Uncertain Supply Chain Management 11 (2023) 725–736

Contents lists available at GrowingScience

Uncertain Supply Chain Management

homepage: www.GrowingScience.com/uscm

The contribution of cargo loading and discharging time to the loss and gain of coal: Empirical evidence from Indonesian ports

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A B S T R A C T

Article history:
Received November 21, 2022
Received in revised format December 20, 2022
Accepted January 13 2023
Available online January 13 2023

Keywords:
Cargo loading
Discharging time
Load quantity
Loss and gain
Waiting Discharge Time

This research aimed to know both the direct and indirect contribution of cargo loading and discharging time to the Loss and gain of coal mediated by load quantity. The process of data collecting was done through secondary data taken from the loading port of Jetty in Samarinda Port and the discharging port of Muara Berau, East Kalimantan. During 2020, there was an average loss of coal cargo of as much as 56 percent. This was caused by the long waiting discharge time during the loading and discharging. Another problem was the long waiting discharge time, as many Mother Vessels, tugboats, and barges entered the Jetty port and made a density there. The research method used path analysis with the loading-discharging unit as the source of secondary data on the determining factors of load quantity and the Loss and gain of coal cargo. This research indicated that one of the dominant factors was waiting discharge time, as a problem frequently occurred when vessels would berth in the port for discharging activities. The key finding was the necessity for the competent party to pay special attention to the factors contributing to vessels' waiting discharge time in the port by providing services as maximally as possible through human resources improvement in the form of training.

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1. Introduction

Some problems are faced by national companies, especially those becoming the research object, namely Mitra Asia Cemerlang, a trading company with much expertise in the coal market. However, in the period, there is a loss of 56 percent on average. This is caused by the long waiting discharge time during the loading and discharging process. The problem is bothersome and hinders the distribution process. The situation causes a waste of time and delays in discharging. The high load quantity in 2020 caused a high density at the loading port of Jetty in Samarinda Port and the discharging port of Muara Berau, East Kalimantan, and also caused unexpected Losses. Indonesia is rich in potential coal resources, especially in Kalimantan and Sumatra. In contrast, the potential economic value of coal in other regions like West Java, Central Java, Papua, and Sulawesi cannot be determined. National Geological Agency predicts that Indonesia still has 160 billion tons of reserved coal that has not been mined yet, mainly in East Kalimantan and South Sumatra. In January 2020, the Loss and gain of coal mining was 3.215. Based on the calculation, it is known that there are some periods dominated by Loss, such as in periods of February, March, and August 2020. So, it is necessary to understand the factors causing the instability of Loss and gain in the loading and discharging process.

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doi: 10.5267/j.uscm.2023.1.008

In general, the result of this research indicates that proper use of the method can reduce the total waiting time so that the total transportation cost can be reduced as well (Yusuf et al., 2020). Commercial shipping is inseparable from loading-discharging activities and cargo transport from the loading port to the destination port. In the implementation of loading and discharging, delays frequently occur so that vessels anchor and wait a long time in the port. One impact of this condition is the Loss experienced by companies. Commercial shipping supports cargo distribution (Sanches et al., 2010). Cargo delivery by sea is preferred to transporting by truck, train, or airplane because sea transportation can carry cargo in a higher quantity (Palmowski & Korneevets, 2018). One of the aims of sea transportation is to carry sea cargo quickly and safely to the destination (Cafaro et al., 2018). Another finding by Li et al. (2019) is obtained by comparing the degree of coal damage in the loading and discharging process. In the loading phase, the following are found: rearrangement, damage, and compressive deformation of coal particles. In the discharging phase, only the permeability reduction of the coal sample is found because the particle deformation can be recovered. Some other contributions to loading and discharging in ports have been made before (Liang et al., 2017; Meng et al., 2019; Barata et al., 2022).

