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Analysis of Barcode System Design and Checklist to Reduce the Lead Time of Delivery of Goods using FIFO Method at PT Indofood TBK Company of Indonesia

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ABSTRACT

PT. Indofood, in carrying out goods storage and retrieval activities, is carried out without a barcode and checklist system. Without this system causes high lead times, referring to the time recorded by the SAT system. This system is used by management to control the loading/unloading movement of the company. Longer times often result in inefficiency and wasted resources, and companies should review their processing times against benchmarks to identify ways to improve their lead times.

The purpose of this study is to provide improvement efforts to overcome delivery errors on finished goods, reduce the lead time of the delivery process with the kanban system through the FIFO method, and compare the difference in the lead time of the delivery process before and after the procedure. The author's research process in carrying out research from planning to carrying out research at a specific time. The analysis carried out is to evaluate the results of the delivery system improvement, search for goods to be sent based on the delivery plan, and the amount of time required to make deliveries based on the lead time displayed via SAT. The results showed that the kanban checklist design using the FIFO method could reduce problems in shipping in and out of products in the warehouse by reducing recording errors and accelerating the recording process quickly, precisely and accurately. The product process flow based on the kanban checklist system makes it easier for operators in the implementation process from incoming products to outgoing products. Item data will be entered automatically into the existing computer kanban checklist using the FIFO method. The type of barcode used is a barcode that can input data in the form of letters, numbers and symbols. The company needs this type because the data inputted in the barcode uses these three forms.

Key Words: Kanban, Lead Time, FIFO Method.

1. INTRODUCTION

Technological developments are based on the need for something that makes the work done easier. This need gave rise to ideas for developing technology for daily life and manufacturing. Technology in manufacturing is needed to support activities on the job so that it can run according to plan. Technology in a system must be immediately applied to manufacturing so that the system can continue to grow, especially systems in warehousing. A sound warehousing system is a warehousing system that can utilize space to store effectively to increase space utilities and minimize material handling costs [1-7].

To obtain success by the goals and directions to be achieved by a production business, it is necessary to have a plan that must be prepared and designed carefully and well so that later it will be able to support the achievement of production goals. One of the plans must be considered in planning the layout and placement of the place of business in question. This is important because a company that does not consider how well the arrangement and order of its place of business and production should affect its activities later. The planning may include how the structure of the building to be used should be for the company's activities or how the division and placement of rooms and machines or work and production equipment should be. With careful and correct planning and calculations in production activity, such as setting the machines and equipment used, it will be able to launch and maximize production.

PT. Indofood Tbk Packaging Division is expanding the company in several areas, so it still needs several new systems to support the existing movements of the expansion company, one of which is the layout system in the warehouse area. As a result, there is no good goods layout system in the warehouse area, causing lead times during the delivery of goods, and sometimes there are still errors in delivery. The goods layout system is still done manually and is not regulated. On the shelves, goods are placed

freely and only look at the type, even though these finished goods are further divided into various kinds. The delivery varies according to the demands of each consumer. These items are placed according to the product type, such as roll or pouch. When the goods are sent, the warehouse operator must look for items on the shelves one by one and sometimes they cannot be seen because the reach of the frames is quite high. The search is not easy to make lead time.

Several strategies can be used in controlling goods, one of which is first-in, first-out (FIFO). Implementing the FIFO product retrieval strategy can be used to keep old products out first. In FIFO retrieval, the first goods received at the warehouse are the first to be sent to the customer. This method is suitable for non-durable products or products with short life cycles (Mulcahy, 1994). Applying this FIFO method requires a high level of access to the location of goods in the warehouse.

The first in, first out method was chosen because it fits the system's needs. This method is based on the assumption that the goods sold are the goods that were previously entered in the warehouse area. The newly completed goods from the production area are then placed in the warehouse area to prepare goods that are then stored. The company needs to consider this method because of the large number of products produced, so it must be done sequentially so that there are no slow-moving items.

Based on the initial documentation, it turns out that the inventory has not been appropriately planned, so the inventory in the store is not optimal; this is due to the lack of inventory in the warehouse. This can be seen when the company gets an order for a particular product, and then places an order. So buyers have to wait for the goods to arrive. On the other hand, it has also experienced excess inventory, so that storage costs include maintenance costs and costs incurred in connection with damage to goods stored in the warehouse [8-17].

