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Improving Vessel Service Performance by Optimizing Pilot and Tug Services: the case of The Port of Tanjung Priok, Indonesia

by

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Abstract

Vessel service as beginning and closing of the entire chain of services in the port holds a vital role in achieving the overall performance of port services. The most important performance indicators are waiting time and readiness tugboat. Achievement of service performance boat, with two main activities namely scouting service and delays, largely determined by the quantity and quality of equipment, human resources and proper systems & procedures.

This thesis takes a case study at Port of Tanjung Priok as a major port in Indonesia, where the service ship is currently one of the problems that cause service user complaint. The complaints are mainly due to high waiting time for ships. From the results of a preliminary evaluation of vessel service, cause of the high waiting time at the Port of Tanjung Priok is the lack of pilot and tug boats which is the main production factor of service ship. In this study, the authors calculate the optimal number of pilot and tugboats for supporting the achievement of a zero waiting time target. In addition to the adequacy of the number of equipment in this study the authors also evaluate the systems and procedures, asset maintenance systems that determine the readiness of equipment and management systems used.

In this study, the authors also evaluate the position of Port of Tanjung Priok Port in the port industry development in Indonesia and internationally, primarily associated with regulatory changes in the Indonesian ports management, where the industry becomes more open and competitive, and position in competition with international ports around.

Segment of vessel service at Port of Tanjung Priok in addition to support the achievement of operational performance also contribute substantially to the company's financial performance. So in addition to optimizing operational performance, this thesis also evaluated the system and form of management of pilotage and towage services that more efficient and flexible. In order to face of competition in the port industry after the implementation of new port regulation that is more opened and competitive, it have to find new management system that more flexible. In the final section of this thesis, the authors propose several improvement plans related to the investment of equipment and human resources, asset maintenance system and also a proposal to change pilotage and towage services as a separate strategic business unit.

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List of Abbreviations

GT	-	Gross Tonnage
GRT	-	Gross Registered Tonnage
HP	-	Horse power
IDR	-	Indonesia Rupiah
IPC II	-	Indonesia Port Corporation II
JICT	-	Jakarta International Container Terminal
KM 24	-	Decree of the Minister of Transportation number KM. 24 year 2002 regarding the Provision of Pilotage
MLWS	-	Mean Low Water Spring
PM	-	Preventive Maintenance
TEU's	-	Twenty feet equivalent units
SLA	-	Service Level Agreement
UNCTAD	-	United Nations Conference on Trade and Development

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Chapter 1 Introduction

1.1. Background

The management of public seaports in Indonesia is currently conducted by State Owned Enterprises, where the entire territory of Indonesia is divided into four areas of management, each managed by Indonesia Port Corporation I to IV. The working area of Indonesia Port Corporation I includes the ports in the north part of Sumatera Island and Riau Island. The working area of IPC II includes the ports in the south part of Sumatera Island, west part of Java Island and West Kalimantan. The working area of IPC III includes the ports in Central and East Java, Kalimantan Island and Bali Island. And the working area of Indonesia Port Corporation IV includes the ports in Sulawesi Island, Maluku Island and Papua Island.

Currently there are 111 public ports in Indonesia (Ministry of Transportation,2009) with one main port in each area, namely the port of Belawan in Medan (under the management of Indonesia Port Corporation I), the port of Tanjung Priok in Jakarta (under the management of the IPC II), the port of Tanjung Perak in Surabaya (under the management of IPC III) and the port of Makassar in Ujung Pandang (under the management of Indonesia Port Corporation IV).

Port of Tanjung Priok as the major port under the management of IPC II, located in Jakarta, the capital city of the Republic of Indonesia, is the main and the largest port in Indonesia, accordingly the role and function of Port of Tanjung Priok are very strategic for the economy and sea transportation in Indonesia. The vital role of Port of Tanjung Priok can be seen from the large volume of goods be handled at the Port of Tanjung Priok. The volume of activity in Port of Tanjung Priok is high especially because it is backed up by a very productive hinterlands which are the economic hub and industrial center in Indonesia, namely Jakarta and West Java.

Based on the data of ship traffic and flow of goods through the Port of Tanjung Priok during the last five years showed a significant increase, where annual traffic increased 9.96% in year 2007, but as the impact of global crisis in year 2008, ship calls turn back to decrease by 1.58% in year 2008 and 4.85% in year 2009. Ship flows through Port of Tanjung Priok in 2009 reached 16,523 units. In the year 2009, the flow of goods at the Conventional Terminal at Port of Tanjung Priok reached 40.8 million tons and container flows in the Tanjung Priok Container Terminal reached 3.8 million Teu's. (source: IPC II)

The growth of the ship and goods flow is a description of industrial growth in the hinterland areas as well as national trade growth, this is based on the fact that the ports in Indonesia today remain having their roles as ports of origin and ports of destination, but not a transshipment ports.

The role played by Port of Tanjung Priok as the origin and destination port, nowadays has shifted to become national transshipment port. In addition to serving goods originating from its hinterland in Jakarta and West Java, Port of Tanjung Priok is now become the transshipment port for container transport from other ports in Indonesia such as the Port of Panjang, Port of Pontianak, Port of Palembang and Port of Teluk Bayur. Accordingly, the Port of Tanjung Priok has been acting as the "National Hub". This role is supported by the increasing number of containers as a

result of shifting patterns of transportation from bulk and general cargo into containers. From the overall cargo flows at Port of Tanjung Priok, 65% is exported and imported goods, while 35% are inter-island cargo (source: IPC II, 2010). From this data we may see the very important role of Port of Tanjung Priok in the Indonesia's economy.

Generally, the service activities carried out by the IPC II consist of three groups of services, i.e. vessel service, cargo services and assorted services.

Vessel service includes:

a. Anchoring services, are the services rendered to the ships to be anchored safely while waiting for further services such as mooring, loading and unloading or waiting for other activities like-docking and document processing). These services aim is to avoid the possibility of collision with another ship which was anchored. In this case the Port of Tanjung Priok has to ensure sufficient pool depth so that the ships will not be aground and will not interfere with boat traffic on groove.

b. Pilotage services, are the services for guiding ships in the navigation channel toward the dock or from the harbor to the dock. These services aim is to maintain the safety of the ships, their passengers and cargo when entering the harbor channel.

c. Towage and mooring services, are the services of towage the ships when entering the navigation channel to the dock or from the harbor to the dock. Mooring services is an activity to bind and ship unlace which move to lean on or departed from the pier, buoy, mooring dolphin or jetty

d. Berthing services, are the services provided in the form of providing facilities for the boats tethered to perform loading and unloading activities safely and smoothly.

e. Water Supply, are the services of filling fresh water for ships.

Cargo handling services include:

a. Stevedoring, which is conducted since the cargo is moved out from the ships until the time of delivery of goods to the owner. Stevedoring activities include the activities of loading or unloading of goods to and from the ship to the pier, the cargo handling activities are to arrange and to move goods from the docks to the warehouse or open storage and vice versa, and the receiving/delivery activities to receive/deliver goods to its owner at the warehouse door or field.

b. The provision of berth for loading and unloading activities to and from the ship.

c. Storage activities, is the provision of warehouse or open storage for cargo storage temporarily since the cargo was unloaded until it is delivered to the owner or since the cargo is received from the owner until it is loaded to the ships.

While the miscellaneous services include the rental of equipments for the loading and unloading activities as well as supporting tools for loading and unloading activities, the supply of clean water to the office premises and other commercial

facilities inside the port area, the lease of land and building for industries and port activities-related businesses, and managing the port gate system.

From all these business segments, the segment of vessel service provides the biggest contribution to IPC II's revenue, especially in Tanjung Priok branch. Contribution of Vessel service to Port of Tanjung Priok can be seen in table below:

Table 1 Contribution of Vessel service Revenue in Port of Tanjung Priok

Unit: million Indonesia Rupiah

Description	2005	2006	2007	2008	2009
Vessel service revenue	291,610.36	277,785.58	289,176.74	351,733.89	370,591.44
Total Revenue	693,388.17	730,094.38	796,932.56	912,377.80	976,213.84
Percentage	42.1%	38.0%	36.3%	38.6%	38.0%

Source: IPC II, Tanjung Priok Branch

While in terms of costs, the portion of the cost of vessel service is less than 30% in the last five years.

Table 2 Cost of Vessel service in Port of Tanjung Priok

Unit: million Indonesia Rupiah

Description	2005	2006	2007	2008	2009
Vessel service costs	85,690.63	113,332.97	94,323.79	106,162.20	102,445.58
Total costs	294,280.43	336,701.00	331,002.49	365,151.22	379,663.25
Percentage	29.1%	33.7%	28.5%	29.1%	27.0%

Source: IPC II, Tanjung Priok Branch

With the composition of revenues and expenses as shown in the tables above, has placed the segment of vessel service as the biggest contributor to the Port of Tanjung Priok branch's profits. So the performance of Port of Tanjung Priok branch will greatly be influenced by the achievement of vessel service performance. Therefore it is very important for the IPC II to continue improving and enhancing the performance of vessel service.

Table 3 Contribution of Vessel service to the Profit of IPC II in Port of Tanjung Priok

Unit: million Indonesia Rupiah

Description	2005	2006	2007	2008	2009
Vessel service profit	205,919.73	164,452.61	194,852.95	245,571.69	268,145.86
Total Net Income	399,107.73	393,393.38	465,930.07	547,226.58	596,550.59
Percentage	51.6%	41.80%	41.82	44.88%	44.95%

Source: IPC II, Tanjung Priok Branch

In terms of quality of services, vessel service activities have always been the focus of the government's attention and port customers, because the smoothness of vessel service is very influential on the overall performance of the port services. Vessel service activities, especially the pilotage services and towage is the beginning and the end of all port services activities, so the performance and the speed of vessel service will greatly affect the overall port performance.

The vessel service have become the problem at the Port of Tanjung Priok and they have decreased the willingness of operators of the big ship to operate a direct call fleet to and from Port of Tanjung Priok. Based on the result of the customer survey on IPC II website at July 15, 2010, 33.4% of respondents said that the vessel service in the Port of Tanjung Priok are very less. On the other hand the value of investments and corporate burden of operational cost and maintenance cost of tugboat are very expensive. It means that the Port of Tanjung Priok needs efforts to improve the vessel service performance and optimizing number and capacity of vessel service resources in the Port of Tanjung Priok.

1.2. The Purpose of Study

The purpose of this study was to evaluate the conditions of vessel service at the port of Tanjung Priok. The vessel service are very influential on the overall performance of port services. If the ships are marked bad, those are indicated by unachieved performance indicators such as a very high waiting time then the activities of other services such as stevedoring, bunker and docking will be disrupted. In addition, delays in vessel service will also have an impact on the failure to fulfill a predetermined shipping schedule. The deviation from the scheduled departure of a ship at the port will have an impact on the fulfillment of the schedule at the port of destination.

In this thesis we analyze the adequacy of the pilot and tug boats which become major factor in the achievement of good ships service performance at a port, especially at the Port of Tanjung Priok. Vessel service at Tanjung Priok Port have not been satisfactory to the customers, where according to the result of the customer satisfaction survey, from all aspects measured there were no item met the customers expectations. From initial observation and research, it can be concluded that the cause of underperformance is the lack of pilot and tug boats. In addition, it is also caused by several other issues that are still related to the realization of performance level, such as human resources and systems and procedures.

The aim of this thesis is to evaluate the activities of pilotage and towage services at the Port of Tanjung Priok, and to calculate the ideal amount of pilot and tugboats required. Evaluation conducted to determine the cause of under performance of vessel service at Tanjung Priok port. In addition we also analyze the external conditions related to shipping and port industry as a whole. Therefore, besides recognizing the existing problems, this thesis may show the opportunities and challenges to be faced by the Port of Tanjung Priok, particularly as it relates to the activities of shipping. From the results of the analysis and evaluation of the activities of pilotage and towage services we hope to provide recommendations for improvements so that the ships services activities at Tanjung Priok Port will be better and will be able to support all of port services at the port of Tanjung Priok more efficiently and will able to compete with other ports around. In addition, if the vessel service at the port of Tanjung Priok is good, this will be a model for other ports under the management of IPC II.

1.3. Structure of Thesis

In this thesis, we discuss the topic of improving vessel services performance at Port Of Tanjung Priok, Indonesia by optimizing pilot and towage service, with the following writing structure:

Chapter 1: Introduction
- Introduction (Background)
- Purpose of The Study
- Structure of thesis
- Literature Review related with Pilot & Towage Service
- Methodology and Research Approach

Chapter 2: will dicuss the Market Trends on Port of Tanjung Priok,
- related with Shipping
- related with Port and Logistics Industry
- related with Vision, Plan and Policy

Chapter 3: will analyze the Pilot & Towage Service on Port of Tanjung Priok
- Present Condition
- Performance Measurement (including regulation) & Problems
- Analysis of competitors
- Chapter Conclusion

Chapter 4: will Calculate The Optimal Number of Pilots and Tug boats required for Ships Services at the Port of Tanjung Priok
- Concept of Model
- Methodology and Data
- Forecasting
- Chapter Conclusion

Chapter 5: Strategy on Pilot & Towage Service for Port of Tanjung Priok
- Corporation Plan
- Investment Plan
- System and Operation Improvement Plan
- Regualtion Improvement Plan
- Chapter Conclusion

Chapter will contained with Conclusion and Recommendation
- Thesis Summary and Conclusion
- Future Plan

1.4. Literature Review

To be able to determine that an activity is good or bad, whether economic activities, operationaal activities or other industrial activities, we need a standard of measurement or a standard of performance. Standard of performance is required to assess whether an activity meets specified goals or targets. In addition, performance measurement is also very important to assess and compare the performance between players in a single industry. Mentzer and Konrad (1991)

defined ‘performance’ as a research on the effectiveness and efficiency of implementation of planned activities where the assessment is made on how well the targets set have been met.

In the port industry, performance measurement can be performed in two major aspects i.e. operational aspects and financial aspects. From the operational side, the dominant measurement of performance is productivity. In the port management, productivity can be measured through the loading volume per unit time (box / hour, tons / gang / hour, throughput), the speed of service (turn round time, waiting time). While in the financial side the performance can be measured by the revenue contribution, revenue cost ratio, profit margin or the ratio of investment.

United Nations Conference on Trade and Development (UNCTAD,1976) has formulated a guideline to measure the performance of the port which focuses on measuring the productivity and effectiveness of an activity and has been used as a reference by the ports in the world. The performance indicators suggested by the UNCTAD covers several aspects:

Table 4 Port Performance Indicator - UNCTAD

Financial Indicator	Operational Indicators
1. Tonnage worked 2. berth occupancy revenue per ton of cargo 3. cargo handling revenue per ton of cargo 4. Labor expenditure 5. Capital equipment expenditure per ton of cargo 6. Contribution per ton of cargo 7. Total contribution	1. Arrival late 2. Waiting time 3. Service time 4. Turn around time 5. Tonnage per ship 6. Fraction of time berthed ships worked 7. Number of gangs employed per ship per shift 8. Ton per ship hour in port 9. Ton per ship hour at berth 10. Tons per gang hours 11. Fraction of time gangs idle

Source: UNCTAD (1976)

Port performance indicator assessment is not only applicable in conventional ports, but also in the modern ports serving containers with modern container terminal facilities. To measure the performance of port services as a whole, according to Prokopenko (1987) is more appropriate when using total productivity approach that has been considering two important variables in a service activity that is capital and labor. Capital in this case including facilities and equipment. When associated with the topic of this thesis, namely improvement of vessel service performance, particularly pilotage and towage services, tugboats are the capital used to serve the ship and the human resources are the pilots.

