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Review of Dry Bulk Terminal Performance Based on Services and Its Financial Impact

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ABSTRACT

The Port of Makassar is the largest port in eastern Indonesia. It serves as a terminal for containers, multipurpose cargo, vehicles, and passengers, while also providing services for handling dry and wet bulk loads. Among these, dry bulk cargo is the most dominant commodity, accounting for over 60% of the total goods flow. This study aims to examine the performance of the dry bulk terminal at the Port of Makassar following its merger with PT. Pelabuhan Indonesia, focusing on its impact on financial performance. The research employed descriptive qualitative methods with a six-month observation period starting in April 2022. The results indicate a significant increase in the loading and unloading services for dry bulk commodities such as soybeans, fertilizer, and wheat at the Port of Makassar. Furthermore, fluctuations in dry bulk terminal management revenue were observed, with growth rates recorded at 5.44% in 2018, 12.27% in 2019, 4.77% in 2020, and 10.90% in 2021. In conclusion, there is substantial potential for managing dry bulk commodities at the Port of Makassar.

1. Introduction.

Port of Makassar is the largest port in Eastern Indonesia, which not only has a Container Terminal, Multipurpose Terminal, Vehicle Terminal, and Passenger Terminal and provides services for bulk cargo, both dry and liquid bulk. Dry bulk cargo service is carried out at the dry bulk terminal, while liquid bulk cargo is carried out from ships and channeled through pipes directly to the storage tanks (Balci et al., 2018a). A dry bulk terminal is one of the key infrastructures in the world, serving services for loading and unloading dry bulk cargo from both domestic and international sources. Dry bulk commodity transportation shipping is quite prospective because the need for raw materials or natural resources is relatively stable from time to time (Widyanto et al., 2022). According to Kurniawan & Ginting (2013) the capacity of a dry bulk terminal is determined by the duration of service and the number of servers available. The ship arrival rate is approximately five ships per day, while the service time for each ship is three days. It is also known that dry bulk exporters and importers are confronted with intense competition on a global scale to optimize the efficiency and effectiveness of their supply chain systems (Balci et al., 2018b).

In Makassar, dry bulk cargo is the most dominant commodity at the Makassar Port, reaching about 60% total of goods flows, including bulk fertilizer, soybeans, press cake, refined sugar, clinker (N. Hamid, 2018). Another port is Tanjung Perak in Surabaya, which has contribution to the economic development and has an important role in increasing trade flows in East Java and the whole of Eastern Indonesia (Syafaaruddin, 2015).

Based on the research that has been done before, the phenomenon indicates a significant risk related to the dry bulk unloading process carried out at the port. Therefore, this topic of discussion interests the researcher regarding the importance of dry bulk terminals for the distribution continuity and consolidation of dry bulk commodities. The purpose of this study is to determine the service performance of the dry bulk terminal at the Port of Makassar after being merged with PT. Pelabuhan Indonesia (Persero) and to determine the impact of operating

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the dry bulk terminal on the smooth distribution and financial performance commodity of PT. Pelabuhan Indonesia (Persero).

2. Review Literature.

2.1. Services.

According to (Moenir, 2008) service is a process management which activities are specifically directed at the delivery of services to fulfil public/individual interests, through appropriate methods and satisfy those being served. Meanwhile, (Tenopir et al., 2014) stated that service is an unseen action that occurs interaction between employees and consumers that provided by companies to solve the costumer issue.

The aim of service management is the satisfaction of service recipients (Ahmad et al., 2015). The satisfaction consists of service and the product (Haverila & Fehr, 2016). Both must be able to fulfil several terms or conditions in order to provide satisfaction to the service recipients. In accordance with several explanation, to sum it up the contribution employees for consumers to fulfil public/individual interests, through appropriate methods and satisfy those being served.

Table 1: Food dry bulk loads.

