of this business are choosing to run the ship itself than rents or even being an agent for other company. So, the only source of the company income is the service to transport goods from one place to another. In this terms, it called freight earnings that was given by the owner of cargoes. The value of freight earnings is depending on the weight of cargoes (Ton) or the volume (m3), it also depending on the type of the cargoes and distance (Susanty, 1982).

In book of Financial Management and Accounting Shipping Company (Engkos & Hananto, 2012 : 289), it said that there are two methods in dividing components of the cost of shipping companies. First a method based on its relationship with the product services: The cost of operations directly, consisting of fuel cost, port cost, loading-unloading cost, agent cost, claims charge, the rent container, shipment costs, daily ship cost, insurance and shrinkage costs. The costs of operations indirectly, consisting of the costs were not directly related to cargoes and overhead cost (employees, shrinkage warehouse, marketing, administrative, etc). Second method is based on behavior of cost itself, there are fixed cost and variable cost, that described on below (all in yearly units):

1. Depreciation Cost (DC)
   It is related to the reduction value of investment within the age of project. The simple way to calculate this kind of cost is by divide all of investment cost with the length of project.

2. Repair Maintenance and Supply (RMS)
   RMS cost is consist of deck equipment, spare parts, maintenance service cost, etc.
   \[ RMS = DoC + SPC \] (2)

3. Management Cost (MC)
   MC represent costs incurred to administration and management interests that are not directly related to ship, but it does support the management of ship operations.
   \[ MC = TC + EC + AC \] (3)

Meanwhile, variable costs are costs incurred when the ship is operated. Variable costs of traditional shipping are shown below (Syahrir, I., 2003 in Subaganata, 2012):

4. Crew Ship Cost (CSC)
   This cost is a result from the activities carried by the crew. The amount of wages each crew depend from his position on board.
   \[ CSC = \sum (N_c \times CSC) \times Trip \] (4)

5. Supplies Cost (SC)
   SC represents costs incurred for crew ship supplies during on board.
   \[ SC = N_c \times Allowance \times day \times people \times 365 \] (5)

6. Fuel Cost (FC)
   The amount of fuel used is depending on engine power (HP). It is the power required to move ship with a certain speed on the displacement condition. Hence, FC incurred to the amount of fuel used ship propulsion engines and auxiliary engines for ships power consumption such as lighting, pumps and others.
   \[ FC = V_f \times P_f \times f \] (6)

7. Lubricants Cost (LC)
LC represents cost incurred for the purchase of lubricating oil used by ship, either while in the port or sailing.

\[ LC = V_l \times P_l \times f \] (7)

8. Fresh Water Cost (FWC)

FWC represents cost incurred for the purchase of fresh water that will be used during sailing period.

\[ FWC = V_{fw} \times P_{fw} \times f \] (8)

9. Docking Cost (DoC)

DC represents cost incurred for any sea transportation activities around the port.

\[ DoC = P_{doc} \times Trip \times GT \times M_s \] (9)

10. Mooring Cost (MC)

Costs incurred that relate in mooring activities in the dock. The amount of this costs depends on GT of the ship, mooring rates and the length of the ship at the dock.

\[ MHC = \frac{P_{mh}}{Ton} \sum M_c \] (10)

11. Material Handling Cost (MHC)

For MHC, traditional shipping industry is the only shipping industry in Indonesia that still use full-labor as its way to handle the materials/cargoes. The amount of cost is depended on labor rate per ton, mechanical equipment used and pallets cost (Engkos & Hananto, 2012). But in simple way this cost is described into this following formula:

\[ MHC = \frac{P_{mh}}{Ton} \sum M_c \] (11)

An investment activity often give increasing value of company for a long periods. As slow yielding industry, traditional shipping companies can obtain the positive result of their business is only when the company has been run for several years. So, in order to know how prosperous this business should be in the future, it need a feasibility study in financial aspect.

