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Implementation of Verified Containers Carried on Ships (Gross Mass and Container Verification) – VGM at Belawan Container Terminal

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Abstract: Implementation of Verified Containers Carried on Ships (Verified Gross Mass of Container) – VGM at Belawan Container Terminal (Research Team Supriadi and Christy Pongkessu). In an effort to improve shipping safety and minimize the risk of damage or accidents at sea due to load imbalance and overloading on ships, in May 2014 the International Maritime Organization - The Maritime Safety Committee (IMOMSC) has decided to approve changes to The International Convention for the Safety of Life at Sea (SOLAS) 1974 Chapter VI Article 2 concerning the requirements for verifying the gross weight of containers (Verified Gross Mass of Container/ VGM). Verified Gross Mass (VGM) is validated container weight information using scales that have been certified and accounted for by a verifier. This study aims to determine the implementation and impact of the implementation of Verified Gross Mass (VGM) at Belawan Port. This research was conducted at Belawan Port located in Medan City, North Sumatra, Indonesia for 6 (six) months, namely from May to October 2023. The type of research used is qualitative research. Qualitative research methods are research methods based on the philosophy of postpositivism, data collection techniques with triangulation (combined), inductive/qualitative data analysis. Based on the results of the study, it was concluded that Belawan Port has implemented the Verified Gross Mass (VGM) procedure in accordance with SOLAS (Safety of Life at Sea) regulations. This process involves verifying the gross weight of containers before loading onto ships using appropriate weighing equipment. The main impact of implementing Verified Gross Mass (VGM) is increasing the safety of container ship navigation. By ensuring the correct gross weight of containers, ports can prevent ship accidents caused by gross weight inaccuracies.

Keywords: Shipping Safety, Containers, Verified Gross Mass

INTRODUCTION

Maritime transportation is a mode of transportation that is full of regulations (rules). Since the ship was ordered to be built until the ship operates, there are always regulations that must be obeyed and supervision is always carried out in its implementation. This is done as an effort to realize the fulfillment of safety and security requirements concerning transportation in the waters. However, maritime transportation in Indonesia is still experiencing problems. Maritime accidents have claimed many lives and property. The root causes of maritime accidents have not been handled seriously so that danger always lurks for users of maritime transportation services at all times.

Maritime accidents that occur have become a discussion throughout the world and IMO has begun to be interested in preventing their recurrence. In an effort to improve the protection of new cargo and passenger ships in the event of an accident, in May 2014 the International Maritime Organization - The Maritime Safety Committee (IMOMSC) decided to approve changes to The International Convention for the Safety of Life at Sea (SOLAS) 1974 Chapter VI Article 2 concerning the requirements for verifying the gross weight of containers. All containers loaded are required to have a Verified Gross Mass (VGM) declared by the exporter/shipper. These provisions are effective from 1 July 2016. Indonesia supports and implements the provisions that have been agreed upon internationally. For this reason, the Ministry of Transportation through the Directorate General of Sea Transportation on June 1, 2016 has issued Regulation of the Director General of Sea Transportation Number HK.103/2/4/DJPL-16 concerning the Verified Gross Weight of Containers Transported on Ships (Verified Gross Mass (VGM), along with its amendments, namely Regulation of the Director General of Sea Transportation Number HK.103/2/5/DJPL-16.

The regulation states that the provisions for verifying the gross weight of containers transported on ships (Verified Gross Mass Of Container / VGM) are intended to prevent differences between the declared weight of containers and the actual weight of containers that can result in incorrect placement on ships, thus impacting the safety of ships, crews at sea and workers in ports as well as potential losses. Meanwhile, containers that exceed the maximum gross weight stated in the Safety Approval Plate (CSC Safety Plate) may not be transported on ships.

With the issuance of this regulation, all stakeholders in the shipping sector, both on the land/port side and on the water transportation side, must support by determining internal procedure standards that include the establishment of a documentation system, communication and dissemination of information from the verified gross container weight (Verified Gross Mass Of Container / VGM).

To increase the economic growth of the people of North Sumatra, the Association of Indonesian Export Companies (GPEI) of North Sumatra continues to strive to improve the smoothness of export businesses using containers. The implementation of Verified Gross Mass (VGM), among others, aims to help exporters improve shipping safety and prevent ship accidents due to load imbalances and overloading on ships. This happens because there is often a difference between the gross container weight reported by the shipper and the actual weight in the container.

With the VGM policy, it is hoped that container shippers will pay more attention to the safety and security of ships and reduce the risk of accidents at sea that can result in material losses and human lives. In addition, the implementation of VGM can also increase shipping efficiency and productivity because there are no ship delays due to problems with the gross container weight that is not properly verified.

Shippers are responsible for determining and documenting the Verified Gross Container Weight (Verified Gross Mass / VGM). Containers along with their packaging and cargo are prohibited from being transported onto ships if the captain, Port business entity, and/or special

terminal/terminal manager for personal interests have not received information on the Verified Gross Mass (VGM) of Containers.

Following the description above, the author is interested in researching this by raising the title "Implementation of Verified Containers Transported on Ships (Verified Gross Mass Off Container) - VGM at the Belawan Container Terminal".

