



Optimization of Waiting Time for Coal Loading and Unloading Activities to Ships at PT Andhini Samudera Jaya Bunati Branch

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Abstract: *Coal is one of the fossil materials used as fuel for power generation. The mining industry, especially coal in Indonesia, has an important role for the state, especially as a source of state revenue that is able to support the country's economic growth. One of the areas in Indonesia that is a coal-producing area is Laut Island, South Kalimantan. The results of coal mining in the South Kalimantan area are mostly exported abroad. The mode of transportation chosen as a means of transporting coal is a mode of sea transportation that can load large quantities of cargo. Coal loading activities can be carried out if the loading room (ship hatch), cargo (coal) and loading equipment (floating crane) are ready to carry out loading and unloading activities. After the ship docks at the loading point, the captain will send a NOR (Notice of Readiness) to all charter parties indicating that the ship is ready to carry out loading/unloading activities. However, the number of ships that come and will load coal with the amount of loading and unloading equipment available is not comparable. This causes waiting time, so that the implementation of loading coal to large ships is not effective because too much time is wasted. Over time, ship service providers are growing and competing to provide effective, efficient and satisfying services for service users. Both for domestic and foreign service users.*

Keyword: *Waiting Time, Unloading, Shipping Company*

INTRODUCTION

The role of the shipping world is very important in supporting the socio-economic life of the Indonesian nation, which is a maritime country. Geographically, Indonesia is located between two oceans, namely the Pacific Ocean and the Indian Ocean, which connects the Asian continents and the Australian continents. 2/3 of Indonesia's area is the sea. The maritime sector should be developed as well as possible considering the advantages of a strategic location and the wealth of natural resources owned by the Indonesian state. The shape of the region in the form of an archipelago encourages Indonesia to become one of the

drivers of economic growth in the trade sector. The breadth of the trade network between countries (export-import) is the impact of the very rapid development of the industrial world. The activity of transporting goods is certainly one of the main factors in international trade business relations. Things that must be considered in the process of transporting international trade commodities are cost-effective and time-efficient distribution. Looking at the opportunities that exist, Indonesia has a great opportunity to develop in the maritime world.

One of Indonesia's largest export commodities is coal, where Indonesia is one of the largest coal exporting countries in the world with a total of 563 million tons during 2020. According to Achmad Prijono, et al (1992): Coal is a solid hydro-carbon fuel formed from Plants grow in an oxygen-free environment and are exposed to long-lasting effects of temperature and pressure. Coal is one of the fossil materials used as fuel for power generation.

The mining industry, especially coal in Indonesia, has an important role for the state, especially as a source of state revenue that is able to support the country's economic growth. One of the areas in Indonesia that is a coal-producing area is Laut Island, South Kalimantan. The results of coal mining in the South Kalimantan area are mostly exported abroad. The mode of transportation chosen as a means of transporting coal is a mode of sea transportation that can load large quantities of cargo. Ships have many types and uses, one type of ship is a bulk carrier. Bulk ship is a type of ship that can transport all types of cargo that is not wrapped or packaged, cargo in the form of grains where the cargo when on board is only separated by cargo space. Coal loading can be done at the jetty or at the loading point which is carried out using a transshipment system. According to KBBI, the meaning of the word transshipment is the transfer of cargo. The transfer of cargo in question is the transfer of coal cargo from barges to large ships caused by the depth of the sea and the river channel that is too shallow to anchor large ships. This is what encourages coal loading in Bunati to be carried out on a ship to ship basis at loading points that have sufficient drafts for Panamax to capesize ships. The transshipment work system is loading coal from the jetty to the barge then the barge is pulled using a tug boat to a large ship. After docking on a large ship, ship to ship activities are carried out from barge to ship using B/M equipment, either Floating Crane, Conveyor, as well as using ship cranes. Floating cranes are loading and unloading equipment that float on the sea and are divided into two types, namely floating cranes, conveyor types and grab types. Coal loading is distributed both between islands in Indonesia and abroad.

