

## ANALYSIS AND IMPROVEMENT OF WAREHOUSE MANAGEMENT SYSTEM: CASE STUDY OF PRODUCTION WAREHOUSE AT PT XYZ

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### Keywords:

Warehouse Management, Logistics Activities, Management Systems, Supply Chain Management, Construction and Manufacturing Industries

### Abstract

*This research was conducted to analyze and improve the warehouse management system at PT XYZ, a company engaged in construction and manufacturing. The focus of this research is on differences in stock data found at PT XYZ, which indicate potential loss of goods. This descriptive research uses the triangulation method, namely interviews, observation and documentation, to collect data. The research results show that PT This research recommends grouping goods based on size, installing CCTV to improve monitoring to minimize loss of goods and data discrepancies in the future, as well as implementing cool roofs to increase comfort for workers.*

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## INTRODUCTION

Companies need a good management system, one of which is warehouse management. Warehouse is an important part of the company. This is in accordance with what Ayuliana said in Firmansyah that the implementation of warehouse management plays a crucial role in the smooth running of the company's business operations. Activities carried out in the warehouse must have a correct storage system in order to support the production process and other warehousing activities. Warehouse management is an integral part of operational processes in the construction and manufacturing industries. In general, warehouse management effectiveness has a significant impact on operational efficiency and client satisfaction.

In the construction and manufacturing industrial sectors, good warehouse

management is the main key in providing the right goods in the right place at the right time. The level of raw material inventory in the company's warehouse is a crucial factor that cannot be separated from the smooth production process. Proper inventory will ensure continued production continuity. The more precise the forecasting the company makes, the more efficient the costs incurred. With accurate forecasting, companies can avoid overstock and low stock.

PT PT XYZ is a company that has been present and developing for 44 years in the fields of manufacturing, engineers and contractors. The products produced by PT XYZ are Process Tanks, Pressure Vessels, Processing Equipment, Dished Heads, Washing Machines, Ductings, Towers & Structures, and others.

PT This indicates that the company has designed a warehouse management strategy that takes into account various factors, including the physical dimensions of the warehouse, goods storage flow, methods and types of goods stored there. Storage of raw materials in the warehouse according to the characteristics of the material being stored, such as size, weight and volume. However, there are aspects that need to be improved in their warehouse management strategy, namely security. According to the data obtained from PT XYZ, there is a comparison of the difference in stock data from February, March to April. This data dispute is the main focus of this research. Data discrepancies that are less than what they should be can indicate loss of goods. This condition raises concerns regarding the accuracy of stock recording and the potential losses it causes. Therefore, this research aims to identify the causes of differences in stock data and find solutions to minimize the occurrence of lost goods in the future.

Effective warehouse management is very important in the production process to distribution to clients. This is in accordance with what Maulani said that storage arrangements in the warehouse will affect customer satisfaction. With good management, companies can ensure the availability of the right raw materials, timely delivery, and guaranteed safety at every stage of the project.

## **RESEARCH METHODS**

This type of research is descriptive research. Whitney stated in Moh. Nazir that the

descriptive method involves searching for appropriate interpretations for facts. Descriptive research examines social issues and practices that are relevant to a particular society and context. This research also looks at interactions, behavior, attitudes and views, as well as ongoing processes and factors that influence a phenomenon.

Rachman in Lexy Moleong states that when conducting research, it is important to choose relevant data collection methods and tools in addition to an appropriate methodology. The triangulation procedure is the technique used in this research to obtain data, namely:

1. Interview

An interview is a conversation with a specific purpose. The conversation is carried out by both parties, namely the interviewer who asks questions and the interviewee who gives answers. Interviews are used by researchers to assess a person's condition. Interviews are usually conducted individually or in group form, so that data can be oriented towards information that is informative. The interview method is a dialogue or question and answer conducted by two or more people, namely the interviewer and the interviewee (resource person) conducted face to face. Interviews were used to reveal data about PT XYZ's warehouse management procedures.

2. Observation

Using all the sensory organs to focus attention on an object is what is meant by observation as part of the scientific method. Therefore, observation is a systematic and deliberate study of events that occur and can be researched when the event occurs using the sense organs, especially the eyes. The observation method is more objective than the survey method. This method is carried out by directly observing the event being studied, and in observing something, a person must focus their attention on that something using all their senses, namely taste, smell, hearing, touch and sight. This research examines the application of warehouse management concepts carried out by PT XYZ.

3. Documentation

The word "documentation" refers to a written product, and the term "documentation method" refers to the process of collecting data through recording existing data. Look for information about things or variables in the form of books, letters, minutes, transcripts, magazines, inscriptions, meeting minutes, agendas, and

so on. Research difficulties can be overcome by collecting data through archives and books about ideas, theories, postulates, laws and other relevant topics using documentation procedures or investigations. The main method of data collection in qualitative research is based on logically and rationally formulated hypotheses, which are supported or refuted by views, ideas or laws.