Based on the background of the problem, the author formulates the following problem formulation: 1) How is the implementation of VGM containers at the Belawan Container Terminal?; and 2) What is the impact of the implementation of VGM at the Belawan Container Terminal?.

METHOD

The type of research used is qualitative research. Qualitative research method is a research method based on post-positivism philosophy, used to research on natural object conditions, (as opposed to experiments) where the researcher is the key instrument, data source sampling is done purposively and snowball, data collection techniques with triangulation (combination), data analysis is inductive/qualitative, and qualitative research results emphasize meaning rather than generalization, (Sugiyono, 2015).

Research Location This research was conducted at Belawan Port, a port located in Medan City, North Sumatra, Indonesia and is the most important port on the island of Sumatra. Belawan Port is a port with a main class level under PT Pelindo. This research was conducted for 6 (six) months, namely from May to October 2023.

The types of data used in this study are: 1) Primary Data: In this study, primary data comes from the research location based on interviews, namely primary data collection activities that come directly from research respondents at PT. Pelabuhan Belawan; and 2) Secondary Data: Secondary data is data obtained from literature related to the object of study in the form of books, journals, written documents, operational rules, and other data.

The data collection technique used is triangulation/combination, namely observation, interview and documentation study methods.

The analysis method used is a qualitative analysis method. Data analysis is the process of finding and compiling data obtained from interviews, direct notes and documentation, by organizing data into categories, describing them into units, synthesizing, compiling them into patterns, choosing what is important and what will be studied, and making conclusions so that they are easily understood by oneself and others.

RESULT AND DISCUSSION

Results

Verified Gross Mass (VGM)

VGM or the abbreviation of Verified Gross Mass is one of the regulations issued by the IMO (International Maritime Organization) based on the amendment to SOLAS 1972 Chapter VI Article 2 which was released at the end of 2015 and began to be enforced mandatory on July 1, 2016. "NO VGM NO SHIPPING", that's roughly the motto for implementing this regulation, meaning that since July 1, 2016 if the shipper (exporter) does not provide verification of the weight of the goods exported and packed in containers, the shipping line is prohibited from transporting the container on the grounds of maintaining the safety and stability of the ship while navigating on the high seas.

According to the International Maritime Organization (IMO) amendment to SOLAS (Chapter VI Article 2) the definition of Verified Gross Mass (VGM) is validated container weight information using scales that have been certified and accounted for by a verifier. According to Anggi (2017) the verified gross weight of the container Verified Gross Mass (verified gross weight) which means the sender states the total gross weight of all full

containers (FULL) must be proven as obtained by one of the methods described below. This Gross Weight Verified not only calculates the weight of all packages and cargo items, but must also include all the tare weight of the container and all kinds of additional loading equipment (for example lashing material and packaging material). Meanwhile, according to the Regulation of the Director General of Sea Transportation Number HK.103/2/4/DJPL-16 article 1 paragraph 17 Verified Gross Mass (VGM) is the total gross weight of the container obtained through one of the methods regulated in this Regulation of the Director General. The International Maritime Organization (IMO) has amended the SOLAS rules (Chaper VI/2 – Verification Gross Mass) which requires all stakeholders to verify the gross weight of export containers. This amendment was issued because of the shipping accident due to the structural failure of the MSC Napoli ship (18 Jan 2007); "there are about 20% of the ondeck cargo + 660 boxes that have an actual weight that is different from the weight stated on the manifest." The purpose of VGM is to improve shipping safety and minimize the risk of damage or accidents at sea due to imbalanced loads and overloading on the ship. In this case, the owner of the goods or the shipper must provide an accurate VGM before the goods are shipped. VGM is calculated by adding the gross weight of the ship, including fuel, ballast water, cargo, and all objects on board, then subtracting the ship's tare weight.

There are many incorrect calculations about the gross weight of Shipper containers, because the tools used are not verified and not calibrated according to the International Organization for Standardization (ISO). The 93rd session of the MSC (Maritime Safety Committee) Maritime Safety Committee in May 2014 in London, has approved changes to SOLAS regarding mandatory container weight verification requirements for shippers. Verified Gross Mass (VGM) Containers began to be applied internationally on July 1, 2016, including in Indonesia. Based on the regulation of the Director General of Sea Transportation Number HK.103/2/4/DJPL-16 concerning Verified Gross Weight of Containers Carried on Ships, especially in Article 3 that containers have been verified (VGM) before being loaded. Determination of Verified Gross Container Weight (VGM) can be done by a third party other than the shipper (Regulation of the Director General of Sea Transportation Number HK.103/2/4/DJPL-16 concerning Verified Gross Container Weight transported on ships Article 4 paragraph 3) with the following conditions: 1) Has a legal entity in the field of transportation or port services or container loading and unloading services; 2) Uses equipment that is calibrated periodically and certified; 3) Is appointed and has an agreement with the shipper; 4) Is known by the UPT that handles port aspects; and 5) Has a weighing procedure that has been approved by the Director General through the UPT that handles port affairs.

