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Analysis of The Occurrence of Container Shortage Size 20GP Using The Grassroots Forecasting Method At PT XYZ

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Abstract: *The shortage of 20GP containers is one of the challenges that has a direct impact on the smooth export process and customer satisfaction in the maritime logistics sector. This research aims to analyze the causes of the 20GP container shortage at PT XYZ, and propose a solution based on the grassroots forecasting method. This method is used to identify container needs more accurately by involving direct input from operational, marketing, and field staff who are in direct contact with market demand. Data was obtained through observation, interviews with key informants, and operational documentation during the observation period. The results of the analysis show that container shortages occur due to export-import imbalances, lack of cross-departmental communication, suboptimal container distribution management, and the absence of a field data-based demand forecasting system. The application of grassroots forecasting is proven to be able to provide container demand predictions that are more responsive and contextual to local market conditions, especially in the Semarang region which has high export potential but minimal import return flows. Based on these findings, this research recommends the integration of the grassroots forecasting method into the container planning system and the development of a real-time digital system to monitor and manage container availability. This implementation is expected to improve the efficiency of 20GP container distribution and strengthen customer service at PT XYZ.*

Keywords: *Container Shortage; Grassroots Forecasting; Freight Forwarder*

Introduction

International trade plays an important role in driving a country's economic growth and containers are a major element in the global trading system. However, in recent years, Indonesia has faced a serious problem of container scarcity that hinders the smooth distribution of goods between countries Hoerunisa, *et al* (2023). Significant pressure on logistics systems arises from supply–demand imbalances, global supply chain disruptions, and production limitations, particularly during periods of crisis (Toygar et al., 2022). This problem also affects one of the shipping companies from Indonesia, namely PT XYZ. PT XYZ which was established in 1953. During its establishment, the company has successfully stepped into international trade, namely export and import.

Shipping containers are available in various types and sizes, such as 20-foot General Purpose (20GP), 40-foot General Purpose (40GP), High Cube (HC), refrigerated (reefer), and special containers, each designed to accommodate different cargo characteristics and logistics requirements. Based on initial interviews with Head Department of PT XYZ, one of the problems that occurred during the export and import process in 2022-2024 at PT XYZ was the 20GP container shortage. Container Shortage is a situation where the demand for containers for shipping goods exceeds the number of containers available. According to informants and observations for 5 months, the shortage of containers can cause no income because there are no containers to rent out. The shortage of containers faced by PT XYZ can have a serious impact on the supply chain and operations of the shipping company, especially if the export demand is more than the available supply of containers. This can lead to increased shipping costs, delayed delivery of goods, and some customers switching to other shipping companies.

The Table 1 shows export and import data using 20GP containers based on annual recapitulation from PT XYZ for the last 3 years.

Based on the table above, the export and import situation at PT XYZ using 20GP containers always experiences a difference even though the difference continues to decrease starting from 2022-2024. Situations like this must be kept in mind so that exports and imports run smoothly. Where the situation of

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lack of containers like this is caused by several different problems or issues.

Table 1. PT XYZ 2022- 2024 Export and Import Data

Year	Number of 20GP Export Containers (teus)	Number of 20GP Import Containers (teus)	The difference (teus)
2022	3965	3351	614
2023	3485	2975	510
2024	3452	3018	434

Source: PT XYZ Performance Report 2022-2024

The method used to analyze this container shortage problem uses the grassroots forecasting method because it plays an important role in forecasting container needs based on historical demand data, making it easier to manage container stocks more accurately and on time. According to Lancaster & Lomas (1985), Grassroots forecasting can help companies to reduce losses and plan container needs and management more effectively. Grassroots forecasting aims to help companies know how much sales or revenue will occur in the future. The company can control its stock turnover. With grassroots forecasting, companies can predict how much stock to add to avoid shortages when there is a lot of demand. In this case, grassroots forecasting is done to find out how many estimated containers will be unloaded and loaded at PT XYZ. Forecasting is done to prevent container shortages and the company can prepare itself to immediately turn over containers so that there is stock to rent to customers and help the company not to lose revenue and customer satisfaction. Thus, the grassroots forecasting approach can help PT XYZ in optimizing the distribution strategy and management of 20GP containers, reducing additional costs, and improving the company's logistics performance in the face of a container shortage crisis. Therefore, the author is interested in analyzing the shortage of containers that occurs at PT XYZ.

