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THE EFFECT OF *GANTRY LUFFING CRANE* EQUIPMENT AND OPERATOR PERFORMANCE ON THE PRODUCTIVITY OF LOADING AND DISCHARGE BULK FOOD COMMODITIES AT PIER 005C CIWANDAN PORT, BANTEN IN 2023

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Abstract: Ciwandan Port is one of the many ports operated by PT. The Port of Indonesia focuses on the port services industry and other businesses related to this business. The presence of gantry cranes has a significant impact on loading and discharge efficiency to understand the loading and discharge process of bulk food cargo. In addition, qualified operators are also needed because the operator's duties are an important part of loading and discharge operations. This study was conducted with the aim of determining the influence of gantry cranes and operator performance on the efficiency of loading and discharge bulk food commodities at pier 005C. This research was carried out using quantitative research methods and using primary data sources by distributing questionnaires and then analyzed using SPSS software. The results of data processing show that there is a significant influence on gantry crane equipment and operator work in loading and discharge food products at pier 005C Ciwandan Port, Banten in 2023.

Keywords: *port, gantry luffing crane, operator performance, productivity, loading and discharge, commodity, bulk food, dock*

1. Introduction

PT Pelabuhan Indonesia (Persero) Banten Branch or known as Ciwandan Public Terminal is located freely on the edge of the Sunda Strait at the coordinates: 06-01'-12" LS and 105-7'-05" E. Ciwandan Banten Public Terminal is administratively located in Ciwandan District, Cilegon City with a distance of about 11 km from the city of Cilegon-Anyer, has a road access relationship through the Tangerang - Merak Toll Road and is related to the Merak - Bakauheni/Lampung crossing which is easy to reach, either through the West Cilegon toll gate or through the East Cilegon toll gate which is connected by the southern ring road directly to PT Pelabuhan Indonesia (Persero) Banten Branch.

The rapid growth of industry in the Banten region both in Cilegon City, West Serang zone, East Serang, Balaraja and western Tangerang which is a *port hinterland* area. Ciwandan Public Terminal was inaugurated on August 27, 1998 with an area of

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54.7 hectares of land working environment and an area of about 4,100 hectares of aquatic working environment. PT Pelabuhan Indonesia (Persero) Banten Branch is one of 12 (twelve) State-Owned Enterprises (SOEs). PT Pelabuhan Indonesia (Persero) Ciwandan Branch is a chain that is connected in a long logistics chain to meet the needs of distributing goods by sea.

To fulfill logistics chain distribution services, PT Pelabuhan Indonesia (Persero) Ciwandan Branch must have port facilities and loading and discharge equipment to support logistics chain activities. PT Pelabuhan Indonesia (Persero) Ciwandan Branch has quite complete loading and discharge equipment and is well managed with port management. Loading and discharge equipment (*Port Equipment*) at PT Pelabuhan Indonesia (Persero) Ciwandan Branch consists of *gantry luffing cranes, harbour machine cranes, forklifts, head trucks, wheel loaders* and *excavators.*

Gantry *luffing crane equipment* is the main tool in loading and discharge operations. The availability of a large number of tools can have an impact on achieving loading and discharge productivity goals. Ciwandan Port itself has 5 units of *gantry luffing cranes* with a SWL of 40 tons, and the cranes are in good condition. Especially at pier 005B there are 2 *gantry luffing cranes* and at pier 005C there are 3 *gantry luffing cranes.*

In the use of *gantry luffing cranes*, qualified abilities are required, as evidenced by the existence of a certificate of expertise in crane operation. This certainly makes the Port of Ciwandan must have a crane operator with superior quality. Gantry *luffing crane operators* are also given daily targets to see the performance results of each of these operators.

Based on this, the researcher aims to see how much the influence of the *gantry luffing crane* and operator performance on the productivity of loading and discharge bulk food commodities at Ciwandan Port, Banten in 2023. The benefits of this research are to increase knowledge and are expected to be used as a reference for parties involved in loading and discharge activities at Ciwandan Port, Banten.

