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The Effect of Implementing a Warehouse Management System (WM3) with Database Applications at PT. Alcos Graha Jaya

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ABSTRACT

PT Alcos Graha Jaya is a company engaged in Steel and Civil Construction, and has two warehouses for storing material goods, namely the main warehouse and the accessories warehouse. Currently, operational activities in the accessories warehouse are still managed manually with Microsoft Excel, and reports are sent via email to the Production Planning and Inventory Control Section (PPIC). Recording of outgoing materials is also still done manually with books. Because the warehouse management system at PT Alcos Graha Jaya has not joined optimally, it is necessary to implement a database-based Warehouse Management System. This system will integrate warehousing controls such as issuing, entering, and returning goods in one platform. Hopefully, the implementation of this software will increase the efficiency and effectiveness of recording production materials from the time the goods are received until they leave the warehouse.

INTRODUCTION

Rovita (2023) states that inventory is a component in a company that will be a reference for companies to continue to maintain and increase their production and sales, both in services and products, by ensuring optimal quality and maintaining it. One important step to ensure production continuity is through the implementation of an inventory management system (Warehouse Management System).

Warehouse management (WMS) is a key element in the supply chain with the main focus on organizing the entire production process. (Paduloh et al, 2020) Zhang & Pan. (2022), WMS includes all activities within the company's warehouse, such as receiving and issuing goods, inspecting goods, and various other processes that aim to provide information or distribute goods or sales information to customers. A good Warehous Management System (WMS) is to utilize warehouse space effectively (Lee 2018). Frikha (2020) states Warehouse Management

A warehouse management system (WMS) is a key element in a company's operations, with efficient inventory management. Warehouse management has a vital role in the organization, covering a series of tasks from the receipt of goods, to the delivery of goods to customers (Paduloh & Djatna, 2021).

Inventory management system is a database-based application system that aims to add warehouse optimization by ensuring data accuracy through recording every transaction. Information contained in the inventory management system includes the type, quantity, location, and source of inventory (Faber 2013). Accuracy in managing the inventory system will help the company run its operations smoothly and maintain a smooth operating cycle (Paduloh 2020).

CASE STUDY

PT Alcos Graha Jaya is a company engaged in the field of Steel and Civil. Then this company develops business fields such as mechanical, electrical, and maintenance building. In running its business, PT Alcos Graha Jaya has supervised various work projects for the construction of WTP plants, concrete floors, building maintenance, Factory Area Block Paving Work, Factory Area Expansion, hot mixing work and many more. PT Alcos Graha Jaya divides into two storage warehouses. The first warehouse stores steel raw materials and the second warehouse is a storage warehouse for accessories.

There are two areas of the accessories warehouse: the upper accessories warehouse and the lower accessories warehouse. The downstairs warehouse is responsible for managing the materials needed for the production process, while the upstairs warehouse is used as a place to receive materials from suppliers and customers. The Warehouse Admin on the upper floor has the responsibility of overseeing the production and entry of goods at PT Alcos Graha Jaya. The warehouse upstairs is also involved in transactions such as entering, receiving, and exiting goods. With the continuous growth of the company, the management of goods in the warehouse has become more complicated. Currently, all operational activities in the Upper Accessories Warehouse, including receiving, issuing, and returning goods, still use Ms. Excel for manual recording, with reports sent manually via email to PPIC. Recording of material releases is also done manually using a notebook. Therefore, optimal integration in controlling the inventory system at PT Alcos Graha Jaya has not yet been realized.

This situation often results in problems such as data inaccuracies, data input errors, data loss, and lack of data coherence. (Rashid 2019) points out that manual recording can result in a lack of control over stock items, which in turn can cause delays in production due to a shortage of necessary goods. Therefore, an inventory control system is needed that includes warehousing supervision such as receiving goods (receiving), issuing (distribution), and returning goods (return) which are incorporated into an integrated system.

According to Edi (2019), one of the steps to improve the efficiency and effectiveness of recording is to implement a simple warehousing system. This statement is reinforced by the results of research by (Andriawan & Hamid, 2023) which shows that the use of a Warehouse Management System (WMS) helps warehouse management access the data needed for data in the warehouse.

The implemented warehousing system will aim at the entry and distribution of goods to the production department. To do this, Microsoft Access database software is used. Microsoft Access is an application that allows the creation and management of data sets. The use of Microsoft Access has been adjusted to the needs to make it easier for users to operate.

METHOD

The qualitative descriptive analysis methodology in this research focuses on the implementation of a Warehouse Management System with Database-Based Applications by PT Alcos Graha Jaya. This research approach was chosen because the aim is to describe each event that occurs in the field and, using the data collected, identify solutions to existing problems.
Among the phases that this research has gone through are:

Stage 1 *Planning*

The initial step involves recognizing the problems that occur in the entry system in the Accessories Warehouse of PT Alcos Graha Jaya. By doing this identification, the existing problems can be clearly identified, user needs related to the use of the system can be determined, and the next steps can be determined.

Stage 2 *Analysis*

At this stage, observations and interviews were conducted with the supervisor of PT Alcos Graha Jaya, Mr. Suseno M, to discuss In the interview, problems were found related to warehouse management at PT Alcos Graha Jaya. The top Accessories warehouse still uses traditional methods. During my internship in the Warehouse Department, all operational activities such as receiving, issuing, and returning goods still relied on Microsoft Excel for manual recording. Reports are also sent manually via email to the Production Planning and Inventory Control (PPIC) Department. The process of recording the release of materials is also done manually.