Port efficiency is also a very important thing for service users to determine which ports will be selected. The efficiency of port services in this case means speed and reliability. For most users of the port services, especially shipping companies, time is very important because the speed and timeliness of services at the port do not only

mean cost efficient but also mean a good image and the trust that must be maintained. The longer the ship docked at the port, then the higher port costs to be incurred. Also during the waiting for services, ship operators still have to bear the high operational costs such as fuel costs, water, crews and supplies costs. Adapted from UNCTAD (1992), on-time delivery, is the focus of attention of the shipper. In the current era of globalization, competitions in many industries are very tight. So the timeliness of delivery of goods from producers to consumers, as well as from supplier to consumer has become the key to successfully compete. Port as one of the logistics chain must be able to ensure fast and reliable service. (Tongzon, 2002). In addition to direct costs such as port fees and ship operating costs, shippers are more concerned with the indirect costs that should be their responsibility due to delayed service at the port. The cost is a loss of markets and market share, loss of customer confidence and lost opportunities because of inefficient service (Tongzon, 1995). Even according to Murphy, Daley and Dalenberg (1992), the facts show that some service users were willing to pay higher port fees in return for a more efficient service and superior.

1.5. Methodology and Research Approach

The thesis will focus to discuss on a few things as follows:

a. What is the optimal number of pilot for the vessel service activities at the Port of Tanjung Priok?
   Do the number of pilot for the vessel service at the Port of Tanjung Priok can meet the demand and how the recent procedures support this service? And the most important is how much waiting time level in Port of Tanjung Priok can be reduced to as the minimum as possible.

b. What are the optimal number and capacity of tugboats needed?
   Do the number and capacity of tugboats can meet the demand of towage service as regulated by authority? It will also affect on operating cost and maintenance cost.

c. What is the most appropriate strategy to improve service performance of boats at the port of Tanjung Priok? Do the current systems and procedures have provided high satisfaction to the customer? And whether management of pilot and tugboat is currently supporting the achievement of optimum service performance?

In order to answer the main question of the thesis, the study will be through some steps as follow:

a. Collecting related data, i.e. data related with vessel service activities at the port of Tanjung Priok ship, target and actual performance, record of technical problems, the list of consumer complaints. In addition, financial performance data of vessel service segment is used to see the contribution of the service segment of the ship to the company's overall financial performance. Data will be collected through:

   1) using the operational data created by Indonesia Port Corporation for of internal and external purposes.

   2) conduct direct interview with relevant officers.

3) conducting direct observations in the field.

b. Evaluating the current condition of the vessel service at Port of Tanjung Priok. The author evaluates the conditions of the vessel service at the port of Tanjung Priok which is currently in terms of operational, service procedures, the amount of resources used and the existing problems.

c. Analizing Market and Technology Trends. To know the port market trends and technology that influence the vessel service operation.

d. Analyzing recent regulations, where the Law of the Republic of Indonesia number 17 year 2008 about Shipping to be impelemented effectively. Author will analyze potential changes in port management pattern and will influence to the business of pilotage and towage services.

e. Analyzing demand and services needed. Under the existing conditions the author prepares the formula for calculating the amount requirement of pilot and tug boats at the Port of Tanjung Priok.

f. Calculating the optimum number of pilots and tug boats required.

g. After getting the results of calculation of the ideal number of pilot and tug boats, the author will try to make vessel service-related strategies so that the adequate number of tugboats and pilots that is the backbone of vessel service activities can be optimized and may provide larger contribution to company performance.

h. Making conclusions based on study results and conclusions in each chapter. In addition, the author also proposes several plans and activities that can be performed by the readers of this thesis related to the results of this study. With hope the results of this study is the beginning of further studies and as a good initial idea for the improvement of the vessel service at other ports.

Considering that currently there is no official literature presenting the formula to calculate the number of pilot and tugboats required at a port, the writer will try to create my own formula that is required based on the calculation pattern used in the operational planning at the Port of Tanjung Priok. Formula to be made is by considering the relationship among these factors:

a. number of ships that require services
b. duration of each service, including the time for pilotage services and the time required to deliver and pick-up pilot from pilot station to the ship and vice versa.
c. pilot work hours
d. number of ships that are required on each service
e. average time of tugboat available for use.

With consideration of the abovementioned aspects, then the formula to be created is expected to provide accurate and reliable results and in accordance with desired conditions.

Chapter 2 Market Trends on Port of Tanjung Priok

2.1. Related with Shipping

The growth of world trade as the main factor to the increase of traffic and cargo flow in sea port industry can not be separated from the existence of globalization era in the 1990s. Since the beginning of the globalization era, international trade increased rapidly(Mc Calla,1999). This is due to the fact that region restrictions do not exist anymore and the whole world becomes one market where the competition becomes more widespread area. International trade is no longer confined to the production of goods but also consumer goods. (Fremont, 2009)

The increase of trade flows will automatically be followed by the increase in transportation demand. With the broader market, so the production scale and market demand to be covered will increase. Increased production will require transport with a larger size or with a total fleet is added. Increased demand will directly affect the shipping industry, as we know almost 90% of the flow of goods between countries and between islands in the world is by using sea transport.

The innovation of shipbuilding technology has enabled the construction of the ships with a very large size. Transportation use of large ships capable of improving the efficiency of the transportation cost per unit of goods. However, the efficiency can be achieved at the optimum level of utilization of the ships. If the utilization of ship is low where the ship carrying cargo under capacity, it will cause the cost of transportation becomes more expensive.

The desire to use large ships require harder effort from ship managers to optimize the use of the available capacity. Where in each fleet should be fullfiled with the cargo that meet a feasible economies of scale. Failure to fill at the economies will cause losses to the owners of the ship, because they must bear the operational costs that are the same as when the ship is fully loaded. Heavier cost to be borne by the liner shipping company where they must perform a routine voyage with or without carrying cargo.

To overcome these problems, nowadays some of the shipping companies make the following policies:

1) Establishing global alliances with other shipping companies with several major goals, as explained by Song and Panayides (2002) and Midoro and Pitto (2000)namely :
    a. financial objectives, that through the alliance they are expected to reduce investment costs and risks can be divided.
    b. economic objectives, namely in order to achieve optimum economies of scale with a focus on service to customers in a consistently and certainly.
    c. strategic objectives, it will be the way to expand their market share or entering a difficult market to penetrate.
    d. marketing objectives, provide better service to customers through a more flexible, reliable, frequent and complete.
    e. operational objectives, through increasing ship utilization and better planning.

2) There is a tendency that shipping companies want to manage their own terminal (Nottebom, 2004). In several international ports currently shipping companies have been managing the terminal, such as Maersk Line manage APM Terminals. This strategy is known as vertical integration. Vertical integration will allow shipping lines to contact directly with the cargo owner, that in conventional shipping business, shipping lines only contact with the shipper, which number is very limited (Shi&Voss, 2008). This trend required management of ports to be more competitive to maintain their customers. Shipping lines which have their own terminal will re-route their fleets to accommodate all of their business. If port operators or terminal operators fail to develop a good and beneficial cooperation with shipping companies, they will be left by their customers.

Based on the new regulation in Indonesia i.e. Law number 17 year 2008 about Shipping and Government Regulation number 61 tahun 2009, there will be a real challenge to IPC II to be able to compete with other operators of ports that will be built by private, especially in Jakarta as the most attractive and potential location. IPC II has been cooperated with private investors to operate container terminal in Tanjung Priok, namely Jakarta International Container Terminal and Koja Container Terminal. Indonesia Port Corporation I has also signed a Service Level Agreement and memorandum of understanding to build intensive communication with its major customers. This action is an anticipative strategy to maintain their existing customers and intensive communication with the shipping companies. Good communication simultantly and good services provided will avoid and reduce their desire to make their own ports.

In connection with the market trend, it also presents a change in the ship size that coming to Port of Tanjung Priok. These changes can be seen from the average gross tonnage (GT) per unit of ships visiting the Port of Tanjung Priok in the last five years, where the average GT of ships increased from year to year, as the table below.

Table 5 Number of Ship Call at Port of Tanjung Priok

No	Description	unit	2005	2006	2007	2008	2009
1	Inter Island	unit	12,105	10,863	12,054	12,789	12,548
		GT	28,613,070	27,496,632	28,006,329	30,038,049	31,095,157
2	Ocean Going	unit	5,269	5,351	5,775	5,321	4,683
		GT	61,191,510	59,330,955	61,024,195	62,946,523	62,889,879
3	Total	unit	17,374	16,214	17,829	18,110	17,231
		GT	89,804,580	86,827,587	89,030,524	92,984,572	93,985,036

Source: IPC II, Tanjung Priok Branch

When compared with the total ship arrivals in all of the commercial ports in Indonesia, then the ship flow through the Port of Tanjung Priok is currently 6.5% of total ship arrivals in Indonesia based on the unit while under Tonage Gross size by 15%. Market share is relatively unchanged in the last five years. This indicates that

the current growth of ship calls in the port of Tanjung Priok in line with the growth of Indonesia's national trade. In addition, the table above also shows that almost no significant changes in shipping patterns in Indonesia.

From the table of ship call in last five years we can calculate the average size of ship visit to Port of Tanjung Priok (Gross tonnage per unit). Then the trend of ship size can be analyzed :

Table 6 Average of Ship Size at Port of Tanjung Priok

No	Description	Unit	2005	2006	2007	2008	2009
1	Inter Island Ship	GT/unit	2,364	2,531	2,323	2,349	2,478
2	Ocean Going Ship	GT/unit	11,613	11,088	10,567	11,830	13,429

Source: IPC II, Tanjung Priok Branch

From the table above we can see that the average weight of the ship for domestic shipping is much smaller than ocean going shipping (international). The size of ships used for domestic or inter-island shipping seems do not experience significant growth. This corresponds to a pattern that inter-island trade is still limited to the transport of agro-industrial goods as well as mining products such as sand, coal and consumer goods for domestic needs which volume is relatively unchanged. Changes in the pattern of breakbulk transport to container transport are not affecting the volume of inter-island trade. With the pattern of container freight transport is also more efficient, so as to transport the same volume of cargo ships simply use a small container ship. While international shipping shows an increase in average gross tonnage per unit, this shows the size of ships became larger. The role of Tanjung Priok Port as a national hub is seen with increasing number of container ships arriving and as well as the size of larger ships. Goods previously transported in the form of Breakbulk by ship directly to their destination, with the pattern that the container is more efficient, the charge would have to wait and transported together. Here the function of the Port of Tanjung Priok become a national hub, so the number of ship arrivals also increases and the size of ships are bigger. The increase of ship traffic from other ports in Indonesia are mainly in the form of inter island container ships. Its role as a hub port would encourage the emergence of the large ships to conduct direct lines from the Port of Tanjung Priok to major ports in continental Europe, America and Africa.

Besides the potential increase in market share that follows the higher flow of goods between islands, then the potential direct international shipping will also need to get serious attention. This is because basically the location of feeder ports for Port of Tanjung Priok Port, have almost same distance to the other ports in the South East Asia such as Port of Singapore, Port of Klang and Port of Tanjung Pelepas. When Port of Tanjung Priok is unable to provide services according to their expectations, then there is the potential for customers which were originally tranship via Port of Tanjung Priok move to those ports. This will result that Tanjung Priok port will lose market share both for inter-island ships or ocean going ships that will continue to the port of destination.

With the existing conditions that the deepest draught of harbor can only serve ships with maximum draft of 11 meters, so if there is no new development and significant

changes in port facilities such as widening and deepening of the channel and basin, basically there will not be a significant change of the ship size that can be served at the port of Tanjung Priok.

2.2. Related with Port and Logistic Industry

As the major port in Indonesia, Port of Tanjung Priok can become an indicator of activity and growth of Indonesia economy. It currently handles more than 30% of intenational trade of commodity in Indonesia outside oil and gas. Port of Tanjung Priok is currently also handling more than 50% flow of import and export of goods of Indonesia, so the Port of Tanjung Priok has a very important role in economic activities and become the barometer of economic development of Indonesia (source: IPC II). By looking at the ship traffic and stevedoring activities at Tanjung Priok Port, we may estimate the condition of the Indonesia economy.

Strategic position of the Port of Tanjung Priok, especially is supported by several conditions as follows:

a. Port of Tanjung Priok is located in Jakarta, the capital city of the Republic of Indonesia which is also the center of national economic activity.

b. Tanjung Priok port is a port with most complete facilities in Indonesia. in addition to port facilities for ship berthing and modern facilities for loading and unloading of goods (general cargo and container), Port of Tanjung Priok also supported by the existence of complete Intermoda transport. To transport goods from origin location to Port of Tanjung Priok and vice versa, customers can now use various transport modes namely through the sea with inter-island ships, trains or using the highway transportation (trucks and small cargo vehicles). There are three most modern container terminal in Indonesia located in Port of Tanjung Priok Port, ie :

    1) Container Terminal I and II, operated by PT Jakarta International Container Terminal (JICT) which is a subsidiary of Hutchinson Port Holding, which is already the largest container terminal operator in the world.

    2) Container Terminal III, which is managed by the Management Joint Operation between the IPC II and Hutchinson Port Holdings.

    3) Regional Harbour Container Terminal managed by PT. Multi Terminal Indonesia, a subsidiary of IPC II.

c. Port of Tanjung Priok is able to serve ships with a draft -11 meters, this is the advantage of Port of Tanjung Priok than other major ports in Indonesia such as the Port of Belawan, Port of Tanjung Perak and Port of Makassar.

The high number of ships call and volume of goods flow through the Port of Tanjung Priok is because it is backed up by hinterland which is the center of industry and economic activties in Indonesia, namely West Java, Jakarta and Banten. These three areas are the main industrial areas where many national and international industries are located.

Based on the data released by Ministry of National Development Planning, foreign investment in Jakarta is equal to 45% of the total foreign investment in Indonesia (PKKSI, 2010). This fact that Jakarta is the most potential to become an

international city. its potential can be realized if there are full supports from other sectors such as regulation, telecommunication, information technology, and also very important is the capacity and service quality of Port of Tanjung Priok and Sukarno Hatta Airport as the main entrance and exit gate of Jakarta. The indication that Jakarta grows to become an international city is that there are many international companies, international hospitals and other international institution open their representative office in Jakarta. So Jakarta will remain the center of economy in Indonesia and this condition will directly affect to the growth of cargo flow in Tanjung Priok.

The growth of goods flow through the Port of Tanjung Priok during the last five years can be seen from the table below :

Table 7 Cargo Flow via Conventional Terminal at Port of Tanjung Priok

(Unit: in ton)

	2005	2006	2007	2008	2009
International					
- Import	11,738,888	11,551,523	11,996,578	12,336,717	11,900,538
- Export	7,622,715	7,216,030	7,379,221	5,479,989	5,427,255
Domestic					
- Inbound	13,054,157	14,020,612	15,787,613	16,868,999	15,152,552
- Outbound	5,738,610	5,948,414	6,817,502	7,363,821	8,341,276
Total	38,154,370	38,736,579	41,980,914	42,049,526	40,821,621

Source: IPC II, Tanjung Priok Branch

Table of goods flow above shows that the flow of goods through the Port of Tanjung Priok increased, especially the flow of imported goods and loading volumes for inter-island. This indicates that the Port of Tanjung Priok has served as national transportation hub, particularly for imported products. While the impact of the global crisis can be seen with a significant decline in export volumes that fell by 25.74% in 2008. In the year 2009 the volume of exports has also indicated a decline. Meanwhile, the flow of imports in 2008 still showed normal conditions where in 2008 the import volume still increased by 2.84% compared to the volume of imports in the year 2007. Impact of global crisis seen in the year 2009 where the volume of imports fell 3.54% compared to 2008. Meanwhile, from the flow of domestic goods can be seen that the volume of unloading showed a decrease in the year 2009, this is in line with the decline in export flows, where the cargo unloaded at the Port of Tanjung Priok is largely a product for exported and raw materials that produce goods for export industries such as oil palm, coal, clinker and sawn timber / plywood.

