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# LAYOUT REDESIGN OF CONTAINER SHAKIGNG FIELD AT PT. XYZ

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## ABSTRACT

The Layout of the Field Layout Stacking containers is an important thing to consider because it can affect the effectiveness of the loading and unloading process in the field by arranging the Layout of the facilities in the stacking field in the Yard Layout including the Rubber Gantry Crane (RTG) and the arrangement of the lane Head Truck. So, it is necessary to research determining the Layout of containers. The design that will be made will affect the distance the head truck travels to transport containers from the dock. In several studies, two types of determined, Layout have been container namely Parallel Layout where the containers are arranged parallel to the pier, and Perpendicular Layout where the containers are arranged Perpendicular to the pier. Container terminal Makassar New Port using Parallel Layout. To increase the productivity of the loading and unloading process, an analysis of the arrangement of the stacking field is carried out. From the results of the research, the farthest travel distance is 1,048 m, with a total travel distance of 729,269 m with a fuel cost of Rp. 1,144,952 in the initial Layout (Parallel Layout), with the Perpendicular Layout, the farthest travel distance is 353.7 m with a total travel distance of 473,533 m, and the use of materials burn 743,446.8 m

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## I. INTRODUCTION

The container loading and unloading port (TPM) is a place for collecting Receiver and Delivery logistics to be unloaded or loaded to the destination port. In general, ports are used as a meeting place for logistics and as a support for the smooth running of industry, in addition to inter-island transportation (Firmansyah et al., 2016).

In the container port system, there are 3 (three) main components, namely the presence of a port or dock and its facilities, containers, and containers themselves. According to (Kurniawati, 2019), the process of loading and unloading containers requires several facilities such as a dock as a place for ships to dock, an apron a place for ships to dock with a marshaling yard, a container yard, warehouse consolidation, container freight station, maintenance, and repair shop, gate and interchange, control center and container depot.

One of the ports operating in South Sulawesi, namely PT XYZ. It is a state-owned company engaged in port, shelter, mooring, and loading and unloading services. Container or containers. This company started operating in 2018 until now. every year there is an increase, namely in 2018, 1,189 Box Containers, in 2019 89,735 Boxes Container and at the end of 2020, there were 101,593 Boxes Container which has been Production. In 2019 the average loading and unloading production was 8,466 boxes per month with Box Crane per Hour (BCH) at 25 Boxes per hour. (Makassar New Port Production Data).

The loading and unloading process starts from the transfer Container from the ship by using Container Crane (CC), then moved by Gantry Crane and brought to the Unloading block and managed by Rubber Gantry Crane (RTG). This layout arrangement affects the efficiency of using Rubber gantry Crane (RTG) and Head Trucks, so it is necessary to determine the number and position of the Transfer Line because the layout design will affect the trip of the truck.

Type Layout determined in this TPKS are: Parallel Layout, Containers are arranged in parallel from the dock in each module/block with this layout the total distance of containers to pick up Container relatively far because it only follows the Transfer Line in each parallel module/block.

In this research, the TPKS layout will be rearranged using the Parallel Layout organized by proportion by calculating the total distance traveled. The result will be compared with Layout early to get results that can be recommended.

## II. METHODE

### 2.1. Time and Place Research

When this research was conducted for 1 month in April-May 2021, this research was conducted at PT. XYZ Makassar City, South Sulawesi.

### 2.2. Data Collection

**a. Primary Data**

Primary data in this study were obtained directly from the object of research through observation, namely as follows:

The area of the port and container holding field, Layout The start of the stacking field Container and interviews with several employees in the division Engineer and Operations.

**b. Secondary Data**

receiving, delivery, and loading and unloading process equipment.