Sugar	Shipped in sacks or bulk.
Rice	Shipped in gunny sacks or bulk.
Beans	Requires adequate dunnage and ventilation, otherwise it will generate heat and sweat which produces yeast, and quickly rots the beans.
Wheat	Requires adequate ventilation, protected from weather impact and rat pests.
Copra	Requires adequate ventilation. If the temperature rises, it will easily burn with an oil rate of up to 60%. Easy to sweat, smelly, causing copra lice. Shipped in the form of sacks or bulk packaging.
Corn	Requires adequate ventilation, since it is easily sweating and steaming. Even flammable with an oil rate of 5-10%. Shipped in packaged or bulk form.
Palm kernel	Requires adequate ventilation, oil rate reaches 40-50%. If the temperature rises, it will cause flame and sweating.
Tapioca	Sliced cassava is then dried and shipped in bulk separated from another cargo loaded with smelly and damp loads.

Source: Authors.

2.2. Bulk cargo.

Bulk materials or bulk cargo are unpackaged commodities handled, transported, and distributed in bulk (Ramos, 2021). Bulk material also refers to any material in the form of *fluids* (*liquid* and *gas*) and *granules*, each with a minimal mass compared to the group of the entire material being loaded—for instance, bulk materials such as *petroleum, coal,* and building materials (Fullmer and Hrenya, 2017). Cargoes containing bulk materials are usually spilt, dumped, or moved with shovels and buckets to be unloaded. Bulk materials are generally loaded in tanker cargo carried by tankers, trains or semi-trailer trucks or flown through channels (*e.g.* pipes) (Trace, 2008). In small quantities, bulk materials can be packed in drums, boxes, sacks. There are types and characteristics of dry and liquid bulk (Shah et al., 2017).

Table 2: Non-food dry bulk loads.

Castor beans	Fruit seeds contains oil. The skin is toxic and should never be put together with food. Shipped in bulk.
Asphalt	Mineral material formed from the process of shipping a rock location contains oil sediment. Shipped in bulk, the hatches and walls are leveled and the whole surfaces are coated with some kind of lime.
Fertilizer	It should never be mixed with textile and food loads because it smells, gives off steam, and is toxic. Shipped in bulk.
Manganese seeds	A mixture of manganese and iron, processed for use as a coloring substance usually for ceramics. Shipped in bulk.
Clinker	Cement-forming basic compounds consisting of the main mineral elements that bind to other elements. A semi-finished cement. Shipped in bulk.
Cement	A hydraulic chemical mixture. When mixed with water, it will react and change its properties to become an adhesive material so that it can bind other ingredients into a unit mass and harden. The adhesive power is going to wear off when mixed with sugar. Shipped in bulk.
Sodium carbonate	Basic material for making glass. Shipped in bulk.
Powder	Animal fat essence in fine form used as an ingredient in soap and candles. Shipped in bulk at a temperature of 51-59 *Celsius*.
Phosphate	Basic materials in the phosphate fertilizer industry. Dusty and absorbs moisture. Shipped in bulk.
Scrap	Basic materials for the steel industry. Shipped in bulk and aluminum.
Coal	Mining industrial fuel. Flammable. Shipped in bulk and must be adequately ventilated.

Source: Authors.

2.3. Characteristics of dry bulk cargo.

Dry bulk goods are divided into two major categories, food bulk and non-food bulk (Bußler et al., 2015). The handling of bulk goods is generally distinguished according to the type and

characteristic of the food bulk, especially the handling and processing, which are primarily required in terms of health aspects (Erazo Solorzano et al., 2023).

Bulk cargo services at ports are generally the same as other shipment services (Matsuda, Hanaoka and Kawasaki, 2020). What differs bulk cargo services differ from other shipment services are the port facilities and loading-unloading equipment used for liquid bulk loading-unloading activities, which include CPO (palm oil), oil or fuel, bulk asphalt, and others, usually through pipes equipped with exceptional facilities and installations, directed from ships straight to storage tanks, or vice versa (Mommens, van Lier and Macharis, 2020). While, the dry bulk loading-unloading activities include wheat, soya bean, fertilizer, cement, refined sugar, clinker, coal. The activities were carried out using a grab to be collected in a hopper for further transport using a dump truck. trains, or conveyors (Rietschel, Read and Mann, 2023). Later, they were taken to a shelter, a secure warehouse, stockpile yard.