2. Literature Review

2.1 Management

Aditama stated in (Irawan, 2022) The word management is etymologically derived from Old French and Italian. In ancient French it is "management" which means the art of organizing and executing, while in Italian it is "meneggiare" which means controlling.

Management is a step, step, or process in planning an activity or activity activity to be in accordance with the goals set together. Without good management in an organization or company, the organization will not be able to achieve goals with a clear direction. Therefore good management consists of careful planning, organization, structured finances, supervision and directed communication.

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2.2 Operations Management

According to Lavari Operational management is an activity that produces value in the form of goods and services by converting inputs into outputs (Faiq et al., 2021).

Operations management is a management method that focuses on the design, operation, and optimization of production systems and value chains within an organization. It concerns the comprehensive management of resources, technical and human resources to convert inputs into outputs of goods or services efficiently and effectively, ensuring supply chain management as well as quality, speed, flexibility and competitive prices on products.

2.3 Port

A port is a place that has 2 boundaries of land and sea as a place where ships dock. The port functions as a place to carry out loading and discharge activities. The role of the port as a gateway for the flow of goods out/in and out of/from other regions or countries, smoothing the flow of passengers between islands, a place of absorption of labor that is quite potential, supporting national economic growth.

Ports have integrated and complex infrastructure facilities, useful as a central point for logistics, transportation, and maritime trade activities. Inside the port, there are various elements and facilities, including docks, ships, warehouses, loading and discharge facilities, navigation systems, and administrative and security services. The port connects sea transportation routes with land distribution networks, supports local and global economic activities through the management of freight and passenger flows, and provides a wide range of technical and operational services for ships and cargo. The success of port operations depends on coordination between various parties, including port authorities, terminal operators, and shipping agents, to ensure efficiency and safety in every stage of the logistics process.

2.4 Gantry Luffing Crane

Goods loaded from the port of origin using a sea ship are then unloaded at the destination port using a dock crane. The demaga crane functions to remove and re-enter the cargo that is transported/to be transported using a ship in the hatch.

According to Andriyani *Gantry Luffing Crane* (GLC) is a device with a ship crane that has features to entangle or unload cargo from the ship to the port dock. (Hidayah et al., 2023) **.**

Meanwhile, according to Azhiza in (Nasution, Nursery Alfaridi S & Nuryadi, 2019) *Gantry Luffing Crane* is another type of loading and discharge equipment in ports, shaped like a ship crane, but located on the dock. Some use rails or wheels as a means to change places. This tool can be used for various types of goods.

Gantry Luffing Crane as the main tool in the dock, therefore, this tool has an important role in loading and discharge activities. *The Luffing Crane Gantry* at

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Ciwandan Port Banten operates fully 24/7 to support the economic activities of the people in the Banten area and its surroundings. *Gantry Luffing Crane* is operated by employees who have certification in their field, this crane itself is able to lift cargo with a lifting capacity / SWL *(Safety Weight Load)* of up to 40 tons.

2.5 Performance

Performance is a unit of measurement or parameter used to measure the ability, quality or efficiency of human resource success either individually or as a team to achieve organizational/company goals in a complex manner.

Performance is the result of a person's ability to carry out the work given based on skills, experience and pressure as well as the density of situations without causing divisions or new problems. This process is a collaboration of three important factors, namely the ability and commitment of the employee, the ability and acceptance of an explanation for the job offer, and the level of performance and motivation of the employee (Fanani Qomusuddin & Nurhayaty, 2022)

2.6 Productivity

According to Prasetyo & Setiono in (Teguh Santoso et al., 2022) Productivity has the meaning of the relationship between output (goods or services) and inputs (labor, materials, assets). Productivity is a measure of production efficiency, the comparison between outputs and inputs and inputs compatible with outputs.

