

Operational Performance of Privately Owned Ship

Muhammad Wildan Rizkyansyah^a, Sri Untung^b,

Imam Sonny^c

^{abc}Trisakti Institute of Transportation and Logistics

Wildan48port@gmail.com^{a*}, sriuntung@gmail.com^b, imamsonny@gmail.com^c

ABSTRACT

The purpose of this study is to determine and identify the effect of warehouse infrastructure and spare parts procurement on ship operational performance with the effectiveness of ship maintenance as an intervening variable on ships owned by PT Mitrabahtera Segara Sejati Tbk in 2020. Methods of data analysis use linear regression analysis, simple correlation, partial or simultaneous and path analysis. Based on the analysis and discussion, it shows that there is a significant positive direct effect of warehouse infrastructure on the effectiveness of ship maintenance, there is a significant positive direct effect of spare parts procurement on the effectiveness of ship maintenance, there is a significant positive direct effect warehouse infrastructure on ship operational performance, direct positive which is significant the procurement of spare parts on the operational performance of the ship, there is a significant positive direct effect of the effectiveness of ship maintenance on the operational performance of the ship, there is an intervening effect between warehouse infrastructure on the operational performance of the ship through the effectiveness of ship maintenance and there is an intervening effect between the procurement of spare parts on vessel operational performance through effective ship maintenance on vessels owned by PT Mitrabahtera Segara Sejati Tbk.

Keywords : Ship; Maintenance Effectiveness; Operational Performance

A. Introduction

During a voyage, there are ship operational procedures that refer to SOLAS 1994, International Regulations on Collision Prevention at Sea (P2TL) 1972, Standard for Training Certification and Watch Keeping for Seafarer's (STCW) 1978, Marine Pollution (Marpol) 73 / 78, International Safety Management-Code (ISM-Code) of 1994 and others which provide guidance and instructions for crew members in ship operations so that safety, environmental protection, safety and comfort of the crew, goods, and the ship itself is guaranteed. However, in the course of shipping, accidents often occur in sailing. Accidents that occur on ships cause obstruction of fuel distribution operations, recorded in the accident data from the National Transportation Safety Committee (NTSC) which is an extraordinary event (PLH),

shipping accidents have decreased and increased every year.

The object of this research is PT Mitrabahtera Segara Sejati Tbk (MBSS). PT Mitrabahtera Segara Sejati Tbk (MBSS) is a leading provider of integrated logistics and sea transportation solutions for bulk materials in Indonesia, specifically coal. Having more than 20 years of experience in this field of business, MBSS is known for a reputation for high quality and reliable service. MBSS primarily serves the largest coal mines in Indonesia. The following services are provided by MBSS as follows:

MBSS provides direct barging services for the transportation of bulk mining materials, particularly coal, from loading ports to ports of loading and also from ports of loading to port points in Indonesia and throughout the surrounding countries. MBSS owns and operates 76 barges as well as

operates several barges which are chartered from third parties to meet client needs. The barges used vary from 250 feet to 365 feet long. The entire MBSS barge fleet meets the requirements of the Indonesian Bureau of Classification, and the majority also meets the classification requirements of the global community which are Registro Italiano Navale, Bureau Veritas, Nipon Kaiji Kyokai, American Bureau of Shipping and Germanischer Lloyd.

MBSS carries out material handling, including barge loading activities, is safe and is coordinated under the supervision of experienced personnel. Based on the findings in the field there are several cases of main engine spare parts that must be fabricated so that it requires a lead time of 3-4 months at the fastest, of course this is a big obstacle for ships and besides the spare part supply factor, another very important factor is for the problem. delivery of the spare part, where the ship operates in the charter area so that the delivery time must be adjusted to the regulations of PT. MBSS especially if the delivery time is outside the schedule of the predetermined regulations so that there can be delays in the supply process, this is also an obstacle in the supply of these spare parts. In addition, there are still identified problems with not optimal procurement of engine parts, insufficient availability of main engine spare parts, lack of human resources available for the maintenance process, lack of human resource skills in maintaining engines, decreased ship operational activities due to the absence of spare parts and unavailability of all reserves. spare parts on the ship because it can not be predicted what damage will occur during the ship's operation.

Based on field observations identified problems where the decline in company operations due to lack of maintenance and maintenance, especially for safety equipment, the implementation of ship maintenance plans is not optimal because it often collides with tight ship operating schedules, advises that there are difficulties in obtaining spare parts for ship equipment,

not yet have a schedule between the ship and the company, especially in terms of carrying out ship maintenance, operating routes for tramper and liner vessels and bad weather hindering ship maintenance, decreasing ship operational activities due to the absence of spare parts and unavailability of all spare part reserves on board because there is no can predict what damage will occur during the operation of the ship.