In detail the growth rate of the flow of goods through the Port of Tanjung Priok is shown in the following table:

Table 8 Growth of Cargo Flow via Conventional Terminal - Port of Tanjung Priok

	2005	2006	2007	2008	2009
International					
- import	-3.47%	-1,60%	3,85%	2,84%	-3,54%
- export	34.30%	-5,34%	2,26%	-25,74%	-0,96%
National					
- inbound	-3.64%	7,40%	12,60%	6,85%	-10,18%
- outbound	22.39%	3,66%	14,61%	8,01%	13,27%

Source: IPC II, Tanjung Priok Branch

Meanwhile, the flow of containers in the Port of Tanjung Priok shows the dynamics of the volume as follows:

Table 9 Container Flow via Container Terminal at Port of Tanjung Priok

	2005	2006	2007	2008	2009
in Teu's	3,277,868	3,419,541	3,689,783	3,984,278	3,804,905
Growth	0.91%	4.32%	7.90%	7.98%	-4.50%
in Box	2,402,031	2,499,592	2,678,214	2,882,936	2,804,083
Growth	-1.04%	4.06%	7.15%	7.64%	-2.74%

Source: IPC II, Tanjung Priok Branch

The table shows that before the world crisis in 2008, cargo flow in port of Tanjung Priok grew significantly. The increasing container flow through Port of Tanjung Priok by 7.9% and 7.98% in year 2007 and 2008 show that the economic activity in its hinterland grows fast enough. As the effect of global crisis that also affect on global trade, container flow through Port Tanjung Priok decreased by 4.5% in year 2009. This condition has turn to be better that the container flow has reached 2,505,603 Teu's in first half year 2010 or increased by 38.84% from 1,804,626 Teu's of container flow were reached in Semester I year 2009. Because the Port of Tanjung Priok is dominant as destination and origin port, so we can conclude that the growth in cargo flow at the Port of Tanjung Priok means the economic activity in the hinterland area is growing. While the most of domestic cargo from and to Port of Tanjung Priok are related to import and export activities, Port of Tanjung Priok has become the national hub as national transhipment center.

The government effort to boost the national economic and industry growth will effect on the need of port improvement, especially an addition of port facilities and improvement in service quality. The existence of modern port with an adequate capacity is very important to support the growth of industries in its hinterland. But as the limitation of land for develop new facilities in Tanjung Priok, the government have to look for new location to develop new port as the complement of Port of Tanjung Priok or develop Port of Tanjung Priok by developing new land through reclamation. This concept has also included in Master Plan of Port of Tanjung Priok. But since the government has released new regulation that allows private investor to enter in the development and port business, there will be many alternative to develop new ports, in which IPC II still have the priority to get the right to develop new port or alternatively government will give the concession to private investor.

2.3. Related with Corporate Vision, Plan and Policy

IPC II as a state-owned enterprises, is not only required to provide good services for its customers, but also have to provide an optimal financial contribution from its operation profit to the shareholders (in this case the shareholders of IPC II is the Government Republic of Indonesia). The vision of corporation that has been defined is "*to be the choice of port and logistics customers with quality service world*."

The company missions are (IPC II Corporate Plan,2009):

a. To ensure the quality of port services with excellent logistics network to meet the expectations of major stakeholders i.e. customers, shareholders, employees, partners and regulators.
b. To ensure smooth flow and safety of ships and goods in order to realize the efficiency of logistics costs in order to boost up national economic growth.
c. To ensure an adequate level of productivity in order to meet the dynamic needs of its customers.

Base on its vision and mission, the corporation now days have made some improvement in its facility, equipments and services. The focus of improvements is how to optimize the capacity of Port of Tanjung Priok, as the fact that it is not possible to develop new facility in Tanjung Priok because of the limited vacant land available.

IPC II has adopted a policy to do reconfiguration in Port of Tanjung Priok, by changing the design and uses of Conventional port (now days is used for handle general cargo, passenger and RoRo Terminal which its productivity is relatively low) to become container terminals. This strategy is also supported by the current conditions where IPC II also manages several other ports around the Port of Tanjung Priok, i.e. Sunda Kelapa Port, Banten Port and Cirebon Port. By the reconfiguration, Port of Tanjung Priok will focus its business on serving containers, while the market share of general cargo that had been served there and use most of the facilities of Port of Tanjung Priok will be served by the other branches stated before. By this corporate policy, Port of Tanjung Priok will mostly serve container ships and of course with a larger size ships.

The policy to focus on the container service in the port of Tanjung Priok certainly should be supported by a better quality of vessel service and cargo handling services that able to compete with other ports in Indonesia and other ports in neighboring countries like Singapore and Malaysia (Port of Klang and Port of Tanjung Pelepas).

In long term planning as stated in Master plan of Port of Tanjung Priok that have been approved by Ministry of Transportation, the development of Port of Tanjung Priok will implemented by develop new port in a new lands that will be provided through reclamation of sea. As the new port, development program will be followed by establishment of some new terminal which is supported by additional of new infrastructure and superstructure, such as quay, basin, channel, container yard and warehouses, which are still in the phase of design engineering study. For the new facilities, this thesis will not discuss and calculate the pilotage and towage services and its resources needed, because it needs more detail data that inline with the

project planning. It is also because there is a possibility for others enterprise in addition of Indonesia Port Corporation to take over this project in according with Law of the Republic of Indonesia number 17 year 2008 about Shipping and Government Regulation number 61 year 2009 about Port that provides an opportunity for private enterprise and state/local government owned enterprises to become port operator.

2.4. Chapter Conclusion

Inline with the development of the international shipping industry, there are few trends that occurred in the market in the port sector. The first trend is the operation of ships which are larger than ever. This is the impact of globalization which has spurred an increase in direct trade between countries, both trade in goods and consumption goods industries. In addition, increased foreign investment in almost all countries are also able to increase the volume and type of commodities traded between countries.

The advanced shipbuilding technology has managed to build ships with a larger size. The presence of large ships that are more efficient have changed the pattern of transport to the hub-spoke pattern. With this trend, the role transhipment port in international trade will be greater.

The tendency that shipping companies want to operate their own terminals is also become a challenge as well as an opportunities for the existing port operators. This will be an opportunity if the port operators are able to cooperate with those shipping companies. However, it would be a threat when they build or operate their own terminals and become the competitors for existing operators.

With the limited facilities that are currently available, from the side of the market being served at the port of Tanjung Priok there is no significant change will occur. The limited land available for port development does not allow for new port development at existing locations. The changes will be more affected by the reconfiguration plan of Port of Tanjung Priok. However, related with the Master Plan for Port of Tanjung Priok, where the port development will be done through the reclamation, it is necessary to study separately with adjustment to the new port capacity to be built.

Short-term programs such as the reconfiguration of Port of Tanjung Priok, which Tanjung Priok port will more focus on containers services, will impact on the increase of container ships to be served, of course, with larger average size. This is supported by the tendency of changing patterns of freight transport from general cargo to container in most of ports in Indonesia, where the Port of Tanjung Priok will become the national hub for other ports such as Port of Pontianak, Port of Panjang, Port of Palembang, Port of Teluk Bayur and Port of Jambi.

Chapter 3 Analysis on Vessel service at Port Of Tanjung Priok

3.1. Present Condition

Vessel service at the Port of Tanjung Priok are currently fully conducted by IPC II. In Tanjung Priok harbour, pilot usage is mandatory, where all of ship sized 500 gross tonnage (GT) or over shall use pilotage services. However, based on safety considerations voyage from pilotage supervisor or at the request of the shipmaster, the ships sized less than 500 GT which sailed in the waters shall be given pilotage services (Decree of the Minister of Transportation of the Republic of Indonesia number KM. 24 year 2002 Chapter IV. Pilotage Service, Article 7).

In order to implement pilot service for ships with specific conditions, pilot officer can use tugboats to help him in ship's maneuvering and motion. The requirement of use of tugboats to assist the pilot officer is regulated in the Decree of the Minister of Transportation of the Republic of Indonesia number KM. 24 year 2002 Chapter IV. The Implementation of Pilotage, Article 10 as follows:

a. Ships with 70m to 100 m length shall use 1 (one) unit of tugboat having minimum power of 800HP.

b. Ships with more than 100 m to 150 m length shall use 2 (two) units of tugboats having minimum of total power of 1,600HP.

c. Ships with more than 150 m to 200 m length shall use 2 (two) units of tugboats having minimum of total power of 3,400HP.

d. Ships with more than 200 m to 300 m length shall use minimum of 2 (two) units of tugboats having minimum total power of 5,000HP.

e. Ships with more than 300 m length shall use minimum of 3 (three) units of tugboats having minimum total power of 10,000 HP.

Referring to the above provisions, then in order to provide good service to its customers, the IPC II must be able to provide sufficient facilities and equipments, and also qualified human resources as required.

For pilotage services, Port of Tanjung Priok is currently employing 31 pilots.

The number of tugboats operated in the Port of Tanjung Priok owned by the IPC II is 13 units with detail specification as follows:

Table 10 List of Tug Boat owned by IPC II at Port of Tanjung Priok

No	Name of ship	Place of Manufactured	Year of Manufactured	Horse power
1	KT Bima II	Indonesia	1987	2 x 1190 HP
2	KT Bima III	Indonesia	1987	2 x 1190 HP
3	KT Bima XI	Indonesia	1997	2 x 1200 HP
4	KT Jayakarta 1	Indonesia	2002	2 x 1200 HP
5	KT Jayakarta 2	Indonesia	2002	2 x 1200 HP
6	KT Jayakarta 3	Indonesia	2002	2 x 1600 HP
7	KT Jayakarta 4	Indonesia	2004	2 x 1200 HP
8	KT Bima 034	China	2003	2 x 1600 HP
9	KT Bima 035	China	2003	2 x 1600 HP
10	KT Bestwin 88	Singapore	2004	2 x 607 HP
11	KT SDS 36	Singapore	2004	2 x 620 HP
12	KT Arjuna I 206	Indonesia	2007	2 x 620 HP
13	KT Arjuna II 206	Indonesia	2007	2 x 620 HP

Source: IPC II, Tanjung Priok Branch

To support the vessel service activities now IPC II deploys:

- Six units pilot boat to drop off and pick up the pilots from pilot station to the ships that will be served.
- Six units of mooring-boats to help mooring activities
- One unit survey-boat to monitor the channel and service activities.

The average number of ships call in Port of Tanjung Priok is 50 units per day. If each ship has two motions per day (berthing and unberthing), so the number of vessel service (pilotage and towage) is 100 movements per day. Because only IPC II has the license to serve the ships in port of Tanjung Priok, so the customers have no other choice on whatever conditions and level of services that realized by IPC II. In addition that Port of Tanjung Priok and most of ports in Indonesia are the origin and destination port, so there are no significant effects between poor level of services with market share condition.

With the monopolistic market condition, there are no worries and strong trigger for IPC II to improve the service quality. This condition has run since the port business in Indonesia existed. Although there were some changes in port policy management and port regulation in Indonesia, the changes are only on the organization structure but still no chance to the other institution and company (private or other state's owned enterprise) to become the port operators that will be the competitors of Indonesia Port Corporation I – IV.

3.2. Performance Measurement and Problem

In accordance with the function of pilot and towage services, the safety becomes the major factor to be considered in the activities of vessel service in the ports. The next factor is the speed and efficiency of service. So IPC II shall always improve its service performance. One of the rules that must be followed in implementing the pilotage is that pilotage must be performed in a fair way and accurate (KM 24 of

Article 9 paragraph 1.c), accordingly the pilot must be physically guiding and the pilot must be on board of ships, and for convoy ships, pilotage services can be performed from the ship in front, and the follower is guided by using pilotage aid (KM 24 article 9 paragraph 3a).

Vessel service performances in the ports are currently measured by several parameters, namely:

a. Level of safety of the customer ships during the process of pilotage and towage services. That is ideally zero accident has to be achieved.

b. Turn round time, is the total operating time of the ship in a port which is calculated from the time the ship reports its arrival and asked for the service until departure time, including time spent for waiting for the pilot and berthing.

c. Waiting time is the time spent to wait before enter to port and get the service at the pier. There are two ways to calculate the waiting time :

    1) Waiting time is calculated since the ships reports its arrival and asking for the service, or

    2) Waiting time is calculated since the ship gets approval for a service, not including time spent for waiting to get service.

    The first calculation method used to measure the performance of the Port of Tanjung Priok.

d. Approach time, is total time used when ship moves from anchorage area to the destination pier, in this case the ship is guided by the pilot and assisted by using tugboats.

e. The accuracy of ship mooring, is the level of effectiveness of the mooring service which is calculated in percentage.

f. Berth occupancy ratio, is the level of use of the pier as a percentage of the available capacity and is computed for a given period (per week, per month or per year).

g. Yard occupancy ratio, is the level of use of yard as a percentage of the available capacity and is computed for a given period (per week, per month or per year).

In addition, IPC II also has set key performance indicator for services through the assessment of facilities and equipments:

a. Level of the tug boat readiness
b. Level of the pilot boat readiness
c. Level of the mooring boat readiness
d. Level of the quay readiness
e. Level of readiness of the basin
f. Utilization of the tug boat

g. Utilization of the pilot boat

The vessel service activities in the port of Tanjung Priok are currently still under the level of services expected by service users, this is evidenced by the high number of complaints from service users on the poor performance of the vessel service. Based on the customer's satisfaction survey at Port of Tanjung Priok conducted by the Supervisory Agency of Financial and Development of The Republic of Indonesia, an official independent institution owned by Government, there is still a significant gap between the level of services expected by port customers and the level of services received from the result of the the survey.

The part of survey results (BPKP, 2010), that related to the vessel service at the Port of Tanjung Priok shows the facts that the level of service still under the customer's expectation, as follow:

Table 11 Summary of Customer Satisfaction Survey at Port of Tanjung Priok

	Attribute	Customer Expectation	Level of Service	Gap	%
1	Cleanliness of harbour ponds	4.26	2.49	1.77	58.45%
2	Condition of navigation signs	4.77	3.23	1.54	67.71%
3	Tug boat readiness	4.65	3.16	1.49	67.96%
4	Waiting time of Pilotage service	4.55	3.07	1.48	67.47%
5	Realibility of tug boats	4.71	3.30	1.41	70.06%
6	Suitability between services received with the fees paid	4.40	3.02	1.38	68.64%
7	Adequacy of navigation signs	4.58	3.23	1.35	70.52%
8	Safety of customer ships during pass navigation channel	4.80	3.45	1.35	71.88%
9	Conformity between time of service with the planning	4.41	3.12	1.29	70.75%
10	Suitability between the fee paid with the tariff	4.42	3.13	1.29	70.81%
11	Quality of *traffic* management	4.54	3.31	1.23	72.91%
12	Ships security in the port	4.65	3.44	1.21	73.98%
13	Mooring service speed (belt and loose rope)	4.47	3.26	1.21	72.93%
14	Pilot and Tugboat crew proffesionalism	4.57	3.39	1.18	74.18%
15	Realibility of *on-line system*	4.40	3.26	1.14	74.09%
16	The depth of channel and basin	4.65	3.54	1.11	76.13%
17	Willingness of staff to solve customer's problems	4.40	3.29	1.11	74.77%
18	Physical condition of pier	4.35	3.27	1.08	75.17%
19	Quality of fresh water	4.53	3.50	1.03	77.26%
20	Accurration of billing documents	4.35	3.36	0.99	77.24%
21	Speed of completion of billing documents	4.35	3.38	0.97	77.70%
22	Communication skill of pilots	4.53	3.64	0.89	80.35%
23	Willingness of pilot to solve customer's problems	4.29	3.40	0.89	79.25%
24	Adequacy and speed of fresh water supply	4.39	3.57	0.82	81.32%
Average		4.50	3.28	1.22	72.96%

Source: The Supervisory Agency of Financial and Development of the Republic of Indonesia(BPKP): Customer Satisfaction Survey Report

And also some important remarks from the survey respondents :

1) it needs to channel dredging to improve the safety and smoothing of the ship traffic flow.

2) It needs to widen the channel to allow two way traffic, so there will be no service delay to wait the channel for free.

3) it needs to improve and add the navigation marks and aids to separate clearly the anchorage area with the channel.

4) it needs to develop a customer's orientation paradigma to each service staff.

5) The service priority policy must be clear and well published, so there will be no opportunity for the operational staff to change or choose the customers as they want, which may allow the staff to take advantage for their own benefit.

Based on the realization of key performance indicator reports released by the management of Port of Tanjung Priok, it is seen that the vessel service performance still has not matched expectations, there is an achievement of performance which remains below the targets set out by management.