From the theory above, it can be concluded that Productivity is the result of inputs that involve several factors such as labor, tools, time and materials to create output that can be measured by physical size, shape and selling value.

Loading and discharge productivity is an approach that focuses on identifying to optimize the use of labor, equipment and container stacking fields in loading and discharge activities. So productivity can be said to be good if productivity is high and performance is better.

2.7 Loading and Discharge

According to Henry Aspan, Fadlan, E. Arinda Chikita, goods loading and discharge services are always related to transportation services as a liaison between loading and discharge companies and service users. A business venture will not be able to neglect this aspect of transportation (Hanrizaldi Bagus Satrio Langgeng et al., 2022).

From the theory of the experts above, it can be summarized that loading and discharge is a series of logistics activities, moving or distributing goods from the place of origin to the destination using means of transportation either ships, trucks, trains or planes. The loading and discharge process carried out at the port of Ciwandan uses a gantry luffing crane. With this gantry luffing crane, bulk food loading and discharge

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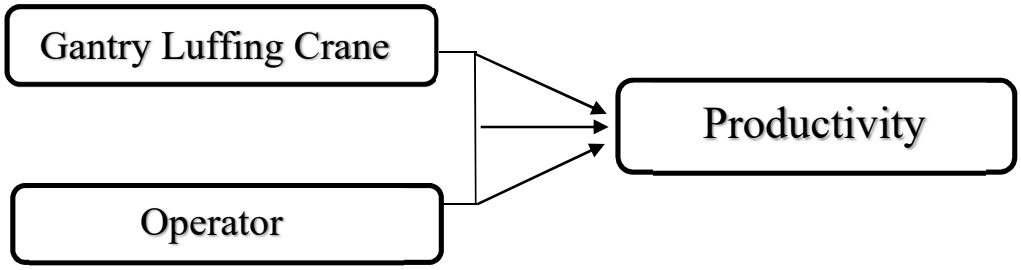
activities at Ciwandan port can be structured and fast in handling.

Framework and Hypothesis



H0 : There is no influence of gantry luffing crane and operator performance on the productivity of loading and discharge bulk food.
H1 : Has the influence of *gantry luffing crane* on the productivity of bulk food loading and discharge
H2: Has the influence of operator performance on the productivity of bulk food loading and discharge
H3: Together (simultaneously) the *gantry luffing crane* and the operator's performance affect the productivity of bulk food loading and discharge.

3. Research Method

3.1 Research Methods

Before carrying out research, researchers are required to provide an overview and direction as well as guidelines in the research using research methods. According to Sugiyono, (2019) the research method is a scientific way to obtain data with certain purposes and uses. To make it easier for the author to conduct research, the author needs a research method so that it can be used as a guideline and make it easier for the author to direct his research and make it easier to achieve the research objectives (Suwarsa, 2021). The research method used in this study uses a quantitative method. The qualitative research method is a scientific process using a systematic approach by collecting numerical data, measuring hypotheses and answering research questions objectively. This method aims to measure variables, generalize results and use statistical analysis.

3.2 Research population

Population is defined as a general area consisting of objects or subjects that have certain volume characteristics and have the same consensus to Selected as a sample

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member (Siska Khairunnisa, 2024). At In this study, the population used is employees of PT Pelindo Ciwandan Banten Branch.

3.3 Research Sample

The sample is part of the population that represents the entire population. The sample in this study aims to collect data and information related to the research objectives. According to Sugiyono (2019) in (Siska Khairunnisa, 2024) Saturated sampling is a sampling technique where all members of the population are sampled. Therefore, researchers must limit the sample that can represent the research. The sample in this study is as follows:

1. The sample selected is an employee/employee of the loading and discharge operational division at PT Pelindo Ciwandan Banten Branch.
2. The sample chosen is the *gantry luffing crane* operator at PT Pelindo Ciwandan Banten Branch.