Coal loading activities can be carried out if the loading room (ship hatch), cargo (coal) and loading equipment (floating crane) are ready to carry out loading and unloading activities. After the ship docks at the loading point, the captain will send a NOR (Notice of Readiness) to all charter parties indicating that the ship is ready to carry out loading/unloading activities. If the captain has issued a NOR (Notice of Readiness) then the ship must be loaded immediately, the delay in loading coal is very detrimental to the ship because this is related to the cost of anchoring the ship. The shipper asked for a turning time of 12 hours to prepare the cargo and the plan for anchoring the Floating Crane to a large ship, but the charter refused because 12 hours was too long for just preparing the barge and Floating Crane. In coal loading and unloading activities there is a laytime, namely the planned time when the ship enters and leaves the port which is agreed upon by the ship owner and ship charterer. Laytime will start when the ship has arrived at the port, the captain has issued a Notice of Readiness, and the Notice of Readiness is received by the charterer. However, the number of ships that come and will load coal with the amount of loading and unloading equipment available is not comparable. This causes waiting time, so that the implementation of loading coal to large ships is not effective because too much time is wasted. Waiting time itself can be interpreted as the waiting time issued by the ship to carry out activities in the port waters area, with the aim of obtaining services to carry out loading and unloading activities. For example, suppose the ship has docked at the loading point at

01.36 LT. However, loading and unloading activities can only be carried out at 19.50 LT, so there is a waiting time of 18 hours and 14 minutes. So waiting time for 18 hours and 14 minutes can be said as wasted or ineffective time in the coal loading process.

Good coordination between loading and unloading companies (PBM), shippers, agency companies and the ship is very important to support the smooth loading and unloading of coal. Load compaction is also an important factor in coal loading, as it relates to the stability and safety of the ship during cargo delivery. However, loading and unloading activities can only be carried out at 19.50 LT, so there is a waiting time of 18 hours and 14 minutes. So waiting time for 18 hours and 14 minutes can be said as wasted or ineffective time in the coal loading process. Good coordination between loading and unloading companies (PBM), shippers, agency companies and the ship is very important to support the smooth loading and unloading of coal. Load compaction is also an important factor in coal loading, as it relates to the stability and safety of the ship during cargo delivery. However, loading and unloading activities can only be carried out at 19.50 LT, so there is a waiting time of 18 hours and 14 minutes. So waiting time for 18 hours and 14 minutes can be said as wasted or ineffective time in the coal loading process. Good coordination between loading and unloading companies (PBM), shippers, agency companies and the ship is very important to support the smooth loading and unloading of coal. Load compaction is also an important factor in coal loading, as it relates to the stability and safety of the ship during cargo delivery. Good coordination between loading and unloading companies (PBM), shippers, agency companies and the ship is very important to support the smooth loading and unloading of coal. Load compaction is also an important factor in coal loading, as it relates to the stability and safety of the ship during cargo delivery. Good coordination between loading and unloading companies (PBM), shippers, agency companies and the ship is very important to support the smooth loading and unloading of coal. Load compaction is also an important factor in coal loading, as it relates to the stability and safety of the ship during cargo delivery.

PT Andhini Samudera Jaya Bunati branch is a company engaged in ship agency services. According to PM No. 65 of 2019 Ship agency business is a business activity to take care of the interests of foreign sea transportation companies and/or national shipping companies while in Indonesia. The loading and unloading activities on ships that are agencyized by PT Andhini Samudera Jaya are aimed at improving the smooth implementation of coal loading and supporting the needs of the ships in the agency. However, according to the author's observations, coal loading activities are not running effectively. This can be reflected in coal loading activities which are almost never on arrival. Ships must wait for the readiness of loading and unloading equipment to dock on large ships to carry out loading and unloading activities. One of the factors that causes the waiting schedule for loading is that the loading and unloading equipment is still completing the loading of coal on other ships. Waiting for cargo to be loaded is also one of the factors that causes coal loading to run ineffectively. This is caused by the distance between the jetty and the loading point which is quite far (30 miles) and the number of tugs & barges that are not proportional to the number of ships served by the shipper. In the process of loading coal, it is also not uncommon for damage to both main equipment and auxiliary equipment, such as broken wire ropes. This is also one of the inhibiting factors in loading coal to large ships. Over time, ship service providers are growing and competing to provide effective, efficient and satisfying services for service users.