To identify patterns or themes in the data, the data analysis strategy used in this research follows the approach created by Miles and Huberman. This approach requires limiting the amount of data and sorting it after the data is collected to eliminate information that is irrelevant or too comprehensive. The next step is data display, which helps in understanding for further information or event analysis. The final step for researchers is to formulate conclusions based on themes and patterns. In other words, conclusions continue to be drawn as the data is reduced and displayed.

## **RESULTS AND DISCUSSION**

Researchers refer to the National Disaster Management Agency (BNPB) as a national agency that focuses on disaster management and also has guidelines related to warehousing, namely in Head of BNPB Regulation No. 06 of 2009 concerning Warehousing Guidelines. According to the results of interviews with the warehouse of PT. XYZ, regarding the findings of the warehousing guideline activities below have been adjusted according to BNPB, as follows:

**Table 1. Warehousing Guidelines Interview**

<b>Warehousing Activities</b>	<b>Field Findings (Already available/ not yet available)</b>
Warehousing activities consist of several processes, namely:	

<p>1. Acceptance          The process of moving and receiving inventory and equipment in a warehouse is known as receiving. This shipping and receiving procedure is carried out as follows:</p> <ol style="list-style-type: none"> <li>a. Collection of information regarding the quantity and quality of supplies and equipment must comply with relevant regulations and meet the requirements for distribution to victims of natural disasters.</li> <li>b. Administrative records, namely documents that can be accounted for by the relevant officers.</li> <li>c. held accountable by the officer concerned.</li> </ol>	<p>Management of the warehouse receipt process is already available at PT XYZ</p>
<p>2. Storage          The storage process in the warehouse involves placing and maintaining the logistics and equipment received, taking into account the following:</p> <ol style="list-style-type: none"> <li>a. Placement of goods in accordance with the layout or regular warehouse plan.</li> <li>b. Guarantee the security of goods from the risk of theft.</li> <li>c. Protect goods from physical damage.</li> <li>d. Prevent chemical and biological contamination which can reduce the quality and quantity of goods. It is.</li> <li>e. Ensure the safety of goods from fire hazards.</li> <li>f. Arrangement of goods in accordance with good warehouse management standards.</li> </ol>	<p>Warehouse storage process management already exists at PT</p>

<p>3. Maintenance</p> <p>Maintenance is an activity to maintain logistics and equipment so that its condition is guaranteed and ready to be used effectively, efficiently and accountably. This is done through the application of the following principles:</p> <ol style="list-style-type: none"> <li>a. Continuously apply the 5R method (Concise, Neat, Clean, Careful, Diligent) to maintain order and cleanliness of the warehouse.</li> <li>b. Using a First In First Out (FIFO) system, where goods that come in first must be taken out first.</li> <li>c. Implementing a First Expired Date First Out (FEFO) system, namely goods with an earlier expiry date must be released first for distribution. This is to prioritize the use of older goods, considering that goods that arrive earlier are usually also produced earlier.</li> <li>d. Arrange logistics and equipment on pallets in a neat and orderly manner, in accordance with regulations.</li> </ol>	<p>Management of the warehouse maintenance process is already available at PT XYZ</p>
<p>4. Distribution</p> <p>Distribution is the process of releasing and distributing logistics and equipment from the warehouse to be handed over to the party entitled to receive it. This process is carried out through a responsible handover procedure, accompanied by valid proof of handover. This distribution is carried out based on request and according to needs.</p>	<p>Management of the warehousing distribution process is already available at PT XYZ</p>
<p>5. Control</p> <p>Control is the process of monitoring the movement of logistics and equipment in and out of and into the warehouse. The aim is so that inventory and placement of goods can be known quickly, precisely, accurately and accountably. This control process is carried out using the attached forms.</p>	<p>Warehouse control process management is already available at PT XYZ</p>

<p>6. Elimination</p> <p>a. Elimination is a series of activities to destroy logistics and equipment, in order to free state assets from management responsibility, in accordance with applicable laws and regulations.</p> <p>b. The purpose of deletion is:</p> <ol style="list-style-type: none"> <li>1) As a form of administrative responsibility of officers for the logistics and equipment managed, which have been determined to be written off/destroyed in accordance with provisions.</li> <li>2) Avoid financing, such as storage, maintenance and guarding costs, for items that are no longer worth maintaining.</li> <li>3) Maintain environmental safety to avoid pollution.</li> </ol> <p>c. The stages of deletion activities are:</p> <ol style="list-style-type: none"> <li>1) Make a list of logistics and equipment that will be written off and the reasons.</li> <li>2) Separating expired or damaged logistics and equipment in certain places until the destruction process.</li> <li>3) Reporting to superiors on logistics and equipment to be eliminated.</li> <li>4) Form a censure and deletion committee through a decision letter from an authorized official.</li> <li>5) Make an official report on the results of criticism and elimination of logistics and equipment.</li> <li>6) Report the results of censure and deletion to authorized officials.</li> <li>7) Carrying out deletion and destruction after a decision from the authorized official.</li> </ol>	<p>Management of the warehousing removal process is already available at PT XYZ with conditions or circumstances adjusted to PT XYZ</p>
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**Source: (Regulation of the Head of the National Disaster Management Agency Concerning Warehousing Guidelines, 2009)**