2. Literature Review

2.1. Cargo Loading and Discharging Time

Theoretically, cargo loading and discharging activities consist of stevedoring; cargo during; receiving; and delivery. Loading and discharging are the activities of cargo movement from sea transportation mode to land transportation mode (Lasse, 2014; Sugandi et al., 2018; Widodo & Suprayitno, 2020; Wirjodirjo et al., 2020). Loading and discharging activities in a port or stevedoring need serious attention, especially safety performance, which is significantly mediated by safety management control (Shang et al., 2011). Loading and discharging is the process of moving cargo from and to the vessel using loading and discharging equipment available in the port where the loading and discharging activities take place (Kotzab & Gudehus, 2012; Mustakim & Hadi, 2018; Rajagopal & Zhang, 2021; Song & Panayides, 2012). According to De Toni (2011) and Golinska (2014), loading and discharging are activities to discharge cargo onboard the vessel using a sling and ship's crane to the nearest land. Many accidents happen to general cargo vessels annually due to inappropriate operating procedures for loading and discharging (Pie-Ya & Chien-Chang, 2020). Then, it is necessary to establish a standard operating procedure for cargo handling and guidance of navigation safety management for a general cargo carrier. Some researchers (Fuadaturrahmah & Manurung, 2020; Nugraha & Yudanto, 2022; Widyawati et al., 2021; Wahyuni et al., 2022; Majid et al., 2022) explain that loading and discharging equipment has a significant influence to container handling and that throughput components will form an effective component to be the key factor in the development of loading and discharging activities. Komalasari (2022) recommends skill training for operators to improve their competence in loading and discharging, especially in loading and discharging equipment. So, loading and discharging activities support the smooth transportation from vessel to port and have a vital position in the port.

2.2. Waiting Discharge Time

Waiting discharge time is a vessel's waiting time to berth at a wharf when running the cargo loading and discharging (De Leeuw & Wiers, 2015; Yusuf et al., 2020). The aim of waiting discharge time is to obtain berthing services in a port or a wharf in order to perform cargo loading and discharging in a port (Kawa & Golińska, 2015). The less or zero waiting time, the better loading and discharging performance at a Terminal. According to Kotzab and Gudehus (2012), a vessel's waiting time can be minimized if the facilities are adequate, such as the availability of wharf facilities, sufficient loading and discharging, and other supporting facilities like stacking yard and lifting and carrying equipment at the wharf. Some research has been conducted on the waiting discharge time in Indonesian ports (Dawangi & Budiyanto, 2021; Kakerissa et al., 2020; Kanamoto et al., 2021; Subagyo et al., 2022; Yunianto et al., 2018). So, it can be concluded that waiting discharge time is the time for a vessel to wait to berth at the wharf while performing the cargo loading and discharging process, which is handled per one jetty.

2.3. Load Quantity

Load quantity is the quantity of cargo loaded onto a vessel (Kotzab & Gudehus, 2012; Popov et al., 2021). Another reference, Notteboom (2004), states that due to the increased cargo availability, operators and alliances are closely related to end-to-end services, and pendulum services will increase the quantity of packaged goods. Therefore, it is vital to know the load quantity to avoid overloading during transportation (Klose et al., 2002). In addition, some other researchers have studied the load quantity in a vessel in some countries, especially in Indonesia (Aguirre-Villegas & Benson, 2017; Ancona et al., 2018; Baskoro et al., 2020; Gosens et al., 2022; Yusuf et al., 2020; Widiyanto et al., 2021). Therefore, it can be concluded that load quantity is the quantity of cargo loaded onto a vessel based on the type of goods packaged in a quantity unit.

