Economic Analysis of KM Mina Jaya Niaga
Longliner Conversion to Fish Carrier Ship

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Abstract—KM. Mina Jaya Niaga is an asset that belongs to PT. IKI (Industri Kapal Indonesia) as one of Indonesian State-Owned Enterprises according to Letter of Directorate General of Treasury Ministry of Finance Republic of Indonesia number S-3715/MK.6/2006 at 20 June 2005. There are 14 ships unit that had been completed and 17 ships set unit. Around 14 ships unit that had been completed, 2 units operated by PT. Perinus, 8 units are heavy damage and 4 units operated with minor repair. Therefore, it need immediate decision to tackle the problems. To optimized the operational, KM Mina Jaya Niaga would be operated as a conversion from longliner to fish carrier. This study covers economic analysis based on operational pattern of KM Mina Jaya Niaga as fish carrier. It will be operated on WPP-RI 716 with home based port at Bitung. It will accommodate fish that obtained from fishing vessels of with 50 GT on 4 fishing ground with estimated time for 1 voyage 18,92 hours, loading-unloading at Bitung 1 day, and time to berth at port 4 days. So, operational is 6 days. Variable financing scenarios are performed to repair, modify and re-operate KM Mina Jaya Niaga as a fish carrier ship. Among them are self-funded by PT IKI as the owner of the vessel or joint funding with several parties. If viewed from an economic point of view, the conversion of KM Mina Jaya Niaga from longliner ship to fish carrier ship is feasible and can be a profitable business.

Keywords— conversion, economic analysis, fish carrier ship

I. INTRODUCTION

KM. Mina Jaya Niaga is an asset that belongs to PT. IKI as one of Indonesian State Owned Enterprises according to Letter of Directorate General of Treasury Ministry of Finance Republic of Indonesia number S-3715/MK.6/2006 at 20 June 2005. There are 14 ships unit that had been completed and 17 ships set unit. Around 14 ships unit that had been completed, 2 units operated by PT. Perinus, 8 units are heavy damage and 4 units operated with minor repair. Therefore, it has been a terrible condition for KM Mina Jaya Niaga and need immediate decision to tackle the problems.

Circular letter from Ministry of Maritime and Fisheries Affairs number B.1234/DJPT/P.1410/D4/31/12/2015 about restriction of Ship’s Gross Tonnage size on SIUP/SIPi/SIKPI, which is Fish Carrier Ship restricted to 150 Gross Tonnage. Meanwhile, size of KM. Mina Jaya Niaga is 512 Gross Tonnage. That’s one of factor that made KM. Mina Jaya couldn’t be operated [1].

Because of the restriction rules and to optimized the operational, KM. Mina Jaya Niaga would be operated as a conversion from fish carrier to mother ship. Where, mother ship would be placed in small islands that have high potential to fish catching. Therefore, fisherman could go fishing without worries about the supply of logistics such as fuel and ice.

In addition, recommendation is needed to optimize used of KM. Mina Jaya Niaga for fisherman near small islands. A recommendation that been given is conversion of KM Mina Jaya Niaga from fishing vessel to carrier ship, reviewed on operational aspect.

It is important to know the parameters before doing an economic analysis to find out whether or not a research is feasible. The aim of this study is to examine whether the conversion of KM Mina Jaya Niaga long liner ship into fish carrier ship is feasible by holding on to certain parameters. Few steps of economic analysis on this research are [2]:

A. Cash flow

Cash flow is done throughout the operational years of KM Mina Jaya Niaga. Figure 1 will describes a general graph of the cash flow process.

Where Co is cash outflow or investment, CF is cash inflow (revenue, operational cost, maintenance cost, etc.) and n is investment year.

Cost analysis is conducted to recommend a cost estimate that will be used by a company on their scenarios. Cost analysis that will be conduct including initial, operational and terminal cost [3]:

1) Initial Cost
   Initial cost or initial investment on each scenario. Initial cost includes Capital Expenditure...
(CAPEX), is a budget allocation for purchase, repair, replacement, or modification of some equipment which is classified as an asset for a business or company [4].