Table 12 Realization of Key Performance Indicator of Vessel service in Port of Tanjung Priok Year 2009

	Description	Unit	Target	Realization	Remark
1	Level of safety of the customer ships	%	100.00	99.99	Fair
2	Turn Round Time (TRT)	Hour	45.00	50.54	Poor
3	Waiting Time (WT)	Minute	60.00	80.47	Poor
4	Approach Time (AT)	Minute	60.00	56.71	Poor
5	The accuracy of ship mooring	%	95.00	95.18	Good
6	Berth Occupancy Ratio (BOR)	%	62.35	59.03	Poor
7	Yard Occupancy ratio (YOR)	%	41.83	40.31	Poor

Source: IPC II, Tanjung Priok Branch

Waiting time is an indicator of vessel service performance which has always been a focus of attention in assessing the efficiency of services in ports. Based on the complaint letter from the Indonesia National Shipowner Association (INSA) the waiting time of pilot service in Port of Tanjung Priok is very high, that in worst condition such waiting time may reach 3-4 hours (Supardi, 2010). This condition is very bad for the shipping companies because they still have to bear operational costs of the ship during waiting time and the worst problem is the difficulty to meet their tight schedule.

So it is very important for management to analyze the matters that cause IPC II fails to achieve its target on waiting time and make improvement efforts.

The poor condition of vessel service in Port of Tanjung Priok can be identified through the problem faced in some aspects as follows :

1) Customers requiring pilotage service officers must wait, because the pilots who are in charge are still on the way back from other tasks of guiding other ship.

2) The numbers of tugboats are still not sufficient, especially when there is a tugboat is still in the process of repair or waiting for the tugboats back from other task. The existence of old tugboats that damage quite often may cause frequent shortage of tugboats.

3) Human Resources and Organization

a) The working system of the crew aboard the ships does not support the implementation of effective Preventive Maintenance (PM level 1 and 2). The corporate policy has stated that the Preventive Maintenance Level 1 and Level 2 is the responsibility of the ship crew. But from the result of identification and observation on site and report from the Docking companies that engaged in ship repair, it is found that some conditions of the ships showing that the effort of preventive maintenance remain very poor. It is also be proven that the routine checking list (daily, weekly and monthly) in connection with the ship and the conditions of its equipments is not duly filled out by the crew and reported consistently.

b) Nowadays ship crew is still focusing on ship operations/running the ships and has no adequate concern on the maintenance and condition of the ship. The main cause is the lack of awareness to the implementation of the maintenance system which is included in crew job description. And there is no incentive given to the crew who has maintained the ship properly. An other cause is that the crews have no equal capability and skill on ship maintenance. It is also a fact, that the maintenance is more focused on the corrective maintenance / repairing because the damage that often occur suddenly. The further impact is the low level of readiness and the level of damage will be higher in the future due to the accumulation of small problems in long time term.

c) Organizational structure and job descriptions that do not support the operational needs, especially related with the clear task division and responsibility to monitor the ship and the conditions of the equipments. There are two departments in Pilotage Division of Port of Tanjung Priok involved in pilotage service and operating of a tug boat, namely Subdivision of Pilotage and Subdivision of Ship Maintenance and Repair. Subdivision of Pilotage is responsible for coordinating pilot, planning of pilotage and towage activities, and planning and operating of pilotage equipments. The Subdivision of Ship Maintenance and Repair is responsible for maintaining and repairing tugboats, other ships (pilot boat, mooring boat and survey boat). The problem occurs when each Subdivision blames on each other on who is responsible in case of damage or if the ships are ready for use.

d) The readiness of some of the crew to carry out the task for 24 hours. A number of personnel on ships are not ready for duty for 24 hours, some of them are even willing to move to the administration office.

e) There are still numbers of complaints related to the pattern and magnitude of incentive for the crew. This will affect their spirit and willingness to do their best effort. This often happens because there is no attractive incentive compared to the administration staff.

4) Technical Condition of Equipments

a. From the equipment list, we may see that there remain some ships aged more than twenty years being operated, namely KT Bima II and KT Bima III. The existence of the old tug boat having more than 20 years age has an impact on very high frequency of breakdown. And because the lack of spare part and supporting equipments this has an impact on the increase of repair

costs, especially because treatment often cannot be finished on schedule and there are several components that should have been replaced but have not been not produced anymore.

b. The existence of two tug boats with inadequate engine capacity to support the pilotage activities in the harbour, namely KT Bima 034 and KT Bima 035 which are only supported by one unit of auxiliary engine. The inadequate capacity of these tug boats has caused a high frequency of damage and they need more breaktime when they are being operated than other tug boat operating normally.

5) Procedures in Emergency Condition

There is no emergency procedure that accommodates the implementation of maintenance and immediate ships repairs. The procedures / mechanism of goods and services procurement is less accommodative for the implementation of emergency ship repairs. This condition occurs because Indonesia Port Corporation as State Owned Enterprise has to adopt the procurement procedure which is generally used by all of government institutions and state owned enterprises.

For example, the repair process of the Tug boat KT Jayakarta 2 had to wait for the completion of the paper works in accordance with the procurement procedures. At the same time the loss of opportunity for revenue is too high compared with the repair cost needed. However, it has to comply with the procedure.

Frequent of delays in the handling of repairs, even though for small improvement which involves small nominal value of small improvements, this requires the ship to stop operating. The current financing mechanism involves relatively low internal control in which the pilot division received cash in advance and has to send the realization of expenses report and the cash recalculation. Besides, there is no standard basis for setting price of the work, both in materials and services used.

6) Maintenance and Repair Plan

The Preventive Maintenance planning has not been scheduled tightly and the accuracy of plan for improvement need is still poor, delays happen quite often in the application of docking / repair work and the existence of substantial deviations between the plan and the actual work. This is mainly because there are no specific personnel who have proper skills in planning and docking/repair ship.

7) The condition of the harbor water, dirty and full of garbage/scrap stuff.

The garbage often may cause damages to the tugboats which causes the towage service process is disrupted. Besides causing damage to tug boats and pilot boats owned by IPC II, garbage in the harbor water also often cause damages to the customer's ships.

Vessel service segment consists Services Pilotage and Towage is a very profitable segment. Viewed from the realization of net income during the last five years shows

that the average net profit pilotage and towage services is very high and during the last four years is 34.15%. This figure shows that the pilotage and towage business segment has excellent prospects, so that should be continuously improved service quality in order to continue to provide an optimal contribution to the company.

Table 13 Revenue and Cost Realization of Pilotage dan Towage Services

(unit : IDR million)

	Revenue and Cost	2005	2006	2007	2008	2009
1	Revenue					
	Pilotage	3,280.92	32,115.13	31,734.31	38,789.61	38,269.34
	Towage	114,172.97	113,064.13	117,955.53	146,114.55	173,146.61
	Total Revenue	117,453.88	145,179.26	149,689.84	184,904.16	211,415.96
2	Cost					
	Employee Expenses	6,243.57	20,122.31	21,262.92	24,783.13	36,505.23
	Material Costs	3,682.47	36,678.31	35,945.06	43,170.45	32,069.95
	Maintenance of Fixed Assets	6,064.34	6,318.87	5,422.61	9,667.46	13,961.39
	Fixed Assets Depreciation	12,008.96	14,082.49	12,183.89	11,855.56	12,381.84
	Insurance Charges Fixed Assets	2,397.30	2,126.19	1,832.79	1,349.78	921.76
	Property Insurance Costs	12.00	9.35	5.38	5.94	4.99
	Administrative Office Expenses	358.49	424.72	378.91	378.80	603.67
	General Expenses	714.37	1,016.24	1,007.57	788.59	3,631.17
	Total Cost	31,481.49	80,778.48	78,039.14	91,999.71	100,080.00
	Income before Interest & Tax	85,972.39	64,400.78	71,650.70	92,904.45	111,335.96
	Income Tax (30%)	25.791.72	19.320.23	21.495.21	27.871.34	33.400.79
	Net Income	60.180.67	45.080.54	50.155.49	65.033.12	77.935.17
	Net profit margin	55.01%	31.05%	33.51%	35.17%	36.86%

Source: IPC II, Tanjung Priok Branch.

With a high level of profitability then should management IPC II can optimize this business segment by investing in a more daring, so better able to compete at the international level and be able to increase financial contributions and corporate image.

3.3. Analysis of Competitors

The old assumption stating that the Port is a business activity that is monopolized because its market is captive and there was no element of competition is no longer relevant. Sea port is the location for the meeting of the modes of sea transport and

inland transportation modes where there is movement of goods between these modes. The development of transportation technology and infrastructure improvement of roads and railway networks in the hinterland area and potential area connected to the port, making the choice of transportation modes that can be used more and more varied (Bosse, 2001). Hinterland area is no longer simply connected with only a seaport. For the hinterland area that currently has an alternate port may choose any port more quickly and efficiently to move their goods both exported and imported goods. In addition to the increasing connections to alternative port, the regions having industrial centers and located in the waterfront are now also possible to build their own alternate ports which are more efficient in terms of time and cost aspects. Increasing number of ports for their own interests or special port proves that the Port at locations that were previously considered to have a captive market now the competition has also emerged.

Potential competition for the Port of Tanjung Priok is because of some industrial area which is currently become Port of Tanjung Priok hinterland also have alternative ports that can handle the goods that exported from their location. Some of the hinterland areas of Tanjung Priok Port, such as West Java Province has alternate port that can handle their cargo namely Port of Cirebon in Cirebon, Port Ciwandan in Banten and Port of Tanjung Emas in Semarang, which has adequate facilities and modern container terminals. Similarly industrial centers in Banten Province who have an alternative port such as Port of Ciwandan which is still under one management of IPC II and Port of Cigading managed by PT. Krakatau Bandar Samudera that has a modern handling facilities for liquid dan dry bulk cargoes, with a very wide back up area and has a deeper port channel and waters (Port of Cigading, 2010).

Competition in the port industry in Indonesia will be more opened with the effective implementation of Law of the Republic of Indonesia number 17 year 2008 about Shipping and Government Regulation number 61 year 2009 about Port which provide an opportunity for private enterprise and state/local government owned enterprises to become port operators. Indonesia Port Corporation which is currently acting as the holder the rights to operate ports and acting as the owner of the lands and waters, will then only acts as a business entity which only operates the terminals under agreements with the Port Authority after the implementation of this new regulation. Port Authority is a representative of the government to give concessions or any other form of cooperation to companies to conduct business activities in the port as outlined in an agreement (the Law of the Republic of Indonesia number 17 year 2008 about Shipping article 65). With these new regulations, then the management of port will not only conducted by the Indonesia Port Corporation. Besides the possibility of the emergence of competition from new ports in Indonesia, it also allows the operating rights that currently held by Indonesia Port Corporation be revoked if they are not able to meet the requirements and its performance does not meet the qualifications required by port authorities.

Besides the competition that will arise in connection with the new ports and other national ports, now the Ministry of Transportation of the Republic of Indonesia is also conducting studies for the development of national hub port. There are several candidates to become national hub port, including Port of Tanjung Priok, Port of Tanjung Perak in Surabaya, Port of Sabang in North Sumatra, Port of Tanjung Emas in Central Java and Port of Bitung in North Sulawesi. With the modern and

complete facility than other candidates of national hub port, Port of Tanjung Priok and Port of Tanjung Perak in Surabaya will become the preferred nominee to be a national hub port, with the possibility that Port of Tanjung Priok will become West Hub Port and Port of Tanjung Perak as the East Hub Port.

In addition to the competition to become the national hub port, Port of Tanjung Priok must also compete with ports in the neighboring countries so its national transhipment market will not move to those ports. Due to their distances which are quite close, it is very possible for Port of Teluk Bayur, Port of Pontianak, Port of Padang, Port of Palembang and Port of Panjang which have served as the feeder for the Port of Tanjung Priok shift to be the feeder port for Port of Singapore, Port Klang or Port of Tanjung Pelepas.

3.4. Chapter Conclusion

As the main ports in Indonesia, Port of Tanjung Priok has to ensure the high level of key performance indicator, especially the punctual services to achieve a zero waiting time and high level of availibility and readiness of tug boat and pilotage.

The nature of public port management in Indonesia is currently monopolistic, where only Indonesia Port Corporation is entitled to manage ports. This has caused that the service users have no alternative ports service providers. This condition causes the service given is not optimal. Even if the performance of the services is below the target level of services, what the service users can only do is to complain but they do not have any alternative or power to leave the services.

Associated with quality of service of a ship in the port, the timeliness, speed and safety became the main focus of performance measures. Timeliness of service will only be achieved if supported by an adequate amount of qualified human resources and adequate equipment. In this study, we focus on pilotage and towage service, where the human factor and equipment i.e. pilot and tug boats become the determining factor whether the quality of the services is good or poor.

Based on results of customer satisfaction survey and realization of quality objectives that are targeted by management, service performance of the ship has not met expectations. Indicators of poor vessel service performance is the high waiting time that could reach 3-4 hours, due to the lack of pilot and low level tug boats readiness.

Although operationally still showed a poor performance, but in financial terms "service segment of the ship", contributes very well to the net income and cash flows IPC II. Vessel service is a very profitable business segment with a net profit margin of more than 36% in 2009. This segment is highly prospective to be developed for example by adding equipment.

In line with the enactment of new regulations on the port business ie Law of Republic of Indonesia Number 17 year 2008, port business in Indonesia will be a competitive industry, where not only the Indonesia Port Corporation, but private investors and other state-owned enterprises can develop and operate ports. This certainly requires IPC II to improve the quality of services to be able to compete nationally and in international markets. Competition to become a national hub port for cargo services from other ports in Indonesia will be opened with the possible

presence of new ports and other existing ports such as Port of Tanjung Perak. It is also to maintain its existing feeder port to move to other ports in neighbouring countries such as Port of Singapore, Port of Tanjung Pelepas and Port of Klang that have high capacity and modern facilities.

Chapter 4 Calculation of the Optimal Number of Pilots and Tug boats required for Ships Service at the Port of Tanjung Priok

4.1. Concept of Model

In accordance with the vision of IPC II, namely became the choice of customers with world class service quality, then the IPC II must provide high quality service. The effort to be done by IPC II to improve vessel service performance in the port of Tanjung Priok is focused on the most important services, namely pilotage and towage services. To be able to provide good services to the customers, the most important factor is the adequacy of the amount and qualified human resources and the number and capacity of the tug boat.

The requirement to meet the adequate number of pilot and tug boat is also because IPC II, as an institution appointed by the government to carry out the pilotage services has obligations under the Decree of the Minister of Transportation number KM. 24 year 2002 regarding the Provision of Pilotage (KM 24/2002), Article 9. Some of the obligations that must be performed by the IPC II in relation with pilotage services, namely:

a. provide qualified pilot,
b. provide supporting equipment and facilities that meet the requirements of pilotage,
c. provide pilotage service fairly and properly,
d. report to pilotage supervisor (appointed by Port Auhority) in the occurence of problems in pilotage activities,
e. report its pilotage activity to Directorat General of Sea Transportation, Ministry of Transportation every three months.

Pilotage service has vital functions such as safety functions, service functions and business functions. Firstly, pilotage activities aim is that ship navigation activities can be conducted safely, orderly and smoothly by providing information about the state of the local waters that are important for the safety of ships and the environment. Secondly, the customer's service function which aim to provide services to port users that will be continued with further activities in the port such as stevedoring and other activities, so all the port services can be implemented quickly and smoothly. Thirdly, a business function, pilotage service is an activity that has to contribute to company revenue. Given these vital functions, then the pilot must meet the requirements specified in regulation. The provisions regarding the necessity of pilot to meets special requirements are set out in KM 24/2002 article 17 paragraph (1) which provides that every pilot in the task of guiding in the waters of pilotage area and exceptional pilotage area must have the expertise and skills in accordance with its responsibilities, where (2) expertise and skills will be acquired after the pilot attended the training conducted by training providers appointed by the Director General of Sea Transportation.

The number and quality of pilot is very important because pilotage service quality depends on the readiness of personnel pilot, also the number and quality of pilot.

In order to be able to provide high quality vessel service in Port of Tanjung Priok, it must be supported by:

a. The adequate number of pilots who meet the requirements.