Literature Review

Port Transportation Management

According to Novack et al. (2010), transportation management includes coordination activities between customer demand and transportation service providers to ensure smoothness, speed, and optimal costs. Port transportation management is closely related to parking management (ships, containers, and vehicles), ship waiting time management, cargo management, and several factors that cause poor port performance, port management and cargo handling and strict operational management.

Port traffic system management is necessary because it is in line with policies that prioritize the development of road transportation, where the role of ports as part of the national transportation network is to role as part of the national transportation network is to improve road traffic safety and restore traffic conditions. Standard road transportation fleet (Irawan, 2021).

Freight Forwarder

Freight forwarders are essential in ensuring the delivery and receipt of goods by managing cargo transportation services, including documentation and coordination across land, sea, and air transport modes, often through integrated door-to-door logistics solutions (Mangan et al., 2017). Freight forwarders are companies engaged in logistics service activities that manage the delivery and receipt of goods, including import-export and domestic shipments, by coordinating multimodal transportation (land, sea, and air). Therefore, freight forwarders play an important role in the global supply chain (Laloma et al., 2017; Marciniak-Neider & Neider, 2014).

To maximize their services, freight forwarders company cooperates with other companies, for example with shipping, aviation and warehousing companies and similar companies where the cooperation can support the movement of export-import goods to the customer's place in a timely manner. Shipping or receiving cargo services for both exports and imports that are usually offered by freight

forwarding, especially services for shipping goods using air, sea and land shipping services.

Container

A container is an international standard transportation tool used to facilitate the process of transporting goods. Containers are designed to enable fast and safe loading and unloading of goods, and reduce logistics costs through efficient flow of goods at ports and container terminals (Rusgiyarto et al., 2017). A container is a sturdy container made according to international standards (ISO) to move goods easily and safely using various types of transportation. PT XYZ has 2 types of container size services, namely 20 feet general purpose (GP) containers and 40 feet high cube (HC) containers. However, PT XYZ faces a new problem, namely the shortage of containers that occurs due to the limited number of 20GP containers in export activities while demand continues to increase.

Container Shortage

A container shortage is a condition where the global availability of containers has decreased significantly, so it cannot meet the high market demand. This condition often causes various problems in the global supply chain. Container shortages often occur due to unbalanced container turnover between inbound (import) and outbound (export) activities. This problem is a major challenge in the global shipping industry and requires safety stock calculations and container repositioning to maintain a smooth supply chain (Cahyono & Pujawan, 2019).

Grassroots Forecasting Method

Bottom-up (grassroots) forecasting is a structured forecasting approach that relies on data generated at the most disaggregated level of an organization, capturing granular and localized demand insights, which are then aggregated to higher levels to enhance the accuracy and reliability of overall forecasts (Mirčetić et al., 2021; Oliveira & Ramos, 2019).

The underlying assumption is that the people closest to the customer or end user of the product know their future needs best. Although this is not always true, in many cases, it is valid and is the basis of this method which involves collecting opinions from lower-level employees or those closest to the customer. They are considered to have a good understanding of market conditions and current trends. Furthermore, employees at various levels are asked to provide their estimates regarding sales, product demand, or market trends. These opinions are then collected and analyzed to produce an overall forecast.

Methods

This study employed a qualitative research approach by utilizing data collection techniques such as in-depth interviews, direct observation, and a review of relevant literature (Creswell, 2014; Sugiyono, 2019). Informants were selected using a purposive sampling method based on specific criteria, including their understanding of container shortages at PT XYZ, their access to historical data, their professional experience in export-import activities, and their willingness to participate in the study (Patton, 2002).

To ensure data validity, this research applied source triangulation by comparing and verifying information obtained from multiple sources, including informants, documents, and other supporting data (Denzin, 1978; Moleong, 2017). This approach enhances the credibility of the findings, as each data source provides different perspectives and strengths. The comparison process was conducted through interviews, observations, and document analysis.