Budget allocation includes several considerations, one of them is where the capital investment that is used for equipment purchasing, repairment, replacement or conversion comes from. Is it from their own capital or having loan from the bank, this definitely affects the financial sustainability of this research [5-9].

![Figure. 1. Cash flow diagram](image)

2) Operational Cost

Operational Cost estimated operating costs or Operational Expenditure (OPEX), is budget expended to finance the operations of a business or company. Operational Expenditure (OPEX) which is covered by the company is related to which kind of chartering fee selected. The type of boat rental that used in this research is bare boat charter. For the funding of bare boat charter, the costs covered by company are as follows:

a) Fix Cost

Operational costs are all daily cost during vessel’s operational time and non-operational time. Fixed cost consists of some cost components such as crew salary, crew assurance, and the ship’s lubrication. This cost includes maintenance cost but not dry-docking fee and fuel consumptions.

b) Voyage Cost

Voyage Cost are the costs incurred to earn the freight or other voyage revenue. Voyage cost consists of some components such as fish sales, fuel costs, docking at harbor cost, loading and unloading cost, and etc.

Other than operational and voyage cost, there are several other costs that affect operational cost or Operational Expenditure (OPEX). Those are the costs of docking, administration fee, and ship-chartering fee. Therefore the total of Operational Expenditures can be calculated with the formula:

$$OPEX = A + B + C \quad (1)$$

where, OPEX is Operational Expenditure, A is Operational Cost, B is Voyage Cost and C is

$$IRR = i1 + \left( \frac{NPV1}{NPV1 - NPV2} \right) (i2 - i1) \quad (3)$$

where, NPV1 is NPV value in low interest rate, NPV2 is NPV value in high interest rate, i1 is low interest rate and i2 is high interest rate.

B. Calculation of Economic Feasibility Parameter

There are several parameters to calculate the economic feasibility of a research, such as:

1) Net Present Value (NPV)

Method that used for arranged stock to measure analysis feasibility of research investment. NPV is the difference between investment value and present value with considering time value of money. If NPV > 0, then proposed research could be accepted, meanwhile if NPV < 0 then it will be rejected. Equation (2) shown NPV calculation formula:

$$NPV = \sum_{t=1}^{n} \frac{Rt}{(1 + i)^t} \quad (2)$$

where, t is cash flow time, (i) is discount rate and Rt is net cash flow.

2) Internal Rate of Return (IRR)

An indicator for efficiency level of an investment. IRR is interest rate that will make NPV value considered as zero. Equation (3) shown IRR calculation formula:

where, NPV1 is NPV value in low interest rate, NPV2 is NPV value in high interest rate, i1 is low interest rate and i2 is high interest rate.
III. RESULTS AND DISCUSSION

A. Operational Scenario

After modified from longliner ship to fish carrier ship, KM Mina Jaya Niaga will have home base port in PP Bitung and will be operated in WPP 716. Figure 3. shows the operational scenario from KM Mina Jaya Niaga. Which A-B-C-D symbols are ship operational point, while 1-2-3-4-5 symbols are distance, estimation route and time from each ship operational point. Figure 3. shows operational scenario scheme of KM Mina Jaya Niaga as fish carrier ship.

Based on Figure 2, fish carrier ship starts from PP Bitung to first fishing ground (point A) then second fishing ground (point B) and so on. Operational pattern of KM Mina Jaya Niaga from 1-5 is consecutive and will be ended at PP Bitung. Operational scenario for this fish carrier ship consists of 3 stage, such as:

a) PP Bitung - Preparation Stage

Before conducted the operational stage, should have done the preparation stage. The preparation stage including:

• Bunkering process of fuel, fresh water and logistic in PP Cempae. Bunkering of fuel and fresh water based on capacity KM Mina Jaya Niaga which has fuel oil tank capacity 349,54 m³ and fresh water tank capacity 33,76 m³.

