FIFO Method Improvement and Adjustment Design for PT. ABC Warehouse Plans

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ABSTRACT

Face film company PT. ABC requires an efficient and organized storage system to secure raw materials and finished products. However, warehouses currently experience problems with random storage, which causes human error, overstocking, and potential product damage. This research aims to design layout improvements and adjustments to the FIFO (First in First Out) method in PT A B C's warehouse plan. The research method used is qualitative with observation, interviews and literature study. Observation results show discrepancies in warehouse layout that disrupt operational flow, as well as the need for restructuring and improving the management system. Through design improvements, such as rearranging the layout, more strategic placement of goods, and implementing the FIFO method, it is hoped that it can increase warehouse operational efficiency, reduce the risk of goods damage, and speed up the delivery flow to customers. More comprehensive improvements, including inventory management and staff training, are also needed to ensure the successful implementation of an effective FIFO system. Thus, this research contributes to improving warehouse management and operational efficiency of PT. ABC.

Keywords: *Warehouse Management, FIFO Method, Layout, Supply Chain*

ABSTRAK

Perusahaan film wajah PT. ABC memerlukan sistem penyimpanan yang efisien dan terorganisir untuk mengamankan bahan mentah dan produk jadi. Namun saat ini gudang mengalami permasalahan penyimpanan acak yang menyebab kan human error, overstocking, dan potensi kerusakan produk. Penelitian ini bertujuan untuk merancang perbaikan tata letak dan penyesuaian metode FIFO (First in First Out) pada rencana gudang PT. ABC. Metode penelitian yang digunakan adalah kualitatif dengan observasi, wawancara dan studi literatur. Hasil observasi menunjukkan adanya ketidaksesuaian tata letak gudang yang mengganggu alur operasional, serta perlunya restrukturisasi dan perbaikan sistem manajemen. Melalui perbaikan desain seperti penataan ulang tata letak, penempatan barang yang lebih strategis, dan penerapan metode FIFO diharapkan dapat meningkatkan efisiensi operasional gudang, mengurangi risiko kerusakan barang, dan mempercepat arus pengiriman ke pelanggan. Perbaikan yang lebih komprehensif, termasuk manajemen inventaris dan pelatihan staf, juga diperlukan untuk memastikan keberhasilan penerapan sistem FIFO yang efektif. Dengan demikian, penelitian ini memberikan kontribusi terhadap peningkatan manajemen gudang dan efisiensi operasional PT. ABC.

Kata kunci: *Manajemen Gudang, Metode FIFO, Tata Letak, Rantai Pasokan*

INTRODUCTION

PT. ABC is a company that operates in the field of face film or phenolic film by handling the process from the start of production to the distribution stage. In carrying out its operations, this company requires a storage system that is not only efficient, but also systematically organized. This is important to ensure the availability of raw materials needed for production and storage of final products that are ready for distribution. Therefore, neat and structured warehouse management is very important. The warehouse

must be equipped with facilities to support accurate inventory management, including organized placement, goods tracking systems, and easy access for picking and adding stock, so as to maximize operational efficiency and better meet customer needs. Warehouse owned by PT. ABC with an area of 1.400 m^2 which is used to store raw materials and finished products. The storage process in this warehouse still applies random storage, without implementing a system such as FIFO or other structuring systems. This causes human error, overstock in certain months, such as New Year or holidays and also the possibility of product damage due to termites. The company explained this problem directly because the Cikande warehouse was also a temporary storage place for finished products originating from Palembang and Banjarmasin, which was one of the causes. As a result, the process of searching and retrieving items takes quite a long time. In fact, raw materials were found piled up under finished products, which not only indicated inefficiencies in warehouse management, but also directly hampered the smooth production process. Therefore, it could potentially slow down the entire workflow and order completion.