### 2.3. Data Processing

In data processing carried out a. Determination of the distance between facilities, b. Calculating Truck Movement Frequency c. Performance determination Layout early d. design layout

## III. RESULTS AND DISCUSSION

### 3.1. Layout Beginning of the Stacking Field Storage

Container parallel block separated between unloading block and loading block

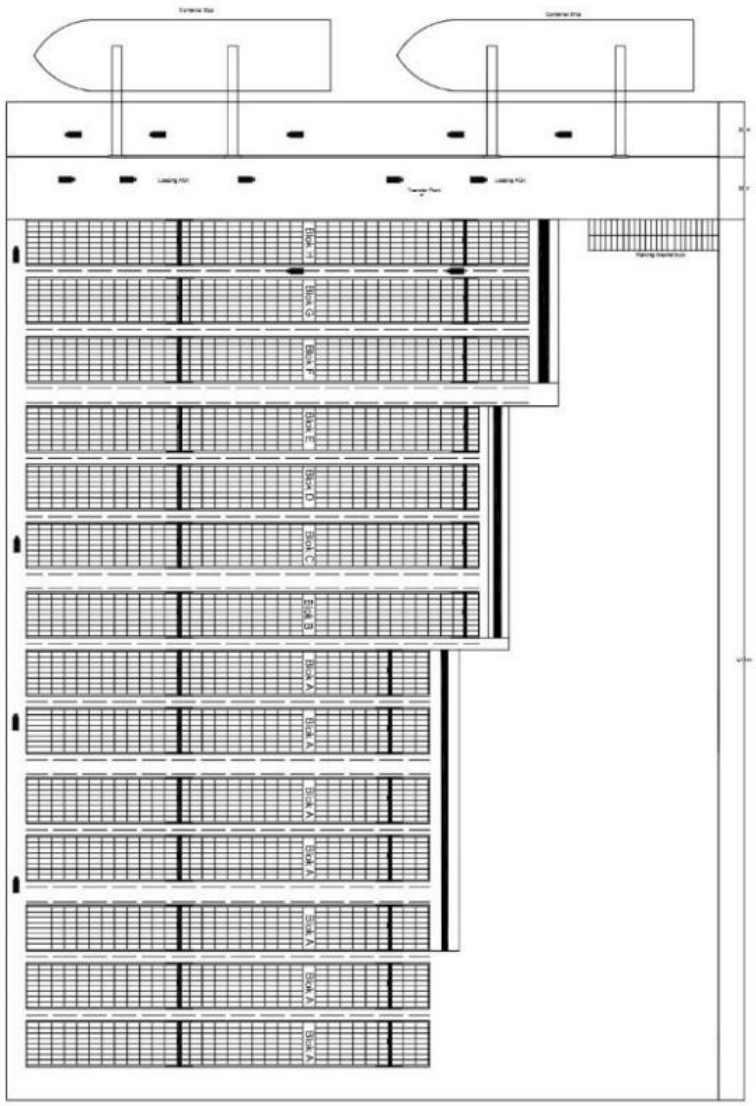

Figure 1. Parallel Layout (Beginning)

Or the export block and the loading block are located in Blocks A to D while the unloading blocks are in Blocks E to H there is also a Refer Block which is a block that accommodates Container Special like Container containing food that requires further handling.

Yard Containers (YC) have 14 Blocks with each block containing 7 Rows of Containers with a Tier 3 clump

Height. Block length in Yard Container which can be seen in Figure 1.

Transfer line at Yard Container on the block has a width of 6 meters with a travel of one direction while the width Driving Line has a road width of 10 meters with a 2-way trip Layout beginning.

**Table 1. Stacking Field Size**

| No | Name | measure |
|---|---|---|
| 1 | Block Length A-C | 269 m |
| 2 | Block Length D-C | 244 m |
| 3 | Block Length H-N | 219 m |
| 4 | Block Width | 24,8 m |
| 5 | Wharf Width | 32 m |
| 6 | Pier Length | 360 m |
| 8 | Container Length 20 feet | 6,058 m |
| 9 | Container Length 40 feet | 12.03 m |
| 10 | road width (transfer line) | 10 m |
| 12 | RTG Cross Width | 15 m |
| 13 | Lane Width Street light | 15 m |
| 14 | Bay Length | 7 m |