METHOD

Theoretical basis

Waiting time

Waiting Time is the amount of time since the submission of a mooring application after the ship arrives at the anchoring location until the ship is moved to the mooring. The waiting

time survey of ships is carried out by recording the ship's activities starting from the ship arriving (anchoring), applying for mooring, and starting to move to the mooring place until the ship begins to moor (first tie the rope), Munah et.al (2018:4).

Unloading and loading

According to FDC Sudjatmiko (2007: 264) loading and unloading means the transfer of cargo from and onto the ship to be stockpiled into or directly transported to the place of the owner of the goods by going through the port dock by using loading and unloading complementary tools, both those on the dock and those above. the ship itself.

Coal

Achmad Prijono, et al (1992) stated that coal is a solid hydro-carbon fuel that is formed from plant growth in an oxygen-free environment and is exposed to the influence of temperature and pressure that lasts a very long time.

Boat

In the Shipping Law Number 17 of 2008 it states that a ship is a water vehicle with a certain shape and type, which is driven by wind power, mechanical power, other energy, pulled or delayed, including vehicles with dynamic support, vehicles under the water surface, as well as floating equipment and floating buildings that do not move.

Ship Agency

According to Capt. RP Suyono M. Mar (2007:223) in his book entitled "Shipping Import Export Intermodal Transportation by Sea", agency is a legally binding relationship that occurs when 2 (two) parties agree to make an agreement, where one party called the agent agrees to represent another party called the owner (principal) on the condition that the owner still has the right to supervise his agent regarding the authority entrusted to him.

Research time

The time of the research was carried out when the researchers carried out land practice (PRADA) at the PT Andhini Samudera Jaya branch of the Bunati company which aimed as a requirement for fulfilling the D-IV program taken by researchers starting from August 2020 to January 2021.

Research Place

The place where the author conducted the research was carried out at the company PT Andhini Samudera Jaya, Bunati Branch.

Approach Method

With the problems raised in this thesis, the researcher uses a qualitative approach, starting with defining a very general concept, which has changed due to the results of his research. In discussing the existing problems, researchers use fishbone diagram analysis techniques that can make it easier for researchers to analyze existing data. This Fish Bone diagram is useful for determining the factors that cause a characteristic event. This diagram shows the cause and effect that is used to find the root of the problem and the cause of the problem and the solution.

Data collection technique

Observation (Observation)

According to Widoyoko (2014: 46) observation is "Systematic observation and recording of the elements that appear in a symptom on the object of research". Observation is a data collection technique by approaching directly the events in the field and recording the activities that occur at PT Andhini Samudera Jaya Branch Bunati. This technique refers to the loading and unloading activities of ships under the agency of PT Andhini Samudera Jaya, the Bunati branch while in the Bunati Harbor area (Bunati Anchorage, Bunati). The following is one of the images that the author collected:



Figure 1 Coal loading and unloading activities from barges to ships using floating cranes

Documentation

According to Sugiyono (2010: 240) documents are records of events that have passed. Documents can be in the form of writing, pictures or monumental works of someone. In this case the documentation in question is documentation that has become a company archive, in the form of data on facilities owned, data on ship visits, data on loading and unloading activities and others.

Literature review

According to Sugiyono (2010: 15) data collection techniques by looking for data from the library. The books that the author is looking for are books related to the problems discussed in this thesis. The author collects data by reading, viewing, researching, quoting from books or references presented, input or consideration and comparison of what can be seen from existing theories. This literature study aims to obtain theoretical foundations by reading books including regulations and other documents related to the issues to be discussed.

