GROSTLOG 2018
Global Research on Sustainable Transport & Logistics

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

Optimizing The Performance Of Ship's Service To Improve The Performance Of Operational Service (Study On The Port Of Old Sampit)

Yosi Pahala[1*], Sukarana[2], D.A. Lasse[3]
[1,2,3]Institut Transportasi dan Logistik Trisakti, Jakarta, Indonesia
*Corresponding Author:yopahala@gmail.com

Abstract

Prime service is very important for improving seaport services. The improvement of seaport services is not only seen from the port facilities, but it should also be seen from the ship service performance. This study aims to see the optimization of ship services at the port of old Sampit which is maintained as a conventional cargo and passenger port, although a container terminal port of Bagendang has been developed. This research is to formulate and implement the service strategies for cargo ships and passenger ships with more refined service system and procedures in accordance with the existing condition of the port of Sampit which is located in the urban area. The research method is collecting secondary data, that is the data of ship's arrival performance in the period of December 2015 to April 2016. The results of this research show that the port of Sampit as a conventional port still has a very important role to drive cargo and people movement in the area of Sampit. The local government as the development authority needs to improve the quality of old Sampit port service to be the port having economic competitiveness with integrated local transportation infrastructures, although it is geographically very difficult to expand this port area.

Key words: Optimization, Performance, Facilities, Service, Port.

Introduction

The seaport of Sampit is one of the open seaports in Indonesia, so the ship's loading and unloading services and facilities management are of primary priorities to fulfill the need of service users, namely ship owners or shipping companies. In order to fulfill the need of port service users, safe and efficient services are necessary. Therefore, the standard performance of operational services has been established as the standard performance of each service that must be achieved by the port/terminal operator in delivering the port services which include providing port facilities and equipment. The reference for standard performance of port operational services at 100 commercially strived ports is regulated in the

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

Regulation of Director General of Sea Transportation Number HK.103/2/18/DJPL-16 dated 12 July 2016.

Port performance can be used to know the level of port services (for ships and cargoes), depending on the time of ship service during at the port. High port performance indicates that the port is able to deliver good services. By knowing the standard, a plan for port facilities improvement or addition can be made.

Sampit as the district capital of Kotawaringin Timur is one of the most important cities in the Central Kalimantan Province. In addition to being relatively advanced regency in term of economy, it is also situated in the strategic position.

Seen from the map of Central Kalimantan, Sampit city is located in the middle between Palangkaraya and Pangkalanbun, making Sampit port have a strategic position in the sea transport activities. Moreover, Sampit port is still the choice for its location in the business center of Sampit city; whereas the distance of the new port (Bagendang port) is 24.5 kilometers away although it is closer to outfall, meaning that it takes more time for reaching it by a road trip. The port management has decided to maintain the port of Sampit special for bulk cargo for the sake of people interests, such as basic commodities (groceries), building materials and for passengers terminal.

Based on the data of Port Service Performance in 2015, the average of TRT (Turn Round Time) the total time of a ship at the Port of Sampit for general cargo ship, particularly for the activity of unloading such commodities as cement, fertilizers, coral, reached 184 hours or 8 days. (According to the speed of loading-unloading, the ideal average rate of time for loading-unloading is around three days or 72 hours for the cargo as much as 1,000 to 1,500 tons as targeted.)

The higher the TRT, then the level of port services, especially berthing service, is considered as not effective (this is due to the queue of ships obtaining the first berthing priority alternately between cargo ships and passenger ships for loading-unloading or for embarking and debarking passengers from and to the wharf). Consequently, it affects the duration of cargo ships at the port for doing cargo loading and unloading activities as seen in the following table.

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

Table 1. The TRT of Ship's Port Operational Activities of PT (Persero) Pelindo III Sampit

NO	SUBJECT	HOURS	REMARKS
1	*Turn Round Time (TRT)*	184	Total time for a ship at the port
2	*Waiting Time (WT)*	28	Time for ship's harboring while waiting for berthing
3	*Aproach Time (AT)*	2	Time for ship to go berthing
4	*Berthing Time (BT)*	154	Total time at the wharf.
5	*No Operation Time (NOT)*	13	Time for a rest with no activity
6	*Berth Working Time (BWT)*	140	Effective working time at the wharf
7	*Idle Time (IT)*	78	Wasted time: Shifting/in-out, rain
8	*Effective Time (ET)*	62	Time for loading-unloading activities

Source: Data processed from PT Pelindo III Sampit Branch 2017

Based on the above table, the problem being described is related to the phenomenon of the port's still low operational performance due to the unachieved TRT (turn round time) of ship service performance and low utilization of port facilities due to the arrival of passenger ships being prioritized for service.