Data analysis was carried out descriptively through four main stages: data collection, data reduction, data display, and conclusion drawing (Miles et al., 2014). Data collection involved interviews, observations, and documentation. Subsequently, data reduction was conducted to simplify and select relevant information. The data were then presented in the form of structured narratives, followed by drawing preliminary conclusions that remained open to revision as additional evidence emerged.

The focus of this research is to analyze the occurrence of 20GP container shortages at PT XYZ using the grassroots forecasting method. The findings are presented descriptively to provide a comprehensive understanding of the causes, impacts, and mitigation efforts related to the shortage of 20GP containers at PT XYZ.

Results and Discussions

In this research, the author explores and examines the problem of Analyzing the Occurrence of 20GP Container Shortages Using the Grassroots Forecasting Method at PT XYZ. In this study, the authors examine the problem into two formulations, the first is the cause of the 20GP container shortage at PT XYZ and the second is how to overcome the 20GP container shortage with the grassroots forecasting methodat PT XYZ.

Causes of 20GP Container Shortage at PT XYZ

This discussion examines the causes of the 20GP container shortage, where the author explains the factors of the 20GP container shortage at PT XYZ which consists of internal factors and external factors.

Internal factors

Internal factors occur due to inefficient container management, lack of communication between PT XYZ and the container depot or related parties and rarely conduct market research. This is supported by informant A-2's statement that: "...Inefficient container management can occur due to an undercooked container allocation strategy, for example PT XYZ does not accurately calculate demand patterns. This can lead to the accumulation of containers at certain ports and scarcity at other ports, especially in Semarang which is always in deficit of 20GP containers". Then, informant A-3 stated that: "...The lack of communication between PT XYZ and the container depots causes an imbalance in the distribution of containers. This results in some depots experiencing an excess of empty containers, while others experience a shortage, thus hampering the smooth delivery of goods". Then confirmed by informant A-1 who said: "...Inefficiencies in container management are often caused by a non-optimal tracking system, making it difficult for PT XYZ to monitor the position of containers in real-time. This causes delays in container rotation and increases the risk of container shortages at certain depots. In addition, PT XYZ also rarely conducts market research to the field directly, which is of course very much needed by the staff to provide an overview and reports related to the immediate situation in the field as well as to approach clients, both shippers and consignees, so that PT XYZ business processes can grow.".

Based on the statements from informants A-1, A-2, and A-3, it can be concluded that PT XYZ internal factors result in container shortages, which need to be taken seriously so that in the future it can improve the integration of tracking systems, improve communication with related container depots, and optimize container allocation strategies that are more efficient and responsive to customer demand.

External factors

One of the main external factors causing the 20GP container shortage in Semarang is the imbalance between export and import activities. In this context, the Semarang region shows a trend of high export demand, driven by increased industrial activity and international trade from local businesses. However, this condition is not accompanied by a comparable volume of imports, resulting in an imbalance of inbound and outbound container flows.

Based on the results of the author's interviews described by informants A-2 and A-3, which were then validated by informant A-1 as a key informant, external factors are also the cause of container shortage at PT XYZ. This is supported through Informant A-2's statement which states that: "...The cause of the container shortage is the imbalance of exports and imports with a container size of 20GP". Then, informant A-3 stated that: "...The import of 20GP containers is small but the strong demand for 20GP containers in Semarang makes this type of container scarce or shortage". Then confirmed by informant A-1 who said: "...The imbalance in container distribution causes some regions to experience a surplus while others are in deficit, including Semarang. This happens because regions with

high import volumes, such as Jakarta or Surabaya, tend to have a surplus of empty containers due to the large number of incoming goods. Conversely, regions such as Semarang, which have high export activity but low import volume, experience a container deficit due to the lack of reverse supply from import activity."