RESULTS AND DISCUSSION

Data Description

Length of Waiting Time for Coal Loading

Descriptive statistics is a method for describing and presenting information from large amounts of data. Descriptive statistics turn raw data into information that can explain. The following is data related to the number of ship arrivals, the amount of waiting time, loading time and the amount of coal loaded by ships at the agency of PT Andhini Samudera Jaya Bunati branch during the period August 2020 to January 2021.

Table 1
Total cargo, Waiting Time & Ship Loading Time agented by PT Andhini Samudera Jaya Bunati branch for the period August 2020 – January 2021

No.	Nama Kapal	Tanggal Kedatangan Kapal	Tanggal Keberangkatan Kapal	Waiting Time Dalam Satuan Jam	Loading Time Dalam Satuan Jam	Jumlah Bantubara yang dimuat
1.	MV. MINERAL NOBLE	19 Agsu 2020	25 Agsu 2020	15	122	152,000 MT
2	MV. CAPE JASMINE	25 Agsu 2020	05 Sep 2020	77	190	159,042 MT
3	MV. DS CHARME	14 Sep 2020	20 Sep 2020	11	150	161,500 MT
4	MV. AQUASCOPE	18 Sep 2020	25 Sep 2020	45	117	156,884 MT
5	MV. PAN JOY	22 Sep 2020	30 Sep 2020	69	127	159,800 MT
6	MV. YASA PIONEER	02 Okt 2020	09 Okt 2020	24	123	79,855 MT
7	MV. KMAX RULLER	13 Okt 2020	18 Okt 2020	8	85	86,333 MT
8	MV. ANASTASIA K	13 Okt 2020	25 Okt 2020	21	273	77,600 MT
9	MV. RAHI	21 Okt 2020	28 Okt 2020	32	124	162,400 MT
10	MV. SAMJOHN SOLIDARITY	30 Okt 2020	05 Nov 2020	19	124	163,600 MT
11	MV. CAPE MARS	12 Nov 2020	19 Nov 2020	40	146	159,500 MT
12	MV. CAPE GARLAND	13 Nov 2020	21 Nov 2020	22	145	159,550 MT
13	MV. CAPE SAMPAGITA	03 Des 2020	13 Des 2020	25	189	162,846 MT
14	MV. BERGE NYANGANI	13 Des 2020	24 Des 2020	10	232	163,600 MT
15	MV. AANYA	27 Des 2020	04 Jan 2021	19	163	162,750 MT
16	MV. CICELLI S	31 Des 2020	06 Jan 2021	10	122	158,700 MT

Based on the table above, during August 2020 - January 2021, PT Andhini Samudera Jaya Bunati branch agency ships a total of 16 vessels with a total cargo of 2,325,960 MT with an average cargo per ship of 145,372.5 MT while the waiting time is 447 hours or on average one ship requires waiting time. for 27.9375 hours and loading time for 2,432 hours or on

average one ship requires a loading time of 152 hours. Based on the table of the number of cargoes, it can be seen that some ships with a larger amount of cargo actually have a smaller waiting time and loading time or even some ships with a smaller amount of cargo but have a longer waiting time and loading time. This means that there is a problem in the loading process on the ship, which is managed by PT Andhini Samudera Jaya Bunati, so that it has a longer waiting time and loading time in the usual coal loading process. Where normal loading for ships with a total load of 150,000 MT only takes 110 hours when loading with two Floating Cranes at once.

The Frequent Occurrence of Loading and Unloading Equipment Damage During the Coal Loading Process

Loading and unloading equipment used to unload/load onto ships must meet the requirements for proper operation and ensure work safety. The loading and unloading equipment is operated by loading and unloading workers who must have competence in the field of loading and unloading as evidenced by a certificate. The following is a table related to floating cranes and conveyors operating at Bunati loading points and their daily loading rates:

Table 2
Floating Crane & Conveyors operating at Bunati loading point along with the loading rate per day.