Warehouse management is the process of planning, organizing and controlling all activities related to the storage, management and distribution of goods or materials in the warehouse. A warehouse is a physical facility used to store and manage goods or materials in various forms, from raw materials to finished products. Warehouses are something that cannot be separated from the world of goods trading business, especially industrial goods (Pitoy et al., 2020; Muhandhiset al., 2023). Warehouse management is crucial in a company's supply chain because efficiency and effectiveness in storing and managing goods can have a direct impact on production costs, customer service and consumer satisfaction. By implementing appropriate warehouse management practices, companies can increase productivity, reduce operational costs and increase customer satisfaction. Therefore, a good understanding of warehouse management concepts and practices is essential for any organization involved in production and distribution activities.

LITERATURE REVIEW

Goods are anything that consumers can offer, both tangible and intangible, that are received by buyers in order to satisfy consumers' desires or needs (Budiharja, 2016; Fatikhudin et al., 2021; Pattiselanno & Tuhumury, 2022; Jaya & Salih, 2022). Goods are a collection of products or goods that are available in various quantities and types to be offered to consumers (Agustina, 2017; Nash, 2019; Kang et al., 2020). Goods are any physical or abstract entities that can be exchanged or consumed by individuals or organizations to satisfy their needs or wants. It includes a wide range of products and services available in various types and quantities. According to Singh et al. (2018), A warehouse is a place or building used to store goods, whether in the form of raw materials, semi-finished goods (work in process) or finished products. Its main function is to provide a safe and organized storage space so that these items can be easily accessed, organized and managed. Warehouses can come in many shapes and sizes, from small warehouses within a store to large warehouse complexes in a logistics distribution center. In a warehouse, goods are stored in an organized system, often using various types of racks, pallets, or other storage systems. In its development, the warehouse concept has experienced a significant evolution, especially with the adoption of digital technology. Modern warehouses are often equipped with sophisticated Warehouse Management Systems (WMS).

According to Heizer et al. (2020), Layout is one of several key decisions that determine a company's operational efficiency over a relatively long period of time. Preparing the layout requires careful decisions to avoid disruptions in the production process and reduce wasted costs and inefficient production activities (Paul & Chowdhury, 2021). This is done to ensure the company's operations run smoothly and efficiently over the long term. According to Utomo et al. (2022), layout refers to the location of machines and equipment, logistics flow, air flow, light control, noise levels, beauty and comfort, as well as the placement of other work areas at that location. It is hoped that a layout that is

adapted to these elements can create a work environment that supports the growth of a high work ethic among employees. A high work ethic will show that employees work for their own satisfaction. This is considered important because it can create more positive and productive behavior in the workplace. By adapting the company's layout in a structured manner, it is hoped that it can increase employee satisfaction, giving them a sense of comfort and security while working. According to Haudi et al. (2022), Supply chain is an integrated process where a number of entities work together to obtain raw materials, convert raw materials into finished products, and send them to retailers and customers. Apart from being a unit of supplier, manufacturing, customer, delivery process, and supply chain, it is also a system where an organization distributes its production goods and services to its customers. Effectiveness in managing the supply chain also plays an important role in meeting customer expectations and maintaining competitive advantage in an increasingly competitive market. With a deep understanding of the dynamics and interconnections between all elements in the supply chain, companies can identify opportunities to improve performance and create added value for their customers. This can help companies survive in a rapidly changing market and allow them to grow and thrive in the long term.

According to Kieso et al. (2017), the goods sold first are the goods purchased first. The FIFO method is a method that assumes that goods purchased first will be sold first, so that the cost of goods purchased first will be charged first as the cost of goods sold (Riswan & Fasa, 2016; Saleh, 2018; Salim & Susilowati, 2019; Putra et al., 2021). According to Bar-Gera & Carey (2017), this method has a number of advantages: First, rational and easy to understand, the FIFO method is easy to understand and apply in most companies. A cycle that goes from oldest to newest sales, this works well for most businesses. Simple cash flow analysis also makes it easy to apply. Second, minimizing costs and time, the FIFO method can save time and money in estimating the costs required for inventory sold. This is due to the direct dependence of costs on the cash flow of previous purchases which will be utilized first. Third, avoiding the risk of damage to goods, the FIFO method can help companies reduce the risk of losses due to damaged goods. By clearing older stock first, companies can manage and organize the flow of goods more effectively. According to Bar-Gera & Carey (2017), there are several categories for the FIFO method requirements. First, types of goods that have perishable characteristics. Second, types of goods with packaging characteristics that are easily damaged if they are left in the warehouse for too long. Third, items that have trend uncertainty. Fourth, a warehouse with a wide and spacious capacity so that the movement of goods in and out is easier.

