EFFICIENCY ANALYSIS THE APPLICATION OF WAREHOUSE INVENTORY POWERAPPS WITH VALUE STREAM MAPPING (VSM) METHOD AT PT. CAMERON SYSTEMS BATAM

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Abstract. This research discusses the efficiency analysis of the warehouse inventory powerapps application in the raw material process warehouse department at PT Cameron Systems Batam. In this study, the raw material process is still experiencing problems in the process of searching for goods and documentation systems that are still manual. for this reason, it is necessary to identify waste processes and analyze the extent to which the warehouse inventory powerapps application affects the raw material process in the warehouse. This research uses a qualitative approach by using the Value Stream Mapping technique as an analytical tool. The data collection techniques used are interviews, documentation and observation. The results of this study are the total percentage of value added time in the Future State Value Stream Mapping condition has increased from the Current State Value Stream Mapping condition, namely from 33% to 41%, an increase of 8% with time from 109 minutes to 89 minutes. The total percentage of non-value added time in the Future State Value Stream Mapping condition has decreased from the Current State Value Stream Mapping condition, namely from 67% to 59%, a decrease of 8% with a total time in the Current State Value Stream Mapping condition of 218 minutes to Future State Value Stream Mapping of 128 minutes so that it has decreased by 90 minutes.

Keywords: Value Stream Mapping, raw material, warehouse, waste process.

1 Introduction

Manufacturing companies definitely need warehouse facilities as an integral component in the manufacturing business that helps maintain a smooth production and supply chain. PT Cameron A Schlumberger Company is a manufacturing company that produces oil and gas pressure control equipment, including valves, wellheads, controls, chokes, blowout preventers and assembly systems for oil and gas drilling, production and transmission (Wellhead Spare parts and Christmas Tree). The company uses the Make-to-Order (MTO) production system, which means that the production process will be carried out after receiving orders from consumers.

Fig.1. warehouse condition before digitalization
(Source. Personal documentation 2022)

Based on the condition of the warehouse at PT Cameron Systems Batam above, which is still very far from being effective in supporting the productivity of a warehouse for storing and issuing goods. In this warehouse work area, especially in the raw material process, the problem often faced by warehouse operators is the search for goods that takes quite a lot of time because the goods accumulate in pallets and are difficult to find because the search is done manually, the absence of standardization in the management of these goods, has an impact on the retrieval of goods that have a great opportunity to be confused.

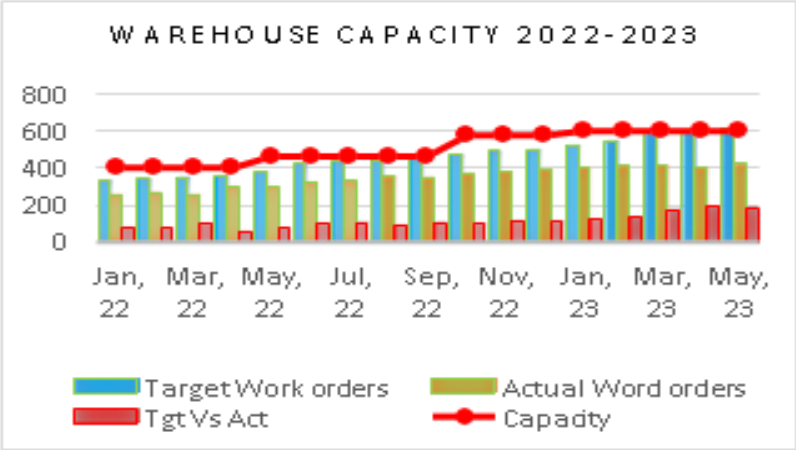

Table 1.1 Warehouse Capacity Chart Table
(Source. PT. Cameron System Chart 2022-2023)

Through the bar chart above, it explains that the warehouse conditions are still not effective throughout 2022 until mid-2023. The blue diagram explains the total work orders released to the warehouse which has an average of around 463 Work Orders, while the green diagram is the actual result of the performance achievement of the warehouse which has an average of around 350 Work Orders, and the red diagram is the comparison of the actual total achievement and the predetermined target which has

an average of around 113 Work Orders, finally the line diagram above is the total capacity that can be accommodated by the company.
Based on the description above, there are several obstacles that show the lack of effectiveness of warehouse work before the application of the information system, which resulted in not achieving the target of working on Work Orders, to work on one work order the operator needs 16.5 minutes for the process of finding a place to store goods, especially in preparing raw materials for GV, HWO FLS, 3.12, 5K FG, P / C, U-EE-2 + 3G-2 * where this product requires a lot of raw materials or components.
Based on this, an information system "Warehouse Inventory Power Apps" is needed which will be able to support the warehouse management process which is much more effective and efficient.