2.4. Loss and Gain

Loss is the decrease of equity value from an incidental transaction and not from the main activities of coal loading and discharging. Gain is the increase of equity value from an incidental transaction and not from the main activities of coal loading and discharging. From the mathematical formula, it is found that Loss and gain = Bill of Lading quantity – loaded tonnage. In the supply chain process, it is expected that Loss and gain will occur (Kachitvichyanukul et al., 2015). Loss is the decrease of equity value from an incidental transaction and not from the main activities of coal loading and discharging (Vach, 2012). A transaction that is unprofitable for a company or makes a company lose is characterized by a decrease in the

company's value of equity or net asset (Endri et al., 2020; Burges, 2012). At the same time, the gain is the increase of equity value from incidental transactions, not from the main activities of coal loading and discharging (Clark & Chambers, 2012). A transaction profitable for a company or making a profit for a company is characterized by the increase of the company's value of equity (net asset) of a business entity, and this infrequently happens or, in the other word, this does not repeatedly happen (Ilarri et al., 2020). In another research, Baruya (2012) states that through a good supply chain process, since the coal loading and discharging activity in the port is done well until delivered to the customer, it will directly contribute to Loss and gain. Conve Loss and gain is an essential part of coal loading activity, used to lift coal from a floating crane to a hatch. The coal from the hopper will be carried through some convey Loss and gain. Some research concerning Loss and gain has been conducted in some countries, especially Indonesia (Ricardianto et al., 2023; Achmad & Morgan, 2021; Brock, 2020; Chelminski, 2022; Damanik et al., 2019; Mohalik et al., 2022; Syofiarti et al., 2021). So, it can be concluded that Loss and gain are the amounts of profit and Loss experienced by the company.

Based on observation, some problems are identified, such as; the long waiting time for discharging, many mother vessels as well as tugboats and barges entering the jetty, the jetty density may cause an unexpected loss and the long waiting time for discharging in the jetty. Therefore, this research aims to; know the direct contribution of the cargo loading and discharging variable to the Loss and gain through waiting discharge time and the contribution of waiting discharge time through cargo loading and discharging. Therefore, the conceptual model in this research is developed based on some problems contributing directly and indirectly to Loss and gain, such as cargo loading and discharging, waiting discharge time, and load quantity in the port. (Fig. 1).

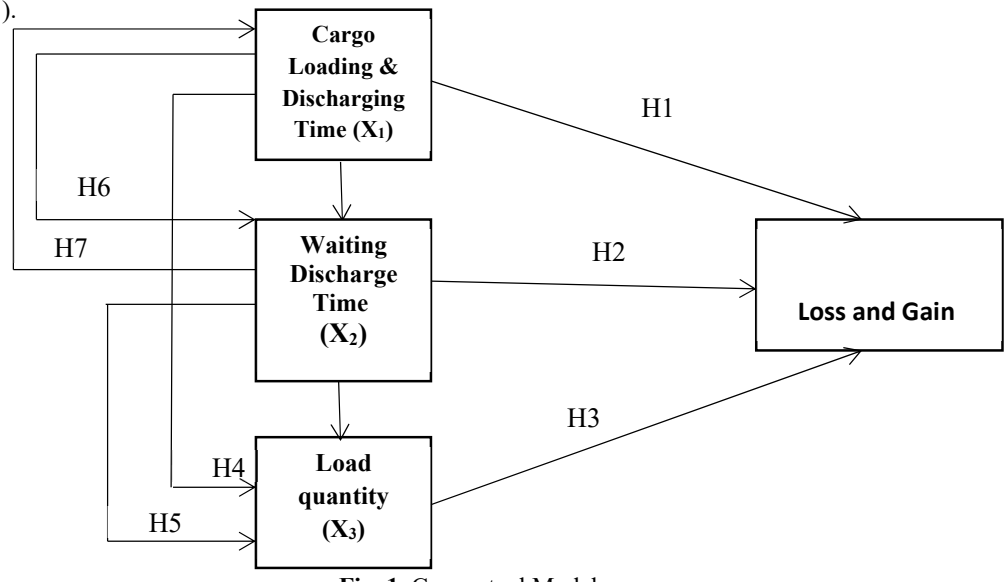

Fig. 1. Conceptual Model

Based on the figure of path model, a contribution is proposed according to the theory that cargo loading and discharging time has a direct contribution to the Loss and gain (H1), waiting discharge time has a direct contribution to the Loss and gain (H2), cargo loading and discharging time has a direct contribution to the load quantity (H3). Furthermore, waiting discharge time directly contributes to the load quantity (H4). Thus, loading directly contributes to Loss and gain (H5).