METHOD

The research method used is qualitative research. According to Andelkovic & Radosavljevic (2018) and Widyadana & Evanthi (2023), qualitative research methods provide an overview or explanation of the condition of the data obtained as is. Data collection techniques used include interviews, observation and document analysis. This research was conducted at PT. ABC which is located on Indonesia. The data obtained in this research is descriptive in nature, to collect information regarding the warehouse management implemented, researchers took notes during observations and interviews regarding the process of storing goods and the work flow that occurred. According to Braganza et al. (2017), Primary data is data collected and processed by an organization or individual directly from the object. The primary data that the author obtained directly is the result of direct observations and interviews with the Head and Warehouse Staff at PT. ABC. Meanwhile, secondary data, said Sugiyono, is a data source that does not provide data directly to data collectors, for example through other people or through documents (Adhikara, 2018; Afriansyah, 2021; Nopangga et al., 2021; Zulfikar et al., 2022). In this research, secondary data sources come from websites, journals and articles related to warehouse management research topics.
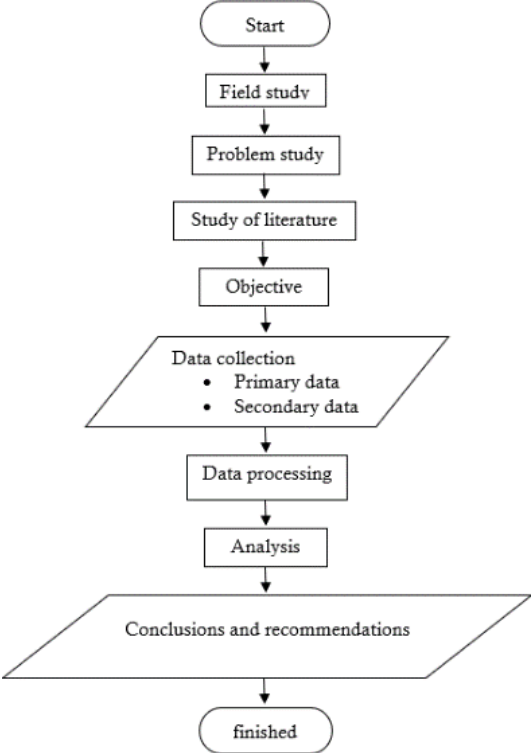
Figure 1. Research flow diagram

RESULT

Based on the results of observations, PT ABC warehouse operational flow begins with the inbound process, which involves receiving goods from suppliers. When the delivery truck arrives, the warehouse employee checks and verifies the travel documents accompanying the goods to ensure order and delivery conformity. After confirmation of conformity, the goods are taken to the receiving area where the Quality Control (QC) team performs an inspection. The focus of QC inspections is on products planned for production in the near future, checking material integrity and specifications according to company standards. After ensuring that all goods meet quality standards, they are unpacked and placed in specific storage locations within the warehouse. The placement of goods is arranged in such a way as to facilitate access when needed, however, observation results show that product numbering in this warehouse is still very lacking, which has an impact on the product outbound process.