A dump truck transfers cargo from the ship to the landfill that does not require mechanical conveyance at the unloading site (Hamid et al., 2021). Likewise, the carrying capacity follows multiples of the bucket capacity, means the bucket does not reduce its maximum capacity.

3. Materials and Methods.

This study used descriptive qualitative approach with library-based method. Descriptive quantitative method used to describe and explaining about studied as it is. It also draws conclusions from observable phenomena using numbers. It was used in determining the effect of management and operation of the Dry Bulk Terminal towards Financial Management System of PT. Pelabuhan Indonesia (Persero) Makassar Branch.

In obtaining the data for researchers used several methods, such as interviews with various parties about loading and unloading equipment services at bulk terminals. The second method used is documentation, where the author takes data collection techniques by directly recording company documents related to the study. A literature review is the following method used in this study. A literature review is a method where the author reads through literary works related to the study, such as books, research, reports, journal articles. The last method the author uses is observation, where the author directly observes the loading-unloading equipment services at the bulk terminal. Analytical method use was qualitative descriptive analysis, a technique that analyses, describes, and summarizes various conditions and situations from multiple data collected from PT. Pelabuhan Indonesia (Persero) Makassar Branch.

4. Results and Discussion.

4.1. Loading and Unloading services of Dry Bulk Terminal in Makassar, Indonesia.

Dry bulk commodity activities at the Port of Makassar are massive, with the primary commodities consisting of coal, wheat, bulk cement, refined sugar, fertilizers. In recent years the number of bulk items has decreased. It is partly due to transferring some dry bulk commodities to Garongkong Port. Apart from the Makassar Port Dry Bulk Terminal which PT carries out in implementation of loading and unloading activities. Pelindo Multi Terminal can also be carried out in several locations at *Soekarno* Terminal in area 105 for export/import goods and area 100 for domestic goods. Flow realization of dry bulk commodity ship visits at Makassar Port in 2018 – 2022 (until July) can be presented in Table 3:

Table 3: Flow realization of dry bulk commodity ship visits at *Makassar* Port in 2018 – 2022*.

No	Year	Call	*Ton*
1.	2018	273	1.887.130
2.	2019	261	2.194.437
3.	2020	185	1.569.788
4.	2021	164	1.472.164
5.	2022* (until July)	95	940.743

Source: PT. Pelindo (Persero) Regional 4 *Makassar* Branch.

Flow realization of the ship visits and goods at the Dry Bulk Terminal in *Makassar* Port for the last 5 years can be presented in the following table 4:

Table 4: Flow realization of ship and goods at the dry bulk terminal in port of *Makassar**.

No	Year	Call	*Ton*
1.	2018	15	298.876
2.	2019	27	602.166
3.	2020	10	263.015
4.	2021	22	449.944
5.	2022	16	407.819

Source: PT Pelindo (Persero) Regional 4 *Makassar* Branch.

From the data in Table 4, it can be said that the flow of goods through the Dry Bulk Terminal has continued to increase in the last 5 years (2018 to July 2022). Several commodities that experienced a significant increase included soybeans, fertilizers, and wheat with total volumes peaked in 2019 for 602.166 and reached 399.999 in 2022 (until July).

Thus, the number of dry bulk commodities loaded-unloaded at the Makassar Port Dry Bulk Terminal continues to increase.

4.2. Income Contribution of Port of Makassar Dry Bulk Terminal.

State-Owned Enterprise known as BUMN, PT. Pelabuhan Indonesia (Persero) functions as a public service to provide services to all tier of social class in a generous and good manner. As an industrial entity in maintaining the viability company, as well as to develop its own business. In carrying out its business PT. Pelabuhan Indonesia (Persero) has a business segment, namely service components that generate service products that provide income to PT. Indonesian (Persero).