2.5. Hypotheses

H_1: *Cargo loading and discharging time contributes to Loss and gain.*
H_2: *Waiting discharge time contributes to Loss and gain.*
H_3: *Load quantity contributes to Loss and gain*.
H_4: *Cargo loading and discharging time contributes to Loss and gain through load quantity.*
H_5: *Waiting discharge time contributes to Loss and gains through load quantity*.
H_6: *Cargo loading and discharging time contributes to Loss and gain through waiting discharge time*.
H_7: *Waiting discharge time contributes to Loss and gain through cargo loading and discharging time.*

3. Research Method

This research was carried out in the loading and discharging unit of Mitra Asia Cemerlang in 2020. The research method used Path Analysis with necessary data of historical data belonging to Mitra Asia Cemerlang and secondary data obtained by the loading and discharging unit that consisted of load quantity determining factors and the Loss and gain of coal cargo. In the initial calculation of Path Analysis, the assumption test would be done through Normality Test, Multicollinearity Test, Autocorrelation Test, and Heteroskedasticity Test. After that, the Model Appropriateness Test and Simultaneous Significance Test (F Statistical Test) were done. Then, they were followed by the Hypothetical Test of t Statistic.

4. Results and Discussion

4.1. Descriptive Analysis

Load quantity decreased by 1,606,442 MT from June to July, 2,438,845 MT from July to August, and 3,197,056 MT from October to November. Meanwhile, the average load quantity per month was 8,956,858 MT. Based on the data, it was known that the quantity of cargo loading and discharging increased by 93.62 days in each period. In addition, the waiting discharge time increased very highly, with an average increase per period of as many as 398. Cargo loading is the time of loading coal onto the vessel, and discharging is the time of waiting for discharging, where the chart shows fluctuating amounts. So, when the amount of cargo loading and discharging activities increases, the total load quantity will also increase.

4.2. Hypothetical Test

4.2.1 The first hypothesis: The effect of cargo loading and discharging on Loss and Gain

Based on the calculation, the resulting value of the determining coefficient is 0.25, indicating that cargo loading and discharging contribute to variation in affecting the level process of Loss and gain by as many as 25 percent. In the testing phase, the value of the standardized coefficient is found to be 0.152, and the value of significance is 0.001. These results show that cargo loading and discharging time strongly influence the forming of Loss and gain.

4.2.2 The second hypothesis: The effect of waiting discharge time on Loss and Gain

In the testing phase, the value of the standardized coefficient is found to be 0.112, and the significance value is 0.002. These results show that waiting discharge time has a substantial direct influence on Loss and gain. Based on the calculation, the value of determining coefficient is only 0.172, indicating that waiting discharge time has contribution variation in affecting the level of Loss and gain by as much as 17.2 percent.

4.2.3 The effect of cargo loading and discharging time on load quantities

In the testing phase, the value of the standardized coefficient is found 0.210 and the value of significance is 0.001. These results show that cargo loading and discharging time strongly influence the forming of Loss and gain. Based on the calculation, the resulting value of determining coefficient is 0.1014. These results show that cargo loading and discharging time contributes to variation in affecting the level process of load quantity only 10.14 percent. So, cargo loading and discharging time fairly contribute to load quantity.