Management in maintaining the quality of the company's ship engines tends to buy spare parts from the distributors of the engine's country of origin so that 90% of the supply of engine parts comes from abroad such as Europe, Japan, USA and Korea. Procurement of spare parts using this global supply chain increases the risk of a longer lead time which is influenced by shipments and government policies. This resulted in the lead time for the provision of machine parts that exceeded the provisions in the Standard Operational Procedure (SOP), namely 16 working days from the date of request for spare parts.

Another factor that triggers a supply delay is that after a Purchase Order is sent to a vendor, the vendor postpones supplying spare parts due to an outstanding invoice. This is because there is no information system linked to the purchasing department so that the purchasing department can monitor and control the list of outstanding vendor invoices so that the purchasing department can submit to the finance department to prioritize payments to vendors related to the next spare parts supply plan.

B. Literature Review

The attributes used for warehouse selection used in AHP varies from case-to-case such as by country or by industry type (Roh, Jang, & Han, 2013). Tools are everything that is needed in educational learning, which is easy to carry, and can be moved by the perpetrator or the student. Meanwhile, infrastructure or facilities are something that is needed in educational learning, permanent or immovable. The definition of means is anything that can be

used as a tool in achieving the goals / objectives. Everything that is the main support for the implementation of a process. Infrastructure is everything that is the main support for the implementation of a process (business, development, projects, etc.).

Vital main ship engine parts such as cylinder liners, cylinder blocks and others are very scarce at local distributors and these spare parts must be ordered directly to the distributor in the country of origin of the engine (Allo & Saroso, 2015). (Herjanto, 1999), states that "Inventory is a material or item stored for a specific purpose, for example for use in the production or assembly process, for resale, or for spare parts of equipment or equipment. machine. Inventories can be in the form of raw materials, auxiliary materials, goods in process, finished goods or spare parts".

According to (Indrajit & Djokopranoto, 2002) "A spare part is a tool that supports the replacement of goods for equipment used in the production process". Spare parts are the main factors that determine the course of the production process in a company. So it can be said that these spare parts have a fairly large role in a series of company activities (Indrajit & Djokopranoto, 2002).

Performance is the use of resources, facilities and infrastructure in a certain amount that is consciously determined in

advance to produce a number of jobs on time. Performance is the use of a certain amount of resources, facilities and infrastructure that is consciously determined in advance to produce a number of goods for the services of the activities it carries out.

According to (Pasolong, 2011), effectiveness basically comes from the word "effect" and this term is used as a causal relationship. Effectiveness can be seen as a cause of other variables. (Sudradjat, 2011), from some of the descriptions and definitions above, it can be explained that the notion of care management is the management of maintenance work through a process of planning, organizing and controlling maintenance operations to provide performance regarding industrial facilities. Maintenance costs reaches 30 to 50 percent of the total costs that must be incurred by a mining company. Maintenance is the biggest controllable cost in the mining industry.

C. Research Methods

The method used in this research is quantitative method. The population in this study were all crew members of PT. MBSS, with a total of 48 ships with 10 crew members each. To determine the minimum sample size needed if the population size is known, the Slovin $n = 220$ rounding sample formula can be used.

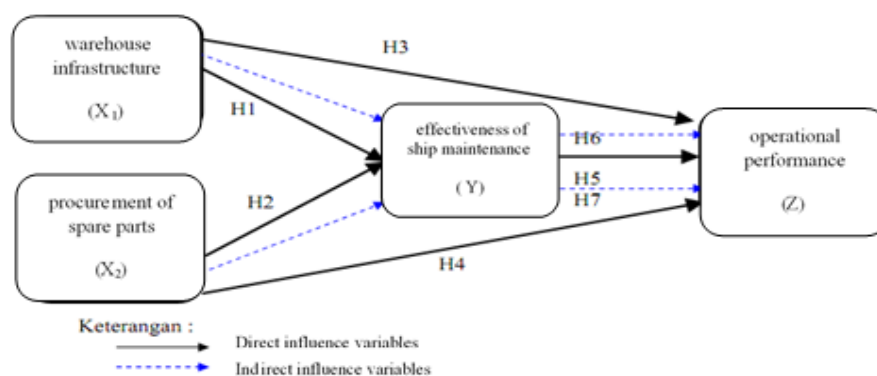


Figure. 1. Framework

The statistical analysis used in this research is path analysis. In path analysis, the influence of independent variables on the

dependent variable can be in the form of a direct effect, in other words, multiple

regression analysis considers the direct effect.

