Product Placement Based on Throughput at PT XYZ Warehouse

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Abstract. PT. XYZ is a company engaged in the manufacture of beverages with various types of drinks both carbonated soft drinks and non-carbonated soft drinks. The company's products are coca cola, fanta, sprite, minute maid, ades, nutriboost, etc. The company has a warehouse to store products that are produced before being distributed to consumers. There are 79 types of products stored in the warehouse. Problems faced by PT. XYZ is a product that does not have a fixed storage block yet and the company does not have a clear product grouping where the placement of products is not based on the similarity of product types and the level of product activity so it takes time to look for products stored in the warehouse when needed. Therefore, it is necessary to design warehouse layout PT. XYZ by using the dedicated storage method to place the product in a fixed location and based on the level of activity. The results of product placement in the dedicated storage method show that the highest T/S value is product code 975341, with a value of 5,200 so that the product is placed in the storage block closest to the staging bays (I/O point).

Keywords : Dedicated Storage, Space Requirement, Throughput

1. Introduction

Layout is the arrangement of production facilities to obtain efficiency in a production. Included in production services are material / goods receiving facilities, storage / warehouse facilities, and shipping facilities. Warehouse or storage is a place to store goods both raw materials that will be carried out manufacturing processes, and finished goods that are ready to be marketed. [1].

A good warehousing system is a warehousing system that is able to utilize space for storage effectively in order to increase space utilization and minimize material handling costs [2].

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warehouse when needed. Therefore, it is necessary to design the layout of the warehouse of PT. XYZ by using the dedicated storage method to place the product in a fixed location and based on the level of activity.

Hadiguna (2008) states that there are several methods that can be used to store products in the warehouse, namely Random Storage, Dedicated Storage, Classed Based Storage and Shared Storage. Random Storage is storage of items that come in every available location, where each item has the same probability at each location. Dedicated Storage, which is an item stored in a certain location depending on the type of item. This policy is designed with the storage area of each item equal to the maximum level of inventory. Classed Based Storage is a pareto effect application where 80% S / R activity by 20% items, 15% S / R by 30%, and 5% S / R by 50%. Shared Storage is a policy that is at the extreme point of random and dedicated storage policy [3].

The method used to solve this warehouse layout problem is the Dedicated Storage Method. Dedicated storage is also called a fixed slot storage that places a specific storage location or address for each item stored. This is because a storage location is given to a specific product [4]. With the design of the preparation using the dedicated storage method, it is expected that the products to be stored can occupy a fixed location to facilitate operators in storing and retrieving products.

Research on the design of warehouse layout using the dedicated storage method has been conducted by Reinny Patrisina and Indrawati (2010) in the warehouse of commercial lightings product distributors from national lighting manufacturers who place products with the largest T / S ratio values in the slots with the smallest spacing, products with values the second largest T / S ratio will be placed in the slot with the second smallest distance and so on so as to obtain total operator distance minimization with an expected total mileage of 4137 m per day [5].

Research using this method has also been carried out by Ayunda Prasetyaningtyas, et al (2013) who did the redesign of the layout of the steel plate products in the warehouse using the dedicated storage method, where the laying process is based on the product ranking of T / S starting from the largest to the highest. The smallest is placed at the shortest distance to the furthest from the I / O point. The results of the design using the dedicated storage method obtained a distance of material handling by 2030,642 m so that it decreased by 1138,391 m or about 35.924% from the previous distance, which is 3168,853 m [6].

According to the research of A Vildha and S Setio (2016) in an electric shop, the warehouse of goods looks irregular which results in inefficient collection and storage of goods in the warehouse. To overcome this problem, 3 alternative layouts are proposed, namely frequency, volume and dedicated storage. The alternative layout for dedicated storage was chosen because goods that are close to the entrance and exit are the types of goods that have the largest exit frequency followed by goods that have the same type and then the type of goods with the second largest frequency etc so that it provides better capabilities with a clear grouping system and provides a faster search, retrieval and storage process time [7].

2. Method

This research was conducted at PT. XYZ where the time of the research takes place during May 2019 to August 2019. This type of research is descriptive research. The object of research was warehouse layout at PT. XYZ. This research consists of several stages as follows:
1. Preliminary studies are conducted to identify problems found in the company, observations and other information.
2. Studying the literature and supporting theories to get solutions for problem solving.
3. Formulate a problem in the company that is the product does not have a fixed storage block yet and the company does not have a clear product grouping where the laying of the product is not based on the similarity of types of products and the throughput so that it takes time to look for products stored in the warehouse when needed.
4. Data collection, are data of product type and throughput value.
5. Processing data using a dedicated storage method, the step taken is to place the product based on the throughput value.
6. Analysis and discussion.
3. Result and Discussion
There are 79 types of products stored in PT. XYZ. Warehouse PT. XYZ has an area of around ± 8200m². The warehouse is divided into several areas, namely loading bays, 4 staging bays (I/O points), and product storage zones. The product storage area is divided into 2 areas namely racking area and bulk area.

Racking area is an area that holds the finished product that is placed on the rack. Racking area has 8 shelves. 1 shelf has 4 levels, 1 level can hold 2 pallets, which means that the capacity of 1 block is 8 pallets. Products stored on the shelves are products with packaging named CBA, TWA, and BIB, which are types of products with packaging characteristics that cannot be stacked by other pallet.

Figure 1 shows the actual layout of PT.XYZ’s warehouse.

![Figure 1. Actual Layout of PT. XYZ’s Warehouse](image)

After obtaining the value of T/S of each product ordered from the largest to the smallest, the product can be provided in the warehouse. Product placement is based on the largest T/S value until the smallest value that is allocated to the block close to the staging bay (I/O point) to the furthest away from the staging bay (I/O point). In a special storage method, each type of product must have a fixed place and only one block for the same type of product.

In the actual warehouse layout, there are inter-storage zones that do not have a material handling aisle/road yet, so it’s difficult to make product retrieves in FEFO. So in the proposed warehouse layout, the addition of material handling lines is based on the length of the diagonal forklift. The size of the forklift used is 220 cm x 110 cm x 250 cm. The calculation is as follows:

\[
\text{length of diagonal forklift} = \sqrt{\text{width of forklift}^2 + \text{length of forklift}^2}
\]
From the calculation of the length of diagonal forklift, it is obtained that the width of the aisle needed for material handling is 2.5 m. The proposed warehouse layout of PT. XYZ can be seen in Figure 2.

**Figure 2.** Proposed Warehouse Layout of PT Coca Cola Amatil Indonesia Unit Medan

4. Conclusion

Based on the results and discussion conducted above, it can be concluded that the layout of the proposed product placement is based on the largest T / S sequence in the storage block closest to the staging bays (I / O point). Based on throughput data, it is obtained that the highest T / S value is product code 975341, with a value of 5,200 so that the product is placed in the storage block closest to the staging bays (I / O point).

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