4.2.4 The effect of cargo loading and discharging time on Loss and Gain through load quantities

In the testing phase, the standardized coefficient values are found at 0.267 and 0.151, and the significance value is 0.003. These results show that cargo loading and discharging time to Loss and gain has a strong indirect influence on the forming of Loss and gain through load quantity. Based on the calculation, the resulting value of determining coefficient is only 0.117. These results show that cargo loading and discharging time has a contribution variation in affecting the level process of load quantity as many as 11.7 percent. So, cargo loading and discharging time has a fair contribution to Loss and gain through load quantity.

4.2.5 The effect of waiting discharge time on Loss and Gain through load quantities

In the testing phase, the values of standardized coefficients are found to be 0.191 and 0.826, and the significance is 0.058. These results show that waiting discharge time has a solid indirect contribution to forming Loss and gain through load quantity. Based on the calculation, the resulting value of the determination coefficient is 0.1176. This result shows that waiting discharge time contributes to the process level of load quantity by only 11.76 percent. Thus, waiting discharge time indirectly but significantly contributes to Loss and gain through load quantity as the mediating variable.

4.2.6 The effect of cargo loading and discharging time on Loss and Gain through waiting discharge time

In the testing phase, the values of standardized coefficients are found to be 0.319 and 0.121, and the significance is 0.003. These results show that cargo loading and discharging time has a solid indirect contribution to forming Loss and gain through waiting discharge time. Based on the calculation, the resulting value of the determination coefficient is 0.540. This result shows that cargo loading and discharging time contributes to Loss and gain of as much as 11.76 percent. Thus, cargo loading and discharging time indirectly but significantly contributes to Loss and gain through waiting discharge time as a mediating variable.

4.2.7 The effect of waiting discharge time on Loss and Gain though cargo loading and discharging time

In the testing phase, the values of standardized coefficients are found to be 0.412 and 0.070, and the significance is 0.004. These results show that waiting discharge time has a solid indirect contribution to forming Loss and gain through cargo

loading and discharging time. Based on the calculation, the resulting value of the determination coefficient is 0.128. This result shows that waiting discharge time contributes to Loss and gain of as much as 12.8 percent. This research is still in line with the study of Tafia and Islam (2022), discussing waiting discharge time and cargo loading and discharging.

Overall, the results of the hypothetical test are summarized in Table 1.

Table 1
Recapitulation of Hypotheses

No	Hypothesis	Result of Research
1	H1: Cargo loading and discharging time contributes significantly to Loss and gain.	Cargo loading and discharging time contributes significantly to Loss and gain. Therefore, a significant decrease will follow the cargo loading and discharging increase in Loss and gain.
2	H2: Waiting discharge time contributes significantly to Loss and gain.	Waiting discharge time contributes significantly to Loss and gain. It means the significant increase in Loss and gain and vice versa will follow the increase in waiting discharge time.
3	H3: Load quantity contributes significantly to Loss and gain.	Load quantity contributes significantly to Loss and gain. It means the significant increase in Loss and gain and vice versa will follow the increase in load quantity.
4	H4: Cargo loading and discharging time contributes significantly to Loss and gain through load quantity.	Cargo loading and discharging time contributes significantly to Loss and gain through load quantity. It means the increase in cargo loading and discharging will be followed by a significant increase in load quantity which will significantly affect the level of Loss and gain and vice versa.
5	H5: Waiting discharge time contributes significantly to Loss and gains through load quantity.	Waiting discharge time contributes significantly to Loss and gain through load quantity. Therefore, it means a significant increase will follow the increase in Waiting discharge time in load quantity which will significantly affect the level of Loss and gain and vice versa.
6	H6: Cargo loading and discharging time contributes significantly to Loss and gain through waiting discharge time.	Cargo loading and discharging time contributes significantly to Loss and gain through waiting discharge time. It means the increase in cargo loading and discharging will be followed by a significant increase in waiting discharge time which will significantly affect the level of Loss and gain and vice versa.
7	H7: Waiting discharge time contributes significantly to Loss and gain through cargo loading and discharging time.	Waiting discharge time contributes significantly to Loss and gain through cargo loading and discharging time. It means the increase in waiting discharge time will be followed by a significant increase in cargo loading and discharging time which will significantly affect the level of Loss and gain and vice versa.