Mandatory Provisions for Ports in Indonesia: 1) All containers to be loaded on a ship, the weight must be determined using calibrated and certified scales (Article 4 Paragraph 2); 2) Two methods are permitted in determining the weight of a container (Article 4 paragraph 1), the first method is determining the gross weight by weighing the container packaging after the container packaging and sealing process is complete or the second method is determining the gross weight by weighing each package and cargo packed into the container including the weight of the pallet, protective pads (dunnage) and other safety materials and plus the tare weight of the container to be weighed; and 3) The Stowage Plan on the ship must use the verified weight Verified Gross Mass (Article 9).

The Verified Gross Mass (VGM) method is a method used in the shipping industry to determine the gross weight of a container to be shipped. The gross weight of a container is needed to determine a safe load and meet safety and security requirements in maritime transportation.

The VGM method can be done in two ways, namely: first: Weighing method, which is by weighing the entire container after the goods are loaded into it. In this method, the gross weight of the container is the total weight of all contents in the container plus the empty weight

of the container itself. Second Calculation method, which is by calculating the gross weight of the container from the total weight of the goods and the empty weight of the container stated by the manufacturer or operator. In this method, the gross weight of the container is the total weight of the goods and the empty weight of the container stated.

After the gross weight of the container is determined using the VGM method, this information must be submitted to the ship operator or ship agent before shipping. The ship operator will use this information to calculate the ship's cargo capacity and ensure the safety and security of shipping.

Several documents that need to be attached when verifying containers: 1) VGM (Verified Gross Mass) document. This document contains information about the gross weight of the container consisting of the net weight of the cargo and the weight of the container itself. VGM documents must be provided by the shipper and submitted to the authorities before the container is loaded onto the ship; 2) Container Loading Document. This document contains information about the type of cargo loaded into the container, the quantity and volume of the cargo, and the location and number of the container. This document is required to ensure that the cargo is properly loaded into the container and that the container has been properly closed and sealed; 3) ISO certificate. An ISO certificate is required to ensure that the container meets the international standards required for cargo shipments. This certificate shows that the container has been tested and meets the necessary durability, security and safety requirements; 4) Ship Documentation. This document contains information about the ship used to transport the cargo, including its load capacity, speed and shipping route. This document is required to ensure that the ship can accommodate the cargo and carry out the shipment safely; and 5) Customs Documentation. This document is required to ensure that the cargo to be shipped meets the applicable customs requirements of the country of origin and destination. This document can also be used to ensure that the cargo does not violate any other laws or regulations.

There are several types of weighing devices used during container verification at the port, including: 1) Weighbridge Scales. This weighing device is used to measure the overall weight of the container. The container is inserted into the bridge scale area and its weight is measured electronically. This bridge scale is capable of weighing large weight capacities and is usually installed at the port; 2) Portable Weighing Scales. This weighing device is used to measure the gross weight of the container by weighing the container while it is on the portable scale. These scales can generally weigh smaller weight capacities than bridge scales and can be moved to different locations; 3) Forklift Scales: This weighing device is installed on a forklift and is used to measure the weight of the container during transportation. This scale works by lifting the container and reading its weight through a sensor installed on the forklift. All of these weighing devices must be calibrated periodically to ensure accurate measurement results and in accordance with the standards set by the IMO (International Maritime Organization).

Consequences for Terminal Operators, Terminal Operators will not load onto a ship if the container has not been declared to have VGM by the party conducting the verification. Technical submission of VGM: 1) Shipper declares VGM and the party conducting the verification; 2) If the Shipper cannot / has not declared VGM, then the Terminal Operator will weigh to obtain VGM and become the party conducting the verification; and 3) The party declaring VGM will be fully responsible for the risks that occur if the VGM weight is inaccurate when the container is unloaded at the destination port. If Verified Gross Mass (VGM) is not implemented at the port, it can have an impact on the safety and security of shipping goods by sea. The following are some of the impacts that may occur if VGM is not implemented at the port: 1) Risk of ship accidents: If the container is filled with a weight that exceeds the maximum permitted limit, then the ship carrying it can become unstable and

vulnerable to accidents. This accident can cause damage to the ship, container, and goods being transported; 2) Risk of damage to goods: If the container is filled with the wrong weight, the goods transported in the container may be damaged or broken due to instability and impact during shipping; 3) Financial loss: If the container is filled with the wrong weight, additional costs may be required to balance the load or to replace goods damaged during shipping; 4) Delay in shipping: If the container must be re-weighed or rearranged due to not meeting VGM requirements, shipping may be delayed; and 5) Legal sanctions: Violation of VGM requirements may result in legal and administrative sanctions for parties involved in shipping goods by sea, such as ship owners, shipping agents, and customers.

In line with Ridwan (2019) who explained that with the implementation of VGM, there will be positive and negative impacts. The positive impacts are: 1) The shipping line will get accurate data on the weight of the goods and containers so that the calculation of the stability of the ship can be more accountable, 2) The port terminal will also get accurate data on the weight of the goods from each container so that it can prepare the most appropriate loading/unloading equipment to avoid "over load capacity" which will be very dangerous for other parties, 3) The truck transportation party will also get a more certain load so that truck drivers can drive their trucks on the highway more comfortably and safely because the containers and their loads are not "overloaded" 4) Shippers and consignees send and receive goods with tonnage that is equally accurate and accountable. The negative impacts are: 1) For certain shippers whose sales and purchase agreements are not based on tonnage, this will result in additional costs because they are forced to weigh the goods and containers that will be sent at the "gate-in". This adds complexity to the process of entering goods into the terminal because each container must be weighed before and after being loaded onto the truck.