As part of its operations, the company's financial performance is influenced by various service segments. Financial performance of PT. Pelabuhan Indonesia (Persero), before the merger with PT. Pelabuhan Indonesia I, II, III and IV (Persero) in 2018 – 2021, showes fluctuations in different service categories. The largest revenue contributor with significant fluctuation is ship services revenue with IDR 146.1 billion in 2020 but dropping at 2021 to IDR 96.9. While non-container services revenue showed stable growth from 2018 to 2021.

One of the key operational areas contributing to this financial performance is the Port of Makassar Dry Bulk Terminal, which offers a range of services. The services at the Port of Makassar Dry Bulk Terminal consist of three main categories. The first is non-container services, which include dock services, loading and unloading services, and trimming/leveling of cargo within the ships' holds. The second category is the utilization of non-property assets, comprising hopper equipment, harbor mobile cranes, and weighbridges. The third category encompasses various additional services, such as port pass issuance, post cadet services, and cleaning services.

Service rates at the Makassar Port Dry Bulk Terminal are determined by the Directors of PT. Pelabuhan Indonesia (Persero) and are guided by the Regulation of the Minister of Transportation Number PM 121 of 2018, which amends the earlier Regulation of the Minister of Transportation Number PM 72 of 2017 regarding the types, structures, classifications, and mechanisms for setting fees for port services. The rates of port service for each business segment at the Makassar Port Dry Bulk Terminal can be presented in table 5 below:

Table 5: The rates of port service at the *Makassar* port dry bulk terminal.

No	Description	Unit	Rate (IDR)
1.	Non-Container Services		
	Dock Services	Per Tons	2.100
	Stevedoring	Per Tons	19.710
	Trimming	Per Tons	2.000
2.	Non-Property Assets Utilization Services		
	Hopper	Per Tons	5.000
	Harbor Mobile Crane	Per Tons	16.200
	Weighbridges	Per Tons	1.500
3.	Various Services		
	Port Pass	Per Tons	260
	Post Cadet	Per Tons	200
	Cleaning	Per Tons	180

Source: *PT. Pelindo Multi* Terminal *Makassar* Branch.

The management of *Makassar* Port Dry Bulk Terminal which is managed by PT. Pelindo Multi Terminal *Makassar* Branch is not yet operating for 1 (one) year so there is no management report available, thus the author is only able to present the realization of port service revenue at *Makassar* Port Dry Bulk Terminal during 2018 - 2021 as table 6:

Table 6: Realization of port services revenue for *Makassar* port dry bulk terminal 2018 - 2021.

No	Description	Unit	Year			
			2018	2019	2020	2021
1	Non-Container Services					
	Dock Services	IDR 000	805.475	1.588.670	770.532	1.545.346
	Stevedoring	IDR 000	5.890.846	11.868.683	5.184.033	9.664.302
	Trimming	IDR 000	597.752	1.204.331	526.031	980.650
2	Non-Property Assets Utilization Services					
	Hopper	IDR 000	1.494.380	3.010.828	1.315.077	2.451.624
	Harbor Mobile Crane	IDR 000	4.841.791	9.168.326	3.952.745	7.454.183
	Weighbridges	IDR 000	448.314	903.248	394.523	735.487
3	Various Services					
	Port Pass	IDR 000	77.708	156.563	68.384	127.484
	Post Cadet	IDR 000	59.775	120.433	52.603	98.065
	Cleaning	IDR 000	52.117	108.389	47.343	88.761
TOTAL		**IDR 000**	**14.268.158**	**28.129.471**	**12.311.270**	**23.145.903**

Source: *PT. Pelindo (Persero)* Regional 4 *Makassar* Branch.

Conclusions.

The dry bulk terminal at *Makassar* Port has a very important role for the distribution and commodities integration. Dry bulk commodities consisting of bulk fertilizers, soya beans, cake, refined sugar, clinker and others are the dominant commodities which reach +60% of the total cargo or cargo passing through *Makassar* Port.

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