An ideal number of pilot should be already taken into account:

1) the needs of service during peak seasons in which the activities of Port of Tanjung Priok on Thursday, Friday and Saturday are very high. This corresponds to a schedule of liner ships to perform the loading of export goods, particularly in JICT Container Terminal and Koja Container Terminal.

2) the normal duration of service which is in accordance with the safety and security requirements plus ample time for pick up the pilot from pilot station to the ship and vice versa.

3) availability of substitutes if the pilot is not avavilabe due to illness, vacation or other reasons.

While the fulfillment of the requirements of all personnel associated pilot must meet the requirements specified in the government regulation.

b. The number of auxiliary facilities and infrastructure are sufficient and meet pilotage requirements. The equipment that must be provided by IPC II in pilotage and towage activities in accordance to Decree of the Minister of Transportation of the Republic of Indonesia number 24/2002 Annex IV KM is as follows:

- Equipments aids for Pilotage :

1) at least two units of tug boats having a minimum amount of power of 4000HP.

2) at least two units pilot boats having a minimum speed of 12 knots.

3) at least two units mooring-boats having a minimum speed of 7 knots.

- Infrastructure aids:

1) Station pilot or supervisor tower and office premises with a minimum width of 350m2 with completeness.

2) VHF handy talky for each personnel pilot with the frequency according to international regulations.

3) life jacket for each personnel pilot.

4) transportation and housing facilities for pilots as needed.

The number above is the minimum amount regardless of the number of ship that may require the pilotage and towage services. If linked with the overall performance of port operations then the number of facilities and infrastructure should be adjusted, so that service performance targets can be realized. Adequacy of facilities and infrastructure will greatly affect the timeliness and speed of service. Lack of tug boats will cause high 'waiting time and idle time "at the port, because sometimes ships have to wait for services after tug boat completes serving another ship in the event that there are demands for tug services at the same time. The adequacy of pilot boat is also very important, because lack of pilot boats will also lead to high waiting time and idle time as a

result of pilot is waiting to be picked up. Although not as important as tug boat, because it only to drop off and pick up pilot from pilot station to the ship and vice versa, and ships can run faster, but the lack of pilot ships can also cause delays in service due to pilot picked up late.

c. Systems and procedures are simple and supported by modern information technology and online. With a simple system and procedures, it will enable customers to obtain services in an efficient and timely manner. in addition, with online systems it enable to connect with other system used by related institutions and also with the other ports.

In order to enable to meet these obligations then it is very important for IPC II to calculate the amount of labor required for pilot and number of tug boat. Adequacy of the number of pilot and tug boats becomes the key succes of efforts to achieve the targeted service quality.

4.2. Methodology and Data

Before calculating the number of pilot and tugs required, it is important to know in advance the vessel service production plans in the Tanjung Priok Port. Considering the limited time to conduct research and surveys as the basis for the preparation of ships and goods flow projections at Tanjung Priok Port, the authors use the projections used in Long-term Planning of IPC II.

In the long term plan which has been prepared by the management of IPC II, the factors and assumptions that affect the growth of the ship and the flow of goods through the Port of Tanjung Priok has been established. Based on current projections on the ship and goods, the production plans of shipping and goods can be calculated.

In this thesis the authors will evaluate and recalculate the number of pilot and tug boats that must be provided by the Port of Tanjung Priok in order to provide good services. With sufficient number of pilot and tug boats, then the most fundamental problems in service activities at the Port of Tanjung Priok ship can be overcome. However, the adequate number of personnel and equipment still requires an effective and efficient management system.

4.2.1. Formula for Calculation of Pilot amount

The adequate number of qualified pilot is an absolute requirement for IPC II to be able to provide good pilotage service. Adequacy of the number of pilot should considers:

1) number of ships to be served
2) the time required for each service
3) labor regulation especially concerning maximum working hours and rights for leave.

Based on these considerations, then the number of pilot can be calculated with the formula as follows:

$$Pn = \frac{SMp \times (Lp+Lt)}{Wp} + Ps$$

Where :

Pn	=	number of Pilot needed per day
SMp	=	highest number of ships to be served per day
Lp	=	average time of pilotage services per ship
Lt	=	average time needed for picking up the pilot and making report
Wp	=	working hour of pilot per day
Ps	=	subtitution for absent pilot due to illness, taking leave or other reasons

(Source: Idea of Supardi,2010 and self modification)

4.2.2. Data to Calculate pilot needed in Port of Tanjung Priok

4.2.2.1. Number of ships to be served per day (SMp)

Basically the number of ships that require pilotage services is equal to the number of ships coming because in the waters of Tanjung Priok Port it is compulsory to use pilotage service. But because there are provisions that certain ships are allowed not to use pilotage service, then the total production of pilotage services is not equal to the number of ship flow. From the data of ship calls and data of pilotage services, it can be viewed the average usage of pilot services per day.

The table below shows the realization of the visit of ships to the port of Tanjung Priok during the last five years:

Table 14 Realization of Pilot Service at Port of Tanjung Priok year 2005-2009

(unit : ship movement)

	Ship Type	2005	2006	2007	2008	2009
1	Ocean Going					
	- Liner	1,293	1,077	1,097	913	820
	- until 500 GRT	-	-	-	-	6
	- 501 - 1000 GRT	22	18	17	14	46
	- > 1000 GRT	1,271	1,059	1,080	899	768
	- Tramper	9,888	8,240	10,669	9,672	8,347
	- until 500 GRT	905	754	709	582	268
	- 501 - 1000 GRT	1,247	1,039	1,219	547	408
	- > 1000 GRT	7,736	6,447	8,741	8,543	7,671
	Total 1	11,180	9,317	11,766	10,585	9,167
2	Domestic Shipping					
	- until 500 GRT	1,790	1,492	1,795	2,523	2,070
	- 501 - 1000 GRT	3,258	2,715	3,450	3,045	3,035
	- > 1000 GRT	13,747	11,456	16,157	17,257	17,823
	Total 2	18,796	15,663	21,402	22,825	22,928
Total		29,976	24,980	33,168	33,410	32,095

Source : IPC II, Tanjung Priok Branch

From the table above it can be seen that the average ship arrivals per day in the last five years is 48 units per day (2005), 44 units per day (2006), 54 units per day (2007), 51 units per day (2008) and 47 units per day (2009). The Average daily ship arrival in five years is 49 units per day.

Meanwhile, the table below shows the realization of pilotage services based on the movement of ships in last five year:

Table 15 Realization of Pilot Service at Port of Tanjung Priok year 2005-2009

(unit: ship movement)

No	Ship Type	2005	2006	2007	2008	2009
1	Ocean Going					
	- Liner	1,293	1,077	1,097	913	820
	- until 500 GRT	-	-	-	-	6
	- 501 - 1000 GRT	22	18	17	14	46
	- > 1000 GRT	1,271	1,059	1,080	899	768
	- Tramper	9,888	8,240	10,669	9,672	8,347
	- until 500 GRT	905	754	709	582	268
	- 501 - 1000 GRT	1,247	1,039	1,219	547	408
	- > 1000 GRT	7,736	6,447	8,741	8,543	7,671
	Total 1	11,180	9,317	11,766	10,585	9,167
2	Domestic Shipping					
	- until 500 GRT	1,790	1,492	1,795	2,523	2,070
	- 501 - 1000 GRT	3,258	2,715	3,450	3,045	3,035
	- > 1000 GRT	13,747	11,456	16,157	17,257	17,823
	Total 2	18,796	15,663	21,402	22,825	22,928
Total		29,976	24,980	33,168	33,410	32,095

Source : IPC II, Tanjung Priok Branch

Based on data in the table above we can aquire data on the number of ship movements per day which requires pilotage service that is 82 movements per day in 2005, 68 movements per day in the year 2006, 91 movements per day in 2007, 92 movements per day in 2008, and 88 movements per day in the year 2009. The highest number of movements per day during the five years is 92 movements in 2008, while based on daily data in IPC II, the highest number of services in one day is 100 ship movements. The calculation of the adequacy of the number of pilot uses the highest amount of movement per day.

4.2.2.2. Working hours of pilot per day

According to company policy, pilotage services are divided into three shifts, each shift consisting of 8 working hours. So every pilot works 8 hours per day.

4.2.2.3. Average time of pilotage services per ship.
The average time of pilotage services in Port of Tanjung Priok is 2.02 hours. This number is derived from the calculation of the total hours of pilotage services devided by total ship movements that using pilotage services in year 2009.

4.2.2.4. Average time needed for picking up the pilot and making report.
There were no formal data of the time needed for picking up pilot and administration work. Based on the explanation of the Pilotage Manager of IPC II, the average time needed for this activity is 30 minutes per service.

4.2.2.5. Subtitution for absent pilot due to illness, taking leave or other reasons.
Additional number of pilots to substitute pilots who are in absence are 2 (two) people per day, assuming there is one pilot who is taking leave and in anticipation of one person is in absence due to other reasons.

4.2.3. Formula for Calculation of Tug boat needed

Before performing calculation of the number of tugs required, it must first be calculated and carried out evaluation of the factors that influence the level of required tug boats in the port. The conditions that need to be studied first are:

a. Hours of available tugs in normal conditions,
b. The number of ships to be served per day,
c. Total use of tugs for each ship movement, and
d. The average time required for one towage service activities.

The formula to calculate the number of tug boat needed in Port of Tanjung Priok is:

$$T = \frac{(SMt \times ST1 \times 1) + (SMt \times ST2 \times 2) + (SMt \times ST3 \times 3)}{Eh} \times Lp$$

Where:

T	=	tug boat needed
SMt	=	the highest number of ship movements using tug boat in one day
ST	=	percentage of use of the number of tugs in a single ship movement
Lp	=	duration of tug boat using for each ship movement (hours/ship)
Eh	=	tugboat readiness per day (hours)

(Source: Idea of Supardi,2010 and self modification)

It can also calculate the number of ship movements that can be served by one tug per day with the formula:

$$Ships/tugboat/day\ (Std) = Eh / Lp.$$

(Source: Idea of Supardi,2010 and self modification)

Each of the factors can be explained as follow:

1. The highest of total ship movement which use tug services in one day (SMt). Basically the number of ships that require towage services is equal to the number of ships served by pilots because towage service is the supporting activities for pilotage services. From the data of ship calls and data of towage services, it can be viewed the average ships using tugboats per day.

2. Percentage of frequency of Tug used per ship movement (ST).

   Frequency of using one tug boat per ship movement (%) = ST1.
   Frequency of using two tug boats per ship movement (%) = ST2.
   Frequency of using three tug boats per ship movement (%) = ST3.

3. The number of ship movement that can be served by one tug boat per day (Std):

   $$Std = Eh/Lp$$

   Where:
   - Std = number of ship movement that can be served by one tug boat per day (ships)
   - Eh = available time of tugboat readiness per day (hours)
   - Lp = duration of tug boat using for each ship movement (hours/ship)

   Two elements that will determine the production capacity of towage service is the hour of availibility of tug boat per day, that mean how much time available of a tug boat to be used by the operators to serve their customers. Tug boats will give the maximum benefit to the owners if it can be operated along the year without stop, but this is impossible. Tug boats need to be serviced and well maintained so it can run optimally and lives as long as its technical age or maybe longer.

   a) Tug boat readiness per day/Eh (hour)
      Available time of tugboat readiness per day (hours) s time available per day (hour) reduced by average time needed for maintenance per day (hour)

      Calculated from:
      - Number of days in one year x total working hour per day

      And reduced by average of total hours required for maintenance of each ship per day, includes:
      - Time needed for docking (hours)
      - Time for emergency damage repairing (in average) (hours)
      - Time for engine lubricant replacement (hours)
      - Time for fuel filling (hours)
      - Time for fresh water filling (hours)
      - Time for water cooler filter washing (hours)

b) Duration of tug boat using for each ship movement/Lp (hours/ship).
Time using of tug boat for each ship movement is average of time using in hour unit, calculated since towage service start until finish the service.

So the amount of ship movement which can be served in one day by one tug boat (Std) can be calculated by:

$$Std = Eh/Lp \text{ ships}$$

So the total need of tug boat in Port of Tanjung Priok is:

$$= \frac{(SMt \times ST1 \times 1) + (SMt \times ST2 \times 2) + (SMt \times ST3 \times 3)}{Std}$$

4.2.4. Data to calculate tug boat needed

4.2.4.1. Number of ship movement using tug services in one day (SMt).

Realization of towage services in the recent years is reflected in the following table:

Table 16 Realization of Towage Service at Port of Tanjung Priok Year 2005-2009
(unit: ship movement)

	Description	unit	2005	2006	2007	2008	2009
1	Ship calls						
	Domestic	unit	12,105	10,863	13,059	12,994	12,548
	Ocean Going	unit	5,269	5,351	6,527	5,691	4,683
	Total	unit	17,374	16,214	19,586	18,685	17,231
2	Towage						
	Domestic		16,358	14,788	17,757	17,835	17,266
	Ocean Going		9,158	8,980	11,096	9,192	8,187
	Total		25,516	23,768	28,853	27,027	25,453

Source : IPC II, Tanjung Priok Branch

From the data in the table above it is known that the average towage production (in units of ship movements) during the five years is 1.48 times the number of ship arrivals (in units). While the average number of service per day in the year 2005 were 69.91 movements per day, in 2006 were 65.12 movements per day, in 2007 were 79.05 movements per day, in 2008 were 74.05 movements per day, and year 2009 were 69.73 movements per day. While the highest number of services in a year is 90 movements per day (Pilotage Division, IPC II) that this number achieved not only once but often at peak season, so for the calculation of the number of tugs needed is using 90 movements/day.

4.2.4.2. Percentage of frequency of Tug used per ship movement (ST).

Under the provisions of the Decree of the Minister of Transportation, the implementation of the pilotage services can be helped by using one, two or three tugboats. To calculate the tugboat needed thoroughly then information of the number of tugboats used in each towage services is needed. In the production reports can be seen the frequency of towage using one tug, two tugs and three tugboats. Based on the explanation of IPC II staff, the realization of tugboat use can be expressed as follows:

a. Frequency of using one tug boat per ship movement (ST1) is 54%.
b. Frequency of using two tug boats per ship movement (ST2) is 45%.
c. Frequency of using three tug boats per ship movement (ST3) is 3%.

4.2.4.3. The number of ship movement that can be served by one tug boat per day.
The number of ship movement that can be served by one tug boat per day is determined by:

a) Tug boat readiness per day/Eh (hour)
Available time of tugboat readiness per day (hours) is time available per day (hour) reduced by average time needed for maintenance per day (hour).

- Based on the operational policies of the management of IPC II, the working hours of operational activities as follows:
  Total working hour per day is 24 hours.
  Total working day per year is 365 days.
  So, total working hours in one year is 24 x 365 = 8760 hours.

- The time in which the tug boats can not be used are based on historical data for the implementation of maintenance, both periodic maintenance and heavy maintenance. Time reduction of working hours in detail is as follows:

Table 17 List of activities that reduce the working hours of tug boats

	Description	Frequency	Duration (hours)	Total Time (hours)
1	Periodic docking	40 days	24	960
2	Emergency damage repairing	12	48	576
3	Engine lubricant replacement	6	8	48
4	Fuel filling	18	2	36
5	Fresh water filling	18	3	54
6	Water cooler filter washing	2	8	16
	Total			1,690

Source : IPC II, Tanjung Priok Branch

b) Duration of tug boat used for each ship movement/Lp (hours/ship).
Average duration of use of tugs within each service can be calculated based on historical data of towage service activities. Based on realization data of towage activities during the five year, average duration of towage service is 2 hours per ship movement.

4.3. Forecasting

4.3.1. Calculation of Pilot Needed

Based on the historical data the number of pilot needed in Port of Tanjung Priok will consider the following condition :

- The highest number of ships to be served per day (SMp) is 100 movements.
- The average time of pilotage services per ship (Lp) is 2,02 hours
- The average time needed for picking up the pilot and making report (Lt) is 40 minutes or 0.67 hour.
- working hour of pilot per day (Wp) is 8 hours
- subtitution for absent pilot caused by sick, take leave or other reasons (Ps) is 2 person.