4.3. Path Analysis

Based on the direct and indirect contribution value calculation, the total effect can be recapitulated (Table 2).

Table 2
Recapitulation of Total Effect

No.	Description	Percent
1	Contribution of cargo loading and discharging time to Loss and gain ($X_1 \rightarrow Y$)	25
2	Contribution of waiting discharge time to Loss and gain ($X_2 \rightarrow Y$)	17.2
3	Contribution of load quantity to Loss and gain ($X_3 \rightarrow Y$)	10.14
4	Contribution of cargo loading and discharging time to Loss and gain through load quantity ($X_1 \rightarrow X_3 \rightarrow Y$)	11.7
5	Contribution of waiting discharge time to Loss and gain through load quantity ($X_2 \rightarrow X_3 \rightarrow Y$)	11.76
6	Contribution of cargo loading and discharging time to Loss and gain through waiting discharge time ($X_1 \rightarrow X_2 \rightarrow Y$)	11.4
7	Contribution of waiting discharge time to Loss and gain through cargo loading and discharging time ($X_2 \rightarrow X_1 \rightarrow Y$)	12.8
	TOTAL	**100**

In general, the structural model that can be formed is seen in Fig. 2.

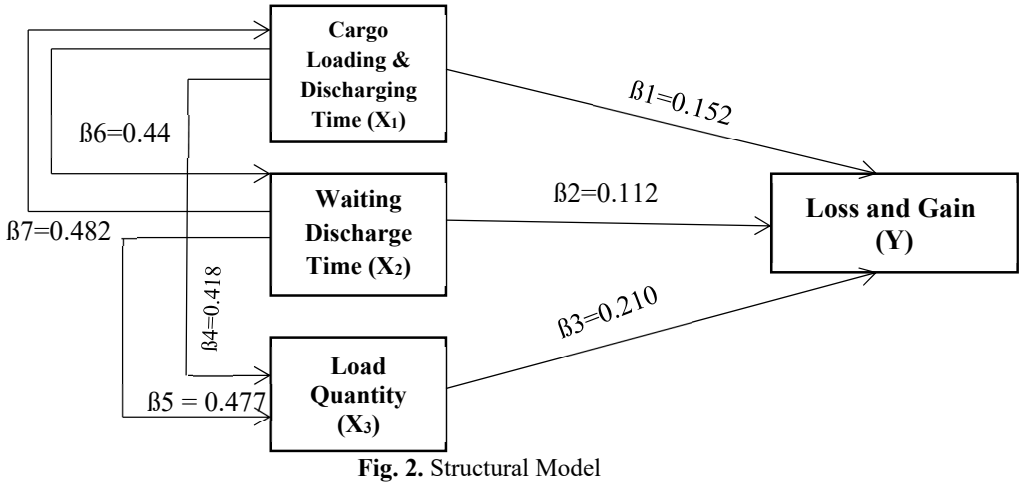

Fig. 2. Structural Model

The contribution of the cargo loading and discharging time variable to the Loss and gain variable through the mediating variable of waiting discharge time is 70.4 percent. Through the mediating variable of load, quantity is 78 percent. Then, the

contribution of the load quantity variable to the Loss and gain variable through the mediating variable of cargo loading and discharging time is 74.6 percent and through the mediating variable of waiting discharge time is 79.9 percent.