**3.2. Calculate the Furthest Distance**

The farthest distance is the terminal distance or Container Crane to Block unload or load. This furthest distance is calculated based on the Head truck's journey from the pier to the unloading block or the loading and returning block. The calculation of farthest distance is calculated by the equation derived by (Kim et al., 2008)

$$d_g\ (M,N) = \frac{(2.N^2 + 3.N + 1)}{M.N^2} B + A$$

N : 1 B : 269 m A : 510 m

$$d_g\ (M,N) = \frac{(2.1^2 + 3.1 + 1)}{3.1^2} 269 + 510$$

$$d_g\ (M, N) = 1.048$$

**3.3. Total Travel Distance**

Travel distance is used to see how far the Gantry Crane is transporting containers from block A to block M. This is because the Gantry crane travel traffic follows the transfer line traffic and is assumed to be a Head Truck at the pier. Then the equation 2x+y is used. where x = Block Length. y = Distance of shelter block to block vertically. For blocks A and B from point 1 to point 63.
Block distance from the pier vertically m, travel distance. The equation to find the total distance of

the Gantry Crane trajectory. That is = 2x+y = 688 m
So the total trip from the dock to the point of loading / unloading Block A= 688 x 21 Containers = 14,448 m for the other blocks, it is done in the same way so that the total distance traveled to transport 1,323 containers is 729,269m

**3.4. Material Handling Cost**

This calculation is to find out the approximate materials used, with a travel distance of 729,269 m. material cost handling is calculated by the following formula:

$$\frac{Total\ Mileage}{Truck\ Mileage\ /\ liter} \text{ X } Fuel\ Price$$

Know :
a. Total Travel Distance : 729.269
b. Cost of Fuel / liter : 7.850 / liter
c. Fuel Consumption : 5000 m/ liter

$$Fuel\ Cost = \frac{729.269\ m}{5000\ m} - X\ 7.850$$

$$\equiv \text{Rp } 1.144.952$$

**3.5. Formation Determination**

Layout Perpendicular Formation by turning Layout Parallel becomes perpendicular to the pier. Because in the application Perpendicular Layout tools used to compose Container different from Parallel Layout if Parallel Layout uses RTG (Rubbed Gantry Crane) while Perpendicular Layout uses RMG. Picture Perpendicular Layout can be seen in Figure 2

**3.6. Farthest distance**

The farthest travel distance is the farthest distance the head truck travels to transport containers and return to the dock. To calculate the farthest distance is calculated by the formula. Derived by (Kim et al., 2008)

$$E\ (X_n) = \frac{2B}{3.N^2}(1+2N^2)$$

Know :
N = 14 B: 269 m
M = 1 A : 510 m
That is =2x+y
2(269 +60) = 688 m
So the total trip from the pier to the unloading point.

$$E(Xn) = \frac{2\ x\ 269}{3.14^2\ (1 + 2\ x\ 14^2}$$

$$E(Xn) = \frac{2\ x\ 269}{3.14^2}(393)$$

$E$(Xn) = 353.7 m

**3.7. Total Travel Distance**

The total distance traveled is calculated based on the journey of each transfer point in each block.