So the number of Pilot needed (Pn) in Port of Tanjung Priok is

$$Pn = \frac{SMp \times (Lp+Lt)}{Wp} + Ps$$

$$Pn = \frac{(100 \times (2.02 + 0.67))}{8} + 2 = 35 \text{ person}$$

The number of pilot has to be fulfilled with qualified person, so there will be no more problems on vessel service such as high waiting time causes by lack of pilot. It also explains that the number of pilot in Port of Tanjung Priok which only 31 persons are not sufficient, so it needs four additional pilots.

4.3.2. Calculation of Tug-boat Needed

Based on the historical data the number of tug boat needed in Port of Tanjung Priok:

- Number of ship movement using tug services in one day (SMt) is 90.
- Percentage of frequency of Tugboat used per ship movement (ST).
  - Frequency of using one tug boat per ship movement (ST1) is 54%.
  - Frequency of using two tug boats per ship movement (ST2) is 45%.
  - Frequency of using three tug boats per ship movement (ST3) is 3%.
- The number of ship movement that can be served by one tug boat per day (St)
  - Tug boat readiness per day/Eh is 8760 hour per year reduced by 1690 hours for maintenance and repairing
    = 8760 – 1690 = 7070 hours per year
    = 7070/365 = 19.35 rounded to 19 hours per day
- Duration of tug boat using for each ship movement/Lp (hours/ship) is 2 hours.

So the amount of ship movement which can be served in one day by one tug boat (Std):

$$Std = 19 / 2 = 9.5 \text{ ships/tugboat/day.}$$

and

the number of tug boat needed (T) in Port of Tanjung Priok is

$$= \frac{(90 \times 54\% \times 1) + (90 \times 45\% \times 2) + (90 \times 3\% \times 3)}{9.5}$$

$$= \frac{48.6 + 81 + 8.1}{9.5} = 14.49 \text{ rounded to } 15 \text{ units}$$

Based on this result, the ideal amount of tug boat that can support IPC II to reach the high level of service is 15 units. With adequate number of tug boat, target of "one hour waiting time" can be improved to 'zero waiting time" as done by major world ports such as Port of Singapore. It also explains that the existing number of tug boat in Port of Tanjung Priok owned by Indonesia Port Corporation which is only 13 tug boats is inadequate. But the adequacy of tug boat will not give the optimum result if there are no improvements in systems and procedure of service, sufficient facilities, adequate channel for two traffic and adequate qualified human resources (crew, operator, administrative officer).

4.3.3. Vessel service Forecasting

To forecast the needs of pilot and tug until next several years, first, projection of ship flow must be made. In this thesis, we use the data of flow projections of ship that as been prepared by the IPC II in company long term plans. Consideration to use projection data that already exists is because the authors believe that the preparation of the projections are based on reasonable calculations and have been considering various aspects that affect growth and the flow of ships and goods, also included the port development plan. With a formula that has been made, then the calculation can be done by adjusting the number of ships visiting the Port. However, if there is a change in the pattern of operations and changes in conditions of other supporting facilities, the value of other factors which should be adjusted, for example:

a. Increasing the channel of Port of Tanjung Priok that was originally only allows one way traffic to be wider and allows for two way traffic, it will affect the speed of service and time required for pilot pickup.
b. Using information technology to make the report of the task also affects the number of services per day which can be done by a pilot.
c. Improvements in ship maintenance system so that maintenance and repair time will become shorter and will affect the readiness levels of tugs.
d. Changes in the average size of ship that will affect change in the number of tugs used per movement.

To forecast the needs of the vessel service at Tanjung Priok Port for the next few years the author use the data container flow projections that prepared David Wignal Associated (DWA) in 2010 in order to study Tanjung Priok Port Short Term Development Review.

In projecting the flow of containers to the Port of Tanjung Priok, DWA using three scenarios, that is the low case with average growth of 6% per year, the base case with an average growth of 8% per year and the high case is with an average growth

of 10% per year. With calculations based on the realization of the flow of containers in 2009, the projection results is as in table below :

Tabel 18 Container Throughput Forecast at Port of Tanjung Priok

(unit : million Teu's)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Realization	3.8											
Low Case		4.41	4.67	4.96	5.25	5.57	5.90	6.26	6.63	7.03	7.45	7.90
Base Case		4.48	4.84	5.23	5.64	6.09	6.58	7.11	7.68	8.29	8.96	9.67
High Case		4.56	5.02	5.52	6.07	6.68	7.34	8.08	8.89	9.77	10.75	11.83

Source: David Wignal Associates, Tanjung Priok Short Term Development Review

The growth of container flows in the port of Tanjung Priok port will not be able to be served by existing facilities and equipments. Therefore it must firstly be conducted the Tanjung Priok port development. Based on the Master Plan for Port of Tanjung Priok, the container flow projections (base case scenario) would be anticipated with the development plan as follows:

a. Container flow amounted to 4.48 million TEU's up to the year 2010 can still be accommodated by the quays and storage facilities that exist today.
b. Container flow amounted to 5.64 million TEU container's up to the year 2013, will be handled by doing the reconfiguration and addition container yard at Jakarta International Container Terminal. (See figure on Annex 1 and Annex 2)
c. Container flow amounted to 7.11 million TEU container's up to the year 2016, will be served at the new container terminal with a quay length of 1000 m' which is planned to be built in the Northern Break water of Port of Tanjung Priok through reclamation (Phase I development, see figure on Annex 3)
d. Container flow above the 8.29 million TEU container's that will be achieved in the year 2018 will be accommodated if the development of facilities in the Northern Breakwater with a 1000 m' quay length can be resolved. (Development Phase II, see figure Annex 3).

In Table 18 above also shows that in 2013, the flow of containers at the port of Tanjung Priok has reached 6.07 million TEU's or 60% above the realization in 2009. The flow of containers that can still be served at the existing Port of Tanjung Priok, the implementation of planned development of the existing harbor is still done entirely by the IPC II. Goods flow after the year 2013 can be served through new port development on reclaimed land. Construction of new terminal at the northern Tanjung Priok break-water is still waiting for further policy of the Government whether it will be done by the IPC II or other Port Enterprise Agency that will be appointed by the Port Authority. For it must be examined separately about investment plans in those locations. However, with the prospect of such a large market, it is very interesting for IPC II to try to obtain additional concessions for these port development.

Associated with the vessel service, since the increased flow of goods is very high it will be followed by increasing the flow of ships to the Port of Tanjung Priok. Increased terminal capacity until the year 2013 is still limited to the development of land side that consisted of the field expansion, the addition of equipment and

arrangement of land use. While in terms of the improving facilities such as widening basin and navigation channel, deepening of ponds and opening new channels will carried on the following stages. Without developing the water side facilities, then vessel service activities will not change significantly, mainly because of the depth of navigation channel and basin still remain as current conditions so it still not able to handle bigger ships. Vessel service facilities will experience significant changes after the development of a new Port in the North Break Water of Port of Tanjung Priok conducted namely the construction of the new pier, harbor and navigation channel with a depth of -18 MLWS that can serve larger size ships.

4.4. Chapter Conclusion

To improve vessel service performance at the port, especially performance of pilotage and towage services, the adequacy of the amount and quality of pilot and tug boats are vital. An ideal ships service performance target is zero waiting time. If the current IPC II still sets a target of one hour waiting time, then the target should be increased so that the Port of Tanjung Priok is able to maintain its major position in Indonesia and compete with other international Ports in surrounding countries. If the problem of shortage of the number of pilot and tug boats can not be resolved it will be very difficult for the IPC II to improve vessel service performance.

To calculate the required number of pilot at the port, the aspects that will be the determinant are the number of ships to be served per day, the average time of pilotage services per ship, average time needed for picking up the pilot and making the report, the working hour of pilots per day and the needs of subtitutes for absent pilots due to illness, taking leave or other reasons. Whereas to calculate the tugboat, it is necessary to know the factors that determine the number of tugs required i.e. number of ship movements using tug services in one day, percentage of one, two or three tugs used per ship movement, the number of ship movement that can be served by one tug boat per day and duration of use of tug boats in each ship movement.

From the calculation of total needs of pilots and tugboats in the Port of Tanjung Priok is concluded as follows:

a. The ideal number of pilots is 35 people, so with the current amount of pilot of 31 people, it will need additional four pilots.
b. The ideal amount of tugs is 15 units, so that with the current amount of tugboats of 13 units it will need additional two units tugboats.

Furthermore, the formula for calculating the amount requirement of pilot and tug boats in the port can be used to calculate the pilot and tug boats in the future. To calculate the needs in the future, first we must make the ship flow projections that will be served. In the projection of ship calls to be made must also have projected the size of ships that will visit the port. Information about the size of the ship will be helpful in projecting the number of tugs used in every service.

The projections of container flow at Port of Tanjung Priok that compiled by David Wignal Associated shows that the prospect of port market at Port of Tanjung Priok is very good. With the base case scenario, the flow of container per year will increased an average of 8% since the year 2010 until 2020. It will followed by the increasing of

the vessel service segment. Container flows can be accommodated at the Port of Tanjung Priok with firstly conducted the Tanjung Priok port development, that also the calculation the number of pilot and tugboats should be included in the development and investment plans.

Chapter 5 Strategy on Vessel service for Port of Tanjung Priok

Indonesia Port Corporation II already exists as the manager of commercial port in Indonesia, but to be able to survive in a competitive business after the new regulation on port effectively implemented, must also be able to compete with international ports in other countries. In line with this condition, management has established medium term and long term targets and plans. The medium-term targets of Indonesia Port Corporation II, which is covered in the Corporate plan year 2009-2013, is the business development of leading segments by improving infrastructure, equipment and information systems. To achieve these objectives management has set corporate strategy and business strategy. While for long-term plans as set forth in Port of Tanjung Priok master plan, because it involves the development of infrastructure and new supersructure, further implementation will wait for the further policy of the Government of the Republic of Indonesia. This decision will be whether the development of Tanjung Priok Port remains to be done by Indonesia Port Corporation II, or by other Port Enterprises to be appointed by the Government (Port Authority) pursuant to the Law of the Republic of Indonesia number 17 year 2008 about Shipping.

The corporate strategy of Indonesia Port Corporation II to achieve long term goals are (Corporate Plan, 2009):

a. Increase the attractiveness of Indonesia Port Corporation II through the fulfillment of agreed level of service to customers in a service level agreement (SLA).
b. Developing professional human resources.
c. Providing facilities and equipment that support the operation of the port of Tanjung Priok Port as a national hub port.
d. Improving working methods in the operation of the port.

The strategy will be proposed in this thesis in addition to complement the strategies contained in the Corporate Plan within the scope of the existing development of Port of Tanjung Priok, as well as proposed strategies for dealing with changes in port management system.

In addition to corporate strategy, management of the Indonesia Port Corporation II also has set a business strategy to be performed as follows (IPC II, 2009):

a. Increase its role in the operation of the terminal, where at present, the Indonesia Port Corporation II only provides land for terminal operations carried out by private stevedoring companies, and only manage few terminals directly. This is in line with the enactment of the Law of the Republic of Indonesia No. 17 year 2008 about Shipping where Indonesia Port Corporation II will only act as terminal operators and no longer manage the port as a whole. With only act as a terminal operator, the activity of terminal operations which previously was only as part of business scope of Indonesia Port Corporation II, then will be the core business and become the primary measure of performance in managing the company.

b. Focus on profitable business segments such as pilotage and towage service, liquid bulk terminals, dry bulk terminals, container terminals, multipurpose terminal, RORO terminal, car terminals and multimoda forwarder.

Based on the above corporate strategy it can be seen that the Port of Tanjung Priok remains the main focus of development and also becomes the backbone of the achievement of the performance targets of the Indonesia Port Corporation II. With the goal of "making the Tanjung Priok Port, as the national hub port", it must be followed by the increase in service performance. Performance improvement can be achieved through the fulfillment of facilities and equipment capable of serving the last generation of ships. It also must be supported by qualified human resources, and systems and procedure-oriented services to customer satisfaction.

Pilotage and towage services as the opening and closing of entire chain of services in the ports must be able to meet the target level of service equivalent to the major ports in the world. Key indicators of vessel service performance is "ship waiting time". The previous target of "one hour waiting time" at Tanjung Priok Port should be upgraded to "zero waiting time". Target of zero waiting time is an absolute must because as a world class seaport should be able to provide fast and reliable services. Reliable in this case means in a timely and safe manner. a service delay can not be tolerated for whatever reason. To reach those levels then the vessel service improvement program should be conducted thoroughly i.e. to the facilities, equipment, human resources and systems.

5.1. Corporate Plan

Port development is directed to be able to anticipate acceleration of the activity for loading and unloading of goods by providing complete and specialized service facilities such as the development of container terminals, liquid bulk terminal and a dry bulk terminal. Focus development of the service segment of the ship at the Port of Tanjung Priok in corporate plan is the renovation and improvement of infrastructure and additional equipment. The plan is to answer the challenges of market growth and meet customer expectations that has not been fulfilled.

The overall corporate plan includes:

a. Increased and improved facilities.
    1) widening or addition of entrance / exit port that currently there is only one and only enough for one ship movements to allow a minimum of two movements (two way traffic). This improvement will reduce the waiting time due to the ship waiting for the clear traffic and increase to the productivity of vessel service.
    2) Dredging and expansion of the harbor channel and accordingly can serve ships with a draft at the optimal and improve safety and security of shipping traffic. With adequate depth of channel then the overall capacity of pier and terminal will be optimum.
    3) Increasing the pool hygiene by increasing the frequency of cleaning and the addition of capacity and number of garbage ships.

b. Additions and repairs of equipment:

1) Procurement of two units additional tugboat based on the calculation of tugboat needed.

2) Procurement of new tugboatss to replace the tug boats which have been old, and oftenly damaged or inadequate capacity to serve customers in the Port of Tanjung Priok.

3) Procurement of additional tugboats to meet the operational needed based on the demand projection below.

Based on the cargo flow forecasting in Chapter 4 and with assumption that no changes in other factors, we assump that ship movement will increase 8% as high as the cargo projection, we can calculate the tugboat needed as follow:

Table 19 Projection of Tugboat Needed year 2010 -2020

	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ship movements	unit	97,2	104,98	113,37	122,44	132,24	142,82	154,24	166,58	179,91	194,30	209,85
Tug Boat Needed	unit	15	16	16	17	17	18	19	19	20	21	22

Source : Self calculation

c. Addition and upgrading of human resources:

1) Addition of pilots to meet the required amount pursuant to the calculation by conducting a strict recruitment, so it will procure high quality pilot who will meet all the requirements specified.

2) Changing the mindset and behavior of employees to have more orientation to the services and customers satisfaction by providing awareness about the importance of customer satisfaction in a competitive industry.

3) Implement payroll system that is able to encourage the increase of employee performance by considering the workload, risk and special skills required.

4) Implement performance standards for each employee along with a strict rewards and punishments system to be carried out consistently.

Apart from the increase in capacity and quality of facilities, equipment and human resources, it needs to intensively study the alternative of changing the management system for pilotage and towage services. The basic considerations to change management system is the existing condition and business prospects of the segments of pilotage and towage services, as well as changes in business environments become more opened and competitive with the enactment of the Law of the Republic of Indonesia number 17 year 2008 about Shipping.

The proposed change is to separate the management of pilotage and towage services into a separate strategic business unit or forming a separate company.