Analysis of findings on warehousing activities at PT. XYZ namely:

1. Acceptance

Receiving is the process of handing over and receiving logistics and equipment in the warehouse [4]. Warehousing guidelines or PT XYZ Receiving Standard Operating Procedures (SOP) include:

- a. The warehouse reception department is tasked with receiving goods.
- b. The warehouse reception team checks the condition of the goods and the completeness of the documents.
- c. Goods data is recorded and recorded manually and electronically through the system by employees.

## 2. Storage

Storage is the process of storing logistics and equipment in a warehouse by placing the logistics and equipment received. Warehousing guidelines or Standard Operating Procedures (SOP) for PT XYZ Storage include:

- a. Placement of goods in the warehouse is categorized based on client, diameter size, material, and type/specification. Small items are grouped together, and the same applies to large items.
- b. Every item stored in the warehouse is given an identification code (IC) in the form of a number label and number for barcode scanning, as well as additional identification in the form of color. This identification code is affixed to each item. The warehouse layout is flexible and can be adapted to the project to be carried out by PT. XYZ. However, there are data discrepancies that need to be explored.

Researchers received a total of 969 data on goods storage in warehouses. The data examined to determine data discrepancies is stock data and "Feb sales" data. Stock data is goods data for February-March 2024, while "Feb sale" data is the term used by the company to refer to data on remaining stock of goods from the previous month recorded in the March-April 2024 report.

Data discrepancies are calculated by calculating the difference between the "Feb sales" data and the previous month's stock data. This inventory discrepancy can indicate various situations, such as damage, loss, recording errors, or even theft[10]. A total of 320 data were examined, and 121 data were found which showed discrepancies between stock data and "Feb obal" data. The following is an example of a data summary table:



**Table 2. Data on Stock of Goods in Warehouses in the System for February-March and March-April**

No.	Material name	Obal Feb (Stock Data for February-March in the March-April system report)	Stock Data for February-March	Difference
1.	LETTER PUNCH HURUF A	20	20	0
2.	ANTI KARAT WD-40	2	118	-116
3.	AMPLAS NO. 1	521	532	-11
4.	BAND EYZER	4	4	0
5.	ALUMINA NOZZLE NO.6	89	123	-34
6.	GASLEN ALUMINA NO.7	655	655	0
7.	CARBON STEEL GRINDING STONE 5" X 6 MM	42	560	-518
8.	CARBON STEEL GRINDING STONE CUT 5" X 6 MM	7557	11892	-4335
9.	GAS ARGON WG 6 M3	11050	11350	-300
10.	JARUM ARGON 2.4MM	2492	3930	-1438
320	GTAW SS WELDING WIRE A5.22R316LT1-5 2,2MM NIKKO STEEL	21	21	0

**Source: (Data Processing Results, 2024)**

### 3. Maintenance

Maintenance is a logistics and equipment maintenance activity so that its condition remains guaranteed and ready for use. Warehousing guidelines or Standard Operating Procedures (SOP) for PT XYZ maintenance include:

- a. In order to control the risk of damage to goods, the company implements a 5S or 5R culture (Seiri or Summarized, Seiton or Neat, Seiso or Resik, Seiketsu or Careful, Shitsuke or Diligent)

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- b. The warehouse applies the FIFO (First In, First Out) method to regulate the entry and exit of goods and prevent damage to goods, such as rust due to prolonged storage in the warehouse.

4. Distribution

Distribution is the process of releasing and distributing logistics and equipment from the warehouse to be handed over to those entitled to it, through an accountable handover process, accompanied by proof of handover. Warehousing guidelines or Standard Operating Procedures (SOP) for PT XYZ maintenance include:

- a. Distribution of goods is carried out based on requests from the engineering department and clients.
- b. When there is a request for goods entering or leaving the warehouse, the warehouse admin will make a Goods Request Note (NPB).