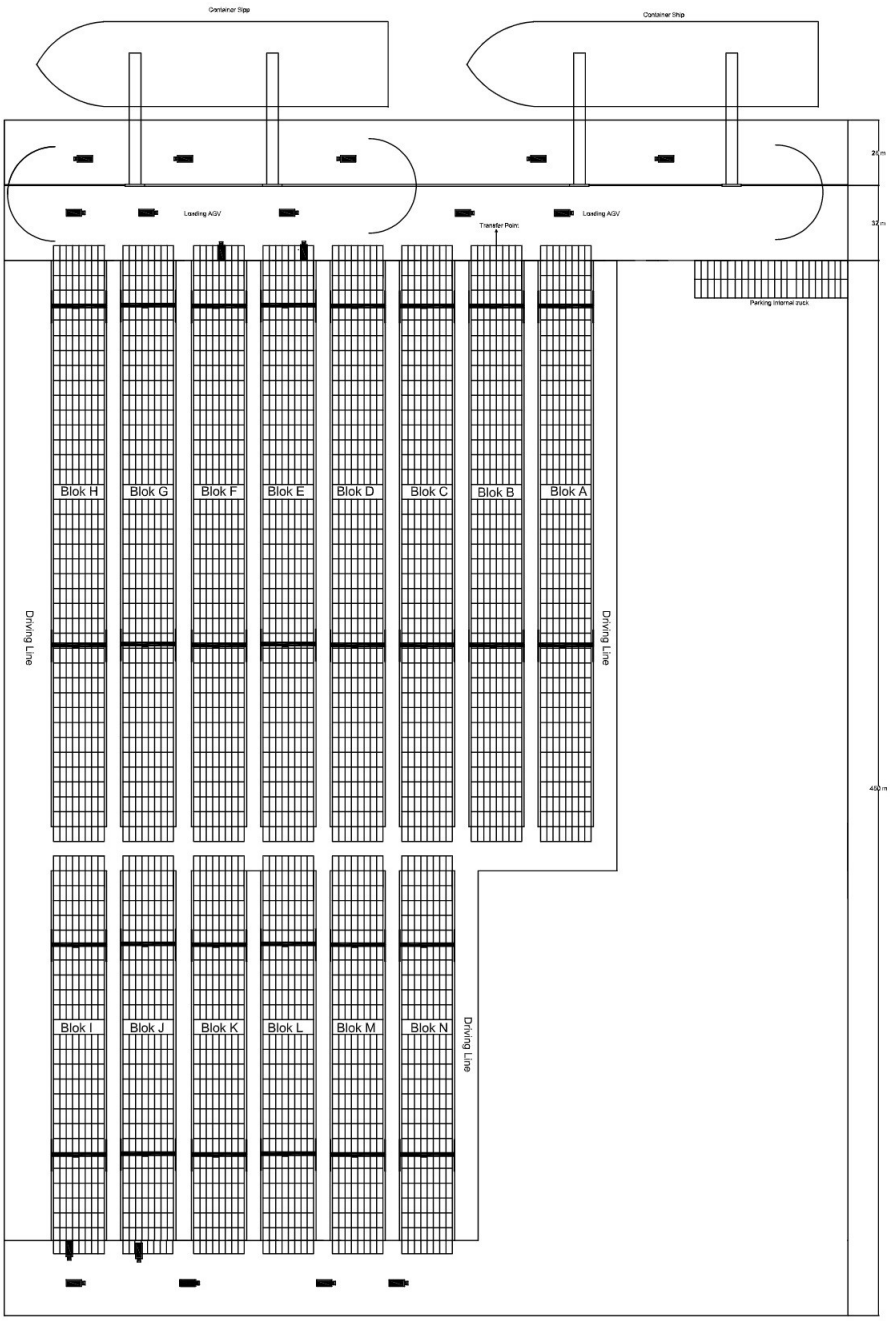


Figure 2. Perpendicular *Layout* (Proposal)

On Layout proposal Perpendicular Layout There are 63 transfer points. To find the total distance traveled in each block, the equation for Travel Distance = 2y+x. is used

y = Block Width in yards x = Module Width for Block A

-1 point X: w/2= 55.6/2=27.8 Travel Distance = (2 . 269) +27.8

= 565.8 M

The calculation is continued until Point 63 in the same way so that the total distance to transport 1,323 containers is obtained, namely the distance to transport 1,323 containers, which is 473,533 m

**3.8. Material Handling Cost**

This calculation is to find out the approximate materials used, with a travel distance of 729,269 m. material handling costs are calculated by the following formula:

$$= \frac{Total\ Mileage}{Truck\ Mileage\ /\ Liter} \quad X\ Fuel\ Price$$

a. Total travel Distance : 473.533
b. Fuel Cost / liter : 7.850 / liter
c. Fuel Consumption : 5 000 m/ liter

$$Fuel\ Cost = \frac{473.533\ m}{5000\ m} x\ 7.850$$

= Rp 743.446,81

## IV. CONCLUSION AND SUGGESTION

### 4.1. Conclusion

Based on the results of research and data processing, it can be concluded that using the layout Parallel Layout can be maximized by redesigning the layout Container with Layout Proposed by reducing the mileage of the gantry crane and increasing the storage capacity. Mileage on parallel Layout 1,048 m with Pedicular Layout storage capacity Parallel Layout Tees and Pedicular Layout 10,807 Tees.

### 4.2. Suggestion

To minimize queues and expedite the production process, it is recommended that Relay Gantry Crane operators can be added so that they can be relocated Container to the block can be done quickly. Further research can determine the division of tasks into each store sales in every area in Makassar City BIBLIOGRAPHY

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