Condition of pilotage and towage services segment as well as environmental conditions that become the consideration of the proposed formation of strategic business units or subsidiaries are:

a. Business segments of pilotage and towage services at the Port of Tanjung Priok is currently managing assets in a large number and in a value of 13 units of tugboats, 6 units of pilot boats, 6 units mooring boats and one unit of survey ship with a total current value of IDR 166.37 billion, not including buildings and supporting equipment. With this big total assets, the Pilotage Division of Port of Tanjung Priok is equivalent to medium shipping companies in Indonesia. Therefore, when administered separately, the management and development will be easier.

b. Management will focus on one business segment, so the results are more optimal and their performance is more easily measured.(Toolika,2010) With focus on one segment, then the performance improvement and development efforts will be easier. In addition, they will be more flexible in managing the market and consumers.

c. The existence of opportunity to develop business in other ports. By becoming a separate entity from the Indonesia Port Corporation II, the opportunity to expand their business by becoming a provider in another port will be more opened. Currently the service is still limited to ships in ports under the management of Indonesia Port Corporation II because of the working area has been determined.

d. As a stand-alone entity, it will be faster in decision making, such as decision for financing and investment as well as operational and financial decision making, so it will be quicker to capture existing market opportunities.

e. Pilotage and towage services are activities that require workers with special skills and requirements and unlike from other terminals service activities such as loading and unloading, stacking, lift on lift off and transfer of goods. With a focus on one area of service it would be easier to improve workers' skills and professionalism. Career patterns of pilot and crew are also becoming more obvious and is not bound by the policies of the parent company. And also the policy and incentive payment system will become more flexible.

5.2. Investment Plan

Implementation of investment to support the increase of service performance of boats at the port of Tanjung Priok is to be carried out in line with the overall port development plans. With the current business conditions, Port of Tanjung Priok should have quickly procured ships, where price of tug boats currently is in the following range:

- Tugboat with capacity 1200 HP = IDR 14.5 billion.
- Tugboat with capacity 2400 HP = IDR 27,5 billion.
- Tugboat with capacity 3200 HP = IDR 40 billion.
  (source: Technical Department, Indonesia Port Corporation II)

If the investment for purchase of additional and replacement of unworthy tugboat is compared with the revenues earned from the activities of pilotage and towage services, then by using simple calculations such investment is still very profitable and very feasible. Actual after-tax net income segment of pilotage and towage services at the Port of Tanjung Priok in 2009 (see Table 13) is IDR 77.9 billion. With

such a large net income, then the implementation of the new tugboats stock investment will not affect financial performance. Addition of tugboats and replacement of old ones with the new tug boats will provide the following benefits:

a. Pilotage and towage service performance will be improved, namely by improving the achievement of the following performance indicators:
    i. Tugboat readiness level
    ii. Ship waiting time
    iii. Tug boat reliability
    iv. Approach time
    v. Turn around time
b. By using a new ship and conducting maintenance consistently, then the cost of ship repairs in the long term will be reduced.
c. To ensure the security and safety of workers and the environment, where the new ship technologies tend to be more fuel efficient and low CO2 emissions.(Thompson, 2009)

Long-term investment plans shall be carried out by the Port of Tanjung Priok development program further. With industry conditions that will soon change, then the Indonesia Port Corporation II should immediately establish corporate strategy, especially in relation to the scope of business and working areas that will be the focus of its corporate development. This strategy will be outlined in the company's long term plan including the investment plan. Based on the calculation described in Chapeter 5.1, then management can set the investment plan for equipment and human resources to support achievement of corporate objectives.

For the initial proposal, the investment plan of procurement new tug boat can be scheduled as follow :

The existing number of tug boat : 13 unit
Proposed investment plan for additional tugboat :
- Year 2010 : 2 units
- Year 2011 : 1 unit
- Year 2013 : 1 unit
- Year 2015 : 1 unit
- Year 2016 : 1 unit
- Year 2018 : 1 unit
- Year 2019 : 1 unit
- Year 2020 : 1 unit

To ensure that the additional tug boat will be ready for use on time it needed, so its important to scheduling the procurement process that can provide enough time for manufacturing and delivery of new tug boat.

While the proposal to make pilotage and towage services segment as a strategic business unit or a stand-alone company should immediately be followed up with a comprehensive study and planning related to the establishment and development. Investment plan must have been included in these development plans.

5.3. System and Operation Improvement Plan

Achievement of high vessel service performance, in addition to the provision of sufficient and qualified equipment and human resources, should also be supported by good a management. A modern port with world class service quality, should be able to provide effective and efficient services. To overcome the problems that arise all this time and to improve the quality of services, the following aspects will need to be increased:

a. System and Procedure of Services

   1) The request for the vessel service should be conducted by on-line system and no longer direct contact between officers with service users, so there are no loophole for illegal payments and irregularities.

   2) Pilot and tug boats that had finished carrying out their service activities do not need to go back to the pilot station but can directly serve other ships, this may result to a one-time deployment of pilot and tug boats can serve more than two ships.

   3) Improvement of the system must also be accompanied by improved communication and reporting systems. With an advanced information and communication technology, for communications, delivery of task and reporting can be handled with various communication tools (such as telephone, handy talki and hand held), so that communication and reporting can be done on-line. On-line reporting system will reduce the time needed by the pilot to compile a report, and in the end will increase the level of pilot readiness.

   4) Development and implementation of service level agreement, which will encourage the operators and management to always meet and exceed the performance indicators agreed with the customer.

b. Human Resources:

   1) Recruitment of qualified pilots and crews of tugboats, pilot boats and mooring boats as many as needed.

   2) Providing adequate training for the crew of the ship on how to operate and maintain the ship correctly.

   3) Re-evaluation of job descriptions of each department and service personnel associated with the ship. Particularly related to the obligation to perform ship maintenance.

   4) Changes in working hours system by following the pattern of the sailors, in which the crews attached to the ship, does not follow the pattern of other employees in companies that follow the shift system, so workers are more responsible and have a good understanding about the condition of the ship.

   5) Improvement of payroll system by considering the pilot's workload and profession as a special profession that requires high skill and has to face particularly high risks in relation with shipping safety function.

   6) Refreshing pilots and crews of tugs with periodic training and education, so they will have the insight and more knowledge, and can follow the

development of shipbuilding technology as well as industry growth and trends in the market.

7) An effective reward & punishment systems needs to be implemented, through strict supervision and use of information technology.
8) Changes in working culture becomes more competitive and develop an attitude of service (customer oriented), where it is not the customers who require the services of the company anymore but the company who needs the customers.

c. Tug boat readiness

To ensure all tugboats are ready for operation and meet safety requirements and seaworthiness, which can be seen from a high level of readiness, then the maintenance should be performed regularly and correctly.

Maintenance of the ship conducted properly and consistently will have an impact on:

- The economic life of ships become longer, so the ships can be used optimally.
- Ensuring the reliability of operation, with a high level of fitness that will minimize the operational disruption incurred due to the damage to machinery or other obstacles caused by the failure to complete the supporting equipment.
- The physical conditions of the ship's engines are good and it will ensure the health and safety of workers, as well as safety and working environment.
- With a good condition boat will push to increase efficiency and productivity. Efficiency will primarily be felt in the long term, with consistent maintenance, then the ship will be avoided from fatal damage that requires a high cost for the repairs.
- The high readiness of the ship will facilitate the management in formulating plans and achieving planned targets.

To ensure the ship to be always in a sea worthy condition then the ship maintenance program must be arranged in stages and a clear division of responsibilities for the implementation of maintenance must be set, as follows:

1) Preventive maintenance
    a) Routine Maintenance
        i. Preventive maintenance level 1(PM1)
        Preventive maintenance level 1 includes two main activities: first, clean the engine components and body board. Secondly, monitoring whether the engine components work well or not by checking the engine oil pressure and temperature.
        PM1 is carried out by the crew, each crew must properly understands his duties and its implementation must be closely supervised. In order the crews to be able to perform well and take responsibility for the consistency of its implementation, it needs to be outlined in the job description and performance indicators of each officer must be set.

Although PM1 is very simple, it is an important indicator to know the condition of the engines.

ii. Preventive maintenance level 2 (PM2)
PM2 includes activities of setting of engine components such as suction valves, exhaust valves and similar parts, and replacement of fast moving components such as air filter, filter and nozzle Olie. PM2 is conducted by the workshops which is under the management of Pilotage Division.

b) Time Based Maintenance (PM3)
PM3 includes replacement of engine components having slow moving. There are three types of implementation of the PM3 ie annual survey, intermediate survey (two years) and special surveys (renewal ship classification carried out every five years).

c) Corrective Maintenance (PM4)
PM4 includes bug fixes and engine damage which is usually carried out by the designated ship repair companies.

2) Predictive Maintenance
Maintenance that is done based on permanent monitoring and on-condition maintenance (detection, diagnosis, repair). Usually carried out by the ship repair company designated by companies.

3) Breakdown Maintenance (Unscheduled Maintenance)
That is the repair of any damage previously undiagnosed or sudden damage.

To ensure timeliness and quality of maintenance, there should be changes in maintenance and repair procedures by using the following maintenance methods:

a. Create and fill in the check list daily, weekly and monthly and fill in maintenance card consistently. It is necessary to implement rigorous monitoring and appoint staff responsible for the filling. Each crew is given instructions and reminder signs should be made available for them to perform their duties according to the standards. In this case the quality of human resources has a very important role. A tight requirements in crew recruitment should be implemented and adequate training for them should be provided.

b. With the number of ships owned by IPC II now, that is 13 units of tugs consisting of six units pilot boats, six units mooring boat and one unit survey ship, amounting to the total of 26 units, a long-term ship maintenance contracts has to be considered. Moreover, to ensure the availability of dock space, with the available land at the Port of Tanjung Priok, it needs to be considered to build their own shipyard to serve their own boats. With a docking yard owned by itself this will accelerate the implementation of maintenance and repairs in the event of damage, so interruption of operations can be minimized.

c. To overcome the problems of delays in the provision of spare parts needed for repairs and maintenance, it is necessary to shorten the process by conducting long-term contract with the authorized agent or engine maker directly. By making a long-term contract it is not necessary to be done through a quite long procurement procedure for every purchase of spare parts. This system will also help to accelerate the implementation of an immediate repair or emergency.

5.4. Regulation Improvement Plan

Regulations related to pilotage and towage services, the improvement can be done through two ways. First, to the regulations which directly relate to the activities and services within the authority of Indonesia Port Corporation II in the form of internal regulation, then the improvements or changes in the regulations can be done directly by disseminating the same first to all service users. Secondly, for the regulations beyond the authority of Indonesia Port Corporation II may be done by submitting proposals to the institutions or government agencies authorized to issue and make changes to these regulations.

a. Internal regulation.

1) Need to apply the rules regarding the level of risk and level of difficulty in the pilotage and towage services at every dock ship in the port of Tanjung Priok. For the services at the location of the pier having a higher difficulty level the application of different rules needs to be studied, including the possible application of special tariffs. As an example is the pilotage service to the dock 009, which has more narrow navigation channel, the level of difficulty and the risk is higher. With these conditions it is actually quite reasonable to apply special provisions related to the number of tugs used and applied tariffs. Application of this particular rule will make it better because it will prevent the illegal arrangements between operational officers in the field with service users.

2) The application of penalties for terminal and shipping companies that change the schedule of departure or arrival adjacent to a predetermined schedule of services, which may cause changes in pilotage and towage services schedule and shift the allocation of the pilot and the tugboat. Frequent changes have caused difficulties in organizing the pilot and tug boats and have caused disruption of shipping schedules of other customers and the high waiting time.

b. Proposals for adjustments general rules
With the enactment of the Law of the Republic of Indonesia number 17 year 2008 about Shipping, then the services related to ships in the port of Tanjung Priok need further implementing regulation related to the authority of pilotage and ship traffic control in the navigation channel.

- Authority of pilotage services.
Possibility of presence of other pilotage service providers and a become competitor of Indonesia Port Corporation II, because according to the new

regulation the authority of pilotage service lies on the Port Authority and can be delegated to the port enterprises. In this case there are possibility of more than one provider of pilotage and towage services in one port.

- The authority of the ship traffic control in the navigation channel
  Ship traffic control in the navigation channel is currently controlled by Harbour Master, so there were no problems in shipping activity at the moment. Problems may arise in the service of the ship if there are some service providers for the authority of the ship traffic control in the navigation channel

  1) because the navigation channel are limited so it needs to be regulated better if two pilotage service providers perform services at the same time.

  2) The authority of the traffic arrangements in the navigation channel. There are several terminal operators at the Port of Tanjung Priok where each of them wants timely service, accordingly we need good coordination and arrangements in this respect. Currently arrangements is made by Indonesia Port Corporation II because all the stations are still under the management of Indonesia Port Corporation II, making it easier to coordinate traffic control on the navigation channel. Pursuant to the new regulation the supervision will be carried out by the port authority. So the Port Authority should be able to coordinate all terminal operators and request them to submit periodic operating plan and submit any changes of the same soonest.

  3) It must be clear on who will be responsible for the maintenance of the harbor and navigation channel. Maintenance is mainly to maintain a safe waters depth and can accommodate the needs of service from all terminals at the port of Tanjung Priok. Also the clean conditions of waters at the Port of Tanjung Priok must be constantly maintained and improved.

5.5. Chapter Conclusion

Long-term strategy of Tanjung Priok Port, as stated in the company's long-term plans includes corporate strategy and business strategy. Overall corporate strategy is to improve service performance and support the efforts of the Port of Tanjung Priok to become national hub port. While the business strategy adopted is to focus on the development of superior business segments, including vessel service business.

Strategy for vessel service in the Port of Tanjung Priok aims to improve services to customers and to maintain the Port of Tanjung Priok as the main port in Indonesia, also in order to compete with other international ports in neighboring countries. In addition the strategy also includes preparation of the company to face the change of industrial environment that will be more open and competitive with the entry into force of new regulations allowing the presence of other players in the port management. Broadly speaking the strategy is divided into several aspects associated with the corporate plan, investment plan, system and operation improvement plan and regulation improvement plan.

Broadly speaking, Port of Tanjung Priok development plan is divided into two stages, mid-term until the 2013 and long-term in accordance to the master plan. The role of Indonesia Port Corporation II is still very clear in medium-term plan, because they still focus on the development and improvement of existing facilities. Meanwhile, for the next long-term plan still must wait for further policy and decision from the government whether Indonesia Port Corporation II will still be designated as a port operator or other parties will be appointed.

Related to the corporate plan, several strategies that can be implemented by Indonesia Port Corporation II are facility improvement and addition of equipment as well as addition and improvement of human resources quality. Also the possibility of pilotage and towage services segment increased to a separate strategic business units will need to be studied in depth. Several considerations such as business prospects and assets value will strongly supports the feasibility for the establishment of the Strategic Business Unit. Becoming a separate strategic business unit is also believed will further enhance the operational and financial performance of these segments, as well as more prepared and flexible enters in the new era of opened and competitive port industry.

Given that the pilotage and towage services segment represents a very profitable segment and influence the performance of port operations, then the management should not hesitate to do investment aggressively. Investment should be able to meet the number and capacity of facilities and equipment needed so that the resulting performance would be optimal, especially the investment of tugboats is very important for vessel service performance.

While associated with the systems and procedures, improvement and development are required in the field of systems and service procedures, human resource management and readiness of equipment, primarily related to the execution of ship maintenance. Improvement of systems and procedures will be in addition to provide convenience to customers, and also to ensure fast and efficient services. While the proper and consistently maintenance, will improve the productivity of equipment and eliminate operational disruptions.

To support the achievement of corporate objectives, some improvements in the areas of regulation also needs to be done. Improvement involves internal provisions directly related to service activities, as well as suggestions for improvement of general provisions beyond the authority of Indonesia Port Corporation II, which can support the functions of pilotage and towage services activities at the Port of Tanjung Priok ie function of safety, service and commercial.

If the strategy is implemented consistently, the service segment of the ship will provide an optimal contribution to the company's operational and financial performance. In addition the vessel service segment can also be a tool for company to expand its business coverage.

Chapter 6 Conclusion and Recommendation

6.1. Thesis Summary and Conclusion

The performance of vessel service at the ports as indicated by the level of waiting time has become a key factor in the selection of ports to be included in the list of ports visited by the leading shipping companies. A seaport with a world-class quality of service must be able to provide a quick, safe and reliable services. Zero waiting time is an absolute target to be achieved by each port if its want to be port users' choice.

Inline with the development of the international shipping industry, there are several trends occurred in the market in the port sector. The first trend is the operation of larger ships than ever. An impact of globalization is an increase in direct trade between countries, both trade in consumer goods and production goods. In addition, the increase of foreign investment in almost all countries are also able to increase the volume and type of commodities traded between countries. The advanced shipbuilding technology has managed to build ships with larger size. The presence of large ships that are more efficient have changed the pattern of transport to the hub-spoke pattern. With this trend, the role of transhipment port in international trade will be greater.