This research aims to study the optimization of ship service in order to obtain a relatively better result from some possible results which fulfill the requirements based on certain definitions (Setijoprajudo, 1999).

The problem statements for analyzing the optimization of ship service are as follows;

1. How long is the ship's ideal turn round time (TRT) based on the current service performance?
2. How long is the ship's turn round time (TRT) based on the service performance after the optimization?
3. What is the comparison or time difference between the ship's current TRT and post-optimization TRT?

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

4. What is the comparison of ship's operational costs at the port between the current time and post-optimization?
5. How much is the ship's operational cost efficiency after the optimization?

Optimization is a process to obtain a relatively better result from some possible results which fulfill the requirements based on certain definitions (Setijoprajudo, 1999). Optimization reflects the rational behaviour of actors; it means, as consumers they will always maximize their decision and as producers they will maximize their profit or minimize their loss. Basically, optimization is to find the maximum or minimum point of something.

There are three aspects of approach to analyze the optimization of ship service at the Port of Sampit which need to be considered, namely:

1. Technical Aspect

   From the technical aspect, it is expected that the ship's in-out movement runs smoothly with no disruption, in this case disruption to the passenger ships which are always prioritized.

2. Operational Aspect

   Port can be optimized so that wharf's productivity can be improved thus the use of wharf and stevedoring equipment can be more efficient, and from the ship's operation there may be efficiency and expectation to reduce the cost of ship's operation.

3. Economical Aspect

   With the improvement of ship service at the port of Sampit, the number of visiting ships will increase and the income of terminal port and local government will increase as well.

According to Moenir, (2010:26), "Service is the activity performed by some one or a group of people based on the material factor through certain systems, procedures, and methods to fulfill people's interests according to their rights".

According to the governmental regulation of the Republic of Indonesia Number 96 Year 2012 concerning the Implementation of Act Number 25 Year 2009 on Public Services in Chapter I; General Requirements, Article (1):

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

Public service is an activity or a series of activities to fulfill the need for service in accordance with legislation for all citizens and residents or goods, services and/or administrative services provided by the public service provider.

Theoretically sea transportation is divided into two, namely sea transport and port.

Port is everything related to the execution of port function to support smoothness, security, and traffic order of ships, passengers and/or cargo, shipping safety and security, displacement point for intra-and/or intermode as well as to promote national and local economy while paying attention to the city spatial plan.

According to Sasono (2012:49) port is a place comprising land and water surrounding it with certain boundaries as a place for governmental activities and economic activities used for ship berthing, harboring, loading-unloading passengers and/or loading-unloading cargo completed with facilities of shipping safety and port-supporting activities as well as for a transportation place. Port can also be defined as a terminal and area where ships load or unload cargo at the wharf, at harboring area, buoy or the like and includes the water as the place while waiting for the turn to get services, Lasse (2014:4)

Port can also be defined as a place for ship harboring, mooring, as well as a terminal for arranging ship services. From the above definitions, it is stated that the most important elements/[roles] of port management are: (a) to support the safety, security and quality of ship services for both cargo and passengers, (b) to trigger local and national economy.

Some reasons are put forward by an expert, Dr. D.A. Lasse (2015:233). In the logistical approach, port is situated in an extraordinarily strategic position. The important reasons that put a port in the strategic role of international trade network, among others, are:

1) A port is bridging the gap among production resources such as manpower and raw/semi-finished material by using sea transportation from the origin to the destination.

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

2) Port, as the most important interface between land transportation mode (truck and train) and sea transportation mode, gives very significant contributions to business players such as cargo shippers/owners, freight forwarders, ship owners/agencies, ship charter brokers, manufacturing and packing industries, and truck/train transport operators, customs services, immigration and quarantine, marine inspectors, ship industry/workshops, bank, and insurance companies.
3) Port as the point of departure and arrival for sea transportation mode. Transportation using ships starts and finishes at a port.

Based on the above definitions, the authors conclude that a port is a terminal functioning for loading or unloading passengers, and/or the process of loading-unloading cargo at the wharf, buoy or the like. Moreover, a port has safety facilities and security services to support the port activities.

Method

This research uses the method of field survey by observing the ship service activities and collecting secondary data from PT Pelindo III Sampit Branch. The survey is performed at the Port of Sampit, Kotawaringin Timur, for about 90 work days, starting from November 2017 to May 2018. Before collecting data, some preparatory activities related to the research would be performed, including: theoretical framework formulation, research instrument arrangement, and data analysis technique simulation.

The population used by the authors is a definite population where the population is the number of ships visiting the Port of Sampit in the period of December 2015 to April 2016 taken from PT (PERSERO) PELINDO III SAMPIT's secondary data.