According to Peterson and Fabozzi (2002), capital budgeting is the process of identifying and selecting an investment that will last for long-term. An investment may always has risks, so the analysis used shall consider on the following points (Erwinsyah, 2012): cash flow in the future, level of uncertainty associated with future cash flows, and the value of the cash flows in the future. The first step in considering how good the investment is to estimate the cash flow of investment in several years ahead. Then determine the discount rate of the project that worthy enough and also considering the risk of the investment. At least there are 4 indicators that used in order to know how prosperous the business is, Net Present Value (NPV), Internal Rate if Return (IRR), Profitability Index (PI) and Payback Period. Net Present Value (NPV) is used to know how well the investment had done in the end of project age. NPV comes from the difference between the present values of cash flow with initial investment value (Sharpe, et. Al., 1993 in Erwinsyah, 2012).

\[ NPV = \sum_{t=0}^{n} \frac{NCF_t}{(1+k)_t^t} - NCF_0 \] (12)

The determination of feasibility result is also can be seen from the value of Internal Rate of Return (IRR). IRR according to Keown is one of the capital budgeting decision that reflects the rate of return of a project. IRR is the discount rate which balanced present value of cash flow-in with present value of cash flow-out (Keown, et. al, 2002 on Erwinsyah, 2012).

\[ IRR = i_{low} + \frac{NPV_{low}}{NPV_{low} - NPV_{high}} \times (i_{high} - i_{low}) \] (13)

Profitability Index (PI) provides a relative measure of a proposed investment, it’s used to see the ratio value of its profits in the future with the initial investment.

\[ PI = \sum_{t=0}^{n} \frac{FCF_t}{NCF_0} \] (14)

Property 1: there are certain characteristics from abbreviations based on equation 2-14 that defines as below:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DoC</td>
<td>Docking Cost</td>
</tr>
<tr>
<td>SPC</td>
<td>Spare Parts Cost</td>
</tr>
<tr>
<td>TC</td>
<td>Telecommunication Cost</td>
</tr>
<tr>
<td>EC</td>
<td>Electrical Cost</td>
</tr>
</tbody>
</table>
Whether the project is accepted or not, it is also determined by the payback period, which has to be appropriate company’s target (Keown, et. al., 2002 in Erwinsyah, 2012).

\[
\text{Payback Period} = n + \frac{(a-b)}{(c-b)} \times 1 \text{ Year} \quad (15)
\]

Property 2: there are certain characteristics from abbreviations based on equation 15 that defines as below:

- \( n \) = latest year where the amount of cash flow is still unable to close initial investment
- \( a \) = amount of initial investment
- \( b \) = cumulative cash flow on n-year
- \( c \) = cumulative cash flow on n+1 year

Cash flow is the difference resulted between income statement and outcome statement. Martin Stopford (2009), in his book had already classified cash flow category in shipping industry generally. This diagram show variance of cash flow according to Stopford.

C. Laminated Veneer Lumber (LVL) on Building Traditional Ship

One of main problem to build traditional ship of pelra, Phinisi ship, is to get its raw material because not all woods are able to be used for ship building purpose. The most famous wood type in ship building purpose in Indonesia is ironwood or ulin timber as local said. But, due to scarceness of supply, ironwood may not feasible for several periods ahead. So, it needs an alternative, there are many option by redesign and replace the material into metal so it would compete with other shipping company. However, if it really happen, then it would make the word “traditional” is less meaning. Therefore, the appropriate way to keep the traditional aspect is just to change the current type of wood into the new one. The suggestion that could be the best answer was Laminated Veener Lumber (LVL), because laminated lumber can be customize by any kind of lumber. Another issue is that because there was pre-research about the application of LVL on wooden boat construction.