The author concludes based on statements from informants A-1, A-2, and A-3 that the container shortage at PT XYZ is also caused by external factors, namely the imbalance of exports and imports with a container size of 20GP, the strong export demand in Semarang but not balanced by the reverse supply of import activities, and also the imbalance in container distribution causing some regions to experience a surplus while others are in deficit, including Semarang. Where the imbalance is caused by dynamic demand behavior, so that the comparison between imports and exports affects the container inventory. Fewer imports than exports lead to container deficit areas.

How to Solve 20GP Container Shortage by Using Grassroots Forecasting Method at PT XYZ

According to Heizer and Render (2015), grassroots forecasting is the art and science of predicting future events. Forecasting will involve taking historical data (such as last year's sales) and projecting it into the future. In this discussion, the author uses the grassroots forecasting method, which is forecasting based on collecting data from lower-level employees who have an in-depth understanding of demand, local market trends, and using aspects that are most appropriate and relevant to the problem at hand. This way the author can focus on the most influential aspects to create relevant discussion results.

Impact of 20GP Container Shortage on PT XYZ

Based on the initial interview with Head Department of PT XYZ, the main problem identified as the cause of the shortage of containers at KMTC Shipping Line Semarang is the unbalanced distribution of containers. This imbalance causes deficit and surplus areas of containers. Where in PT XYZ there is a deficit or shortage of 20GP containers. From the results of observations in the field by the author, the following lifting data in table 2 is processed regarding the type of container from 2022-2024.

From the table above, it can be seen that the type or type of container size 20GP often occurs scarcity, while the size 40HC occurs on the contrary, namely there is a surplus because there are more exports than imports and of course has a serious impact on the problem of container shortages that occur at PT XYZ.

This condition has a direct impact on the operations of shipping companies, especially PT XYZ, which must face obstacles in meeting customer demand. The scarcity of 20GP containers causes delays in the process of transporting export goods, which in turn disrupts the achievement of the company's routine targets.

Thus, the scarcity of 20GP containers is not a simple problem, but a systemic problem involving imbalances in global logistics flows,

Table 2. PT XYZ Lifting Data 2023-2024

UPPER	2022		2023		2024	
	20GP	40HC	20GP	40HC	20GP	40HC
Export (TEU)	3965	798	3485	653	3452	642
Imports (TEU)	3351	816	2975	687	3018	712
The difference	614	-18	510	-34	434	-70
Description	Disadvantages	Surplus	Disadvantages	Surplus	Disadvantages	Surplus

Source: Data processed (2024)

exportimport dynamics, and container distribution management between regions. Therefore, there is a need for a thorough evaluation of container management strategies, increased cooperation between ports and shipping companies, and the development of a more accurate container demand forecasting system, such as the grassroots forecasting method used in this study.

Efforts made to avoid 20GP Container Shortage at PT XYZ

The problem of container shortages, especially the 20GP size at PT XYZ, has not been handled optimally. The shortage of containers is still a major obstacle in achieving operational targets and customer satisfaction. However, PT XYZ has shown a number of efforts in dealing with the problem.

PT XYZ endeavors to expedite the process of unloading and returning containers from customers so that containers can be reused immediately and not held for a long time. This strategy aims to improve the efficient use of available containers, especially in the midst of limited supply.

In addition, PT XYZ is also working more closely with container depots, port operators, and trucking companies to speed up the distribution of containers to customers. This collaboration is important to ensure containers are more accessible and not hampered by slow internal logistics processes. Another step taken is the repositioning of empty containers from surplus to deficit areas, including Semarang, where this process involves coordination with various related parties, including container depots and logistics partners.

20GP Container Shortage Analysis Using Grassroots Forecasting at PT XYZ

Grassroots forecasting is a qualitative forecasting method that involves individuals closest to customers, such as sales personnel, in estimating future demand, based on the assumption that they have better knowledge of customer needs (Chase, 2013; Krajewski et al., 2007). In this study, the method is used to analyze the impact of 20GP container shortages at PT XYZ and to identify strategies to mitigate such shortages.