Container Terminal

According to Amir M.S (1979) Containers are boxes made of metal that contain goods commonly called general cargo that will be shipped by sea. Unlike conventional ship transportation, since loading to unloading (even to the destination) the goods to be shipped by container are not touched by people, because the container is loaded onto the ship and with the container the goods are unloaded from the ship and lowered onto land.

R.P. Suyono (2007) explains that the definition of Container Terminal based on the provisions of Article 1 of the Decree of the Board of Directors of Indonesian Port II Number HK.56/2/25/P.I-II-2002, what is meant by Container Terminal is a terminal equipped with at least facilities in the form of moorings, docks, stacking fields (container yards), and equipment that is suitable for serving container loading and unloading activities.

In general, containers are made of materials such as steel, aluminum and plywood or FRP (Fiber glass Reinforced Plastics). The selection of container materials is based on the use of the container in question. While the size of the container is based on the International Standard Organization (ISO). The unit of measurement commonly used is TEU's (Twenty Feet Square Equivalent Units). A container with a size of 20 square feet is equal to 1 TEU's, while a container with a size of 40 square feet is equal to 2 TEU's. In field records, the term BOX is often used to indicate one container box with a certain size. For the transportation process, this BOX size is easier to use than using the TEU's size.

The functions of containers in a seaport system include: a) Transportation equipment, meaning that containers function as a means to transport goods in certain quantities or sizes; b) Warehouse, namely containers can also function as a place to store goods or objects for a certain period of time; c) Goods packing equipment, meaning that containers function as containers or means for packing or packaging goods from bulk to grouped.

Based on the provisions according to ISO (Rec.no.804): 1) Has a permanent nature, strong enough to be used repeatedly; 2) Designed specifically as a facility to carry goods using

one or more modes of transport without removing or reinserting the contents; 3) Installed with equipment that allows it to be used at any time to handle the transfer from one mode of transport to another; and 4) Has a room content of at least 1m3 (35.5 ft3).

In general, the function of the Container Terminal includes several activities as follows: 1) Planning for loading/unloading (Shipping/Planning); 2) Unloading/Loading and moving/moving containers (Container Handling); 3) Filling and emptying containers (Stuffing & Stripping Container); 4) Storing goods (Storage); 5) Maintenance of loading/unloading equipment (Equipment Maintenance); and 6) Stacking containers (Container Stacking). Containers are objects that are used as permanent, strong, reusable goods transport tools, specially designed to be easily transported by various modes of transportation safely, and equipped with lifting sockets at the corners (Lasse, 2012).

Basically, the size of the container has been determined by the International Organization for Standardization (ISO) as follows:

Table 1. Container Sizes

Size Type	Outer Size	Inner Size	Capacity	*Pay load*
20 feet container	20 '(p) x 8 '(l) x 8'6 "(t) 6.058 x 2.438 x 2.591 m	5.919 x 2.340 x 2.380 m	*Cubic Capasity*: 33 Cbm	22.1 ton
40 feet container	40 '(p) x 8 '(l) x 8'6 "(t) 12.192 x 2.438 x 2.591 m	12.045 x 2.309 x 2.379 m	*Cubic Capasity*: 67.3 Cbm	27.396 ton

Container Type, R.P. Suyono (2007) stated that containers are divided into 6 groups, namely:

1. General Cargo Container is a container used to transport general cargo: General Cargo Container is a container used to transport general cargo.

Figure1. ***General Cargo***

Containers included in general cargo are:

a) General Purpose container: This is a container used to transport goods or general loads. Goods that are ordinary or do not require special handling in their delivery.
b) Open-side container: A container whose side can be opened to insert or remove goods or loads for ease due to the size or arrangement that requires insertion or removal using the side of the container.

c) Open-top container: A container whose top can be opened, this container is only used to transport goods or heavy loads that can only be inserted and removed from above using a crane.

2. Ventilated Thermal: Containers that use ventilation to allow air circulation, usually these containers are used to transport goods or cargo that contain a fairly high water content.
3. Thermal Container is a container equipped with a temperature controller for certain loads: Thermal Container is a container equipped with a temperature controller for certain loads.

Figure 2. ***Reefer Container***

Thermal containers can be divided into:

a) Insulated container: A container with insulated inner walls so that cold air inside does not seep out.
b) Reefer container: A container equipped with a cooling machine to regulate the temperature according to the temperature needed for perishable goods such as meat, fruit and vegetables.
c) Heated container: A container equipped with a heating machine so that the air inside the container can be regulated to the desired temperature.

4. Tank Container: Tank Container is a tank placed in a container frame which is used for liquid (bulk liquid) and gas (bulk gas) cargo.