In the outbound process, a placement system that does not implement FIFO or something else results in less-than-optimal product picking, positions that are more easily accessible tend to be chosen first for distribution, while products that are more difficult to access are often left behind and do not move for months. As a result, during observations it was found that products had not left the warehouse for up to a year, resulting in a significant reduction in quality, including damage caused by termites. The less-than-optimal management system in the PT. ABC warehouse is also influenced by the warehouse layout. Therefore, expanding and rearranging warehouse layouts is very necessary to support a more accurate system and increase operational efficiency. The warehouse layout is currently experiencing several inconsistencies that are disrupting operations.
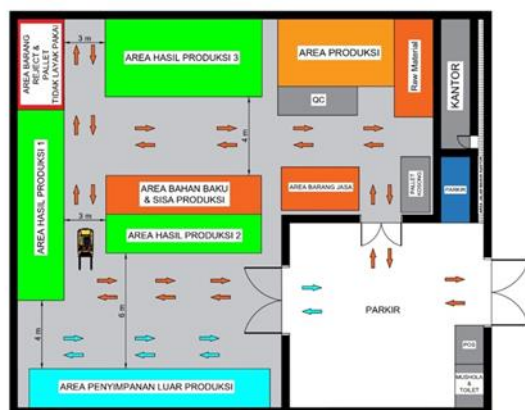
Figure 2. Original layout of PT ABC warehouse

The results of observations made on the company's warehousing flow revealed quite striking discrepancies. At the operational level, there are significant differences regarding the location of goods entry and exit points in various warehouse areas. The placement of these doors should be designed in a planned manner to ensure a smooth and efficient flow of goods. However, in practice, there is confusion regarding which entrances and exits should be used, causing disruptions in workflow and potential delays. Apart from that, during these observations, it was also seen that there was a buildup of raw materials and production waste in areas that should have been designated for production areas. This buildup not only disrupts the ongoing production process, but also reduces the space available for further production processes. This shows the need to improve storage strategies and warehouse space allocation to suit the established production workflow.

Therefore, these findings emphasize the need for a thorough evaluation of the existing warehouse management system, as well as the implementation of more systematic and structured improvements. In this way, companies can increase efficiency and productivity in their supply chain, reduce potential disruptions in the production process, and increase customer satisfaction through timely and efficient delivery. Warehouse design and management principles play an important role in increasing operational efficiency, reducing operational time and improving service standards. Warehouse layout is a plan to increase the efficiency of the distribution network by reducing costs associated with receiving goods, analysis, concept development, and shipping goods to customers. The best location to store goods is a location that allows easy access and short distances to retrieve stored goods, thereby reducing damage to goods, operational costs and order completion time for customers. The stages of goods movement must also pay attention to the type of goods that will be put into the warehouse. Types of goods at PT. ABC is diverse, from raw materials to finished goods originating from various regions. Implementing an appropriate layout between the warehouse block and the goods to be stored is an important thing to pay attention to because this will have an impact on the movement lane for forklifts during distribution activities.

Findings during observations show that various factors have an impact on the flow of warehouse movements at PT. ABC. The warehouse aims to optimize the efficient use of energy sources to meet customer demand or reduce waste as much as possible taking into account the available resources. Therefore, warehouse design is expected to support the use of space, equipment and workers in achieving work efficiency by ensuring smooth access and protection for both goods and workers. In accordance with the problem that occurred, the previous layout condition could be said to be less effective because it caused goods to experience storage mismatches, this happened because storing goods only paid attention to empty areas and made forklift mobilization less free. The following is a new warehouse floor plan improvement design to try to overcome this problem.
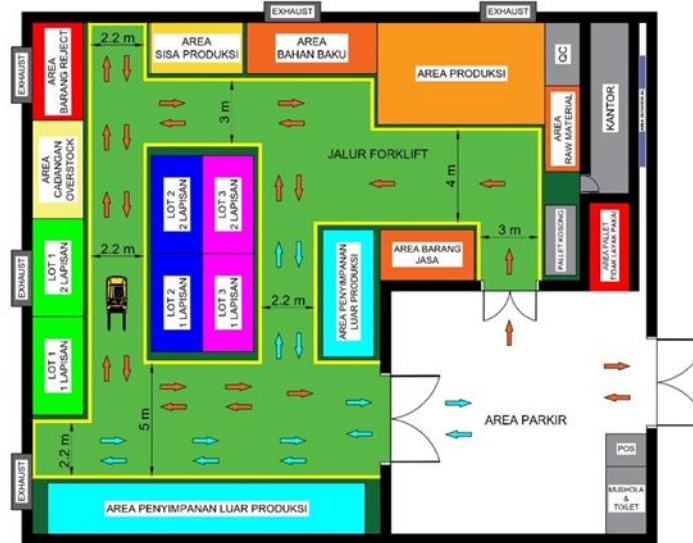
Figure 3. Layout after repairs