Furthermore, at this stage the author looks for potential problems or causes of container distribution imbalance and based on the author's in-depth observation, there are 8 problems, namely inefficient container management, rarely conducting market research, lack of communication with container depots, lack of communication with the port, container distribution imbalance, export and import imbalance, lack of import potential in Semarang and strong export potential in Semarang. To make it easier to

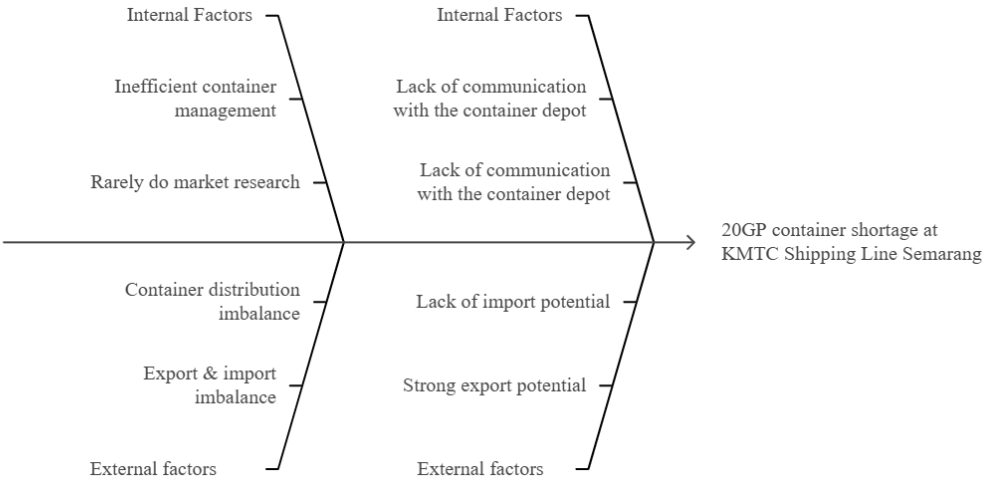

Figure 1. Fishbone Diagram
Source: Data processed (2025)

understand these potential problems, I will divide them into two categories: internal factors and external factors. To provide a clearer picture, the author draws a flowchart of the 20GP container shortage problem as shown in Figure 1.

The flowchart above provides a comprehensive overview of how internal and external factors synergize to produce the 20GP container shortage problem at PT XYZ. By knowing the root of this problem, corrective measures can be focused on improving management efficiency, communication and adjusting container distribution and procurement strategies in a more targeted manner. With various potential problems or causes of 20GP container shortage at PT XYZ as well as the results of interviews from informants A-1, A-2, and A-3 who are people

Table 3. Grassroots Forecasting

Possible Root Causes	Discussion	The Root of the Problem?
	INTERNAL	
Inefficient container management	PT XYZ container management is inefficient because PT XYZ lacks maturity in organizing container allocation strategies and does not pay attention to demand patterns accurately.	Yes
Lack of communication with related depots or related parties	The lack of communication between PT XYZ and the container depots led to an imbalance in container distribution. This resulted in some depots experiencing an excess of empty containers, while others experienced a shortage, hindering the smooth delivery of goods.	Yes
A small number of containers	The number of PT XYZ containers scattered throughout Indonesia is already so large that it is not considered necessary to add new containers because it can lead to many other unexpected costs and expenses.	Yes
Rare market research and visits	Market research is conducted weekly by analyzing PT XYZ export and import performance data. Meanwhile, direct market research to the field or to client sites is carried out quite rarely, which is once every 1-2 months.	Yes
	EXTERNAL	
Export and import imbalance with 20GP container size	Few imports of 20GP containers but high demand for 20GP containers in Semarang is causing a shortage of containers.	Yes
Unbalanced container distribution, causing some areas to experience deficits	The imbalance in container distribution occurs because regions with high import volumes, such as Jakarta or Surabaya, tend to experience a surplus of empty containers due to the large number of incoming goods. Conversely, regions such as Semarang that have high export activity but low import volume experience a container deficit due to the lack of reverse supply from import activity.	Yes
Lack of import potential in Semarang	Import strength in Semarang is quite strong, especially for household needs such as clothing, medicine, electronics, and domestic businesses such as construction, electrical components, chemicals, and others. However, PT XYZ has yet to find the right target market to capitalize on this potential and this is a problem for the export and import balance.	Yes
Strong export demand in Semarang	Semarang's export strength is particularly strong in commodities such as textiles, garments, furniture, timber, wood pellets, and footwear. There is a lot of export demand, but PT XYZ cannot fulfill all the needs due to container limitations.	Yes

Source: Data processed (2025)

close to customers, the author can summarize them into the Table 3.