Figure 3. Tank Container

5. Dry Bulk Container: Dry Bulk Container is a general purpose container that is used specifically to transport bulk cargo.

Figure 4. Dry Bulk Container

6. Platform Container: Platform Container is a container consisting of a ground floor. Containers included in the platform are:
   a) Flat Rack Container: Flat Rack Container is a container consisting of a ground floor with walls at the ends, Flat Rack Container is divided into: 1) Fixed and type The walls (stanchions) at the ends cannot be opened or folded; 2) Collapsible type The walls (stanchions) at the ends can be folded, to save space when transported empty.
   b) Flatform Based Container. A container consisting only of a ground floor, and if necessary, walls can be installed. This container is usually used for loads that have a width or height exceeding the size of a standard container.

Figure 5. Platform Based Container

7. Special container: Special containers are special containers made for certain loads, such as containers for livestock (cattle containers) or vehicle loads (car containers).

There are 3 (three) groups of containers (based on their use) that are commonly used today, namely: a) Containers for general goods (General Cargo Container) For general goods/general cargo (do not require temperature control devices), often referred to as containers for dry bulk goods (dry cargo containers); b) Containers with temperature control For goods that require temperature control devices, such as fruits, meat or vegetables; c) Special containers For special goods, such as fertilizers, grains and liquid bulk forms equipped with filling holes (loading batch).

In order for container operations to run smoothly, all parties involved must agree that the sizes of the containers must be the same and of the same type and easy to transport. The International Standard Organization (ISO) has determined the sizes of containers. According to Law Number 17 of 2008, shipping safety and security is a condition in which safety and security requirements concerning transportation in waters, ports, and the maritime environment are met, (Thabah dkk, 2018).

Implementation of VGM in Ports

Verified Gross Mass (VGM) is the gross weight of a container that has been verified before being loaded onto a ship. VGM is a policy resulting from the Safety of Life At Sea (SOLAS) convention held by the International Maritime Organization (IMO). The implementation of VGM at Belawan Port is very important for the safety of ships and workers on board while sailing. This VGM regulation has been implemented internationally in every port in all countries in the world. The implementation of VGM (Verified Gross Mass) at Belawan Port has been in effect since July 1, 2016. In a meeting held on June 7, 2021, the obstacles encountered during the initial implementation and the addition of facilities to support the smooth running of VGM Reimplementation were discussed. This meeting aims to discuss the obstacles implemented regarding the implementation of tariffs, scale calibration methods at Belawan Port and the implementation of verification methods in accordance with PM 53 of 2018. Based on Permenhub No. 53/2018, additional costs are imposed on each container to be loaded onto a ship, namely for certification of IDR 75,000 per container and verification of IDR 50,000 per container.

The following are the requirements that must be met by shippers at Belawan Port to implement VGM: 1) Provide correct and accurate Verified Gross Mass (VGM) before the container is loaded onto the ship; 2) Use certified scales to weigh the gross weight of containers; 3) Use the services of a third party that has a calibration certificate and is declared capable of running VGM if they do not have scales; 4) Provide ship documents containing the gross weight of the container which are then submitted to the terminal; 5) Pay additional costs for certification and verification of each container to be loaded onto the ship; and 6) Pay attention to the VGM regulations in effect at Belawan Port and choose a measurement method that is in accordance with these regulations.

There are two methods that can be used to measure the gross weight of containers obtained at Belawan Port in accordance with VGM regulations. The following is an explanation of the two methods: a) The first method, shippers who do not have scales can use the services of a third party to carry out weighing as long as the party has a calibration certificate and is declared capable of carrying out VGM; and b) The second method, owners of goods who have certified scales must carry out weighing by calculating the weight of the goods plus the empty weight of the container. After that, the owner of the goods can issue a ship document containing the gross weight of the container which is then submitted to the terminal.

However, to determine the right method, the owner of the goods must consider several factors. The following are factors that influence the choice of gross weight measurement method for containers at Belawan Port: 1) Availability of scales: The owner of the goods must consider the availability of certified scales to weigh the gross weight of the container; 2) Cost: The owner of the goods must consider the costs incurred to use the services of a third party to weigh the gross weight of the container; 3) Shipping needs: The owner of the goods must consider shipping needs and the time available to weigh the gross weight of the container; 4) VGM Rules: The owner of the goods must pay attention to the VGM rules applicable at the Port of Belawan and choose a measurement method that is in accordance with these rules; and 5) Certification and verification: The owner of the goods must consider the additional costs imposed for certification and verification of each container to be loaded onto the ship.

Therefore, the owner of the goods must consider several factors before choosing the right method of measuring the gross weight of the container at the Port of Belawan.

If the shipper does not provide the correct VGM at the Port of Belawan, there will be several consequences that can occur, including: 1) Not being allowed to load the container onto the ship: The captain or container terminal will not allow the container to be loaded onto the

ship if there is no correct and accurate VGM; 2) Legal action: The shipper of goods can be subject to legal action if they do not comply with the VGM rules applicable at the Port of Belawan; 3) Delay in delivery: If the VGM is not provided correctly, the delivery of goods can be delayed because they have to wait for the verification process of the gross weight of the container; and 4) Additional costs: If the VGM is not provided correctly, the shipper of goods can be charged additional costs for certification and verification of each container to be loaded onto the ship.