Port of Tanjung Priok, as the main ports in Indonesia, has to ensure the high level performance, especially to achieve a zero waiting time. The high level of readiness of tug boat and pilotage take important role in its achievement of the target. With limited facilities, there will be no significant change in market size. With limited land available, the changes will be more affected by the reconfiguration plan of Port of Tanjung Priok. However, related with the Master Plan for Port of Tanjung Priok, where the port development will be done through the reclamation, it is necessary to be studied separately with adjustment to the new port capacity to be built.

Based on the results of customer satisfaction survey and realization of internal quality objectives, it shows that service performance of the ship has not met expectations. Indicators of poor vessel service performance is the high ship waiting time that may reach 3-4 hours, due to the lack of pilot and low level tug boats readiness. Improvement of the performace will only be achieved if supported by an adequate amount of qualified human resources and adequate equipment. In this study, the authors focus on pilotage and towage service, where the human factor and equipment i.e. pilot and tugboats become the determinant factors of performance achievement.

In line with the enactment of new regulations on the port business ie Law of Republic of Indonesia number 17 year 2008 about Shipping, port industry in Indonesia will be more competitive, where it is not only the Indonesia Port Corporation, but private investors and other state-owned enterprises can develop and operate ports. This certainly requires Indonesia Port Corporation II to improve its quality of services to be able to compete nationally and in international markets. Competition to become a national hub port will be opened with the possible presence of new ports and other existing ports such as Port of Tanjung Perak. It is also necessary to maintain its existing feeder port in order to avoid them from moving to other ports in the neighbouring countries such Port of Singapore, Port of

Tanjung Pelepas and Port of Klang that have high capacity and modern facilities. To improve vessel service performance at the port, especially performance of pilotage and towage services, the adequacy of the amount and quality of pilot and tug boats are vital. If the problem of shortage of pilot and tug boats can not be resolved it will be very difficult to improve vessel service performance.

To calculate the required number of pilot at the port, the aspects that will be the determinant are the number of ships to be served per day, the average time of pilotage services per ship, average time needed for picking up the pilot and administrative work, working hour of pilot, and the needs of subtitutes for absent pilots. Whereas to calculate the number of tugboat required, it is necessary to know the determinant factors in this respect i.e. number of ship movements using tug services in one day, percentage of one, two or three tugs used per ship movement, the number of ship movement that can be served by one tug boat per day and duration of use of tug boats in each ship movement.

From the calculation of total needs of pilots and tugboats in the Port of Tanjung Priok it is concluded that the ideal number of pilots is 35 people, so with the current amount of pilot of 31 people four additional pilots is required. In addition the ideal amount of tugs is 15 units, so with the current amount of tugboats of 13 units two additional tugboats is required.

Long-term strategy of Port of Tanjung Priok, as stated in the company's long-term plans include corporate strategy and business strategy. The corporate strategy is to improve service performance and to promote Port of Tanjung Priok as national hub port. While the business strategy adopted is focusing on the development of superior business segments, including vessel service.

Strategy for vessel service in the Port of Tanjung Priok aims to :
- improve services to customers,
- maintain the Port of Tanjung Priok as the main port in Indonesia,
- compete with other international ports in the neighboring countries, and
- prepare the company to face the change of industrial environment that will be more open and competitive

Corporate strategy is divided into several aspects associated with the corporate plan, investment plan, system and operation improvement plan and regulation improvement plan.

Related to the corporate plan, several strategies that can be implemented by Indonesia Port Corporation II are facility improvement and addition of equipment as well as additional and improvement of human resources quality. Also the possibility of pilotage and towage services segment increased to a separate strategic business units will need to be studied in depth. Several considerations such as business prospects and assets value will strongly supports the feasibility for the establishment of the Strategic Business Unit. Becoming a separate strategic business unit is also believed will further enhance the operational and financial performance of these segments, as well as more prepared and flexible enters in the new era of opened and competitive port industry.

Given that the pilotage and towage services represents a very profitable segment and influence the performance of port operations significantly, then the management should take aggressive investment policy. Investment should be able to meet the number and capacity of facilities and equipment needed so the performance will be optimal. In addition, it needs to improve and develop systems and procedures in the field of service procedures, human resource management and ship maintenance. Improvement of systems and procedures is aimed to provide convenience service to customers and to ensure fast and efficient service. While the proper and consistent maintenance will result to a high productivity of equipment and eliminate operational problems.

Some improvements in the areas of regulation need also to be done. Improvement involves internal provisions directly related to service activities, as well as suggestions for improvement of general provisions that are beyond the authority of Indonesia Port Corporation II, which can support the safety, service and commercial functions of pilotage and towage activities at the Port of Tanjung Priok. The vessel service will provide an optimal contribution to the company's operational and financial performances if the above strategy is implemented consistently. In addition the vessel service segment can also be the pilot project for company to expand its business coverage.

Given the pilotage and towage services represents a very profitable segment and influence the performance of port operations significantly, then the management should take aggressive investment policy. Investment should be able to meet the number and capacity of facilities and equipment needed so this will optimize the performance. In addition, it needs to improve and develop systems and procedures in the field of systems and service procedures, human resource management and ship maintenance. Improvement of systems and procedures is aimed to provide convenience services to customers and to ensure fast and efficient service. While the proper and consistent maintenance will end on a high productivity of equipment and eliminate operational problems. It also needed some improvements in the areas of regulation also needs to be done. Improvement involves internal provisions directly related to service activities, as well as suggestions for improvement of general provisions beyond the authority of Indonesia Port Corporation II, which can support the safety, service and commercial functions of pilotage and towage activities at the Port of Tanjung Priok.

The vessel service will provide an optimal contribution to the company's operational and financial performance if the above strategy is implemented consistently. In addition the vessel service segment can also be the pilot project for company to expand its business coverage.

6.2. Future Plan

The performance of vessel service at the port of Tanjung Priok has provided a very large financially contribution to the IPC II, although operationally remain unwell. This phenomenon is certainly very interesting to study in depth to find out what was wrong with the management of this business segments. The next question is whether weakness or problems also occur in other branches under the management of IPC II. If weakness occurs in all ports under the management of IPC II, the results of the studies in this thesis need to be applied in other branches.

The Port of Tanjung Priok with the the most complete and modern condition of facilities, equipment and human resources can become a model for improving ships service performance. Optimizing the vessel service can also be carried out comprehensively in all branches of IPC II, by reviewing the needs of pilots and tug boats in each branch, then the addition or replacement be carried out centrally. With centralized planning it will allow asset transfers between branches in order to optimize existing assets. Thus the ship needs in one branch can be satisfied with the existing fleet in another branch that is not optimal, such as unsuitable engine to the needs. With centralized planning, the investment will be more efficient and optimal.

The formula for calculating the needs of pilot and tug boats shall also include continuous improvement that needs to be done. The Accuracy of the calculation result is influenced by the determinant factors which will be the basis of the calculations. The increase of efficiency and improvement of the systems of each of these factors will directly influence the calculation of pilot and tug boats needed.

Some examples of improvements related to the determinant factor is:

1) Improvement of port facilities so that the speed of pilotage service will be faster and will increase the terminal capacity.
2) Changes in the reporting system so that the time required by pilots to make reports will decrease, which means more time is available for the service increases (availble time).
3) Change in the system of drop off and pickup of pilots and pilot assignment patterns that allow the pilots serve more than one ship in a single assignment without wasting time to leave and return to the pilot station.

With these improvements, the production capacity of pilotage and towage services will increase. The increase will also occur at the operational and financial performance.

Associated with changes in business environment in which the port industry will be more open and competitive, then the IPC II should immediately conduct a study to increase pilotage and towage services segment into the Strategic business unit separate from the parent company. In addition to financial and operational performance improvement, these changes will improve the competitiveness of the IPC II and also can seize opportunities to develop business pilotage and towage services at other ports. With the new Act will be implemented effectively, then the IPC II should promptly begin the review and prepare for the changes, especially in pilotage and towage services. So that when the changes were effective in the port industry, IPC II is ready to compete and take the opportunities that are available.

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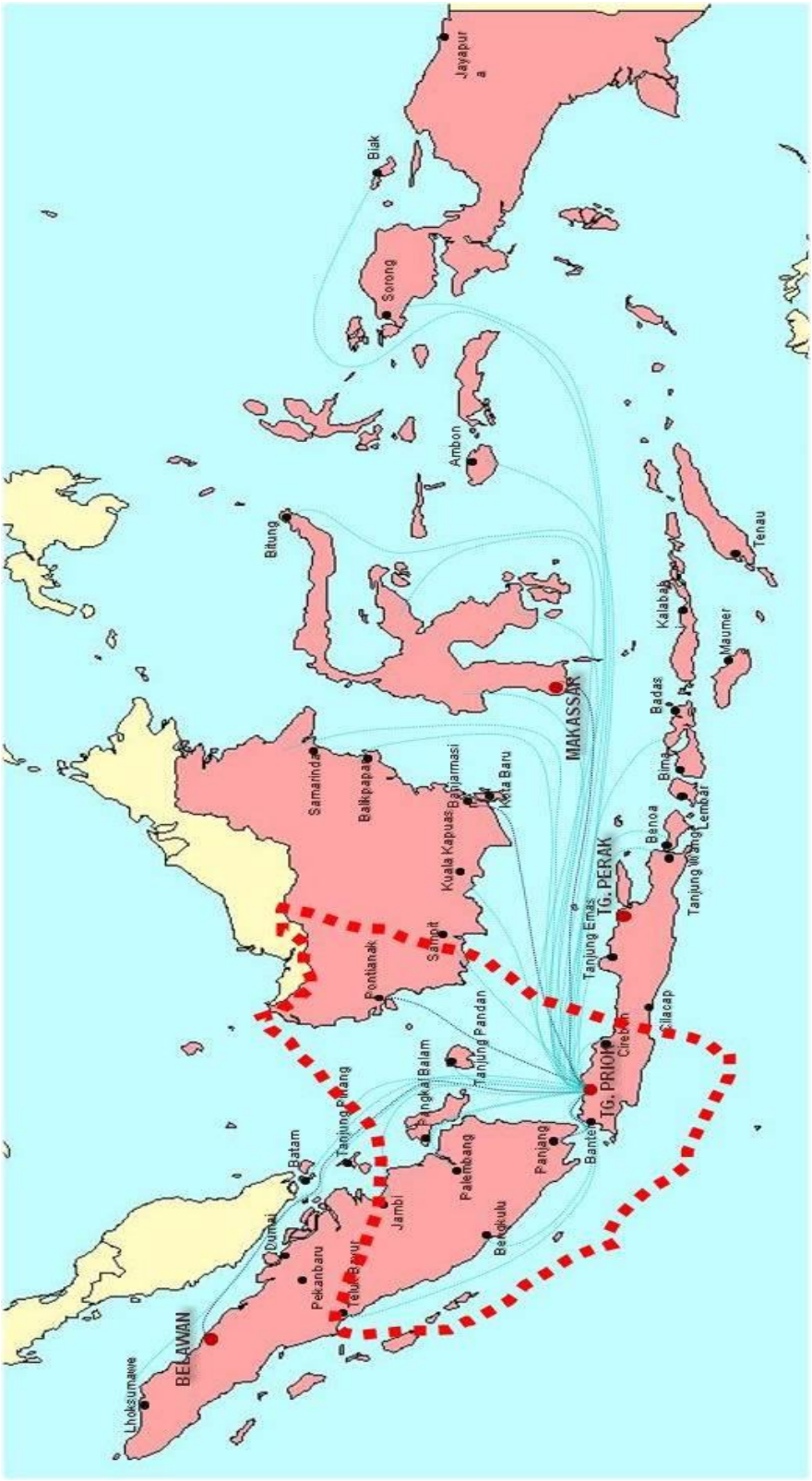
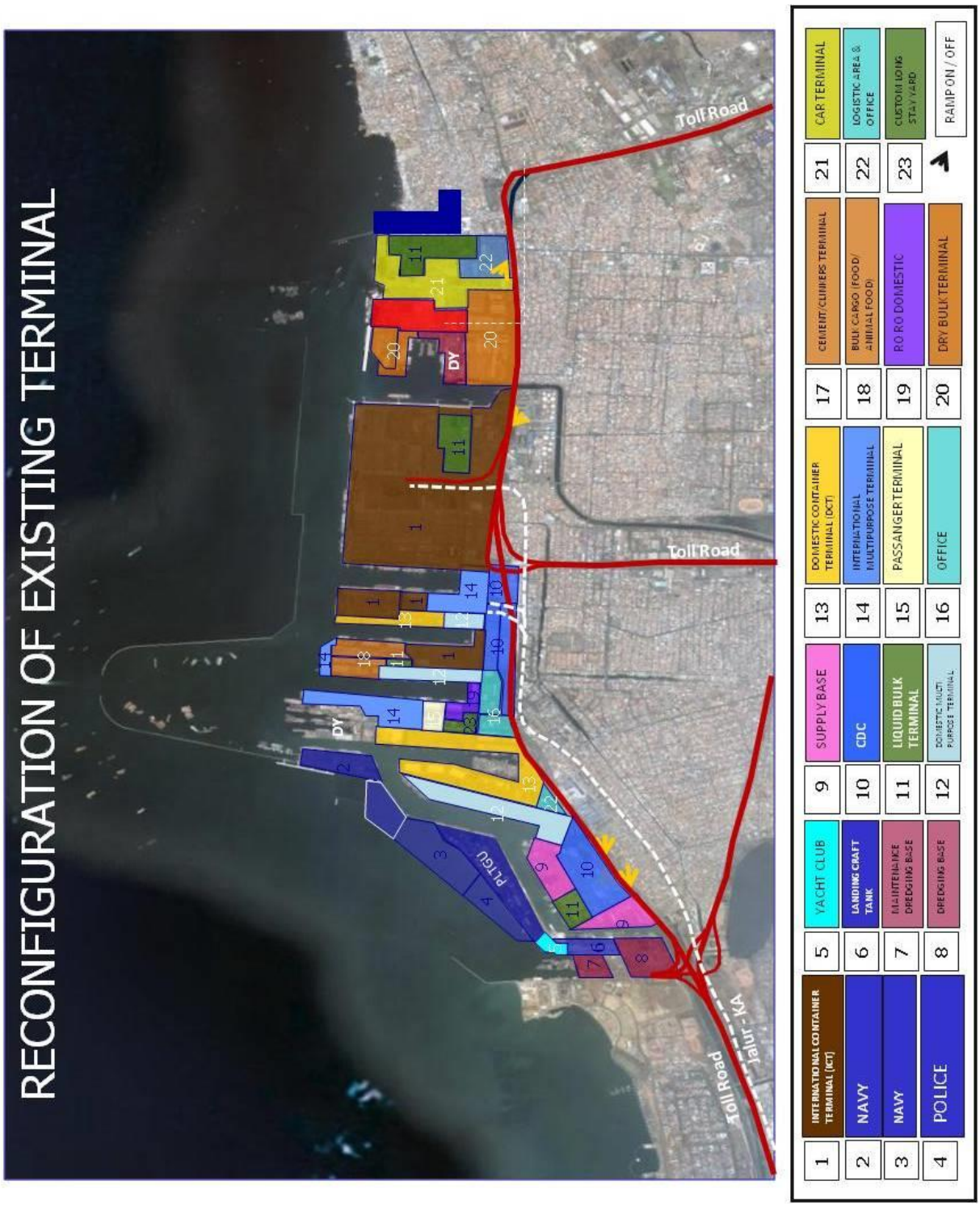
Appendix 1 Maps of Working Area of Indonesia Port Corporation II



Appendix 2. Design Picture of Reconfiguration Plan of Port of Tanjung Priok



Appendix 3 . Design Picture of Jakarta International Container Terminal Expansion Plan in Port of Tanjung Priok

Appendix 4. Design Picture of Development of Container Terminal in North Kalibaru, Jakarta (Northern Break Water)