The warehouse is designed in a U shape to maximize the use of space and optimize the flow of goods traffic. With this form, accessibility to goods in the warehouse becomes better. Clear and organized flows help reduce the time required to manage goods and improve overall operational efficiency. Placing manufactured goods near the main exit makes it easier to transfer goods from the warehouse to the shipping or distribution area. By tailoring this placement to batch and product type, warehouses can manage the shipping process more efficiently, avoid confusion and minimize shipping errors. Non-production goods, such as goods to be sent or received from suppliers, are placed near the exit to avoid disruption to the production process. Adding shelves to anticipate overstocking is also a smart step to optimize storage space and manage inventory more effectively. Placing the rejected goods area at the end of the warehouse ensures that goods that do not meet quality standards do not interfere with the process of picking up goods that are in good condition. This helps reduce the possibility of confusion and speeds up the overall operational process. Placing the raw material area next to the production area makes it easier to access and retrieve the goods to be produced. This also helps maintain the flow of finished goods so that it is not disrupted by raw materials that have just arrived or are in the process of being prepared.

Separating the production waste area from the raw materials area helps avoid contamination and ensures that waste or production residue can be managed efficiently. By separating this area, warehouses can more easily identify, separate and manage waste in accordance with applicable regulations. Utilizing unused areas near the main gate to store pallets that are no longer suitable for use is a smart strategy for optimizing storage space and maintaining neatness in the warehouse. This also helps ensure that traffic lanes within the warehouse remain open and unobstructed by unused items. Adding exhaust or ventilation at several points in the warehouse helps reduce humidity and increase air circulation in the warehouse. This is important to maintain optimal storage conditions for goods and prevent damage or deterioration due to unsuitable environmental conditions. Placing the QC area close to the production area allows for better monitoring of product quality without disrupting the flow of goods traffic. This helps in detecting and addressing quality issues quickly and efficiently.

Adding lane boundaries to keep forklift paths clear and organized helps reduce the risk of accidents and ensures efficiency in forklift use. Thus, warehouses can reduce wasted time and increase operational productivity. Sizing the forklift ramp according to the width, turning radius and movement of the forklift helps ensure that the flow of traffic within the warehouse remains smooth and efficient. This is important to prevent

deadlocks or obstacles that could disrupt overall warehouse operations. Allocation of office doors that make it easier for employees to leave and enter the warehouse helps increase operational efficiency and employee comfort. By considering accessibility and employee traffic flow, warehouses can ensure that daily activities run smoothly and efficiently. Converting the area previously used as an office entrance for outdoor AC placement helps keep the temperature inside the office stable and comfortable. This is important to maintain comfort for working employees.