• After finish the bunkering process, then sail to fishing ground point A.

b) Point A, B, C, D - Operational Stage

On the operational stage, ship will be operate around fishing ground, which means :

• Fish carrier ship will be operated at point A, B, C, and D. Every point has several fisherman ship with a measurement of 50 GT, the fisherman transfer their fish catches to KM Mina Jaya Niaga as a fish carrier ship. The capacity of 50 GT ship fit up to 31,25 ton with comparison between ice and fish is 50:50 so, the total of fish catches which transferred from fisherman ship is estimated in amount of 15 ton for every 50 GT ship. While waiting for fish transferring to KM Mina Jaya Niaga fish carrier ship, they also do fuel transferring, logistic
transferring and crew transferring according to their needs. All of the process is estimated takes 2 hours for every single ship.

- Fish that have been obtained from fisherman will be gathered in the processing room.
- Fish that has been obtained from fisherman will be cut and cleaned.
- After is cleaned then it washed with ice water. Assumed that 1 kg of fish need 1 kg of ice.
- After cleaning process is done, fish will be included to trey and getting frozen at freezer around 8 hours, then transferred to the fishing hold (cold storage).

Figure 2. Operational Scenario KM Mina Jaya Niaga as Fish Carrier Ship

c) PP Bitung – Selling Stage

After fish is collected and stored at the inside of cold storage, fish would be sold to partner or market. From this selling stage, it become benefit for the operator company.

Total of the distance that KM Mina Jaya Niaga as a fish carrier ship for 1 voyage from PP Bitung - A – B – C – D – PP Bitung is 157.25 km, with velocity servis 8 knot. It is estimated that 1 voyage takes 10.92 hours plus the estimated loading and unloading time in each fishing ground is 2 hours, so the total time of 1 voyage is about 18.92 hours or 0.8 days. If 1 trip time coupled with loading and unloading process in PP Bitung is estimated to be up to 1 day and estimated time to berth on port is 4 days, then total operational of KM Mina Jaya Niaga is 5.7 days or 6 days.

The cost from operational of KM Mina Jaya Niaga affected by the distance and operational time as a fish carrier ship. The explanation about total cost which is needed by KM Mina Jaya Niaga will be shown at economic analysis.

B. Capital Expenditure

Capital expenditure is the investment cost which used to start the research. Capital expenditures include repair and modification costs for KM Mina Jaya Niaga plus ship price.

Table 1. shows total capital expenditure of KM Mina Jaya Niaga’s.

<table>
<thead>
<tr>
<th>Capital Expenditure of KM Mina Jaya Niaga</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cost for repair and modification</td>
</tr>
<tr>
<td>Price of the ship</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

C. Operational Expenditure

Operational Expenditure is an outflow cost for KM Mina Jaya Niaga’s operational activities. Operational Expenditure has a strong impact to company revenue. Because of that, the calculation of Operational Expenditure must clear and precise.

Operational Expenditure affected by several cost component, such as:

a) Revenue that comes from sales of fish per month

Sales of fish depends on the amount of fish catches which can be affected by the weather or season. Figure 3 will show the estimation of skipjack tuna production in ton which the collective assumption from fishing ground fitting the fishing season.

Based on the Figure 3, can be obtained that the amounts of Skipjack Tuna catches in April until July (medium season), is estimated around 250 ton/month. In August to November (high season), the amount of Skipjack Tuna catches is estimated around 300 ton/month, while in January to March and December (low season) the number of catches is 0 due to the bad weather and these 4 months are used to do the ship docking.

Figure 4 Revenue Skipjack Tuna (Milliar Rp) will show the estimation of income in billion rupiah units from the selling of the skipjack tuna production based on the fishing season, and the estimation of skipjack tuna selling is Rp30,000,- per kilogram.
Based on the figure 6, can be obtained that the total income of selling the fish catches from April until July (medium season) is Rp7,500,000,000, -. From August until November (high season) fish catches income is Rp9,000,000,000, -, while in January until March and December (low season) the number of income is 0 because there are no fishing activity.

b) Operational cost which consist of Fixed Cost and Voyage Cost

Fix cost is the number of cost needs to be pay fully in a month, whether the ship is operating (high and medium season) nor the ship is docking (bad weather and docking). Fixed cost consists of some cost components such as crew salary, crew assurance, and the ship’s lubrication.