3.4 Data Sources

The source of data can be said to be data obtained or information obtained from related research. There are 2 data used in the study:

1. Primary Data
   Primary data is a source of information that is obtained and then processed to be used for research purposes that are useful for decision-making. According to Fuadah, primary data is Data sources that directly provide data to data collectors (Kusuma Dewi & Noviyanti, 2023). In this study, the data obtained used a questionnaire distributed to respondents.
2. Secondary Data
   Secondary data is data that is focused on information obtained from existing or previous information. Secondary data sources used are company documents, publications of previous scientific journals, the internet, etc.

3.5 Data Collection Methods

The data collection method is the most important thing in research, in this data collection method the researcher will not get relevant data if the researcher does not know the data collection method. In this study, the data processing method is used through the SPPS application. Furthermore, the data collection techniques of this research are divided into 2, namely:

1. Observation is a data collection technique through observations that occur with objects that are studied directly in the field.
2. Questionnaire is a data collection technique carried out by researchers by providing statements and then answered by respondents by providing values to the indicators

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of research variables using *the Likert scale*. The Likert scale is a measurement index used to evaluate the consistency of responses. The form of the Likert scale in this study is as follows:

Questionnaire Scale :

No.	Alternatif Jawaban	Bobot Skor (+)
1	Sangat Setuju (SS)	5
2	Setuju (S)	4
3	Ragu-Ragu (RR)	3
4	Tidak Setuju (TS)	2
5	Sangat Tidak Setuju (STS)	1

Figure 3.1

4. Results and discussion

The *gantry luffing crane* at pier 005c along with the work efficiency of the operational staff of Ciwandan Port is expected to be able to achieve the productivity target that has been set by the company. This is because if there is damage to unqualified equipment or employees, it will have an impact on loading and discharge productivity, especially on bulk food commodities at Ciwandan Port in 2023. The following calculation data has been analyzed through instrument tests, classical assumption tests and multiple linear regression analysis tests.

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1) Test Instruments.
   a) Validity Test
      - *Gantry Luffing Crane* (X1)

Correlations

		x1.1	x1.2	x1.3	x1.4	x1.5	x1.6	x1.7	x1.8	x1.9	x1.10	x1.11	total_x1
x1.1	Pearson Correlation	1	.617**	.755**	.625**	.327*	.700**	.464**	.492**	.732**	.574**	.277	.813**
	Sig. (2-tailed)		.000	.000	.000	.028	.000	.001	.001	.000	.000	.066	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x1.2	Pearson Correlation	.617**	1	.488**	.572**	.461**	.515**	.297*	.248	.475**	.197	.142	.618**
	Sig. (2-tailed)	.000		.001	.000	.001	.000	.048	.100	.001	.194	.352	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x1.3	Pearson Correlation	.755**	.488**	1	.655**	.446**	.656**	.422**	.465**	.646**	.614**	.197	.788**
	Sig. (2-tailed)	.000	.001		.000	.002	.000	.004	.001	.000	.000	.194	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x1.4	Pearson Correlation	.625**	.572**	.655**	1	.643**	.632**	.251	.461**	.707**	.581**	.212	.785**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.096	.001	.000	.000	.163	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x1.5	Pearson Correlation	.327*	.461**	.446**	.643**	1	.556**	.349*	.430**	.467**	.413**	.379*	.666**
	Sig. (2-tailed)	.028	.001	.002	.000		.000	.019	.003	.001	.005	.010	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x1.6	Pearson Correlation	.700**	.515**	.656**	.632**	.556**	1	.613**	.620**	.722**	.581**	.556**	.881**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x1.7	Pearson Correlation	.464**	.297*	.422**	.251	.349*	.613**	1	.609**	.521**	.497**	.689**	.693**
	Sig. (2-tailed)	.001	.048	.004	.096	.019	.000		.000	.000	.001	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x1.8	Pearson Correlation	.492**	.248	.465**	.461**	.430**	.620**	.609**	1	.625**	.480**	.532**	.722**
	Sig. (2-tailed)	.001	.100	.001	.001	.003	.000	.000		.000	.001	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x1.9	Pearson Correlation	.732**	.475**	.646**	.707**	.467**	.722**	.521**	.625**	1	.685**	.417**	.867**
	Sig. (2-tailed)	.000	.001	.000	.000	.001	.000	.000	.000		.000	.004	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x1.10	Pearson Correlation	.574**	.197	.614**	.581**	.413**	.581**	.497**	.480**	.685**	1	.351*	.733**
	Sig. (2-tailed)	.000	.194	.000	.000	.005	.000	.001	.001	.000		.018	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x1.11	Pearson Correlation	.277	.142	.197	.212	.379*	.556**	.689**	.532**	.417**	.351*	1	.572**
	Sig. (2-tailed)	.066	.352	.194	.163	.010	.000	.000	.000	.004	.018		.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
total_x1	Pearson Correlation	.813**	.618**	.788**	.785**	.666**	.881**	.693**	.722**	.867**	.733**	.572**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	
	N	45	45	45	45	45	45	45	45	45	45	45	45