Therefore, it is important for the shipper of goods to provide the correct and accurate VGM before the container is loaded onto the ship at the Port of Belawan. This aims to ensure the safety of the ship and the workers on board while sailing. To overcome these consequences, Belawan Port can take several actions, including: 1) Providing massive socialization: Belawan Port can provide massive socialization to shippers regarding the VGM rules applicable at Belawan Port and the importance of providing correct and accurate VGM; 2) Tightening supervision: Belawan Port can tighten supervision of shippers who do not comply with VGM rules and provide strict sanctions for shippers who violate these rules; 3) Providing weighing facilities: Belawan Port can provide adequate and certified weighing facilities to facilitate shippers in weighing the gross weight of containers; and 4) Optimizing cooperation with third parties: Belawan Port can optimize cooperation with third parties who have calibration certificates and are declared capable of running VGM to assist shippers who do not have scales.

By taking these actions, Belawan Port can overcome the consequences if shippers do not provide correct VGM and ensure the safety of ships and workers on board while sailing.

Communication with shippers is very important in implementing VGM at Belawan Port. Here are some things to consider in communicating with the sender: 1) The sender (communicator) is the party sending the message or information to be delivered. While the recipient (communicant) is the party receiving the message or information. Therefore, it is important for Belawan Port to ensure that the message or information delivered to the sender can be understood clearly and relevantly; 2) The message delivered must be clear and accurate. Belawan Port must provide correct and accurate information regarding the VGM rules applicable at Belawan Port, as well as provide massive socialization to the sender regarding the importance of providing correct and accurate VGM; 3) The communication channels used must be effective. Belawan Port must ensure that the communication channels used can reach the sender properly, such as via email, telephone, or social media; and 4) Feedback from the sender must be received and followed up properly. Belawan Port must provide clear and accurate feedback regarding the VGM that has been given by the sender, as well as provide strict sanctions for senders who violate VGM rules.

By communicating well with shippers, Belawan Port can ensure the correct and accurate implementation of VGM, as well as ensuring the safety of ships and workers on board while sailing.

All data related to VGM (Verified Gross Mass) at Belawan Port will be carefully documented. This includes records of net weight and container weight, shipper information, container number, and all other related data. The documents required by shippers to implement VGM at Belawan Port are the correct and accurate VGM before the container is loaded onto the ship, ship documents containing the gross weight of the container which are then submitted to the terminal, calibration certificates from the metrology agency for weighing equipment if the shipper uses third-party services to carry out weighing, and circulars on this new regulation must be followed by all industries related to export containers. All of these documents must be fulfilled by shippers to ensure the correct and accurate implementation of VGM.

Belawan Port has also made several efforts to integrate a strong information technology (IT) system. Belawan Port has implemented the National Logistic Ecosystem (NLE), a logistics ecosystem that aligns the flow of goods and international documents since the arrival of the means of transport to the warehouse. NLE is expected to create collaboration of international and domestic logistics service systems between actors so that there is no more repetition or duplication of document processes. In addition, Belawan Port has also increased the availability of service systems and procedures, HR capacity, permanent mooring facilities, loading and unloading equipment and operating systems for each terminal location. They also have a 388 m long conveyor facility and a productivity of 850 to 900 tons/hour, a 6,912 m2 warehouse with a capacity of 30,000 tons, 4 truck loading conveyors and a dock with a carrying capacity of 2.5 tons/m2.

The Verified Gross Mass process applies to international service activities with the provision that Containers that have been equipped with documents or certificates of Verified Container Gross Weight from shippers or third parties, before entering the Container terminal at the port can be verified through the Container weighing facility at the port. If the results of determining the Verified Gross Container Weight show a deviation (difference in results) of less than 5% (five percent), then there is no need to issue a new Verified Gross Container Weight document.

Impact of VGM Implementation at Ports

The implementation of VGM (Verified Gross Mass) at Belawan Port has had a positive impact on shipping safety. The main impact of the implementation of VGM is improving shipping safety. By ensuring that the gross weight is verified, the risk of accidents caused by unstable cargo can be avoided. This protects the ship, the crew, and the maritime environment. Here are some points of analysis related to these impacts: a) Preventing Overloading: One of the main positive impacts of VGM is preventing overloading of the ship. Overloading can cause the ship to become unstable, increase the risk of capsizing, and can cause accidents. By having a verified gross weight for each container, the chances of overloading can be minimized; b) Improved Ship Stability: By having accurate weight data for the cargo, the ship captain can more accurately calculate how the load will affect the stability of the ship. This allows the captain to make wiser decisions in arranging the cargo and minimize the risk of accidents; c) Improved Work Safety: The gross weight verification process involves loading containers in a more controlled and safe manner. This can reduce the risk of accidents at the port, such as container falls or worker injuries.