Researchers chose the Value Stream Mapping method in the data processing carried out to describe each step in the production process of goods

or materials. Therefore, this researcher decided to use the Value Stream Mapping method in mapping the flow of material processes, especially in the warehouse work area, namely in the raw material process. Furthermore, to assess the proportion of each warehousing activity as Value Added (VA), Non- Value Added (NVA), and Necessary Non-Value Added (NNVA). The reason for using Value Stream Mapping is because this method is often applied in lean manufacturing practices, allowing companies to detailed map the production flow to identify potential waste literature review

2. Literature Review

2.1 Definition of Warehouse

A warehouse is a place where parts, materials, and goods are temporarily stored for production purposes or to support the production process. According to the Warehousing Management Institute (2008), a warehouse or warehousing is a storage location that serves as a starting point for storage before the goods are processed further. The presence of a warehouse in a company signifies a fairly large scale of production, so managing the flow of goods in and out and managing stock becomes crucial. Therefore, warehouses are an important solution in creating effective and efficient planning regarding the availability of a company's production.

2.2 Powerapps Basic Concepts

Basic Concept of Power Apps Microsoft PowerPlatform is a product of Microsoft Corporation that consists of four applications Power Automate, Power Apps, Power Bl, and Power Virtual Agents. In this case, the use of applications from the Microsoft Power Platform can be combined with each other, allowing companies to increase the

productivity and efficiency of their processes through targeted use. One of the products of the Microsoft PowerPlatform is Power Apps. Power Apps is a platform that allows users to develop small applications with relatively little effort. It allows orchestration of applications according to the type of construction kit. Apps are developed in a simplified way like visual app design, and without the classic, manual programming. Powerapps can connect to any type of online or local data source such as Cloud, Share Point, Microsoft 365, SQL and can even connect to APIs and so on.

2.3 Value Stream Mapping

According to research by Mike & John (2003), Value Stream Mapping is a method used to illustrate the production and information path of a product or group of products from start to finish, not only in each work area, but also throughout the production process. The main focus is to identify activities that add value and those that do not.
Visually, Value Stream Mapping depicts the overall flow of materials and information, starting from the receipt of raw materials from suppliers to the production process, and until the delivery of products to end consumers.

2.4 Waste Process

According to Suhartono (2007: 13-14), in the Toyota Production System (TPS) there are seven wastes in the production process, which are as follows:

1. Overproduction
2. Waiting
3. Transportation
4. Excess Process
5. Inventories
6. Motion
7. Defects

3 Research Methods

3.1 Location and Object Research

The location of this research was carried out at PT Cameron System Batam in the *warehouse department* to be used as a reference source. So the researcher chooses the object of his research, namely the efficiency of the *Powerapss Inventory warehouse* application.

3.2 Research informants or subjects

Informants or sampling in this study are warehouse Supervisor, warehouse TeamLeader, and warehouse Operator.

3.3 Data Collection Techniques

1. Interview
2. Observation
3. Documentation

3.4 Data Analysis Technique

VSM is a method used to identify opportunities to improve production work processes that do not add value. When discussing waste, it is easier to understand it by defining activities in the production process into three different types of activities, and dividing these activities into:

1. Value added activity (VA)
   All activities in the production process that add value are directly sourced from the customer perspective.

2. Non-value-added activity (NVA)
   All activities in the production process that do not add value are directly sourced from the customer perspective.

3. Necessary non-value added activity (NNVA)
   Any activity in the production process that does not add value directly from the customer's perspective, but is still necessary, is generally difficult to eliminate quickly.