The authors choose the sampling technique according to Arikunto (2010:134-185), where the number of population is more than 100 ships, so the number of samples to be taken is as many as 100 of the ship's visit population at Pelindo III Sampit. The sampling technique used in this research is random or probability sampling technique where each ship has the same opportunity to be chosen. Since this is a

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

quantitative research, then this type of random sampling is suitable where the authors try to minimize mistakes.

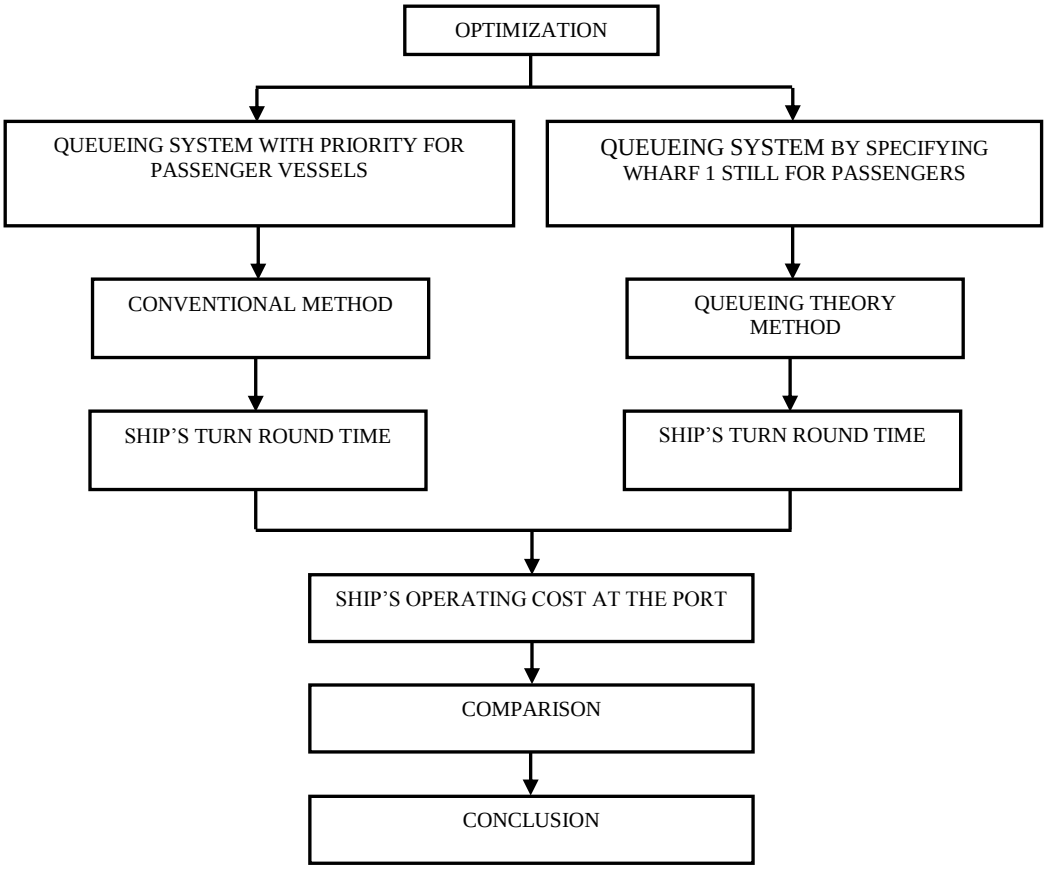
The research is carried out through a direct field observation on the research aspects to describe exactly the current empirical condition. According to Supranto (2014), descriptive research is explorative in its nature, expecting the researchers to describe the condition in a certain period of time as the base of decision making.

Discussion and Result

The obtained data is processed mannually, then it is processed again to know how significant it is to the optimization of ship service at the port, so that the ship's waiting time in the queue can be reduced up to minimum level as possible.

The research framework can be arranged as follows:

Figure 1 Research Framework



Herewith the statements of problem being researched:

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

1. *Idle Time* based on the current ship's performance

To measure the current ship service performance can be done conventionally, that is measuring the time spent by a ship starting from entering the anchoring area until it has been served and leaves the service area. Since the source of problem is the obstacles resulted from passenger ships, then the essence of ship service performance to be known is the time needed for serving a ship at the service area and the time spent by a ship to wait in a queue at the anchoring area.

The number of ship visits to be studied as the limited population at Pelindo III Sampit (P) port from 1 January 2016 to October 2017 is as many as 417 visits.

With random or probability sampling technique and implementing Arikunto's theory, the sample to be taken is as many as 100 visits because the number of population is more than 100 visits.