Stage 3 *Design*

To improve the effectiveness and efficiency of record keeping, the implementation of a simple warehousing system is a possible solution. The simulation will be carried out with a focus on the receipt and distribution of goods to the production department. In this simulation, *Microsoft Access* database software will be used. There are four menus in this design, namely Room Data, Report, Room Data, Goods Condition, and Goods Category.

RESULT AND DISCUSSION

PT Alcos Graha jaya is a company engaged in Steel and Civil Construction and. started its business from 1984 as a company engaged in Steel and Civil Construction. In 2000 until now, we developed ourselves by expanding the scope of our business fields such as Mechanical, Electrical and Building Maintenance. We have BRIDGESTONE TIRE INDONESIA, KOMATSU INDONESIA, YAMAHA INDONESIA MOTOR MANUFACTURE and ISUZU ASTRA MOTOR INDONESIA as our clients and various projects such as WTP Plant Construction work, concrete floor, building maintenance, Factory Area Block Paving Work, Factory Area Expansion, hot mixing work and many more.

PT Alcos Graha Jaya implements a pull production system in the course of production. The *pul* model is a production system that can carry out the manufacturing process based on direct requests from sales (*sales orders*). Production activities require raw materials so that the production process can run smoothly. The materials required for the production process are divided into two main types: basic raw materials and supporting materials. There are various kinds of raw materials used in the production process. Although each product requires unique raw materials, fabric is generally used as the main raw material. Supporting materials, often referred to as accessories, are used in the production process.

The warehouse at PT Alcos Graha Jaya is divided into two types. The first warehouse serves as a storage place for steel and iron before entering the production stage. While the second warehouse is an accessories warehouse, which is in charge of storing various kinds of accessories needed in the production process. The accessories warehouse is divided into two parts, the upper accessories warehouse and the lower accessories warehouse have different roles. The lower accessories warehouse is responsible for managing the supporting materials needed to start the production process, while the upper accessories warehouse serves as a storage place for supporting materials received from suppliers and customers.

The PPIC admin starts the material receiving cycle by sending a product request to the logistics admin, then to the purchasing department for processing. After purchase, the material is received by the logistics admin and distributed to the PPIC admin, then unloaded in the warehouse according to its type. (Harsono, 2020).. Quality and quantity validation is done before distribution to production. Material records are still manual with *Ms. Excel* for receipts and books for discharges. To improve the effectiveness and productivity of documentation, a basic storage

system will be created using *Microsoft Access* database software designed according to warehousing needs.

For this purpose, a warehousing database system was set up to store inventory data, record material input into and out of the warehouse. The initial configuration used the .mdb format. *Microsoft Access* has been adapted to be easy to use as needed. This is the first step towards simulating the system to be implemented.

Figure 1 shows the main interface of the system, which has a number of functions, such as reports, room data, condition data, item categories, and item data menu.

Figure 1. Main Menu Display

Information regarding item id, category, name, brand, number of items, value or unit price of items, storage space, condition of items, origin of acquisition, and year of acquisition are all included in the item data menu. The quantity and condition of items are taken into consideration when entering all item data. It is recommended to complete the item category, condition data, and room data menus before using the item data menu. This is so that you only need to provide the id that corresponds to each column when filling in the columns in the item data menu.

Item Data Menu

Both item category and item name can be found in the item category menu. This menu searches the item data menu for the same item with different brands.

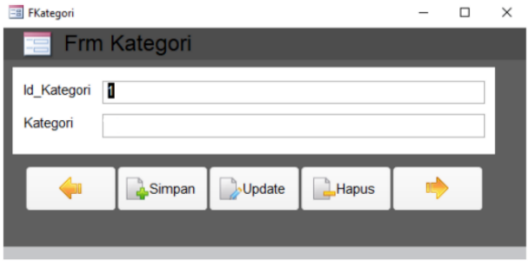

Figure 3. Item Category Menu

Details about the room name and ID can be seen in the room data menu. This is the result of several warehouse rooms that PT Alcos Jaya Graha has for material storage.

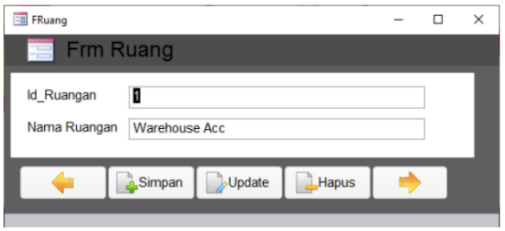

Figure 4. Room Data Menu

Information about conditions and condition names can be found in the condition data menu. You can enter numbers or alphabetical letters in the condition name. Condition name 1 indicates a favorable condition, while condition name 2 indicates an unfavorable condition.

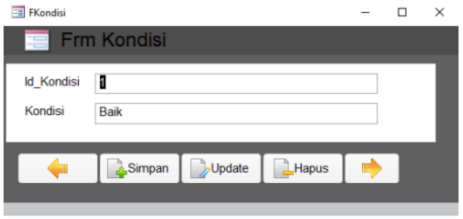

Figure 5. Data and Conditions Menu

The report menu contains information that has been processed from each item that has been inputted.

Report Menu

The production of raw materials can be determined more effectively and efficiently from the time they reach the target until they reach the target by using this program. One of the benefits of this program is its ability to increase the amount of raw materials and reduce processing time and errors as it does not require paper documentation in the form of books. However, in order for staff members to use this application effectively when it is implemented, they must receive training on how to use it.

CONLUSION

Installing a warehousing management system can improve efficiency and convenience in tracking the inventory needed for the business production process. The collaboration between PT Alcos Graha Jaya and the Industrial Engineering Study Program, Faculty of Engineering, Bhayangkara University of Greater Jakarta, has made this research possible. This collaboration paves the way for a wider alliance, allowing both parties to collaborate harmoniously to achieve common goals.

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