LVL (Laminated-Veneer Lumber) has many advantages and economic values, which is important for wooden boat construction. The recovery of veneer, the main material of LVL, are higher than sawn-timber and their drying process are
faster. LVL produced with a continuous press has been approved as an engineered material with reliable strength and stiffness. In a wooden boat processing, the easy forming into a curve shape and strength are main factor, because of the streamline shape of boats. LVL material is able to meet those requirements (Widodo, 2012) and beside LVL has strength greater than any other laminated wood. LVL produced with continuous press has been approved as an engineered material with reliable strength and stiffness. In addition, the continuous process produces a product having unlimited length. LVL possesses several advantages not inherent in solid-sawn material. Natural defects such as knots, slope of grain, common in lumber are dispersed among many layers of veneer, thereby minimizing their effect on strength. Advance modification can permit production on having selective and predictable strength properties. All these factors contribute to reduce variability of strength properties, thus resulting more reliable uniform product to meet specific end-use requirements (Widodo, 2012).

Technically, LVL is appropriate to replace other nature wood such as ironwood to build a ship. The only question is the price in producing this wood type. Because it surely will affect on the investment cost of traditional shipping.

![Fig. 3. Illustration the Hull Construction of Wooden Boat Using LVL](image)

III. RESEARCH METHODOLOGY

This research used in-depth interview as a method to collect the data. This kind of interview was not executed with certain structure but it was done by asking a question which focused on a specific problem, so the information were gathered accurately enough. The primary data were obtained through interviews with many parties that directly involved in traditional shipping business. Because this research is focusing on traditional shipping industry, then the major source of information is traditional shipping company. Other respondents like head of Sunda Kelapa port and some of labor are considered as supporting parties.

In order to be able to do financial analysis, it is necessary to get all the data related to expenses and incomes from traditional shipping companies. In this discussion, there are 3 (three) main categories of expenses which are investment costs, pre-operation cost and operation cost. The next step is to perform cash flow in the future by considering engineering economics’ perspective such as time value of money and other logical assumptions related to cash flow projection. Of course there will be a limitation on how long the projection is made.

The most substantial investment costs is investing on the ship (engines included). The overall cost for investment by using one ship is Rp. 8,320,800,000.00. The number of investment will increase as the number of ships used. Uniquely, the investments do not use capital loans from banks, most of Indonesian traditional shipping owners pay independently all the investment. They never go to the bank to loan the money as the bank neither want to invest their money on traditional ship due to the safety of the ship. It has already known, that wooden ships are more easily damaged. There are many accidents like burning ship in the middle of sailing, or another accidents that occurred in the past that made other parties did not want to invest much in this business sector.

Meanwhile, pre-operation cost is company expense that is needed as pre requirements to start a business. Pre-operation cost on traditional shipping are company license, ship licenses and crew ship training. The total amount of pre-operation needed cost is Rp. 454,550,000.00. The last chapter of company expenses is operation costs. Operation costs of traditional shipping companies are very dependent on the only company's revenues which is freight earning. Freight rate revenue is then divided into 2 (two) section, for ship revenue and non-ship revenues. The amount of non-ship revenues is set at Rp. 35,000.00 per ton, and the amount of ship revenues is Rp. 130,000.00 per ton. The purpose of this separation is because each revenue will have their own expenses of operation cost differently.
Another expenses from traditional shipping company is come from non-ship revenue called non-ship operation cost. This kind of cost is separated from the other three that mentioned before, due to it’s the source. Non-ship operation cost consist of office manpower cost, management costs, the cost of idling/detention ship, porter’s cost and the cost of certificates of certain document. The mechanism of determining ship operation cost is a little tricky, because of traditional shipping company is doing sharing system with the crew ship.

In financial analysis, logical or scientific assumptions are required for the projection of cash flow matrix in the future. The assumptions used must have a base and a reliable source. One example of the assumptions used in this study is the assumption of rising rate of fuel prices, inflation and the number of ship trips in a year.

**IV. DISCUSSIONS AND RESULTS**

Net Present Value is a key indicator in determining whether a business is feasible or not, then the data analysis refers to the cash flow projections which have been described in previous chapters. Then another indicator is the Internal Rate of Return, Profitability Index and Payback Period.