PT. ABC warehouse will be more efficient using the FIFO method in the movement of its goods flow. The warehouse flow method shows how goods move in and out of the warehouse. The First in First Out (FIFO) method means that the first item that comes in (bought) becomes the first item that goes out (sold) (Halimah & Amnah, 2018; Waryanto & Haryadi, 2021; Pramudito et al., 2023). Applying the FIFO method has the advantage of high selling value of goods because goods produced from rubber wood cannot be stored for too long. This also reduces the quality of the goods due to being eaten by termites. The following is a picture of the flow of goods movement:
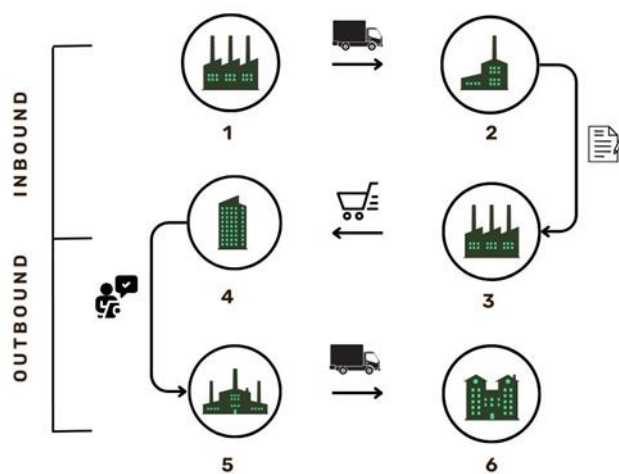

Figure 4. Goods Movement Flow Using the FIFO Method for Palembang and Banjarmasin Products

The following is an explanation of the flow of goods movement that occurs with the application of FIFO to products originating from Palembang and Banjarmasin: First, sending goods from Palembang/Banjarmasin, goods are sent from the Palembang/Banjarmasin location to PT. ABC uses available means of transportation. Second, administrative checking, when the goods arrive at the warehouse, the warehouse officer carries out administrative checks and verification, including the accompanying travel documents, to ensure the conformity of the order and delivery. Third, store products according to numbering. After confirmation of suitability, the goods are placed in the designated storage location according to the predetermined numbering. Fourth, orders from customers, customers place orders for products that will be sent from the PT. ABC warehouse. Fifth, the picking process, the warehouse team carries out the picking process by taking the goods that have been ordered from the warehouse according to the instructions recorded in the system. Sixth, delivery to consumers, goods that have been packaged and selected from the picking process are sent to consumers using available transportation facilities, such as trucks or couriers, to ensure timely and efficient delivery to consumers. The picture of the flow of movement of goods produced in Cikande is as follows:
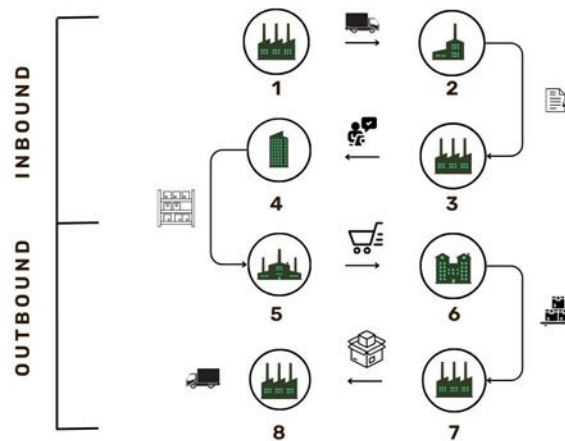
Figure 4. Goods Movement Flow Using the FIFO Method for Cikande Production Goods

The following is an explanation of the flow of goods movement that occurs with the application of FIFO to goods produced by Cikande: first, goods are sent from suppliers/service users to PT. ABC uses a transport truck. Second, upon arrival of the truck carrying the goods at the warehouse, the warehouse officer checks and verifies the travel documents accompanying the goods to ensure the suitability of the order and delivery. Third, goods that have passed the administration process are then checked by the Quality Control (QC) team to ensure material integrity and specifications comply with company standards. Fourth, after passing QC, the goods are placed in a certain storage location in the warehouse according to the predetermined numbering. Goods that do not pass QC will be stored in the reject section. Fifth, customers place orders for products that will be sent from the PT. ABC warehouse. Sixth, the warehouse team carries out the picking process by taking the goods that have been ordered from the warehouse according to the instructions recorded in the system. Seventh, the items that have been selected are then packed neatly and according to packaging standards to be ready to be sent. Eighth, packaged goods are sent to consumers using transportation facilities such as trucks to ensure timely and efficient delivery.