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4.1a.1

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- Operator Performance (x2)

Correlations

		x2.1	x2.2	x2.3	x2.4	x2.5	x2.6	x2.7	x2.8	x2.9	x2.10	x2.11	total_x2
x2.1	Pearson Correlation	1	.698**	.675**	.747**	.643**	.453**	.619**	.486**	.701**	.519**	.628**	.835**
	Sig. (2-tailed)		.000	.000	.000	.000	.002	.000	.001	.000	.000	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x2.2	Pearson Correlation	.698**	1	.537**	.676**	.569**	.407**	.582**	.500**	.550**	.648**	.728**	.807**
	Sig. (2-tailed)	.000		.000	.000	.000	.006	.000	.000	.000	.000	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x2.3	Pearson Correlation	.675**	.537**	1	.667**	.623**	.375*	.450**	.310*	.470**	.344*	.592**	.703**
	Sig. (2-tailed)	.000	.000		.000	.000	.011	.002	.038	.001	.021	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x2.4	Pearson Correlation	.747**	.676**	.667**	1	.507**	.576**	.512**	.484**	.532**	.589**	.573**	.796**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.001	.000	.000	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x2.5	Pearson Correlation	.643**	.569**	.623**	.507**	1	.393**	.563**	.532**	.628**	.484**	.648**	.768**
	Sig. (2-tailed)	.000	.000	.000	.000		.008	.000	.000	.000	.001	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x2.6	Pearson Correlation	.453**	.407**	.375*	.576**	.393**	1	.776**	.734**	.611**	.517**	.473**	.718**
	Sig. (2-tailed)	.002	.006	.011	.000	.008		.000	.000	.000	.000	.001	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x2.7	Pearson Correlation	.619**	.582**	.450**	.512**	.563**	.776**	1	.889**	.803**	.522**	.622**	.843**
	Sig. (2-tailed)	.000	.000	.002	.000	.000	.000		.000	.000	.000	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x2.8	Pearson Correlation	.486**	.500**	.310*	.484**	.532**	.734**	.889**	1	.759**	.493**	.633**	.785**
	Sig. (2-tailed)	.001	.000	.038	.001	.000	.000	.000		.000	.001	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x2.9	Pearson Correlation	.701**	.550**	.470**	.532**	.628**	.611**	.803**	.759**	1	.459**	.639**	.825**
	Sig. (2-tailed)	.000	.000	.001	.000	.000	.000	.000	.000		.001	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x2.10	Pearson Correlation	.519**	.648**	.344*	.589**	.484**	.517**	.522**	.493**	.459**	1	.590**	.713**
	Sig. (2-tailed)	.000	.000	.021	.000	.001	.000	.000	.001	.001		.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
x2.11	Pearson Correlation	.628**	.728**	.592**	.573**	.648**	.473**	.622**	.633**	.639**	.590**	1	.835**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000		.000
	N	45	45	45	45	45	45	45	45	45	45	45	45
total_x2	Pearson Correlation	.835**	.807**	.703**	.796**	.768**	.718**	.843**	.785**	.825**	.713**	.835**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	
	N	45	45	45	45	45	45	45	45	45	45	45	45