4.4. Discussion

4.4.1 The effect of cargo loading and discharging on Loss and Gain

Based on the hypothetical test result, the significance value is found to be 0.001. This indicates that the higher the cargo loading and discharging, the more it can reduce the Loss and gain. The process of cargo loading and discharging affects the amount of Loss and gain; Loss is when the equity value decreases from an incidental transaction and not from the main activity of coal loading and discharging, whereas gain is the increase of equity value from an incidental transaction and not from the main activity of coal loading and discharging. So, cargo loading and discharging can contribute to Loss and gain as much as 25 percent. This research supports the study by Hu et al. (2021), showing that cargo loading and discharging affects the amount of Loss and gain in the coal burning in the iron manufacturing industry. On the other hand, Ricardianto et al. (2021a) study state that the loading and discharging process is still hindered, so it can bring about material loss and even accidents while working and performing the delivery. This research is also in line with the studies by Gaol et al. (2021), Lin et al. (2022), Ricardianto et al. (2021b), Wibawa et al. (2021), and Yusadi et al., 2021) related to cargo loading and discharging and loss/gain. Thus, the finding of this research supports the result of other research that cargo loading and discharging time contributes significantly to Loss and gain.

4.4.2 The effect of waiting discharge time on Loss and Gain

Based on the second hypothetical test's result, the significance value is found at 0.002. This indicates that waiting discharge time directly contributes to Loss and gain. Waiting discharge time contributes to variation in Loss and gain by as mach as 17.2 percent, so waiting discharge time somewhat contributes to Loss and gain. It means the significant increase in Loss and gain and vice versa will follow the increase in waiting discharge time. In line with the research by Patterson et al. (2017), waiting discharge time can increase the amount of Loss in once coal loading and discharging process. This research is also in line with the study by Hia et al. (2022), explaining that halt time, maintaining cycle time, and maintaining standard loading time contribute to increasing gain. Furthermore, this research supports the study by Allen et al. (2019) and Rahayu et al. (2022) that waiting time in coal transportation is related to modified losses such as quality losses, performance losses, availability losses, and road transportation losses. Thus, the finding of this research supports the result of other research that waiting discharge time contributes significantly to Loss and gain.

4.4.3 The effect of load quality on Loss and Gain

Cargo loading and discharging significantly contribute to the quantity of cargo loaded onto a vessel. Load quantity contributes to variation in the process of Loss and gain by as much as 10.14 percent, so it contributes to Loss and gain. Pratap et al. (2018) state that the longer the cargo loading and discharges, the higher the load quantity of coal will be. Notteboom (2004) states that the increase in load quantity from the cargo availability, which is mutually related to end-to-end and pendulum services, will increase the gain. In their study, Shi et al. (2018) provide empirical evidence of profit for welfare in the trading scheme of the Chinese coal industry. However, production overcapacity in China is also a global problem since the load quantity dominates the world's total production (Shi et al., 2021; Ward et al., 2004). This research is also in line with the studies by Caneda-Martínez et al. (2021), Cribari et al. (2021), Ho and Zhao (2022), Lu et al. (2022), Rahayu and Nurcahyo (2019) related to load quantity and Loss and gain. Thus, the finding of this research supports the result of other research that load quantity contributes significantly to Loss and gain.

4.4.4 The effect of cargo load and discharging time on Loss and Gain though load quantity

Cargo loading and discharging time has a solid direct contribution in forming Loss and gain through load quantity. Cargo loading and discharging time contributes to variation in the level process of Loss and gain by as much as 78 percent, so it contributes to Loss and gain. This research is in line with He-Lambert et al. (2019), stating that one of the time factors that contribute the most is a cargo loading and discharging time. Such a condition is caused by the number of loading-discharging equipment, vessel capacity, and jetty capacity. Moreover, according to Altop (2020), a long time waiting for the loading-discharging process will impact the cumulative amount of load quantity. This research also supports the study by Fuadaturrahmah and Manurung (2020) that less understanding of the things related to cargo operation, which is related to the measurement tool used in tanker vessels, will trigger cargo depreciation. Furthermore, this research also aligns with the finding (Permata et al., 2019) that load quantity and the number of gangs contribute significantly to loading and discharging productivity. Thus, the finding of this research supports the result of other research that cargo loading and discharging contribute significantly to Loss and gain through load quantity.