To ensure the effectiveness of the FIFO warehousing system, there needs to be more comprehensive changes than just improving the physical layout of the warehouse. Proper implementation of a FIFO system involves various aspects, including inventory management, stock monitoring, and staff training. By implementing the FIFO system properly, the warehouse can reduce the possibility of goods not leaving the warehouse for a long period, even up to a year. This not only helps maintain optimal rotation of items but can also reduce the risk of termite damage. First of all, it is important to update internal policies and procedures that stipulate those goods that come in first should be first that go out. This requires clear communication to all warehouse staff about the importance of implementing a FIFO system and the consequences of breaking it. In addition, an efficient stock monitoring system is needed to ensure that new incoming goods can be released in the order they were entered. This system can include the use of sophisticated warehouse management software or even a system of clearly marking each item for easy identification. Furthermore, warehouse staff must be properly trained in the implementation of the FIFO system and the use of tools that may be required, such as an efficient goods retrieval system. This training will help them understand the importance of running the FIFO system correctly and minimizing errors that can disrupt the flow of goods. Apart from the logistical benefits, running a FIFO system well also helps reduce the risk of goods being damaged due to not being used for a long period of time. Goods that are left in the warehouse for too long without proper rotation become susceptible to physical damage and attacks by pests such as termites. By ensuring goods always move

out of the warehouse in the order they arrive, this risk can be significantly minimized. Not only product damage, but it can reduce company losses caused by damaged products.

CONCLUSION

The findings emphasize the need for a thorough evaluation of existing warehouse management systems. More systematic and structured implementation of improvements is needed to increase efficiency and productivity in the company's supply chain. Warehouse design and management principles are key to increasing operational efficiency, reducing operational time and improving service standards. The proposed improvements are concrete steps to increase the operational efficiency of PT. ABC's warehouse. By optimizing U-shaped warehouse flow, companies can increase the accessibility of goods in the warehouse, minimize the time required to manage goods, and increase overall efficiency. Placing manufactured goods near the main exit is a smart strategy that simplifies the process of transferring goods from the warehouse to the shipping or distribution area, reduces the potential for confusion, and minimizes delivery errors.

Placing a rejected goods area at the end of the warehouse has significant benefits in speeding up operational processes. In this way, goods that do not meet quality standards do not disrupt the flow of picking up goods that are in good condition, reducing the potential for confusion and increasing warehouse operational efficiency. These steps, along with placing out-of-production goods near exits, separating production waste areas from raw materials areas, and utilizing unused areas for storage of unusable pallets, all contribute to improving overall warehouse efficiency. Apart from physical effort, implementing the FIFO storage method is an effective solution for optimizing the flow of goods in the warehouse. This method has a positive impact in reducing the company's potential losses due to goods not leaving the warehouse for a long period of time. By prioritizing the release of goods on a first-come, first-served basis, companies can ensure optimal goods rotation and avoid the accumulation of unmoved stock. This can reduce the risk of damage to goods due to long periods of storage and help maintain the quality of products provided to customers, thereby increasing customer trust and satisfaction.

Implementing the FIFO system also has the added benefit of reducing the risk of damage to goods due to environmental conditions or termite attacks. By prioritizing the release of older goods up front, companies can ensure that goods that are susceptible to damage due to unsuitable environmental conditions or pest attacks such as termites can be quickly moved out of the warehouse. This helps maintain the integrity and quality of goods and reduces the risk of company losses due to damage or unwanted loss of goods. Setting a clear internal policy regarding the FIFO system, implementing an efficient stock monitoring system, and training warehouse staff in implementing the FIFO system are important steps in ensuring the successful implementation of this method. By carrying out the proposed improvements and implementing the FIFO system effectively, PT. ABC is expected to increase the operational efficiency of its warehouses, reduce potential disruptions in the production process, and increase customer satisfaction through timely and efficient deliveries.

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