D. Results and Discussion

1. The results of the calculation of the hypothesis test

Tabel 1. Hypothesis and Conclusion

No	Effect	Hypothesis	Conclusion
H1	Warehouse infrastructure facilities on the effectiveness of ship maintenance.	$0,000 < 0,05$	Significant
H2	Procurement of spare parts on the effectiveness of ship maintenance.	$0,000 < 0,05$	Significant
H3	Warehouse infrastructure facilities on ship operational performance.	$0,000 < 0,05$	Significant
H4	Procurement of spare parts on ship operational performance.	$0,000 < 0,05$	Significant
H5	The effectiveness of ship maintenance on the operational performance of the ship.	$0,000 < 0,05$	Significant
H6	The effect of warehouse infrastructure has an indirect effect on the operational performance of the ship through the effectiveness of ship maintenance.	$0,000 < 0,05$	Significant
H7	The effect of spare parts procurement has an indirect effect on the operational performance of the ship through the effectiveness of ship maintenance.	$0,000 < 0,05$	Significant

2. Discussion

H1: Warehouse infrastructure facilities on the effectiveness of ship maintenance.

The magnitude of the influence of warehouse infrastructure on the effectiveness of ship maintenance on vessels owned by PT MBSS is 0.276 or 27.6% meaning 27.6% of the effectiveness of ship maintenance, determined by the warehouse infrastructure. This is partially supported by the significant direct influence of warehouse infrastructure on the effectiveness of ship maintenance on vessels owned by PT MBSS. Ship necessities consist of spare parts, ship stores, fresh water, and repairs. Ship spare parts are very

important, because the running of the ship's engine depends on the spare parts available on board. Procurement of spare parts must be on time or experience no delay, because if there is a delay in the procurement of spare parts it can affect the operation of the ship without experiencing obstacles and can harm the company.

H2: Procurement of spare parts on the effectiveness of ship maintenance.

The magnitude of the influence of the procurement of spare parts on the effectiveness of ship maintenance on vessels owned by PT MBSS is 0.650 or 65% meaning 65% of the effectiveness of ship maintenance is determined by the procurement of spare parts. This is partially supported by the significant

direct effect of spare parts procurement on the effectiveness of ship maintenance on vessels owned by PT MBSS. Operational services are said to be of quality if the ship can operate properly. One of the factors supporting the ship to operate properly is the fulfillment of the need for spare parts on board.

H3: Warehouse infrastructure facilities on ship operational performance.

The amount of direct influence of warehouse infrastructure on the operational performance of ships owned by PT MBSS is 0.331 or 33.1%, which means that 33.1% of the operational performance of the ship is determined by the warehouse infrastructure. This is partially supported by the significant direct influence of warehouse infrastructure on the operational performance of vessels owned by PT MBSS. A good administrative system (inventory) of ship spare parts will facilitate control so that at any time the spare parts are needed can be easily obtained. A well-regulated system will be able to control spare parts inventory.

H4: Procurement of spare parts on ship operational performance.

The magnitude of the direct influence of the procurement of spare parts on the operational performance of ships owned by PT MBSS is 0.402 or 40.2%. This is partially supported by the significant direct effect of spare parts procurement on the operational performance of vessels owned by PT MBSS. The procurement of spare parts has a positive and significant effect on the operational performance of the ship, meaning that changes in the value of the procurement of spare parts have a direct effect on changes in the operational performance of the ship or in other words if the procurement of spare parts increases, there will be an increase in the operational performance

of the ship and statistically has a significant effect.

H5: The effectiveness of ship maintenance on the operational performance of the ship.

The influence of the effectiveness of ship maintenance on the operational performance of ships owned by PT MBSS is 0.344 or 34.4% meaning 34.4% of the operational performance of the ship is determined by the effectiveness of ship maintenance. This is partially supported by a significant direct effect on the effectiveness of ship maintenance on the operational performance of vessels owned by PT MBSS. The effectiveness of ship maintenance has a positive and significant effect on the operational performance of the ship, which means that changes in the effectiveness of ship maintenance have a direct effect on changes in ship operational performance or in other words, if the effectiveness of ship maintenance increases, there will be an increase in ship operational performance and statistically has a significant effect.

H6: The effect of warehouse infrastructure has an indirect effect on the operational performance of the ship through the effectiveness of ship maintenance.

The magnitude of the indirect effect of warehouse infrastructure on the operational performance of ships owned by PT MBSS is $\rho_{Yx1} (0.276) \times \rho_{zY} (0.344) = 0.095$ or 7.8% means 7.8% of ship operational performance, determined by warehouse infrastructure. Through the effectiveness of ship maintenance. This is supported by the significant indirect effect of warehouse infrastructure on ship operational performance through the effectiveness of ship maintenance on vessels owned by PT MBSS. In accordance with the results of the analysis above, the effectiveness of ship maintenance can be an

intermediary for warehouse infrastructure to ship operational performance where H_0 is rejected, H_a is accepted, obtained a p-value of 0.000 smaller than the real level or $0.000 < 0.05$. So it can be concluded that there is an intervening effect between warehouse infrastructure and ship operational performance through the effectiveness of ship maintenance.