No.	Nama Floating Crane/Conveyor	Loading Rate Per Hari	Jenis
1	FC Ratu Giok 2	15.000-17.000 MT/hari	FC/GRAB
2	FC Ratu Giok 3	17.000-18.000 MT/hari	FC/GRAB
3	FC Ratu Giok 5	15.000-17.000 MT/hari	FC/GRAB
4	FC Sovereign 8	17.500-18.500 MT/hari	FC/GRAB
5	FC Joshua	15.000-17.000 MT/hari	FC/GRAB
6	CLB Cahaya Mustika Laut 02	18.000-20.000 MT/hari	FT / CONVEYOR BELT

Based on the table, there are 5 floating cranes and 1 conveyor operating at the Bunati loading point, with an average loading speed of 15,000 - 20,000 MT of coal per day. If seen from the table, the use of conveyors is relatively faster to load coal when compared to floating cranes. This is because the Conveyor work system uses Grab to take coal from the barge and then the coal is loaded through the Conveyor Belt so that loading will be faster. But unfortunately there is only one conveyor operating at the Bunati loading point.

Damage to loading and unloading equipment often occurs during the coal loading process. This can be caused by technical and non-technical factors, both human error, lack of maintenance on tools, outdated equipment conditions and natural factors such as high waves and strong winds that can cause the wire rope to break.

The following is data related to the damage to loading and unloading equipment while operating on a ship that was managed by PT Andhini Samudera Jaya, Bunati Branch:

Table 3
Damage to loading and unloading equipment during operation on ships agencyed by PT Andhini Samudera Jaya Bunati branch for the period August 2020 – January 2021

No.	Nama Kapal	Nama Floating Crane/Conveyor	Lama Malfunction	Jenis Kerusakan
1	MT AMBERAL NORLE	FC Ratu Giok 1	2 jam 10 menit	Broken Rope Aft
		FC Ratu Giok 2	1 jam 30 menit	Broken Rope Prod.
2	MT CAPE JARLAND	FC Joshua	30 jam 15 menit	Trunk Crane
		FC Ratu Giok 2	1 jam 25 menit	Trunk Crane
3	MT DE CHARGE	FC Ratu Giok 1	1 jam 25 menit	Trunk Crane
		FC Ratu Giok 3	4 jam 30 menit	Broken Rope Aft
4	MT AQUARCOPE	FC Ratu Giok 2	1 jam 30 menit	Broken Rope Aft
		FC Ratu Giok 1	1 jam 30 menit	Trunk Crane
5	MT PANT SOY	FC Ratu Giok 1	3 jam 30 menit	Trunk Crane
		FC Ratu Giok 2	3 jam 30 menit	Trunk Crane
6	MT TAMA POWER	FC Ratu Giok 2	1 jam 30 menit	Trunk Crane
		FC Ratu Giok 1	4 jam	Problem Motor/Sliding
7	MT CAPE MARK	FC Ratu Giok 1	1 jam	Broken Rope Prod.
		FC Joshua	9 jam	Block Down
8	MT CAPE GARLAND	FC Joshua	1 jam 5 menit	Broken Rope Prod.
		FC Joshua	1 jam 40 menit	Broken Rope Aft
9	MT CAPE SARAGATA	FC Sovereign 8	35 menit	Broken Rope Aft
		CLB Cahaya Mustika Laut 02	1 jam 15 menit	Broken Rope Aft
10	MT BERBE STANGANI	FC Ratu Giok 2	1 jam 25 menit	Repeat Shooting Line

Figure 4.
An example of one of the damage to the floating crane bearing



Data source: Personal Documentation

If seen from the table above, of the 16 ships that were agencyed during the period August 2020-January 2021, there were 10 ships which during the coal loading process were constrained by equipment damage. Damage often occurs in holding motors, bearings and breaking wire ropes. This of course hampers the loading and unloading of coal at the Bunati loading point. With equipment damage, of course, it will reduce the amount of loading rate of the tool itself which has the potential to cause an increase in coal loading time.