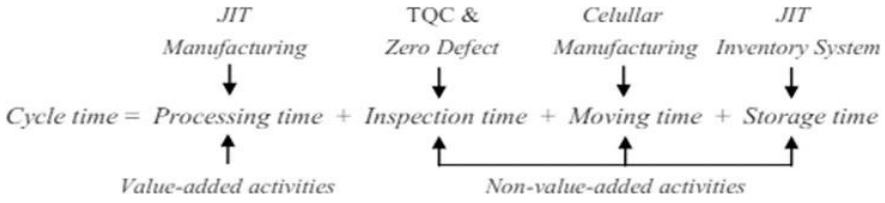

Fig.3. VA,NVA,NNVA concepts
(Source. Mulyadi (2001) and Bambang (2010)

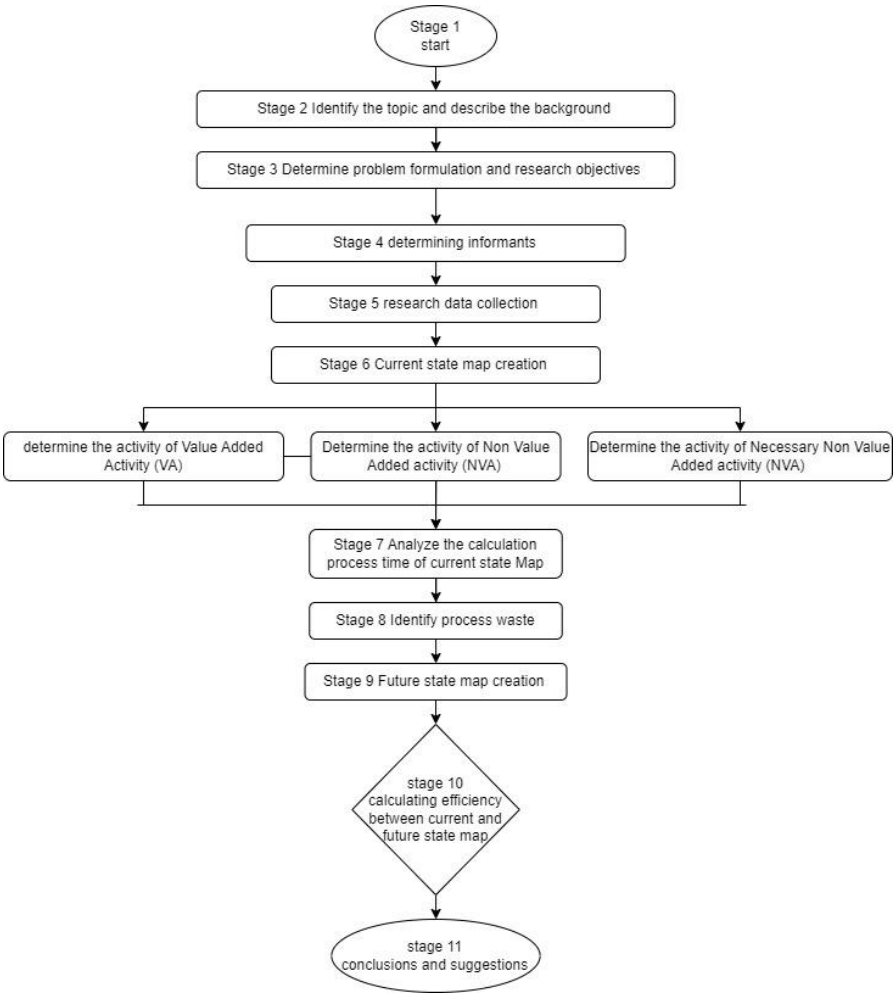

Fig.3.1. flowchart of data analysis techniques
(Source. Personal Data processed with Microsoft Office, 2024)

4 Result and Discussion

4.1 Current State Value Stream Mapping

The process of identifying VA, NNVA and NVA at PT Cameron was carried out through a thorough analysis of the entire value chain in the raw material process. The

first step is mapping the entire raw material production process using Value Stream Mapping (VSM).