**Table 1. NPV, IRR, PI and PP Analysis on 1 (One) Fleet of Traditional Ship**

<table>
<thead>
<tr>
<th>Tahun</th>
<th>Cashflow</th>
<th>Cumulative Cashflow</th>
<th>MARR 10.58%</th>
<th>Present Value</th>
<th>Cumulative Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(8,775,350,000)</td>
<td>(8,775,350,000)</td>
<td>1</td>
<td>(8,775,350,000)</td>
<td>(8,775,350,000)</td>
</tr>
<tr>
<td>1</td>
<td>427,942,828</td>
<td>427,942,828</td>
<td>0.904322562</td>
<td>386,998,398</td>
<td>(8,388,351,602)</td>
</tr>
<tr>
<td>2</td>
<td>457,901,737</td>
<td>885,844,565</td>
<td>0.817799478</td>
<td>374,471,801</td>
<td>(8,013,879,802)</td>
</tr>
<tr>
<td>3</td>
<td>487,264,178</td>
<td>1,373,108,742</td>
<td>0.739554601</td>
<td>360,358,465</td>
<td>(7,653,521,337)</td>
</tr>
<tr>
<td>4</td>
<td>633,925,143</td>
<td>2,007,033,885</td>
<td>0.668795986</td>
<td>423,966,591</td>
<td>(7,229,554,746)</td>
</tr>
<tr>
<td>5</td>
<td>756,757,817</td>
<td>2,763,791,702</td>
<td>0.604807366</td>
<td>457,692,702</td>
<td>(6,771,862,044)</td>
</tr>
<tr>
<td>6</td>
<td>808,399,393</td>
<td>3,572,191,641</td>
<td>0.546941008</td>
<td>442,147,077</td>
<td>(6,329,714,967)</td>
</tr>
<tr>
<td>7</td>
<td>863,925,341</td>
<td>4,366,113,882</td>
<td>0.494611148</td>
<td>427,307,105</td>
<td>(5,902,407,862)</td>
</tr>
<tr>
<td>8</td>
<td>830,342,034</td>
<td>5,266,455,916</td>
<td>0.44728807</td>
<td>371,402,086</td>
<td>(5,531,005,776)</td>
</tr>
<tr>
<td>9</td>
<td>1,465,383,361</td>
<td>6,731,842,376</td>
<td>0.404492739</td>
<td>592,736,929</td>
<td>(5,305,935,059)</td>
</tr>
<tr>
<td>10</td>
<td>1,508,524,269</td>
<td>8,300,366,646</td>
<td>0.36579195</td>
<td>573,753,551</td>
<td>(5,164,151,508)</td>
</tr>
<tr>
<td>11</td>
<td>1,679,242,618</td>
<td>9,979,609,264</td>
<td>0.33079395</td>
<td>555,483,299</td>
<td>(4,930,668,209)</td>
</tr>
<tr>
<td>12</td>
<td>1,681,785,878</td>
<td>11,661,395,141</td>
<td>0.299144466</td>
<td>503,096,938</td>
<td>(4,696,572,271)</td>
</tr>
<tr>
<td>13</td>
<td>1,925,631,624</td>
<td>13,587,026,766</td>
<td>0.270523188</td>
<td>520,927,874</td>
<td>(4,375,644,896)</td>
</tr>
<tr>
<td>14</td>
<td>2,062,511,603</td>
<td>15,649,538,369</td>
<td>0.244640188</td>
<td>504,573,226</td>
<td>(4,050,071,670)</td>
</tr>
<tr>
<td>15</td>
<td>2,209,393,264</td>
<td>17,858,931,633</td>
<td>0.221233666</td>
<td>488,792,172</td>
<td>(3,724,279,498)</td>
</tr>
<tr>
<td>16</td>
<td>2,221,990,009</td>
<td>20,080,921,642</td>
<td>0.200066618</td>
<td>444,546,026</td>
<td>(3,399,243,422)</td>
</tr>
<tr>
<td>17</td>
<td>3,217,666,107</td>
<td>23,298,587,749</td>
<td>0.180924776</td>
<td>864,940,240</td>
<td>(3,074,252,182)</td>
</tr>
<tr>
<td>18</td>
<td>3,448,155,450</td>
<td>26,746,743,200</td>
<td>0.163614376</td>
<td>567,177,439</td>
<td>(2,749,074,743)</td>
</tr>
<tr>
<td>19</td>
<td>3,695,321,895</td>
<td>30,442,065,094</td>
<td>0.147960188</td>
<td>345,988,082</td>
<td>(2,403,086,651)</td>
</tr>
<tr>
<td>20</td>
<td>6,279,557,968</td>
<td>36,721,623,063</td>
<td>0.133803751</td>
<td>1,186,216,492</td>
<td>1,186,216,492</td>
</tr>
</tbody>
</table>