Compaction is also very important in coal loading. This is related to the stability and safety of the ship during the coal shipping process. In addition, compaction of the load carried out properly will avoid broken stowage.

However, the lack of supervision and the skill of the dozer operator causes the compaction to sometimes run less than optimally. The frequent occurrence of damage to the bulldozer also causes the compaction of the load to run less than optimally.

Figure 5

Comparison of optimal and less than optimal load compaction.



Data source: Personal Documentation

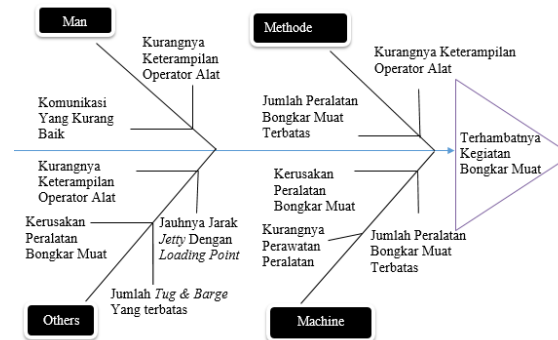
From the picture above, it can be seen that the comparison of the optimal load compaction with the less than optimal load compaction can be seen. Compaction of cargo can be said to be good (good stowage) if the cargo does not damage each other due to incorrect compaction, the cargo is protected from the weather and does not shift, does not interfere with unloading at each port of destination of goods, and fulfills ship stability so that the ship can sail safely.

Data analysis

Based on the data that the authors described previously, the authors will analyze these data using fishbone diagram analysis techniques. This Fish Bone diagram is useful for determining the factors that cause a characteristic event. This diagram shows the cause and

effect that is used to find the root of the problem and the cause of the problem and the solution.

Figure 6
Fish Bone Diagram of Loading and Unloading Activities.



The following is a discussion of the root problems described above:

Man

1. Poor communication

Communication is an important factor in all activities, good communication can avoid misunderstandings from all parties involved. But unfortunately the communication between the shipper and the ship is not going well, this is what causes misunderstandings regarding shipping and the availability of cargo and the amount of loading and unloading equipment that will be reduced on the side of the ship. So that there is a delay in the docking of the Floating Crane and the barge.

2. Lack of tool operator skills

Lack of supervision and operator skills have hampered loading and unloading activities. Every 15 days there is a crew change operator crane and loader equipment operator. Each individual has different skills so that sometimes the new operator is less skilled in operating the tool. The lack of dozer operator skills in operating and maintaining the equipment is also an obstacle during the load compaction process. Because it is not uncommon for damage to the bulldozer, so that the compaction runs less than optimal. The bulldozer must be repaired first to continue the compaction of the load, this takes a lot of time depending on the type of damage that occurs. Dozer operators seem to work less than optimally if there is no supervision from either the foreman or the ship's crew.

Method

Limited number of loading and unloading equipment

The number of loading and unloading equipment operating at the Bunati loading point is 6 loading and unloading equipment, 5 types of Floating Crane and 1 Conveyor. This amount is not proportional to the number of ships that come to load coal, considering that the demand for coal from the buyer is not small. For PT Andhini Samudera Jaya alone, on average 4 ships are agencyed per month. Therefore it is necessary to procure loading and unloading equipment.

Lack of tool operator skills

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Machine

The number of loading and unloading equipment is limited.

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Damage to loading and unloading equipment.

When viewed from the data that the researchers previously described, there was a problem with loading and unloading equipment damage on 10 of the 16 ships operated by PT Andhini Samudera Jaya, the Bunati branch. This of course hampers the loading of coal to ships, because loading can be carried out again when the maintenance process has been completed. Equipment damage during the coal loading process often hampers the loading process. This is because coal loading cannot be carried out and must wait for maintenance rather than the loading and unloading equipment itself. The availability of equipment has an important role in loading and unloading performance as well as in loading coal from barges to large vessels. If the tool is available and can be operated optimally (not damaged), it will certainly increase the performance and production of the equipment.