Category	Time (Minute)	Percentage
NNVA	126	39%
NVA	92	28%
VA	109	33%

Table 4.1 Current Total comparison of VA, NVA, NNVA
(Source. Personal Data processed with Microsoft Office, 2024)

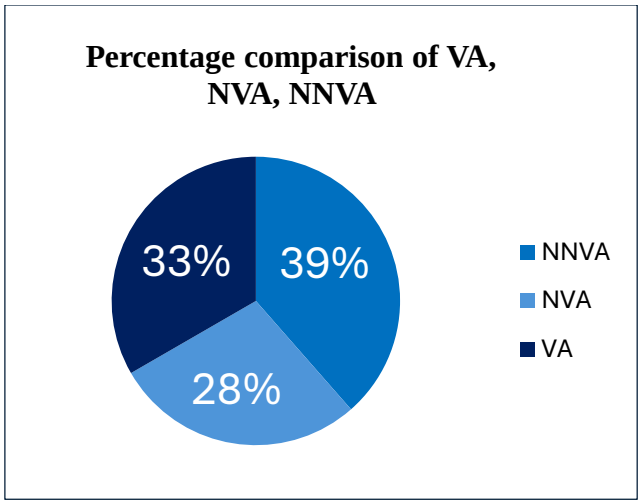

Table 4.2 Percentage comparison current of VA, NVA, NNVA values on Raw Material
(Source. Personal Data processed with Microsoft Office, 2024)

Current Value Stream Map pada kegiatan Procurement Raw Material Waktu yang dibutuhkan pada proses pengadaan raw material adalah adalah 327 menit jika dikonversikan dalam hari adalah 5,45 jam. Pada proses ini menunjukan bahwa presentase value added time sebesar 33%,nonvalue added time sebesar 67% dengan rincian necessary but non value added sebesar 39% dan non value added sebesar 28% dengan total value added time pada kegiatan ini sebesar 109 menit , sedangkan total nonvalue added time sebesar 218 menit.

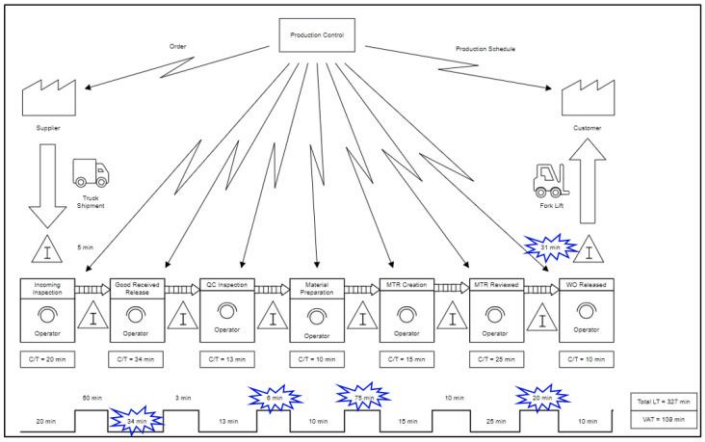

Fig.4.1. Current Value Stream Mapping procurement raw material
(Source. Personal Data processed with Microsoft Office, 2024)

4.2 Identify Waste in raw material procurement activities

In the context of production, "waste" refers to any activity that consumes resources but does not add value to the final product or service produced.
Waste processes found in raw material procurement activities are identified in the following stages:

1. The process of searching or identifying goods by the warehouse to find the appropriate shelves to place raw materials takes about 25 minutes; the planner's process of searching and checking raw materials to identify goods takes 30 minutes; the warehouse takes 16 minutes to find the location of the material according to the schedule given by the planner (71 minutes in total).

2. The manual data entry process is when the warehouse team needs to record the receipt of goods and when the material handler needs to input the work order number into the excel spreadsheet, totaling 35 minutes.