**MATERIAL REQUISITION ORDER**  
 NOTA PERMINTAAN BARANG

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No. PURCHASING: \_\_\_\_\_ Project: \_\_\_\_\_  
 (Supplies No.) (Fixed Equipment)  
 (Date) MATERIAL CONTROL: \_\_\_\_\_ WAREHOUSE: ALAT KIRILAN  
 (Date) (No. Sp.) (General) (No. Sp.) (Service)  
 MRO No. \_\_\_\_\_ Project No.: L01-00411.24  
 (No. Proyek) (No. Proyek)  
 Date: 25 May 2023

No.	ITEM CODE (Kode Barang dan Spesifikasi)	DESCRIPTION	QTY	UNIT	SCHEDULE (Date Delivery)	REMARKS (Keterangan)
1	2	3	4	5	6	7
1	MONITOR LED 18 LG - 108MS	ATK 18"	1	Lbs	25-May-23	For Engineering
2	SOLENOID VALVE - BRAY - SM A 812207 / 0.3 W	Instrument	1	Unit	25-May-23	
3	POSITIONER VALVE - BRAY - SMDRS-0200N009AD / 1.2" NP	Instrument	1	Unit	25-May-23	Pengganti yang rusak
4	Spare Wound Gasket #160 - CS	Gasket DN 40	12	Sa	25-May-23	
5	Tube - SS	Material 1.2" Thk 1.0	1	Balang	25-May-23	
6						
7						
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16						

Marketing / PFM  
 PPM  
 Production  
 QA/QC  
 Quality

Approved by: \_\_\_\_\_ Retained by: \_\_\_\_\_ Checked by: \_\_\_\_\_ Requested by: \_\_\_\_\_  
 Date: 25 May 2023 Date: 25/05/2023 Date: 25/05/2023 Date: 25/05/2023

Figure 1. Goods Receipt Note PT. XYZ

Sumber: PT. XYZ

- c. To send goods to customers, companies are required to produce legal documents or travel documents as legal proof that the goods have been sent.



## 6. Elimination

Write-off is an activity of destroying logistics and equipment in the context of freeing state property or assets from responsibility based on applicable laws and regulations. Warehousing guidelines or Standard Operating Procedures (SOP) for the removal of PT XYZ include:

- a. PT. XYZ will first confirm with the client regarding the collection of items that cannot be reused.
- b. PT. XYZ implements a policy of removing goods that cannot be reused from the warehouse and selling them.

The problems that exist at PT. XYZ is basically the same as the problems found in Efrataditama and Wigati's (2016) research, namely that the process of searching, retrieving and storing goods becomes difficult because there is no clear grouping, therefore an appropriate alternative warehouse layout is needed to overcome the existing problems. now and simplify the process of searching and storing goods. The author suggests that large items be placed near the outer door of the warehouse, and small items placed in the middle of the warehouse. This solution is designed to prevent loss of items because large items tend to be more difficult to retrieve. Apart from placing goods, to prevent the problem of theft of goods, the author suggests installing CCTV in the warehouse to increase warehouse security. This is intended to reduce the chance of discrepancies in stock data in the warehouse.

Another problem identified based on observations is that the temperature in the warehouse is very hot, especially during the day, making workers feel uncomfortable. According to the World Health Organization (WHO), the ideal room temperature for health is between 18°C and 24°C. Temperatures above 24°C can cause discomfort and harm your health. Therefore, to reduce the hot temperature in the warehouse room, the author recommends that PT. XYZ installed a cool roof. A cool roof is a roof coated with a water-based acrylic coating with high reflectivity and emissivity characteristics. This layer is applied by coating the entire surface of the roof (Seifhasemi, 2017). Cool roofs work by reflecting solar radiation and releasing heat back from the roof to the environment. Apart from reducing heat, another benefit of

a cool roof is energy efficiency because it can reduce the need for cooling equipment in the building.

## **CONCLUSIONS AND SUGGESTIONS**

PT XYZ, a company operating in the construction and manufacturing sector, has implemented most of the principles of good warehouse management. The application of these principles includes aspects of receiving, storing, maintaining, distributing, controlling and writing off goods. However, in an effort to achieve more optimal warehouse management, there are still several aspects that need to be improved, especially those related to the placement and security of goods in the warehouse.

The analysis carried out shows that there is a mismatch in stock data between the system records for February-March 2024 and March-April 2024 in the warehouse. This data discrepancy can indicate potential loss of goods, damage, or recording errors. To overcome layout and security problems, researchers recommend several improvement steps, including:

1. Grouping items based on size: Large items should be placed near the warehouse door to make the transportation process easier.
2. Installation of CCTV: CCTV can improve surveillance and security in the warehouse, thereby minimizing the potential for loss or damage to goods.
3. Installation of a cool roof: A cool roof can help reduce hot temperatures in the warehouse, thereby increasing comfort and health for workers.

The implementation of these improvement measures is expected to increase the effectiveness and efficiency of warehouse management at PT XYZ, thereby contributing to improving the company's overall performance. It is important to note that the recommendations given need to be adapted to the specific conditions at PT XYZ.

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