Inventory of goods is one of the company's activities that are very important for the company's development. This company often faces errors in recording transaction data for ordering and selling goods, so it is challenging to control inventory. With the increasing number of goods, several problems arise: inventory information cannot be presented quickly, precisely and accurately. The cause of the emergence of these problems is the processing of transaction data that requires several stages and frequent recording errors in invoices, forms, and reports. In addition, transaction data processing into inventory information is often delayed by staff in the inventory section. To overcome these problems, a proper inventory information system is needed [17-23].

Inventory is one of the company's assets. The role of internal control, in this case, is significant in improving the security of the list as company assets because there are quite a several types of products and goods in and out, so it is feared that there will be loss or theft of stock of goods. In inventory, goods are the most prone to fraudulent actions. Therefore it is necessary to have an adequate internal control system to prevent fraud by those who handle inventory [24].

The determination of the cost of inventory is highly dependent on the valuation method used, namely the FIFO (First in, First out) method, the LIFO (Last in, Last Out) method or the average cost method (Average cost Method). The First In, First Out method assumes that the calculation of the cost of goods is based on the order in which the goods were purchased. Accordingly, the remaining or residual inventory is considered from the time of the last purchase. (25-28].

The company's warehouse storage system currently uses shelves with four levels of height. The frames are placed with finished goods produced randomly and without a standard procedure. The placement of goods on the shelves must use the DBH AGV forklift so that the layout of the goods is carried out by the operator who operates the tool. However, due to the absence of a good goods layout system, the operator only places goods if there is an empty slot.

To apply the FIFO method, the control of goods is carried out on the proposed warehouse layout. Control of goods is carried out on receiving, storing and retrieving the proposed warehouse layout. So that it is expected to be a recommendation for improvement for the company to the problems that exist in the warehouse.

From the observations so far at PT. Indofood, storage and retrieval of goods is carried out without a barcode and checklist system, without which the lead time refers to the time recorded by the SAT system. This system is used by management to control the loading/unloading movement of the company. Longer times often result in inefficiency and wasted resources, and companies should review their processing times against benchmarks to identify ways to improve their lead times. Reducing lead times increases overall productivity, resulting in higher revenue and profits. The problem of late delivery at PT. Indofood happened because the barcode and checklist system for goods had not yet been implemented. The problems above can be shown in the total time taken in preparation for delivery of goods for PT. UPA which is known to take 5 hours 13 minutes.

From these problems, it is necessary to improve the system in the supply and delivery of goods, which is based on

temporary analysis of the barcode system and checklist the root of the problem lies in the man and method, namely the perpetrators who do not carry out work

maximum instructions regarding the barcode and checklist system so that it is necessary to implement a kanban system. Therefore, this study aims to improve the use of the barcode system and checklist using the kanban system, implement and control the kanban system on PT Indofood Tbk inventory to reduce the occurrence of lead times in shipping.

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Based on the problems above, research will be conducted on the analysis of the barcode system design and checklist to reduce the lead time of delivery time which is carried out through the creation of a good layout system in the racking area, which will then be integrated through the barcode on the goods.

2. RESEARCH METHOD

Types of research

In this research, it is necessary to plan and design so that this research can run by the initial objectives of the study. A research design is needed for the investigation to run well and systematically. Research design is all research processes carried out by the author in carrying out research, starting from planning to carrying out research carried out at a specific time.

Types of Data and Information

This type of research data and information is carried out by direct observation of the object to obtain primary and secondary data.

1. Primary Data

This research method is carried out directly on the object and existing field conditions for improvement.

2. Secondary Data

Secondary data in this study is by obtaining documents related to the object under investigation, which is intended as evidence that the research was carried out on the company concerned. Secondary data (documentation) will be tangible in comparison before and after repairs. Documentation can be in the form of photos or lead time data.

Method of collecting data

The data collection method is to obtain primary and secondary data for research purposes. The data collection method used in carrying out this research is collecting primary and secondary data. In this study, there are several data collection methods used, including:

1. Observation

Observations were carried out on related parties to obtain general data by direct observation and observation. At this stage, the author asks the warehouse supervisor and quality control for opinions about the often faced problems.