4.3 Causes of Waste

Fishbone diagram is a tool to identify potential causes of a problem and analyze the

problem. The fishbone diagram was created based on the results of interviews with procurement employees. The following is a fishbone to describe the root cause of the waste problem that occurs in procurement

1. **Item search or identification process**

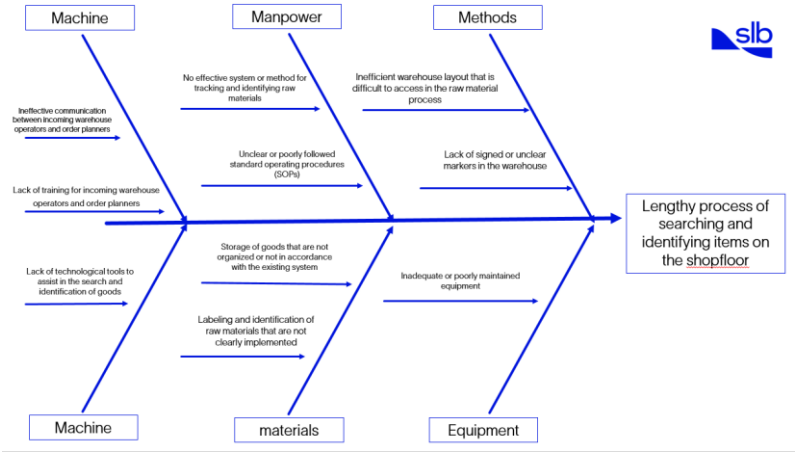

Fig.4.2. Fishbone Process of searching or identifying goods
(Source. Personal Data processed with Microsoft Office, 2024)

2 **Item search or identification process**

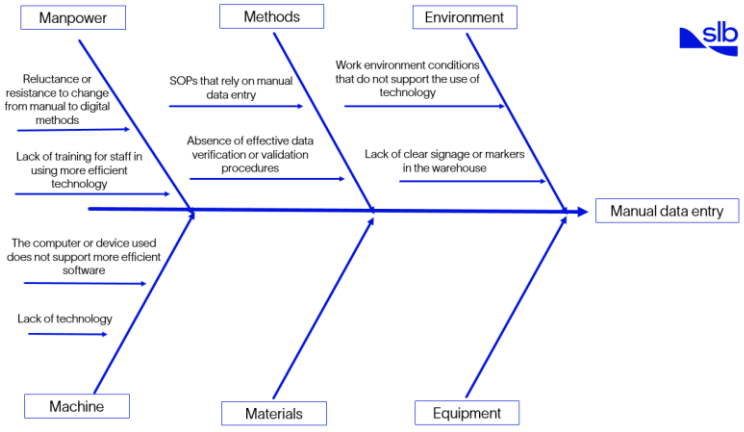

Fig.4.3. Fishbone Manual data entry process.
(Source. Personal Data processed with Microsoft Office, 2024)

4.4 Proposed Improvements

we have identified various root causes of waste in raw material procurement activities at PT Cameron. There are two main areas that are the focus of the analysis: the process of searching and identifying items, and manually inputting raw material data. To overcome these problems and improve operational efficiency, here are some suggestions that can be implemented:

a. Replace manual data entry with a digital system to reduce errors and speed up the data entry process.
b. Implement a well-integrated IT system to support real-time material search and identification.
c. Adopt modern technology such as barcode scanners or RFID systems to speed up the process of identifying and tracking goods.

4.5 Future State Value Stream Mapping

Future State Value Stream Mapping is a proposed improvement of the current state value stream mapping by eliminating activities that are considered waste. Future State Value Stream Mapping is created based on the proposed improvements that have been made.

Category	Time (Minute)	Percentage
NNVA	102	47%
NVA	26	12%
VA	89	41%

Table 4.3 Future Total comparison of VA, NVA, NNVA
(Source. Personal Data processed with Microsoft Office, 2024)

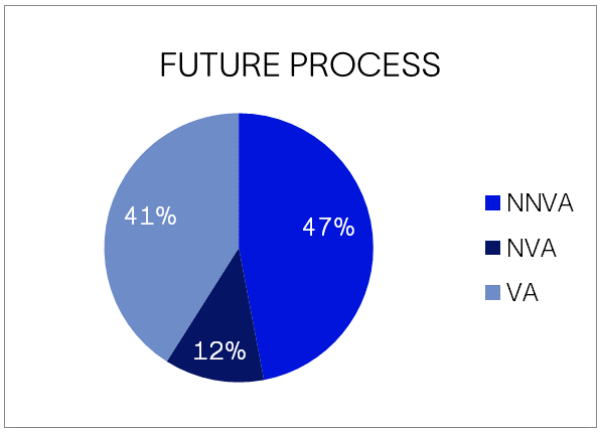

Table 4.4 Future percentage Total comparison of VA, NVA, NNVA
(Source. Personal Data processed with Microsoft Office, 2024)

Future state value stream mapping shows that the total percentage of value added time is 41%, while the total percentage of non-value added time is 59% with details of non-value added time of 12% and necessary non-value added time of 47% with a total value added time of 89 minutes, while the total non- value added time is 129 minutes.