Table 1. Data of ship's visits at Pelindo III Sampit Port

No.	Name of ship	Ships arrived		Ships departed	
		Date	Hour	Date	Hour
1	INARAN	14-Dec-2015	8:00	18-Dec-2015	8:00
2	EVER CONCORD	14-Dec-2015	11:30	18-Dec-2015	13:00
3	KIRANA III	15-Dec-2015	21:30	18-Dec-2015	8:00
4	FAJAR NUSANTARA	21-Dec-2015	13:00	25-Dec-2015	8:00
5	CITRA NUSANTARA BARU	29-Dec-2015	23:00	2-Jan-2016	13:00
6	KIRANA III	30-Dec-2015	19:30	2-Jan-2016	8:00
7	LEUSER	31-Dec-2015	18:10	7-Jan-2016	13:00
8	SELASIH	31-Dec-2015	19:00	4-Jan-2016	8:00
9	KIRANA I	4-Jan-2016	20:00	7-Jan-2016	19:00
10	KALTIM EXPRESS-22	5-Jan-2016	3:00	9-Jan-2016	8:00
11	PHU AN 268	5-Jan-2016	6:00	13-Jan-2016	8:00
12	SIRIMAU	5-Jan-2016	13:00	13-Jan-2016	13:00
13	KIRANA III	5-Jan-2016	23:59	8-Jan-2016	19:00
14	LEUSER	6-Jan-2016	23:00	15-Jan-2016	8:00
15	KIRANA III	9-Jan-2016	21:10	12-Jan-2016	8:00
16	NAGA JAYA	13-Jan-2016	15:00	17-Jan-2016	8:00
17	KIRANA III	13-Jan-2016	19:00	16-Jan-2016	8:00

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

No.	Name of ship	Ships arrived		Ships departed	
		Date	Hour	Date	Hour
18	LEUSER	14-Jan-2016	18:35	22-Jan-2016	8:00
19	EVER CONCORD	16-Jan-2016	18:30	21-Jan-2016	8:00
20	KIRANA III	17-Jan-2016	21:00	19-Jan-2016	8:00
21	KIRANA I	18-Jan-2016	22:00	21-Jan-2016	19:00
22	HOSANA	19-Jan-2016	13:25	24-Jan-2016	8:00
23	LEUSER	20-Jan-2016	22:30	27-Jan-2016	8:00
24	SELASIH	24-Jan-2016	15:00	27-Jan-2016	8:00
25	MARINA-22	25-Jan-2016	6:00	29-Jan-2016	8:00
26	MARINE POWER 3019	25-Jan-2016	6:00	30-Jan-2016	8:00
27	DORADO	25-Jan-2016	17:00	31-Jan-2016	8:00
28	BINA MARINE-95	27-Jan-2016	19:00	31-Jan-2016	8:00
29	NUSANTARA 3005	27-Jan-2016	19:00	8-Feb-2016	8:00
30	SM KENCANA 228	27-Jan-2016	19:00	4-Feb-2016	8:00
31	LEUSER	28-Jan-2016	17:10	6-Feb-2016	8:00
32	KIRANA III	29-Jan-2016	20:00	31-Jan-2016	13:00
33	SHINPO 16	30-Jan-2016	8:00	7-Feb-2016	13:00
34	KIRANA I	1-Feb-2016	17:00	3-Feb-2016	19:00
35	TIRTA SAMUDRA XXVI	1-Feb-2016	23:00	11-Feb-2016	8:00
36	SIRIMAU	2-Feb-2016	12:38	13-Feb-2016	8:00
37	POWER JET	3-Feb-2016	16:00	14-Feb-2016	8:00
38	LEUSER	3-Feb-2016	21:00	17-Feb-2016	8:00
39	KIRANA III	3-Feb-2016	21:00	6-Feb-2016	8:00
40	CAMRY	6-Feb-2016	14:55	17-Feb-2016	8:00
41	BINAIYA	7-Feb-2016	13:30	24-Feb-2016	8:00
42	KIRANA I	8-Feb-2016	16:00	11-Feb-2016	19:00
43	PERMATA TIMUR	8-Feb-2016	17:00	20-Feb-2016	19:00
44	KIRANA III	8-Feb-2016	20:00	13-Feb-2016	8:00
45	KAPUAS BAHARI XVII	10-Feb-2016	1:00	19-Feb-2016	8:00
46	AULIYA KURNIA XVII	10-Feb-2016	1:00	23-Feb-2016	8:00