| NPV     | 1,186,216,492 |
| IRR     | 11.84%        |
| Profitability Index | 1.14 |
| Payback Period | 10 Years 4 Months |
From data cultivation, it was found that the result of Net Present Value at the end of the project is Rp. 1,186,216,492.00. Cash flow projection produces Internal Rate of Return of 11.84%, which greater than the discount rate determined (MARR). While the return on investment period is 10 years 3.4 months. Profitability Index value obtained in this scenario is 1.14. So that as a whole all indicators, both NPV, IRR, and Payback Period PI has appropriate eligibility requirements of a business financial terms.

The sensitivity analysis is used to determine how sensitive financial feasibility results in facing the uncertainty. The aim is to be able to give priority treatment to a variable that have significant impact on traditional shipping business. To know which variable that more sensitive, is by change the value of variable that allow NPV to reach zero condition. The closer switching value deviation to 0% is reflect that is the more sensitive variable. These are the variables which have high sensitive level than any other:

1. Freight earnings
2. Number of voyage
3. Amount of cargoes
4. Ships and machinery investment costs
5. Fuel price
6. Porter cost

Table 2: Sensitivity Analysis on Scenario Using 1 (One) Fleet of Traditional Ship

<table>
<thead>
<tr>
<th>Variable</th>
<th>Initial Condition</th>
<th>NPV = 0</th>
<th>Switching Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship and Machines</td>
<td>Rp. 8,000,000,000</td>
<td>Rp. 9,296,150,593</td>
<td>16%</td>
</tr>
<tr>
<td>Freight Earnings</td>
<td>Rp. 165,000</td>
<td>Rp. 153,605</td>
<td>-7%</td>
</tr>
<tr>
<td>Porter Cost</td>
<td>Rp. 11,000</td>
<td>Rp. 18,872</td>
<td>72%</td>
</tr>
<tr>
<td>Fuel Price</td>
<td>Rp. 6,900</td>
<td>Rp. 8,761</td>
<td>27%</td>
</tr>
<tr>
<td>Cargoes Weight</td>
<td>1200 Tons</td>
<td>1107 Tons</td>
<td>-8%</td>
</tr>
<tr>
<td>Annual Trip</td>
<td>12</td>
<td>11</td>
<td>-8%</td>
</tr>
</tbody>
</table>

From previous chapter, it mentioned to tackle the raw material problem in building Indonesian traditional ship was by using Laminated Veneer Lumber (LVL). But since that idea is come up, another issue is also occur which is the cost of LVL itself. By using LVL as raw material surely will affect on investment cost and make the companies reevaluate their strategy in order to be able to gain profits. One Phinisi ship will have cost around Rp. 8,320,800,000.00, this calculation data of building traditional ship using LVL wood was collected by interviewing one of LVL company in Indonesia, PT. X and ship building company, PT. Y that both were located in Jakarta. Comparing with previous investment cost that using nature wood in building traditional ship, the difference of total investment is not quite far away. So, it is still feasible to continue this business.