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4.1a.2

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- Validity Test of Bulk Food Loading and Discharge Productivity (Y)

Correlations

		y1	y2	y3	y4	y5	y6	y7	y8	y9	y10	total_y
y1	Pearson Correlation	1	.555**	.412**	.721**	.448**	.436**	.378*	.680**	.232	.361*	.659**
	Sig. (2-tailed)		.000	.005	.000	.002	.003	.011	.000	.124	.015	.000
	N	45	45	45	45	45	45	45	45	45	45	45
y2	Pearson Correlation	.555**	1	.584**	.640**	.722**	.710**	.654**	.751**	.408**	.513**	.825**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.005	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45
y3	Pearson Correlation	.412**	.584**	1	.392**	.616**	.807**	.745**	.702**	.562**	.484**	.798**
	Sig. (2-tailed)	.005	.000		.008	.000	.000	.000	.000	.000	.001	.000
	N	45	45	45	45	45	45	45	45	45	45	45
y4	Pearson Correlation	.721**	.640**	.392**	1	.556**	.548**	.498**	.718**	.290	.596**	.750**
	Sig. (2-tailed)	.000	.000	.008		.000	.000	.000	.000	.053	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45
y5	Pearson Correlation	.448**	.722**	.616**	.556**	1	.753**	.739**	.745**	.580**	.577**	.848**
	Sig. (2-tailed)	.002	.000	.000	.000		.000	.000	.000	.000	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45
y6	Pearson Correlation	.436**	.710**	.807**	.548**	.753**	1	.937**	.800**	.576**	.623**	.908**
	Sig. (2-tailed)	.003	.000	.000	.000	.000		.000	.000	.000	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45
y7	Pearson Correlation	.378*	.654**	.745**	.498**	.739**	.937**	1	.746**	.473**	.615**	.858**
	Sig. (2-tailed)	.011	.000	.000	.000	.000	.000		.000	.001	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45
y8	Pearson Correlation	.680**	.751**	.702**	.718**	.745**	.800**	.746**	1	.453**	.709**	.924**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.002	.000	.000
	N	45	45	45	45	45	45	45	45	45	45	45
y9	Pearson Correlation	.232	.408**	.562**	.290	.580**	.576**	.473**	.453**	1	.482**	.626**
	Sig. (2-tailed)	.124	.005	.000	.053	.000	.000	.001	.002		.001	.000
	N	45	45	45	45	45	45	45	45	45	45	45
y10	Pearson Correlation	.361*	.513**	.484**	.596**	.577**	.623**	.615**	.709**	.482**	1	.742**
	Sig. (2-tailed)	.015	.000	.001	.000	.000	.000	.000	.000	.001		.000
	N	45	45	45	45	45	45	45	45	45	45	45
total_y	Pearson Correlation	.659**	.825**	.798**	.750**	.848**	.908**	.858**	.924**	.626**	.742**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	
	N	45	45	45	45	45	45	45	45	45	45	45

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4.1a.3

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Result Interpretation:
The results of the validity test above with a sample (N) = 45 and a value of 0.2940 in the table can be used SPSS that all instruments starting from *the Gantry Luffing Crane* variable (X1), the Operator Performance variable (X2) and the Productivity of B/M food bulk (Y) produce a value (rCalculate) > (rTable) so that it can be concluded that all of these research instruments can be said to be valid.

b) Reliability Test

- Variable *Gantry Luffing Crane* (X1)