Based on the analysis above, it can be concluded that the causes of the main problem of container shortage include inefficient management of container management, infrequent market research, lack of communication with container depots, lack of communication with the port, unbalanced distribution of containers, unbalanced exports and imports, lack of import potential in Semarang and strong export potential in Semarang. The impact of container shortages is not only felt by businesses, but also consumers. This impact can have serious consequences on company profitability, customer satisfaction, and the smooth running of business activities. A concerted effort is needed to overcome the container shortage and minimize its negative impact. The strategies that can be carried out by PT XYZ to overcome the shortage of containers are:

Optimize container turnaround time

Container turnaround time is the duration from when an empty container arrives at the depot until it is available for the next load, reducing this time directly lowers demurrage and holding costs which often run into tens of dollars per day per container. Every hour of reduction in container dwell time can increase the amount of asset turnover, allowing one container to serve more shipping cycles in a given period. Container dwell time is the amount of time a container spends at a port, terminal, or depot from the time it arrives until it is reloaded or removed from the area.

Repositioning the container

Container repositioning is the process of moving empty containers from one location to another to meet demand elsewhere. It is important to maintain the balance of container movements and ensure a smooth global supply chain. Feeder vessels play an important role in the container repositioning process, especially those that connect primary ports with secondary ports. Without effective repositioning, PT XYZ faces increased operational costs, reduced asset utilization, and disruption to smooth supply chains. The repositioning of containers carried out by PT XYZ has the following objectives: a. Lower operational costs b. Better customer service c. Improving supply chain resilience d. Better planning and forecasting.

By implementing automated and data-driven container repositioning practices, shipping companies such as PT XYZ can reduce costs, maximize existing assets, maintain a smooth supply chain, and provide more reliable services to customers.

Conclusions and Recommendations

Based on the results of the analysis and discussion regarding the Analysis of the Occurrence of 20GP Container Shortage Using the Grassroots Forecasting Method on the PT XYZ, the authors can draw the following conclusions

First, the author found that the shortage of containers at PT XYZ is caused by two factors, namely internal factors and external factors. Internal factors consist of inefficient container management, lack of communication between PT XYZ and container depots or related parties, and infrequent market research. External factors consist of an imbalance of exports and imports with a 20GP container size, strong export demand in Semarang but not matched by the opposite supply from import activities, and also an imbalance of container distribution that causes some regions to experience a surplus while other regions experience a deficit, including Semarang.

Second, there are constraints that have an impact on the analysis of the occurrence of 20GP container shortages at PT XYZ. Based on the results of the analysis with the grassroots forecasting approach, the author concludes that the main cause of the 20GP container shortage is the imbalance of container distribution caused by ineffective allocation strategies and less than optimal communication. There are alternative strategies that can be carried out by PT XYZ, namely optimizing container turnover time and repositioning containers. By accelerating the container turnaround process, PT XYZ can improve operational efficiency. This includes

reducing the time needed for loading and unloading, inspection, and preparing containers for the next shipment. These efficiencies not only increase service capacity without the need to increase the number of containers, but also reduce overall operating costs. Repositioning containers from areas with surplus to areas with high demand, such as from Jakarta to Semarang, allows for more optimal asset utilization. This strategy helps balance container distribution, reduce customer waiting time, and improve demand fulfillment rates.