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

No.	Name of ship	Ships arrived		Ships departed	
		Date	Hour	Date	Hour
47	KELIMUTU	11-Feb-2016	18:17	27-Feb-2016	1:30
48	KIRANA III	13-Feb-2016	20:00	16-Feb-2016	8:00
49	KIRANA I	15-Feb-2016	17:30	19-Feb-2016	8:00
50	LUMENA-26	17-Feb-2016	5:10	25-Feb-2016	13:00
51	LMN-316	17-Feb-2016	5:10	8-Mar-2016	8:00
52	KELIMUTU	17-Feb-2016	23:00	2-Mar-2016	19:00
53	KIRANA III	19-Feb-2016	10:30	22-Feb-2016	8:00
54	KOTA NABIRE	20-Feb-2016	7:00	2-Mar-2016	8:00
55	SUMBER CAHAYA XI	20-Feb-2016	23:00	4-Mar-2016	8:00
56	BINAIYA	21-Feb-2016	13:20	8-Mar-2016	19:00
57	KIRANA I	22-Feb-2016	13:30	26-Feb-2016	8:00
58	SELASIH	22-Feb-2016	13:30	6-Mar-2016	8:00
59	KAPUAS BAHARI XVI	23-Feb-2016	16:00	8-Mar-2016	8:00
60	AULIYA KURNIA XVIII	23-Feb-2016	16:00	12-Mar-2016	8:00
61	KIRANA III	23-Feb-2016	19:00	27-Feb-2016	8:00
62	KELIMUTU	25-Feb-2016	18:00	19-Mar-2016	19:00
63	KIRANA III	29-Feb-2016	3:30	2-Mar-2016	8:00
64	KALUGA LAUT	29-Feb-2016	18:00	11-Mar-2016	8:00
65	KIRANA I	29-Feb-2016	19:00	3-Mar-2016	19:00
66	SIRIMAU	1-Mar-2016	11:47	17-Mar-2016	8:00
67	KELIMUTU	2-Mar-2016	12:00	18-Mar-2016	13:00
68	BONGORO	4-Mar-2016	12:00	19-Mar-2016	13:00
69	GMS MT 168	4-Mar-2016	12:00	22-Mar-2016	19:00
70	CHARLES 211	4-Mar-2016	12:00	24-Mar-2016	8:00
71	KIRANA III	4-Mar-2016	16:30	7-Mar-2016	8:00
72	BINAIYA	6-Mar-2016	12:25	1-Apr-2016	13:00
73	NAYAKA III	7-Mar-2016	15:30	25-Mar-2016	8:00
74	KIRANA I	7-Mar-2016	21:30	10-Mar-2016	13:00
75	CITRA NUSANTARA BARU	9-Mar-2016	10:00	26-Mar-2016	8:00

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

No.	Name of ship	Ships arrived		Ships departed	
		Date	Hour	Date	Hour
76	KELIMUTU	10-Mar-2016	18:27	31-Mar-2016	13:00
77	KIRANA III	12-Mar-2016	23:30	14-Mar-2016	8:00
78	TIRTA SAMUDRA XXVI	14-Mar-2016	9:00	31-Mar-2016	8:00
79	SABA NIAGA	14-Mar-2016	15:25	2-Apr-2016	8:00
80	KIRANA I	14-Mar-2016	16:30	17-Mar-2016	8:00
81	KELIMUTU	16-Mar-2016	10:00	6-Apr-2016	19:00
82	KIRANA III	16-Mar-2016	11:45	19-Mar-2016	8:00
83	PETRO NUSANTARA	18-Mar-2016	12:00	6-Apr-2016	13:00
84	BINTANG SEJAHTERA 8	19-Mar-2016	12:05	5-Apr-2016	13:00
85	KIRANA III	20-Mar-2016	14:30	22-Mar-2016	13:00
86	KIRANA I	21-Mar-2016	13:00	24-Mar-2016	8:00
87	SELASIH	23-Mar-2016	17:05	7-Apr-2016	8:00
88	KELIMUTU	24-Mar-2016	17:02	20-Apr-2016	13:00
89	KIRANA I	25-Mar-2016	5:30	27-Mar-2016	19:00
90	SIRIMAU	28-Mar-2016	8:48	13-Apr-2016	8:00
91	KIRANA I	29-Mar-2016	2:30	30-Mar-2016	19:00
92	KELIMUTU	30-Mar-2016	9:25	13-Apr-2016	19:00
93	POWER JET	31-Mar-2016	10:50	16-Apr-2016	8:00
94	KIRANA I	2-Apr-2016	8:25	5-Apr-2016	8:00
95	KIRANA I	5-Apr-2016	8:10	8-Apr-2016	13:00
96	KARYA AGUNG 25	6-Apr-2016	5:00	16-Apr-2016	8:00
97	SUMBER JAYA 3016	6-Apr-2016	5:00	21-Apr-2016	8:00
98	SHINPO 16	6-Apr-2016	12:00	19-Apr-2016	19:00
99	BINAIYA	7-Apr-2016	10:20	25-Apr-2016	19:00
100	KELIMUTU	7-Apr-2016	16:08	29-Apr-2016	20:22

Based on the field observation and supported by the data from Pelindo III Sampit, namely data of ships in and out, effective time (ET), Ship's waiting time (WT), then the data is analyzed using average statistics (mean) and the result is recorded into the ship service performance.