Reliability Statistics

Cronbach's Alpha	N of Items
.919	11

Table 4.1b.1

- Operator Performance Variable (X2)

Reliability Statistics

Cronbach's Alpha	N of Items
.937	11

Table 4.1b.2

- Variable of Productivity of Bulk Food Loading and Discharge (Y)

Reliability Statistics

Cronbach's Alpha	N of Items
.936	10

Table 4.1b.3

Conclusion of reliability test results: From observation, the reliability test above shows that the alpha cronbachs value of the X1 variable is 0.19 X2 is 0.937 and the Y variable is 0.936 > 0.60 of the minimum standard of alpha cronbach so that the conclusion of reliable data can be drawn.

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2) Classic Assumption Test.
   a. Normality Test

One-Sample Kolmogorov-Smirnov Test

			Unstandardized Residual
N			45
Normal Parameters[a,b]	Mean		.0000000
	Std. Deviation		2.26401015
Most Extreme Differences	Absolute		.185
	Positive		.185
	Negative		-.148
Test Statistic			.185
Asymp. Sig. (2-tailed)			.001[c]
Monte Carlo Sig. (2-tailed)	Sig.		.081[d]
	99% Confidence Interval	Lower Bound	.074
		Upper Bound	.088

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. Based on 10000 sampled tables with starting seed 2000000.

Table 4.2a.1

Results: The interpretation of the normality test results above the method used according to Kolmogrov Smirnov by the monte carlo method is due to the large amount of data < 100 monte carlo results with a significance value of 0.81 > 0.05 which means that the data can be declared as normal distributed data.

   b. Multicollinearity Test.

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	X1	.245	4.089
	X2	.245	4.089

a. Dependent Variable: Y

Table 4.2b.1

Interpretation of Results: In the results of the multicollinearity test above, in the variables *of gantry luffing crane* (x1) and operator performance (x2) tolerance values of 0.245 > 0.100 and VIF values of 4.089 < 10.00, it can be interpreted that no symptoms of multicollinearity occur.

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c. Heteroskedastistas Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.259	2.233		1.459	.152
	X1	-.051	.098	-.160	-.517	.608
	X2	.011	.094	.037	.118	.906

a. Dependent Variable: ABS_RES

Table 4.2c.1

Heteroscedasticity Test Criteria:

a. If the sig value of the independent variable < 0.05, then heteroscedasticity symptoms occur.
b. If the sig value of the independent variable > 0.05, then no symptoms of heteroscedasticity occur.

Intreprestasi Results: from the results of the heteroscedasticity test using the glacier test method, all variables x1 and x2 have a sig value of > 0.05 so that it can be concluded that the data does not have heteroscedasticity symptoms.

3) Multiple Linear Regression Analysis

a. Test T

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-2.864	2.989		-.958	.343
	X1	.390	.131	.371	2.973	.005
	X2	.578	.125	.575	4.608	.000

a. Dependent Variable: Y

Table 4.3a.1

T Test Criteria:

- If the sig value < 0.05, it can be concluded that it has a significant influence.
- If the value of t is calculated > t table, it is said to have a significant influence.

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Df = n-k (number of variables)

Interpretation of Results :

The first condition of the T test results above can be seen that:

- The sig value is 0.005 < 0.05, then it can be concluded that X1 has a significant influence on Y
- The sig value is 0.000 < 0.05, then it can be concluded that X2 has a significant influence on Y.