The implementation of Verified Gross Mass (VGM) at Belawan Port can also have a positive impact on ship loading accuracy. VGM ensures that the gross weight of each container loaded onto a ship is verified and accurate data. This prevents miscalculations and errors in determining the actual weight of the cargo. Here are some analyses related to the impact of VGM on ship loading accuracy: a) Increased Loading Efficiency: With accurate VGM data, the port can plan and execute ship loading more efficiently. This avoids delays that may occur due to time-consuming manual weight checking and calculation. A more efficient loading process can also reduce the time the ship spends at the port; b) Reliability of Loading Data: The implementation of VGM produces a valid gross weight record for each container. This provides transparency and reliability in ship loading data. This data can be used to better track and manage cargo, as well as ensure that containers that are in accordance with the permitted weight are loaded onto the ship.

The implementation of Verified Gross Mass (VGM) at Belawan Port also has an impact on legal risk. The implementation of VGM is a legal obligation that must be complied with by all parties involved in container shipping. Belawan Port ensures that all shipping companies

and shippers comply with this regulation to avoid potential legal sanctions. Here are some analyses related to the impact of VGM on legal risk: a) Compliance with International Regulations: The implementation of VGM at Belawan Port is a step to comply with international regulations set by the International Maritime Organization (IMO). By complying with these regulations, the port can reduce legal risks related to violations of international regulations. This can involve sanctions, trade barriers, or other impacts that may arise if the port does not comply with VGM requirements; b) Legal Protection for Involved Parties: With VGM, Belawan Port can provide better legal protection for all parties involved in the ship loading process. This includes the port itself, shipping companies, container owners, and third parties involved in the supply chain. With verified VGM data, the port has a strong record to support legal action in the event of a dispute or issue related to ship loading; c) Reduction of Risk of Accidents and Lawsuits: VGM ensures that the loading of the ship is carried out according to the permitted weight. This reduces the risk of accidents caused by sudden changes in the distribution of the cargo. Thus, the implementation of VGM can reduce the risk of lawsuits that may arise in the event of an accident that harms a third party; and d) Protection against Cargo Ownership Lawsuits: In some cases, if the cargo is damaged during shipping or while being loaded on the ship, the cargo owner can file a legal claim against the shipping company or the port. With verified VGM, the port has strong evidence to support the correct declaration of gross weight, which can reduce the risk of unwarranted lawsuits.

Overall, the implementation of VGM at Belawan Port has the potential to improve shipping safety, ship loading accuracy, and reduce legal risks. However, it also presents several challenges that need to be addressed to ensure optimal safety and efficiency in port operations. Here are some of the challenges that arise along with the implementation of VGM: a) Additional Cost: The gross weight verification process requires investment in equipment and employee training. This can incur additional costs for the port and shipping lines; b) Delays: The gross weight verification process can slow down the flow of work at the port, especially during the initial implementation. This can affect port performance and operational efficiency; and c) Compliance: Although VGM aims to improve safety, there are challenges in ensuring that all parties involved comply with these requirements. This includes port operators, shipping lines, and container owners.

Technical Implementation of Verified Gross Mass at the Port

The technical implementation of Verified Gross Mass (VGM) involves various stages and procedures that must be adhered to by various parties, including ports, shippers, and ship operators. The following is the procedure flow for weighing services and determining container weight verification at the port terminal (SOLAS VGM).