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

Effective Time (ET)

The average value of ET for the sample of ships in-and-out at Pelindo III Sampit based on the data from PT Pelindo III Sampit is 62 hours or 2.59 days.

Idle Time (IT)

From the sample data it is obtained that the average value of IT is 79 hours or 3.28 days. [3.29167]

Berth Working Time (BWT)

From the sample data it is obtained that the average value of BWT is 141 hours or 5.87 days [5.875], that is the average sum of ET and IT, or it can be written in the formula of BWT = ET + IT

No Operation Time (NOT)

The average of NOT from the sample data is obtained as 13 hours or 0.55 days. [0.54167]

Berthing Time (BT)

From the sample data it is obtained that the average value of BT is 154 hours or 6.43 days.[6.4167] This average value of BT is the average sum of NOT and BWT, or it can be written in a formula to become BT = NOT + BWT

Approach Time (AT)

The average value of AT for all the ships in and out Pelindo III Sampit based on the data from PT Pelindo III Sampit is 2 hours or 0.11 day.[0.0833]

Waiting Time (WT)

From the sample data it is obtained that the average value of WT is 28 hours or 1.16 days. [1.1667]

Turn Round Time (TRT)

The average value of TRT is the average sum of WT, AT, and BT (written as TRT = WT + AT + BT). From the sample data it is obtained that the average value of TRT is 184 hours or 7.70 days.[7.666]

2. Idle Time after optimization by dividing wharfs into 3 sections

The queueing method is used to know how far the division of wharfs into 3 sections with 1 wharf special for passenger ships affects the decrease of ship's waiting time in the queue so that it can reduce the ship's operational cost as well as increase the number of available ships being serviced; 2 wharfs for general cargo ships and 1 wharf special for passenger

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

ships but it can be used for cargo ships when there is no passenger ship and if passenger ships come, then the cargo ship should move out giving the priority to the passenger ship.

The queue discipline used here is FIFO (First In First Out) for 2 wharfs (wharfs 2 and 3) and 1 wharf (wharf 1) uses two queue disciplines: FIFO for cargo ships, and LIFO (Last In First Out) when there are passenger ships.

The idle time in the queue (T) can be defined as the time from the ships start to berth, up to the ships unberth, which is influenced by climate, labor break time, wharf maintenance, in-out when passenger ships come in.

Then, the average idle time which is previously 78:47:36 hours or 3.28 days decreases to become 12:42:47 hours or 0.53 day.

The decrease of idle time may happen mainly because of ship's in-out process when passenger ships come in. In the previous condition, the in-out process can take place at wharfs 1, 2, and 3. Whereas in the optimum condition, the in-out process happens only at wharf 1.

With the difference between conventional IT and optimization, it influences the ship service performance as follows:

Effective Time (ET)

The average value of ET for the sample of ships going in and out Pelindo III Sampit based on the data from PT Pelindo III Sampit is 62 hours or 2.58 days.

Idle Time (IT)

From the sample data it is found that the average value of IT is 13 hours or 0.53 day. [0.5416]

Berth Working Time (BWT)

From the sample data it is found that the average value of BWT is 74 hours or 3.11 days[3.083], that is the average sum of ET and IT, or it is written in a formula BWT = ET + IT

No Operation Time (NOT)

The average of NOT from sample data is found 13 hours or 0.54 day.[0.5416]

Berthing Time (BT)

From the sample data it is found that the average value of BT is 87 hours or 3.65 days. This average value of BT is the average sum of NOT and BWT, or it is written in the formula BT = NOT + BWT

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

Approach Time (AT)

The average value of AT for all the ships going in and out Pelindo III Sampit based on the data from PT Pelindo III Sampit is 2 jam or 0.10 day.[0.083]

Working Time (WT)

The average value of WT from the sample data is found 28 hours or 1.16 days.