Lack of equipment maintenance

Maintenance and repair is an aspect that cannot be separated from loading and unloading equipment so that it is ready to use because the equipment is not separated from aspects of planning and operational activities, so that the equipment can operate properly and smoothly. Even though the equipment is well designed, if it is not balanced with maintenance and repair, the durability of the machine or equipment will not last long.

Others

Lack of tool operator skills

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Damage to loading and unloading equipment.

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to large vessels. If the tool is available and can be operated optimally (not damaged), it will certainly increase the performance and production of the equipment.

The distance between the jetty and the loading point.

The distance between the jetty and the loading point is 120 miles, while the tug boat runs quite slowly when fully loaded at around 3.5-4 knots plus the current and wave height are uncertain, especially in October-April where the Indonesian waters are traversed by the west monsoon. blowing from the continent of Asia to the continent of Australia. This will certainly slow down the speed of the tug boat itself. All of these things certainly hinder coal loading activities, if berthing is done faster of course loading can be carried out immediately.

Limited number of tug&barges.

Tug boat is the main means of transportation used to pull the barge from the stockpile to the big ship. Therefore, the number of tug & barges is very influential in supporting the smooth loading of coal to large ships. The number of barges owned by the shipper and ready to operate for loading and unloading activities is 9-10 barges with a cargo capacity of $\pm 7,500$ MT per barge. While the number of ships served by the shipper is quite a lot. For a 150,000 MT cargo ship, it requires around 24 barges, even more if there are barges with return cargo. This limited number of tug & barges certainly hampers the coal loading process.

Alternative troubleshooting

Length of Waiting Time for Coal Loading

To overcome the problem of the length of waiting time for coal loading, the authors provide several alternative solutions, including:

1. Increase the number of tug&barge
2. Increase the number of floating cranes and conveyors

The Frequent Occurrence of Loading and Unloading Equipment Damage During the Coal Loading Process

To overcome the problem of frequent damage to loading and unloading equipment during the coal loading process, the authors provide several alternative solutions, including:

1. Perform equipment maintenance on a regular basis according to schedule
2. Replace the floating crane that is often damaged with a new floating crane

Evaluation of Troubleshooting

From the various alternative solutions to the problems that have been stated above, the authors can evaluate alternative solutions that can be done to overcome existing problems.

Length of Waiting Time for Coal Loading

To overcome the problem of the length of waiting time for coal loading, the author has found several alternative solutions. For this reason, an evaluation of alternative solutions to problems is carried out, both in terms of advantages and disadvantages, including:

Increase the number of tug&barge

Pros: With the addition of the number of tug boats and barges, it is hoped that the docking of barges for rede on large ships can be more timely. Given the large number of ships that come to load coal with a large amount of cargo, it must be balanced with a commensurate number of tug boats and barges.

Disadvantages: The price of tug & barge is not cheap, therefore it is necessary to prepare quite large funds by the shipper to buy or rent tug boats and barges.

Increase the number of floating cranes and conveyors

Pros: If the number of floating cranes and conveyors is increased, it can load more than one ship at one time, thereby speeding up the loading process and facilitating the coal transshipment process. In one loading, one floating crane can load 15,000 MT / day, if the number of floating cranes is added to two, then in one loading coal can load 30,000 MT / day. Weaknesses: With the addition of equipment, of course, it will require more spare parts supply, considering that Bunati is a small town that is quite remote, it must supply spare parts from outside the region, while the demand for coal loading is very large, including the need for acetylene and oxygen supplies, which must always be met to support maintenance activities by welding. The increase in tools will certainly increase the number of operators, the selection of tool operators must be selective. Must choose an operator who has work experience and a good track record to minimize equipment damage due to human error.