2. Interview

Conduct question and answer activities with interested parties and collect data needed to resolve a problem that occurs. At this stage, the author conducts interviews with several parties, starting from the operator in the warehouse department to the section head relating to the management of finished goods in the field to find out the conditions and problems in the field.

3. Literature Study

This method collects data from several supporting literature that can help data collection that discusses the warehouse and its layout. The literature used comes from national and international journals and books in the bibliography chapter.

4. Documentation Study

Collecting data by studying and observing various sources of documents and data owned by the company, such as the layout and area of the warehouse, dimensions of packaging and pallets.

Data Processing and Analysis Methods

The analysis was carried out on the data processing carried out. The research carried out is to evaluate the results of the delivery system improvement, search for goods to be sent based on the delivery plan, and the amount of time required to make deliveries based on the lead time displayed via SAT. The evaluation was conducted to determine the contribution of research results in overcoming the problems faced by the company.

3. RESULT

The warehouse is a temporary storage place for Tango Chocolate products sent by the production according to a predetermined delivery schedule to be later supplied by the warehouse operator. Actual production that occurs often does not match the predetermined delivery schedule. This is due to changes in the production plan caused by various things, including quality problems and others that cause the production sequence to change and the daily production amount not according to plan, the production order changing and the production amount not according to plan, less or more with the existence of overtime production to meet the shortage. This results in delivery often not according to needs. If there is a delay, the Tango Chocolate product that has been shipped takes up space both in the warehouse transit area and until it is time for us. The shelves used have many sizes, depending on the dimensions of the existing production. Each line on the rack is usually used for one type of production. However, for the production of Tango Chocolate, 3 rack lines are used. Figure 2 shows the condition of the shelves at PT Indofood, TBK.

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Figure 1 Goods Storage Rack in the Warehouse Area

Barcode is an electronic device that shows a label used to identify the identity of a material. By implementing a barcode system, the process of recording and processing data can run quickly, precisely, and accurately to provide real-time information that can be used for PT Indofood Tbk. Barcode symbols can be designed using applications that have been widely circulated, such as Codabar, Code 11, Code 39, Code 93, Code 128, EAN, UPC, and so on. At PT. Indofood Tbk. Codabar barcodes are used in labelling Tango Chocolate products, as can be seen in the following image:

Figure 2 Barcode Type Codabar

An explanation of the barcode code above is as follows:

1. B explains the factory's location, namely the cikampek area because PT Indofood's packaging division has three plants: Tangerang with code T, cakung with code J, and cikampek with code T B.
2. 1 describes the year the product was made. Tango products with lots above are products manufactured in 2021.
3. C describes the month the product was made. The month names are explained in alphabetical order. A is January, B is February, and so on.
4. 12 is the number of the date the product was made.
5. 5 describes the final process of the product being made. Number 5 describes the slitting process, and number 8 in the bag making process.
6. K is the serial number of the machine used. K is the machine with the number 11. In alphabetical order, machine number one is A; machine number two is B, etc.
7. X is the shift of the operator who does his job. Shift consists of X, Y, Z. Shift 1 is X, Shift 2 is Y, and Shift 3 is Z.
8. 20 is a sequence number from the product derivatives of jumbo rolls into small rolls. The lot above is the 20th derivative.

The software used is the Barcode Generator as follows:

Figure 3 Barcode Generator

From the design process that has been designed, the hardware requirements used in the barcode system can be seen. These tools and equipment include:

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1. Barcode Computer

The computer used as a barcode computer has a minimum specification of Pentium IV. This computer will be connected to the data input performed by the barcode scanner. It is estimated that the number of computers used for data input using the barcode system is 4 units.

Figure 4 Computer Barcode

2. Barcode Scanner

The barcode scanner is used as a barcode scanning tool to input material transaction data that enters and exits each warehouse area. Barcode scanners themselves are widely sold with various specifications according to user needs. Warehouses should use a barcode scanner type RF Cordless Wireless Barcode Scanner. This type of barcode is easier and more flexible to use in the reception and storage areas of materials that are prone to damage and make it difficult for operators to scan. The working principle of a wireless scanner is similar to Bluetooth as a means of radiofrequency and receives/sends signals to a computer with an operating range of up to 100 m.