Turn Round Time (TRT)

The average value of TRT is the average sum of WT, AT, and BT (written in a formula TRT = WT + AT + BT). From the sample data it is found that the average value of TRT is 118 hours or 4.92 days.[4.916]

Then the ship service performance of PT Pelindo III Sampit both currently and after optimization is as follows:

Table 2. Comparison between current and after-optimization ship service performance at the Port of Sampit

Performance	Current Condition		Optimum Condition	
	In hours	In days	In hours	In days
ET	62:08:31	2.589252115	62:01:52	2.584632155
IT	78:47:36	3.283060657	12:42:47	0.529710638
BWT	140:56:08	5.872312772	74:44:39	3.114342793
NOT	13:18:25	0.554455446	13:02:58	0.543729373
BT	154:14:33	6.426768217	87:47:37	3.658072165
AT	2:31:40	0.105327218	2:31:40	0.105327218
WT	27:55:05	1.163249169	27:55:05	1.163249169
TRT	184:41:18	7.695344604	118:14:22	4.926648552

Based on the comparison between ciurrent and after-optimization TRT, it decreases as follows:

TRT decrease = TRT current – TRT optimum

= 7.69 - 4.92 = 2.77 or rounded to be 3 days

3. Ship's Operational Cost

Table 3. Ship's cost per visit in the current condition

Class of GRT	Range of GRT	Cost (Rupiah)		Current TRT	Total Cost (million/visit)
		million/month	million/day		
1	0 - 1000	650	22	8	173
2	1000 - 2000	1,000	33	8	267

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

3	2000 - 3000	1,500	50	8	400
4	3000 - 4000	2,000	67	8	533

Table 4. Ship's Cost per Visit after Optimization

Class of GRT	Range of GRT	Cost (Rupiah)		TRT after Optimization	Total Cost (million/visit)
		million/month	million/day		
1	0 - 1000	650	22	5	108
2	1000 - 2000	1,000	33	5	167
3	2000 - 3000	1,500	50	5	250
4	3000 - 4000	2,000	67	5	333

After knowing the current and after-optimization, ship's operational cost or the value of ship's harboring/mooring fee during in the queue at harboringb area, then saving can be made due to the decreased TRT.

The value of saving for ship charter cost can be obtained by multiplying the decreased GRT with the ship charter cost, or it can be written as:

Cost saving = $TRT_{decrease}$ x Ship charter cost

= 3 days x Ship charter cost

Subsequently, the saving value can be seen in the following table. From the table of ship classification based on the above GRT, then the saving is obtained as follows:

Table 5. Saving of Ship Charter Cost by the Size of GRT

Class of GRT	**Current TRT**	**After-Optimization TRT**	**Difference of TRT**	**Ship Charter Cost (million/ day)**	**Saving (million/day)**
1	8	5	3	22	65
2	8	5	3	33	100
3	8	5	3	50	150
4	8	5	3	67	200

Comparison of Current and Optimum Idle Time

Table 6. Table of Time Decrease/TRT after Optimization

Performance	Current Condition	Optimum Condition	Difference

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

	In hours	In days	In hours	In days	In hours	In days
TRT	184:41:18	7.6953446	118:14:22	4.9266485	66:26:56	2.7687037

Based on the above table, it can be seen that there is a decrease of TRT as many as 2.7687037 days and rounded to be 3 days based on rounded calculation.

Comparison between current and optimum cost

Table 7. Comparison and Difference of TRT and Ship Operational Cost

Class of GRT	Range of GRT	Current		After Optimization		Difference	
		TRT	Cost (million/ visit)	TRT	Cost (million/ visit)	TRT	Cost (million/ visit)
1	0 - 1000	8	173	5	108	3	65
2	1000 - 2000	8	267	5	167	3	100
3	2000 - 3000	8	400	5	250	3	150
4	> 3000	8	533	5	333	3	200

Conclusion

Based on the result of research it can be concluded that the Port of Sampit should do the division of 3 wharfs, namely:

Wharf 1 : special for passenger ships and can be used for other ships if there is no passenger ship provided if a passenger ship comes in so the other ships should be shifted out.

Wharfs 2 and 3 : special for cargo ships/general ships, or for general cargo and liquid bulk ships.

Based on the above calculation, it is known that the ship services at the Port of Sampit can still be optimized by dividing wharfs into 3 and 1 special wharf for passenger ships so that the ship's in-out movement at wharf 2 and 3 is not disrupted by passenger ships.

The strategic location of Sampit Port can be maintained and the infrastructure quality can be improved considering the distance of new port of Bagendang from Sampit city is 24.5 kilometers far away, thus it needs road transportation which means it still needs time.

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

References

Ahyari, Agus. 2012, *Manajemen Produksi dan Perencanaan Sistem Produksi*, 4th ed., BPFE, Yogyakarta

Algifari. 2008. *Analisis Statistik untuk Bisnis dengan Regresi, Korelasi & Non-Parametrik.* Yogyakarta : BPFE.

Assauri, Sofjan, 2011, *Manajemen Produksi dan Operasi*, Revised ed., Lembaga Penerbit Fakultas Ekonomi Universitas Indonesia, Jakarta

Dimyati, T. T. and A. Dimyati. 2011. *Operating Research: Model-Model Pengambilan Keputusan*. Bandung: Sinar Baru Algensindo.