The second condition If you look at the t calculation and t table:
Df = 45 - 3 = 42

- The value of t calculated = 2.973 > t table = 2.018, it can be concluded that X1 has a significant influence on Y.
- The value of t calculated = 4.068 > t table = 2.018, it can be concluded that X2 has a significant influence on Y.

b. Simultaneous F Test (Together)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1183.267	2	591.634	110.177	.000[b]
	Residual	225.533	42	5.370		
	Total	1408.800	44			

a. Dependent Variable: Y

b. Predictors: (Constant), X2, X1

Table 4.3b.1

Decision making policy:

- If the sig value < 0.05, it can be interpreted as having a sig influence on Y.
- If the value of f is calculated > f table, then it can be interpreted to have an influence of sig on Y

Df1 (degree of fredem 1) = k-1
Df2 (degree of fredem 2) = n-k

Interpretation of Results :

- If the sig value is 0.000 < 0.05, then it can be said that X1 and X2 have a significant or simultaneous influence (together) on Y.
- If the value of f count = 110,117 > f table = 3,220 then it can be said that X1 and X2 have a significant or simultaneous (together) influence on Y.

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c. Determination Test

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.916[a]	.840	.832	2.317
a. Predictors: (Constant), Kinerja, GLC				
b. Dependent Variable: Produktivitas				

Table 4.3c.1

Interpretation of the results: From the output above, the Adjusted R Square value (determination coefficient) of 0.832 was obtained, which means that the influence of the independent variable (X) on the dependent variable (Y) was 83.2%, the remaining 16.8% was influenced by other variables that were not studied.

5. Conclusion

The researcher can draw conclusions:

Based on the results of this study, it can be concluded that gantry luffing cranes have a significant influence on loading and discharge productivity. The results of the study show that when the gantry luffing crane is in good condition and maintained, it produces maximum productivity. This shows the importance of a quality loading and discharge equipment in supporting loading and unloading activities

In addition, this study also found that operator performance plays an important role in quality loading and discharge productivity. This means that the performance provided by the operator in using the gantry luffing crane tool is considered very good. Good operator performance reflects the achievement of the company's loading and discharge productivity targets in accordance with the company's vision and mission

By combining these conclusions, it can be concluded that the gantry luffing crane and the operator's performance have a significant influence on loading and discharge productivity. If the quality of the gantry luffing crane is good, then the productivity target can be achieved. In addition, the operator's performance in operating loading and discharge equipment is considered good. Finally, loading and discharge productivity can be achieved because it is supported by these 2 aspects.

This conclusion provides a more comprehensive understanding of the importance of gantry luffing crane tools and operator performance in loading and discharge productivity. By knowing this, improvement steps can be taken as an evaluation action to increase loading and discharge productivity.

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6. Implications

First, this study provides information on how the influence of *gantry luffing cranes* and operator performance on factual and accountable bulk food loading and discharge productivity.

Second, this study helps Ciwandan port employees to be able to assess the importance of a properly functioning crane in achieving productivity targets. The effective use of *gantry luffing cranes* can improve efficiency in the loading and discharge process. This implies that the right selection and maintenance of tools is essential to increase port productivity.

Third, this research helps crane operators to be able to find out the extent of the quality and results of their work. The operator's performance plays a key role in determining how effectively a tool like *a gantry luffing crane* can be used. Operator training and performance evaluation need to be considered to ensure they can maximize the potential of the tools used.

Fourth, this research can increase loading and discharge productivity at Ciwandan Port so that it can contribute to improving the local economy, considering that the port is the main gateway for the distribution of important commodities such as food.

Fifth, this research can provide sustainable investment in transportation technology as well as the development of human resource skills (operators), which will contribute to the long-term growth of port productivity.

7. Research limitations

Time limitations: This research was conducted in a limited period of time so that if there is more time, the researcher can analyze other variables in depth.

Challenges in data collection: The number of bureaucracies that need to be prepared at Ciwandan Port causes a long time during primary data collection. This is important to do in order to get permission for research at the location.

Challenges of using the SPSS application: The SPSS application presents something very complex and complicated so researchers need to study through media such as YouTube to understand the use of the application.

Challenges in quantitative data analysis: There are many series of data analysis tests, so it is necessary to be precise and accurate in processing good data. Good research requires the presentation of valid data, so researchers need to recheck the results of the analyzed data

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