Figure 5 Barcode Scanner

3. Barcode Printer

A Barcode printer is a printer that is used to print barcode stickers according to the data that has been created. This printer must be adjusted to the size of the sticker to be used.

Figure 6 Barcode Printer

4. Barcode Labels

A Barcode label is a sticker paper that is used to print barcode labels and other information that has been designed on the barcode sticker which will then be affixed to each packaging material. The barcode label used is ceramic. This barcode is

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designed to withstand high temperatures because it is undeniable that there are significant temperature changes during the material storage process in the material warehouse.

Figure 7 Barcode Label

The supply chain is one of the disciplines whose scope of discussion is very broad. In the product supply chain, there are logistics, distribution, and so on. Transportation is one part of the overall activities in the most important product supply chain. Without good modes, methods, and transportation scheduling, all activities in the product supply chain will not run optimally to achieve customer satisfaction and cost-efficiency. Transportation or transportation is the movement from one place to another by using transportation, whether driven by human, animal or machine power. The concept of transportation is based on the existence of a journey between origin and destination. Travel is the movement of people and goods between two separate places of activity to carry out individual or group activities in society. The journey is carried out through a certain path that connects the origin and destination using a conveyance or vehicle with a certain speed. So travel is the process of moving from one place to another.
After conducting data analysis and successfully collecting data in this study, the researchers concluded that PT. Indofood Tbk. will systematically maintain inventory and delivery records to determine how much product is available for delivery and how much has been shipped. company policy related to the application of the FIFO (First In First Out) method is good, namely where the application of the FIFO method is carried out when the goods arrive and then arranged on the shelves in the warehouse according to the date the goods arrived but have not been fully implemented, such as employees who have not implemented the kanban checklist system using the FIFO method, employees place items at random that are not by the actual rules, so it can be concluded that there is an influence from the implementation of the FIFO (first in first out) kanban checklist system on the effectiveness of the delivery of goods.

Various costs have a huge impact on distributing goods to several destination areas, including operational costs and other unexpected costs. The transportation costs that run in this company can be categorized as quite large, this is because the distribution of goods carried out is by using the FIFO (First In First Out) method, we can directly see that if you use this method, it is almost sure that the costs incurred are significant. The company performs demand services that come in the production of ordered goods and then immediately delivers the goods without waiting for other goods that may be delivered simultaneously.
If we look at the consumer side, service using this method is considered very good because for consumers who place an order in advance, it will be delivered first, and vice versa. But if we look from the producer's perspective, using the FIFO method is considered less appropriate because it will impact the swelling of the transportation costs for shipping goods. The analysis using this method of solving transportation problems aims to reduce transportation costs to a minimum without ignoring the delivery time factor. However, the problem in using the transportation problem-solving method is that the lead time factor is not considered. The transportation problem-solving method only focuses on cost minimization. This situation can be overcome by making a delivery time limit by the company to the customer, namely by making a lead time agreement that has been agreed upon by both parties.

Thus, the company can reduce transportation costs through multi-decision delivery of goods (multiple destinations) carried out by several transportation facilities simultaneously.

4. CONCLUSION

Conclusion

Based on the barcode system design and checklist at PT Indofood Tbk, it can be concluded that:

1. The design of a barcode and checklist system using the FIFO method can reduce the problem of high lead times in product delivery in the warehouse by reducing recording errors and accelerating finding goods quickly, precisely, and accurately.

2. The product process flow based on the kanban checklist system makes it easier for operators to carry out the implementation process from incoming products to outgoing products

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3. The data items listed on the kanban checklist will be ordered in the storage on the shelves so that the layout of the racks will be sequential, making it easier to find goods and deliver them using the FIFO method.

Suggestion

Some suggestions and input suggestions from the research that has been made are:

1. Further research is needed to design a delivery system that integrates a barcode system directly integrated into a computer on SAP. This is so that the barcodes that have been created can be implemented immediately.

2. Orders should be made when the inventory quantity reaches the reorder point. This is done to avoid the occurrence of out of stock by considering the fluctuating delivery lead time.

3. Product storage considerations should consider the product priority order group.

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