Duwi Priyatno. 2010. *Teknik Mudah dan Cepat Melakukan Analisis Data Penelitian dengan SPSS dan Tanya Jawab Ujian Pendadaran*. Yogyakarta: Gaya Media.

Hadi, Sutrisno. 2010. *Document Level 4 Phase 1 Major Component*. Samarinda : PT. Altrak 1978.

Handoko, T. Hani, 2011, *Manajemen*, 2nd Ed., 18th printout, BPFE, Yogyakarta

Hsb Amron, Sahdan. 2009. *Analisa Kelayakan Ukuran Panjang, Dermaga, Gudang Bongkar Muat Barang dan Sandar Kapal*. Skripsi. Program Studi Teknik Sipil Fakultas Teknik Universitas Sumatera Utara.

Heizer, Jay and Barry Render. 2009. *Manajemen Operasi* Book 1, 9th Ed. Jakarta: Salemba 4.

Hiller, F. S., and Gerald J. Lierbermen. 2006. *Introduction to Operation Research*. London: Holden Day.

Iqbal, Hasan and Firmanto, Hadi. 2011. Model Optimalisasi Tata Letak Pelabuhan Curah Kering dengan Pendekatan Simulasi Diskrit: Studi Kasus Pelabuhan Khusus PT Petrokimia Gresik. *Jurnal Teknik*. Surabaya: Fakultas Teknik Perkapalan Institut Teknologi Sepuluh November.

Lasse, 2014. *Manajemen Kepelabuhanan*, Penerbit PT. Raja Grafindo Prasada, Jakarta.

Lasse, 2015. *Manajemen Bisnis Transportasi Laut, Carter, dan Klaim*, Penerbit PT. Raja Grafindo Prasada, Jakarta.

Siagian, 2010. *Manajemen Opersional*, PT. Grasindo, Bandung

Stopford, Martin. 1997. *Maritime Economics* Second Edition, Routledge, London

Subagyo, P., et al. 2007. *Dasar-dasar Operations Research* 3rd ed. Yogyakarta: BPFE.

ISSN: 2622-5778 (online)
Advances in Transportation and Logistics Research
http://proceedings.itltrisakti.ac.id/index.php/atlr

Sudarmo, Sudjanadi Tjipto 2016. *Reinventing Port Management in Indonesia – No. 3: Best Practices on Port Business Development, Change and Creativity*. Jakarta: AGPH Publishing.

Supranto, J. 2012. *Riset Operasi: Untuk Pengambilan Keputusan*. Jakarta: Universitas Indonesia Press.

Taha, H. A. 2008. *Riset Operasi Suatu Pengantar*. Jakarta: Binarupa Aksara.

Tamin, Ofyar Z. 2008. *Perencanaan, Permodelan, & Rekayasa Transportasi: Teori, Contoh Soal dan Aplikasi*, Bandung ITB.

Triatmodjo, Bambang. 2008. *Teknik Pantai*. Yogyakarta: Beta Offset.

Triatmodjo, Bambang. 2006. *Pelabuhan*. Yogyakarta: Beta Offset.

Trisakti, STMT, 2016, *Pedoman Penyusunan dan Penulisan Tesis*. Jakarta. Program Pendidikan Pascasarjana, STMT Trisakti.

Aulia Ahmad and Muhammad Mashuri.2016. Analisis Sistem Antrian Kapal Pengangkut Barang di PelabuhanTanjung Perak Surabaya. *Jurnal Sains Dan Seni ITS* Vol. 5, No.1, (2016) 2337-3520

Clinton Yan Uguy, T. K. Sendouw, A. L. E. Rumayar. 2015. Evaluasi Kinerja Operasional Pelabuhan Manado. *Tekno* Vol.13/No.64/December 2015.

Cherryl Clinda Rumambi, T. K. Sendouw, Mecky R. E. Manoppo. 2016. Evaluasi Kinerja Operasional Pelabuhan Bitung. *Tekno* Vol.14/No.66/December 2011

Youlinda Noviara D.L.S., Darnah A. Nohe, Yuki Novia N. 2015. Analisis Penerapan Sistem Antrian Single Channel Multi Phase pada Engine Overhaul di PT. ALTRAK 1978 Branch Samarinda. *Jurnal Eksponensial* Volume 6, No. 1, May 2015

Act of the Republic of Indonesia No. 17 Year 2008

The Republic of Indonesia Governmental Regulation No. 61 Year 2009

The Director General of Sea Transportation Regulation No. UM.002/38/18/DJPL-11

The Director General of Sea Transportation Regulation No. HK.103/2/18/DJPL-16