The suggestion that the author can share to overcome the shortage of 20GP containers at PT XYZ is to use a real-time container booking system for customers to access container availability, namely the importance of thoroughly socializing to all PT XYZ internal teams to understand how this system works and the benefits of this system. The socialization should include the flow of using the system, its effect on service efficiency, and its impact on customer trust. Regular technical training is also required for employees who will operate or support the system, including field staff and sales staff. This training should focus on solving simple technical problems that may occur when using the realtime container booking system, without having to rely directly on the IT team. However, it is advisable to recruit or add IT staff and data analysts who have competencies in supply chain management and digital forecasting. This is to ensure the system is stable and accurate in predicting container demand, including supporting integration with grassroots forecasting methods.

Limitations

This study is limited by its qualitative approach, which may introduce subjectivity and reduce replicability. The single case study design focusing on PT XYZ constrains external validity, limiting the generalizability of the findings. In addition, the application of the grassroots (bottom-up) forecasting approach is restricted by limited data and the absence of rigorous quantitative validation, which may affect its predictive reliability. Future research should employ mixed methods, multiple case studies, and advanced quantitative modeling to enhance robustness and generalizability

References

Cahyono, H., & Pujawan, I. N. (2019). Analysis of empty containers supplies in the shipping network: Case study at national shipping company. *IPTEK Journal of Proceedings Series*, (5), 441-451.

Chase, C. W. (2013). *Demand-driven forecasting: a structured approach to forecasting*. John Wiley & Sons.

Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (4th ed.). Sage Publications.

Denzin, N. K. (1978). *The Research Act: A Theoretical Introduction to Sociological Methods*. McGraw-Hill.

Heizer, J., & Render, B. (2015). Operations Management: Sustainability and Supply Chain Management. Prentice Hall.

Hoerunisa, Sijabat & Setyawati (2023). Analysis of Factors Influencing Container Shortage in Tanjung Priok Port, Jakarta. *International Journal of Innovative Science and Research Technology, 8*(12).

Irawan, H. G. (2021). *Manajemen transportasi pelabuhan di Indonesia*. Semarang.

Krajewski, L. J., Malhotra, M. K., & Ritzman, L. P. (2007). *Operations management: Processes and supply chains* (9th ed.). Pearson.

Laloma, V., Tampi, J. R., & Mukuan, D. D. (2017). Role of Freight Forwarder in Import Export Business at PT. Jasa Trans Samudera Sulut. *Jurnal Administrasi Bisnis*, *5*(005), 269348.

Lancaster, G. & Lomas, R., (1985). *Forecasting for Sales and Materials Management*. McGraw-Hill.

Mangan, J., Lalwani, C., & Lalwani, C. L. (2017). *Global logistics and supply chain management* (3rd ed.). Wiley.

Marciniak-Neider, D., & Neider, J. (2014). The role of freight forwarders in global supply

chains. *LogForum,* 10(3), 257–265.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook (3rd ed.).* Sage Publications

Mirčetić, D., Rostami-Tabar, B., Nikoličić, S., & Maslarić, M. (2021). Forecasting hierarchical time series in supply chains: An empirical investigation. *International Journal of Production Research,* 60(1), 1–20.

Moleong, L. J. (2017). *Metodologi Penelitian Kualitatif*. PT Remaja Rosdakarya.

Novack, R. A., Gibson, B. J., & Suzuki, Y. (2010). *Transportation: A supply chain perspective (6th ed.).* South-Western Cengage Learning.

Oliveira, J. M., & Ramos, P. (2019). Assessing the performance of hierarchical forecasting methods on the retail sector. *Entropy, 21*(4), 436.

Patton, M. Q. (2002). *Qualitative Research and Evaluation Methods* (3rd ed.). Sage Publications.

Rusgiyarto F., Sjafruddin A., Frazila R. B., & Suprayogi. (2017). Import Container Inter-Arrival Time and Handling Characteristic in Marine Container Terminal with External Yard – A Case Study of Jakarta International Container Terminal, Indonesia. *International Journal of Civil Engineering and Technology (IJCIET), 8(10), 1085–1095.*

Sugiyono. (2019). *Metode Penelitian Kualitatif, Kuantitatif, dan R&D*. Alfabeta

Toygar, A., Yildirim.U, & Inegol, G.M. (2022). Investigation of empty container shortage based on SWARA-ARAS methods in the COVID-19 Era. *European Transport Research Review, 14*:8.