Table 3: Investment Cost on Building LVL Traditional Ship

<table>
<thead>
<tr>
<th>Investment</th>
<th>Cost</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVL</td>
<td>Rp 7,000,000,000</td>
<td>It needs approximately 500 m³ of LVL wood in order to build 496 GT Traditional Ship of Phinisi Boat. Each m³ has a price Rp. 14,000,000</td>
</tr>
<tr>
<td>Manufacturing Cost</td>
<td>Rp 1,500,000,000</td>
<td>Service cost to ship building company within the project</td>
</tr>
<tr>
<td>Main Machine</td>
<td>Rp 851,800,000</td>
<td>Marine machine with 500 HP</td>
</tr>
<tr>
<td>Lighting Machine</td>
<td>Rp 9,200,000</td>
<td>Lamp machine with 7500 Watt and S1100</td>
</tr>
<tr>
<td>Crane Machine</td>
<td>Rp 25,400,000</td>
<td>Yanmar TS 230</td>
</tr>
<tr>
<td>Supporting Machine</td>
<td>Rp 26,000,000</td>
<td>Water pump machines: 5 units</td>
</tr>
</tbody>
</table>
The results of Net Present Value analysis, Internal Rate of Return, Profitability Index and Payback Period shows that traditional shipping business even with only one ship used in this study is eligible to do. Therefore, Indonesian traditional shipping industry is not a failure business. By embracing many parties to support this sector, there will be good sign in improving and supporting domestic maritime logistic system to increase economic growth.

In order to strengthen companies profits and attract more parties to join in. An improvement on marketing sector is needed by the companies because marketing play a big role in searching the cargoes. Another alternative to make traditional shipping company better is to utilize the exotic side of traditional shipping which wooden built ship as tourism business unit by providing foreign and domestic tourists to have an experience on sailing with wooden ship. This option, can be done on the ship waiting period, so it won’t disturb main activities of traditional shipping role to transport goods to area that difficult to reach.

Technically and economically, building traditional ship using LVL wood is eligible. But, an advance and comprehensive research of building traditional ship with LVL lumber is needed. As well as the need for studies on government regulations that minimize the potential of traditional shipping industry. However, this research still has shortcomings in predict the uncertainty problems that might occur. Hence, an advance research on this matter is needed, real option may be the new direction in this area.

REFERENCES


ACKNOWLEDGMENT

On this occasion, the authors would like to thank respectfully and humbly to those who have helped in completing this article, especially to:

1. Dr. Ir. Rahmat Nurcahyo, M.Sc., as the thesis supervisor, mentor for discussions during the work of this study and also co-partner of this article writing.
2. Mr. Salim and Mr. Munir, as an owner of traditional shipping company at Sunda Kelapa Harbor. Mr. Sarmin as head of stevedoring at Sunda Kelapa Harbor who have been willing to become a correspondent in this study and are willing to provide the data required.
3. Mr. Nino and the entire team of PT. X, who are willing to become partners in the discussion in order to understand on how to build wooden boat.
4. Mr. Dody as Research and Development staff of PT. Y, who are willing to tell about LVL product that has been produced by PT. Samko Timber.
5. Prof. Yuri, Ayudah D. Prayoga, M.A. and Dr. Ir. Sunaryo, M.Sc., as part of UI lecturer that assist authors in discussions about research methodology.

BIOGRAPHY

**Wegit Triantoro** is a fresh graduate from Bachelor of Engineering degree in Industrial Engineering, Universitas Indonesia. Mr. Wegit now is an awardee of Indonesian Endowment Fund for Education Scholarship for Master Degree Program with the planning to take the chance to continue on Supply Chain Management course at Netherland. His research interests include manufacturing, logistic, quality control and lean. He was a member of assistant laboratory of Manufacturing System in Industrial Engineering Department and hold Head of Research Development role. He was also an active student with several events with most interest in community development program.

**Rahmat Nurcahyo** is currently a fulltime senior lecturer and Head of Quality Management System and Assurance at Faculty of Engineering, Universitas Indonesia. Mr. Rahmat holds his Doctorate degree in Strategic Management, Universitas Indonesia. He is a Certified ISO 9000:2000 Auditor since 2005. He has taught courses in production system, plant layout and total quality management for engineers. He is also a member of IEOM.