H7: The effect of spare parts procurement has an indirect effect on the operational performance of the ship through the effectiveness of ship maintenance.

The magnitude of the indirect effect of the procurement of spare parts on the operational performance of ships owned by PT MBSS is $(\rho_{YX2} (0.650) \times \rho_{ZY} (0.344)) = 0.224$ or 2.7%. This is supported by an indirect effect. procurement of spare parts to the operational performance of ships through the effectiveness of ship maintenance on vessels owned by PT MBSS. In accordance with the results of the analysis above, the effectiveness of ship maintenance can be an intermediary for the procurement of spare parts to ship operational performance where H_0 is rejected, H_a is accepted obtained a p-value of 0.000 smaller than the real level or $0.000 < 0.05$. So it can be concluded that there is an intervening effect between the procurement of spare parts on the operational performance of the ship through the effectiveness of ship maintenance.

The total effect of warehouse infrastructure on ship operational performance is 0.331 with the total indirect effect of warehouse infrastructure on ship operational performance through ship maintenance effectiveness is 0.095, so the total effect is $\{0.331 + (0.276 \times 0.344)\} = 0.426$. The effect of the total procurement of spare parts on the operational performance of the ship is 0.402 with the total indirect effect

of the procurement of spare parts on the operational performance of the ship through the effectiveness of ship maintenance is 0.224, so the total effect is $\{0.402 + (0.650 \times 0.344)\} = 0.626$.

To anticipate the unavailability of spare parts due to damaged or non-functional parts and limited supplies, the office must implement a safety stock system. Safety stock is an additional supply that allows demand / use in a non-uniform quantity and becomes a reserve. The purpose of the safety stock is as an anticipation of the shortage of spare parts for the ship, thus ensuring the smooth operation of the ship. Apart from being used to tackle delays in the arrival of spare parts, the safety stock of these spare parts is also expected so that the ship's operational process is not disturbed by the long lead time of spare parts.

To overcome the low engine monitoring stage, it can be overcome with consistency in the implementation of machine monitoring based on the scheduling made by the technical fleet division to match the engine monitoring targets. This means that if the maintenance of the engine is stiffened periodically according to the schedule that has been made and monitoring is carried out intensively, the engine will always be in good condition and smooth activities for ship departure will run according to schedule.

E. Conclusion

There is a significant positive direct effect of warehouse infrastructure on the effectiveness of ship maintenance on vessels owned by PT MBSS. There is a significant direct positive effect of spare parts procurement on the effectiveness of ship maintenance on vessels owned by PT MBSS. There is a significant positive direct effect of warehouse infrastructure on the operational performance of ships on ships owned by PT MBSS. There is a significant direct positive effect of spare parts procurement on the operational performance of ships owned by PT MBSS. There is a positive and significant direct effect on the effectiveness of ship

maintenance on the operational performance of vessels owned by PT MBSS. There is an indirect influence between warehouse infrastructure on ship operational performance through the effectiveness of ship maintenance on vessels owned by PT MBSS. There is an indirect influence between the procurement of spare parts on the operational performance of the ship through the effectiveness of ship maintenance on vessels owned by PT MBSS.

F. References

- Allo, L., & Saroso, D. (2015). Rancangan Model Sistem Informasi Dalam Proses Penyediaan Suku Cadang Mesin Utama Kapal. *Jurnal PASTI*, 9(2), 138–148.
- Herjanto, E. (1999). *Manajemen Produksi dan Operasi* (2nd ed.). Jakarta: PT Gramedia Widiasarana Indonesia.
- Indrajit, R. E., & Djokopranoto, R. (2002). *Konsep Manajemen Supply Chain: Cara Baru Memandang Mata Rantai Penyediaan Barang*. Jakarta: PT. Gramedia Widiasarana Indonesia.
- Pasolong, H. (2011). *Teori Administrasi Publik* (3rd ed.). Bandung: CV Alfabeta.
- Roh, S. Y., Jang, H. M., & Han, C. H. (2013). Warehouse Location Decision Factors in Humanitarian Relief Logistics. *Asian Journal of Shipping and Logistics*, 29(1), 103–120. <https://doi.org/10.1016/j.ajsl.2013.05.006>
- Sudradjat, A. (2011). *Aplikasi Asesmen Resiko Dalam Sistem Maintenance Studi Kasus pada Sistem Bahan Bakar Generator Set Caterpillar type 3306* (Vol. 5). MeTriK.

Halaman ini sengaja dikosongkan