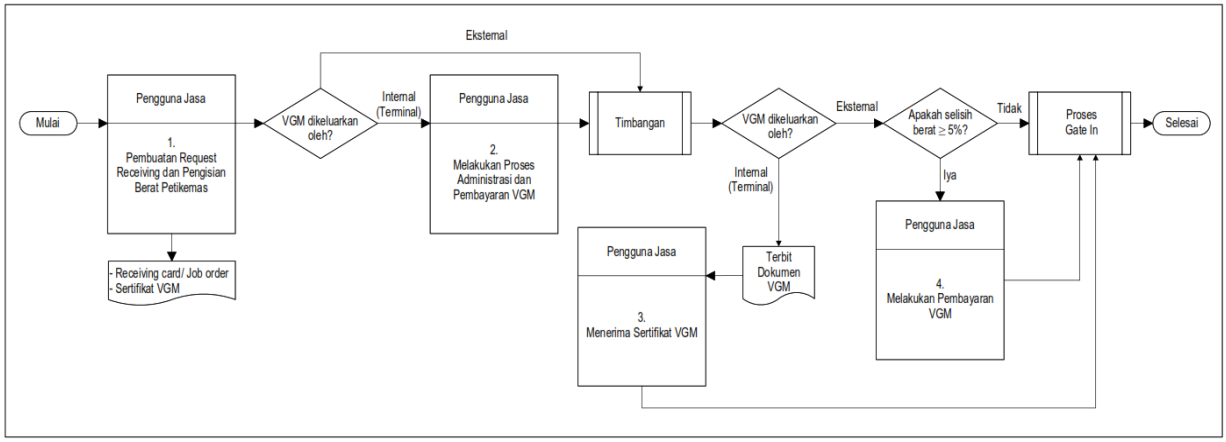

Figure 6. ***Diagram Flow Process***

Based on the image above, here is an explanation of the flow process for weighing services and determining container weight verification: 1) Making a Request Receiving Card: Service users make a request receiving through the customer portal. Container data entered by the Service User must be in accordance with the COPARN data sent by the Shipping Line. Then fill in the container weight by attaching an external VGM certificate, and if you do not have an external VGM certificate, internal weighing (Terminal) will be carried out. If the container already has a VGM certificate, the External Truck Operator will go directly to the scales; 2) VGM Administration and Payment Process: Service Users who will carry out internal VGM at the Terminal, then carry out the administration process and pay the VGM fee; and 3) Receiving VGM Documents: VGM documents will be issued after the Service User has carried out the administration process and paid the VGM fee. The VGM document is received by the Service User, then the External Truck Operator can order to proceed to the Gatein subprocess. Making VGM Payment: If at the time of weighing a container that has an external VGM certificate there is a difference in container weight of ≥5%, VGM Certificate then the Terminal will follow the container weight from the weighing results at the Terminal. The Service User will make a VGM fee payment to cover the weight difference. Then it can go to the Gate-in subprocess.

Discussion

Based on the formulation of the problem and relevant previous research, the discussion in this article is as follows:

The implementation of VGM (Verified Gross Mass) at Belawan Port involves various aspects, including rules, procedures, and practices designed to ensure that the verified gross weight of containers to be loaded onto a ship is accurate. The results of this study indicate that Belawan Port follows the regulations set by the Indonesian maritime authorities, including regulations issued by the Ministry of Transportation. These regulations include requirements related to VGM, including the obligation of the shipper to provide the correct VGM before the container is loaded onto the ship.

At Belawan Port, containers will be weighed using techniques that comply with VGM provisions, which include the use of calibrated weighing equipment. The results of this weighing have included the net weight of the container as well as the weight of the container itself. The shipper is the party responsible for providing the correct VGM. Belawan Port will communicate with the shipper to ensure that the VGM provided is in accordance with applicable provisions. In addition, all data related to VGM will be carefully documented, including records of the net weight and weight of the container, shipper information, container number, and all related data.

Belawan Port has also provided training to employees and related parties on the importance of VGM in maintaining the safety of ships and cargo. Awareness of VGM rules is essential so that all parties involved understand their obligations. Belawan Port also ensures that shippers comply with VGM regulations, and if violations are found, appropriate enforcement actions will be taken. Meanwhile, in an effort to facilitate the implementation of VGM, Belawan Port has also integrated a robust IT system, including the National Logistic Ecosystem (NLE), to facilitate data exchange and optimize processes. The impact of VGM (Verified Gross Mass) at Belawan Port covers various operational and logistical aspects. Strict implementation of VGM at Belawan Port helps maintain the safety of ships and crews.

By having the correct gross weight of the container, the risk of ship accidents caused by inaccurate ship loads can be reduced. This is in accordance with the findings in the study by Thabah et al. (2018) which showed that the role of VGM in maintaining the safety of ship navigation is very important. In addition, VGM also ensures that containers are loaded onto ships according to the correct gross weight, this can avoid overloading or underloading which

can impact ship stability. Ridwan's study (2019) illustrates that incorrect weight in placing containers on ships can be a determining factor in arranging appropriate goods stowage.

With pre-verified VGM, the ship loading process at Belawan Port can be more efficient. Rahmatika et al. (2018) who studied the impact of VGM implementation at Tanjung Priok Port stated that the loading process became more orderly and faster, because there was no need to wait for weight verification at the port. However, along with the implementation of VGM, additional costs occurred, especially related to the weight verification process. Most of these costs will be charged to the shipper. Aras and Chen's study (2019) also showed that shippers had to pay additional costs for the provision of weighing services.

Thus, the implementation of VGM at Belawan Port is an important step in maintaining shipping safety and complying with international maritime regulations. Although there are some challenges, the safety and transparency benefits generated by the implementation of VGM have a positive impact on the logistics and shipping industry at the port concerned. Ports and stakeholders must work together to minimize its negative impacts while optimizing its benefits.

Verified Gross Mass (VGM) container weight document, contains: 1) Document number; 2) Container number; 3) Name and address of shipper/third party; 4) Date and place of determination of VGM weight; 5) Method used; 6) Name and contact of designated personnel; 7) Verified Gross Mass (VGM) value of container; 8) Weight of container and weight of all contents of container (if using method 2); and 9) Total weight of vehicle; if done by weighing the whole vehicle and container.

CONCLUSION

The conclusion of this study summarizes the results of research related to the implementation of Verified Gross Mass (VGM) in the Port. The implementation of VGM is an important step in efforts to improve the safety of container ship navigation and comply with international maritime regulations. Based on the results of the research that have been described previously, the following are the main conclusions:

1) Belawan Port has implemented VGM procedures in accordance with SOLAS (Safety of Life at Sea) regulations. This process involves verifying the gross weight of containers before loading onto a ship using appropriate weighing equipment. The implementation of VGM at Belawan Port is also an effort to comply with international maritime regulations mandated by the IMO. This is an important step in maintaining the safety of container ship navigation.
2) The main impact of the implementation of VGM is the improvement of container ship navigation safety. By ensuring the correct gross weight of containers, the port can prevent ship accidents caused by gross weight inaccuracies.

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