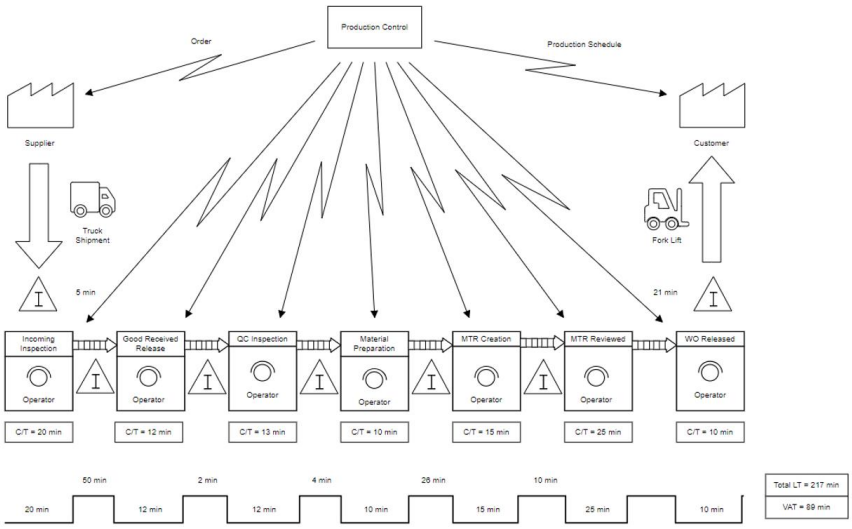

Fig.4.4. FutureValue Stream Mapping procurement raw material
(Source. Personal Data processed with Microsoft Office, 2024)

4.6 Difference between Current State Value Stream Mapping and Future State Value Stream Mapping on Raw Material Process

This section explains the difference between Current State Value Stream Mapping and Future State Value Stream Mapping in procurement which includes percentage of value added time, percentage of non-value added time, total value added time and total non-value added time.

	Current State Value Stream Mapping	Future State Value Stream Mapping
Percentage of *value added time*	33%	41%
Percentage of *non-value added time*	67%	59%
Total value added time	109	89
Total Non value added time	218	128

Table 4.5 Difference between Current and Future State Value Stream Mapping
(Source. Personal Data processed with Microsoft Office, 2024)

The total percentage of value added time in the Future State Value Stream Mapping condition has increased from the Current State Value Stream Mapping condition from 33% to 41%, an increase of 8% with a time from 109 minutes to 89 minutes.
The total percentage of non-value added time in the Future State Value Stream Mapping condition has decreased from the Current State Value Stream Mapping condition, namely from 67% to 59%, a decrease of 8% with a total time in the Current State Value Stream Mapping condition of 218 minutes to Future State Value Stream Mapping of 128 minutes so that it has decreased by 90 minutes.

5 Conclusions and Suggestions

In an effort to improve operational efficiency and productivity at PT Cameron, an in-depth analysis was conducted on the raw material procurement process using Value Stream Mapping (VSM). The main findings of this analysis showed that the total raw material procurement time was 327 minutes, with the percentage of Value Added (VA) time at 33% and Non Value Added (NVA) time at 67%. Major wastes were identified in item sourcing and manual data entry, resulting in decreased efficiency.
The proposed improvements involved the implementation of a digital system to replace manual data entry, the use of an integrated IT system for real- time material search and identification, and the adoption of modern technologies such as barcode scanners or RFID systems. The implementation of these improvements successfully reduced the total procurement time to 217 minutes, increased the percentage of VA time to 41%, and decreased the percentage of NVA time to 59%.

Overall, the implementation of more modern technology and digital systems at PT Cameron has proven to significantly improve operational efficiency. This not only reduces non- value-added time but also increases the company's productivity. The reduction of inefficient time and increased accuracy in inventory management demonstrate the success of this strategy in creating more effective and responsive business processes.

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