4.4.5 The effect of waiting discharge time on Loss and Gain through load quantities

The influence of load quantity as the mediating variable between the variable of waiting discharge time and the variable of Loss and gain is 79.9% with a significance value of 0.00. So, waiting discharge time and Loss and gain contribute significantly to Loss and gain through load quantity. Related to the variable of waiting discharge time being studied, this research supports some studies related to Loss and gain and another variable, load quantity (Fragkos & De Reyck, 2016; Mokia & Dinwoodie, 2002; Tafia & Islam, 2022). Thus, the finding of this research supports the result of other research that waiting discharge time contributes significantly to Loss and gain through load quantity.

4.4.6 The effect of cargo loading and discharging time on Loss and Gain through waiting discharge time

Based on the result of the hypothetical test, the significance value is found to be 0.003; This indicates that cargo loading and discharging time has a solid indirect contribution to Loss and gain through waiting discharge time as the mediating variable. The contribution of waiting discharge time as the mediating variable between cargo loading and discharging and Loss and gain is 70.4 percent, so cargo loading and discharging contributes indirectly but significantly to Loss and gain through waiting discharge time. As explained in the research by Sapan et al. (2019), a long discharge time will cause a loading quantity in large quantities and not infrequently causes Loss. Cargo loading and discharging activities from and to a vessel consist of stevedoring, cargo during, and receiving/delivery in a port which is very closely related to waiting discharge time and in line with the Government Decree of 2002 concerning the management and operation of cargo loading and discharging from and to the vessel. The result of this research is still in line with the study by Sutanto (2021), noting that the volume of cargo loading and discharging in the port terminal is immensely fluctuated and not stable but still related to the ship's call and increasing cargo loading and discharging. Generally, in coal loading and discharging activities, this research supports some studies related to cargo loading and discharging, loss and gain, and waiting discharge time (Fragkos & De Reyck, 2016; Guo et al., 2021; Sandee, 2010; Schernikau, 2010; Siswanto et al., 2018). Thus, the finding of this research supports the result of other research that waiting discharge time contributes significantly to Loss and gain through cargo loading and discharging.

4.4.7 The effect of waiting discharge time on Loss and Gain through cargo loading and discharging

Waiting discharge time contributes to variation in the Loss and Gain through cargo loading and discharging as much as 74.6 percent, and the significance value is 0.003. These results show that waiting discharge time through cargo loading and discharging strongly contributes to Loss and gain. This research is in line with another study by Raevskaya et al. (2019) that finds the potential Loss and gain caused by the quantity of cargo loaded onto the mother vessel. Furthermore, this research also supports the related study concerning waiting discharge time, Loss and gain, cargo loading and discharging (Arianto et al., 2022; Rahayu et al., 2022; Rozar et al., 2022; Ricardianto et al., 2022). Thus, the finding of this research supports the result of other research that waiting discharge time has a solid indirect contribution in forming Loss and Gain through cargo loading and discharging time.

5. Conclusion

Some factors cause unstable Loss and gain, but this research focuses on the contribution of cargo loading and discharging time to waiting discharge time through load quantity. One of the dominant factors is waiting discharge time, which is a problem that frequently occurs when a vessel berths in a port to perform discharging activities. Some processes of the ship's waiting time are loading and discharging productivity, preparedness of loading and discharging equipment, document administration, request of the pilot boat, and ship’s arrival time. So, the competent party must pay special attention to the factors that bring about the ship's waiting discharge time in a port by maximally improving the services through human resources development in the form of training.

The recommended policy is to centralize an integrated document service system designed to shorten the administrative process and result in good coordination between port service users and stakeholders. There is a worry that minimum loading and discharging equipment in the port will, in a busy condition, lower the productivity of cargo loading and discharging. Therefore, it is necessary to add adequate equipment so that cargo loading and discharging will be shorter and increase the company's productivity.

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