The Frequent Occurrence of Loading and Unloading Equipment Damage During the Coal Loading Process

To overcome the problem of frequent damage to loading and unloading equipment during the coal loading process, the author has found several alternative solutions. For this reason, an evaluation of alternative solutions to problems is carried out, both in terms of advantages and disadvantages, including:

Perform equipment maintenance on a regular basis according to schedule

Pros: If routine maintenance is carried out on loading and unloading equipment, it can reduce obstacles when loading coal into large ships. If the tools used are getting better, there will be an increase in productivity, thereby increasing interest in loading and unloading services. Disadvantages: The cost required will be more if the available tools are damaged. Requires technicians and crane operators who are skilled and competent and can be relied upon if the equipment is needed in an emergency situation. It takes more time to manage the smooth implementation of the existing maintenance and repair schedule.

Replace the floating crane that is often damaged with a new floating crane

Pros: With the newer and more sophisticated floating crane, it is expected to improve the performance of the equipment in the process of loading coal to large ships. This of course will increase the loading rate of the tool, with the increase in the loading rate, the loading will run faster. So that it can reduce waiting time for the queue of ships in the transshipment area. Disadvantages: Floating cranes that have often been damaged often encounter problems during the coal loading process. As a result, the loading process is hampered and takes time. If this floating crane is not replaced with a newer and more sophisticated floating crane, it can cause ongoing damage that will disrupt the coal loading process. This may result in missed opportunities for further transshipment.

Solution to problem

Problem solving given by the author is to evaluate problem solving based on the situation and conditions since the research, the authors choose the most appropriate problem solving is to do:

Length of Waiting Time for Coal Loading

The addition of the number of floating cranes and conveyors is expected to reduce the queue for coal loading services, because ships often have to wait for the floating cranes to dock because they are still completing loading on other ships. With the addition of a floating crane, it is possible to load more than one ship at one time, thereby accelerating the loading process and facilitating the coal transshipment process. In one loading, one floating crane can

load 15,000 MT / day, if the number of floating cranes is added to two, then in one loading coal can load 30,000 MT / day.

The Frequent Occurrence of Loading and Unloading Equipment Damage During the Coal Loading Process

Carrying out regular equipment maintenance according to a schedule can be done in the following ways:

Carry out regular maintenance

Making equipment maintenance planning schedule. In the implementation of maintenance in the field, it must be in accordance with the maintenance planning schedule, this is to support the performance of the loading and unloading equipment. So that the loading and unloading equipment is always in optimal condition and ready to be operated at any time.

Perform incidental maintenance

Incidental maintenance is carried out without a plan, maintenance is carried out in case of damage. If any tools or components of loading and unloading equipment are damaged, they must be replaced immediately. Because if not addressed immediately can result in ongoing damage to the loading and unloading equipment. Carrying out routine maintenance on floating cranes aims to extend the life of the floating crane and so that in the coal loading process there is no sudden damage because the floating crane is always controlled. The coal loading process can also run smoothly because the queue of ships breaks down. With the smooth loading of coal, it can increase the achievement of shipments.

CONCLUSION

Based on the analysis conducted by the author, the factors that cause less than optimal waiting time in coal loading activities at PT Andhini Samudera Jaya Bunati branch are as follows: Due to the lack of floating cranes in the transshipment area, ships have to wait for floating cranes to dock because they are still finishing loading coal on other ships. If the number of floating cranes is not increased and each loading process only uses one floating crane, then in one loading process it can only load 1 barge. Meanwhile, there are already many queues of ships that have arrived in the transshipment area and are ready to be loaded. If this continues, there may be a potential loss of further transshipment opportunities because ships that have been scheduled for further loading activities still have to queue to load in the transshipment area; Loading and unloading equipment often operates without routine checks or routine maintenance schedules are not implemented so that these tools often experience damage during the loading and unloading process, a problem that often occurs during coal loading activities is the Floating Crane which does not function optimally because it is not carried out check regularly before carrying out loading activities. There is a need for periodic checks on operating equipment to facilitate operations during the coal loading and unloading process, so as not to interfere with the activities of ships carrying out loading and unloading which will have an impact on increasing ship docking costs.

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