Voyage cost is the amount of expense that needs to be pay only when the ship is operating (medium and high season). Voyage cost consists of some components such as fish sales, fuel costs, docking at the harbor cost, loading and unloading cost, and etc.

Figure 5 will show comparison of fix cost and voyage cost within 1 year period.

c) Additional cost which consist of docking cost and administration cost.

Figure 6 will show a comparison of operational expenditure costs within 1 year.

From the figure 6, can be seen that in low season (December, January, February, March) the company will incur losses. This is due to the low season no income at all, but still had to pay fixed costs. Table 2. shows the estimated amount of total operational expenditure in a year.
Figure 5. Fix Cost and Voyage Cost

Figure 6. Operational Expenditure.

<table>
<thead>
<tr>
<th>Type of Cost</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Revenue</td>
<td>Rp 66,000,000,000</td>
</tr>
<tr>
<td>B. Operational Cost</td>
<td></td>
</tr>
<tr>
<td>Fixed Cost</td>
<td>Rp 1,263,000,000</td>
</tr>
<tr>
<td>Voyage Cost</td>
<td>Rp 62,700,552,604</td>
</tr>
<tr>
<td>C. Additional Cost</td>
<td>Rp 1,540,000,000</td>
</tr>
<tr>
<td>Total Cost</td>
<td>Rp 65,503,552,604</td>
</tr>
<tr>
<td>Profit and (Loss)</td>
<td>Rp 496,447,396</td>
</tr>
</tbody>
</table>

D. Cash flow

The arrangement of cash flow consist cost of capital expenditure, cost of operational expenditure, and additional cost per year. Cash flow arrangement will begin from year-0 for repairing and modifying the ship, and for 15 years of ship operation. Error! Reference source not found. will define the total of profit and loss from year-0 to year-15 of operation of the ship.
From the figure below, we can see that the value total profit and loss in each year always changing. This is due to several assumption factors, such as:

- Increase salary of crew
- Increase fuel cost
- Increase fish price
- Increase maintenance cost
- Etc.

After knowing profit and loss of each year, we can calculate Earning After Tax (EAT). Equation 5 will show how to calculate Earning After Tax (EAT):

\[
EAT = (Revenue - Expenditure - Depreciation - Installment - Tax) + Depreciation
\]

where, depreciation added again due to the ship depreciation not reduce revenue, but only reduce the value of the assets of the research which the value of the ship.

From Earning After Tax (EAT) we can determine the parameters that used to indicate whether the research is feasible or not feasible. The parameters is a value of NPV, IRR and Payback Period (PP). Figure 8 will define the total Earning After Tax (EAT) from year-0 to year-15 with interest rate \( i \) and Tax assumption 15%.

After knowing Earning After Tax (EAT) we can determine the value of NPV, IRR and Payback Period (PP). And based on figure above the value of NPV Rp4.629.121.002, IRR of 29%, and Payback Period (PP) 4.27 year. From that parameters we can conclude that this research is feasible because the value of NPV > 0, IRR higher than interest rate and time of Payback Period less than duration of ship operation.

IV. CONCLUSION

Based on the analysis of this research study which refer to data analysis results and others information, then some conclusions could be taken as explained below:

1. Operational scenario from KM Mina Jaya Niaga, this fish carrier ship will be operated on
WPP-RI 716 with home based port at PP Bitung. KM Mina Jaya will accommodate fish obtained from fishing vessels of with 50 GT on 4 fishing ground with estimated time for 1 voyage 18.92 hours, loading-unloading at PP Bitung 1 day, and time to berth at port 4 days. So, operational time for KM Mina Jaya Niaga is 6 days. That means within 1 month KM Mina Jaya Niaga will do 5 voyage.

2. In this research, some variable financing scenarios are performed to repair, modify and re-operate KM Mina Jaya Niaga as a fish carrier ship. Among them are self-funded by PT IKI as the owner of the vessel or joint funding with several parties as can be seen in each business scenario.

3. If viewed from an economic point of view, the conversion of KM Mina Jaya Niaga from longliner ship to fish carrier ship is feasible and can be a very profitable business.

REFERENCES