ERP System As A Inventory Control And Waste Elimination (Pt Vif Case Study)

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***Abstract* —** *The presence of excess inventory in the main fabric and finished products as well as replication activities in several departments at work caused by the absence of an integrated system, so the need for the implementation of the ERP system is expected to be the solution of problems in a company. Based on the background of problems, the study aims to design a business blueprint as a description of the business processes used in accordance with the scope of the ERP system and making design so it can be used during system development.*

This study used an exploratory descriptive method with qualitative and quantitative approach, where the analysis results obtained are useful for the development of the system. With the establishment of the design of the ERP system will be able to solve the existing problems, because the ERP entire data centers in a single database so that activity - the next activity is done by calling the data for the previous processes. With ERP systems can also reduce errors - errors made by labor in the process of data input.

Keywords — *ERP, Waste Elimination, overstock, Unified Modeling Language, fishbone*

I. INTRODUCTION

A. Background

Currently manufacturing companies are working to improve performance in producing products that are on time. Control of raw materials by exchanging information with suppliers. In order for the manufacturing industry to be more competitive, the industry needs an integrated information system that is able to provide comprehensive information to management to make managerial decisions accurately.

To achieve this goal, an Enterprise Resource Planning (ERP) system is needed, according to Somers & Nelson in Sumner (2003) that ERP is software that is used for data management and helps in organizing with supply chain, revenue, inventory management, customer order management, production planning, shipping, accounting, Human Resource Management, and other business functions. [1]

According to Djahidin (2018) that "system users assess both the quality of information produced in the form of 100% for the subject (i.e. in the form of presentation / format, understanding, and relevance), 92% on object criteria (i.e. complete, timeliness, and access), and 88% for process criteria (i.e. in the form of accurate and place time) [2]. Meanwhile, according to Tiara et al. "ERP implementation can improve performance in providing fast service and data exchange" [3].

With an ERP system, companies begin to realize that to achieve the company's vision needs to be supported by information technology on the importance of integrated data. The advantages of integrated data usage include eliminating waste. One of the many wastes that occur in companies or the industrial world is the level of excess inventory which is considered as a process that does not provide added value, besides that the work activities carried out repeatedly.

This situation also occurred in PT VIF, which had excessive inventory in terms of main fabric and finished products. In addition, there are activities that are carried out repeatedly in work in several departments due to the absence of an integrated system.

B. Research Problems

a. identification

Based on the background of the problems in this study, the problems that can be identified are:

1. Still using Microsoft Excel in inventory control, so that when the data displayed on a system is very large, the GUI process is getting harder and slower
2. the use of excel in controlling inventory is very difficult to do, because it cannot be opened simultaneously in the update process, because it will have read-only status for files that are opened simultaneously

b. Restricting the problem

1. The drafting applied to PT VIF includes the following business functions:
   a. The ERP system design to be built is in the Material Inventory Row and Production area
   b. Designing PT VIF's business report design
2. The programming language used is the PHP program language

c. Formulation of the problem

The main problems that will be examined in this study are:

1. How to identify waste sources and overstock problems?
2. How to design and create an ERP system that suits the needs of manufacturing industries at PT VIF?

d. Research purposes

Based on the formulation of the problem, the objectives of this study are:

1. identify inventory problems
2. design ERP systems and ERP software that can be used to minimize repetitive work activities in business processes at PT VIF

e. Benefits of research

The benefits of this study are expected to be able to:

1. Get the information needed in the Sales Order Management and Purchasing Management module at PT VIF.
2. The company has an overview of the business process of the Sales Order Management module and Purchasing Management which is used as a reference for designing ERP systems.

II. LITERATURE REVIEW

A. ERP

ERP is a system that enables the integration of information flows and business processes in functional fields within the company so that they are able to share data together, and can access data in real time. In recent years many new concepts and related software to complement the functions of ERP systems include Supply Chain Management (SCM), Customer Relationship Management (CRM), Product Life Cycle Management (PLM), e-procurement, Financial Management (FM) , Business to Business (B2B), Business to Customer (B2C), and others. (Khanna & Gupta, 2012) [4].

ERP functions to integrate individual functionalities from systems such as manufacturing, finance, procurement and distribution. The system also allows companies to make changes to existing information systems and also helps to standardize management information flows and has been considered the next step in the evolution of MRP-II, besides that ERP also helps integrate data in organizations in a common platform (Yusuf et al, 2004) [5].

According to Uram (2008) argues that there is a set of computers or what is called an ERP infrastructure that is needed consisting of [6]:

1. Physical Component
2. People
3. Organization Process

B. Framework

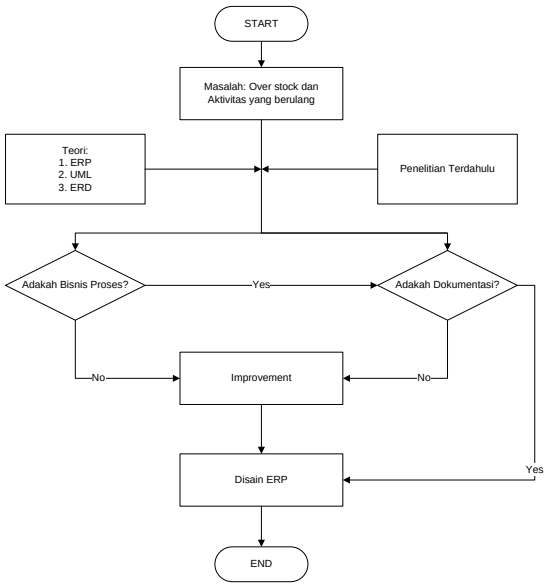

Fig. 1 Flowchart of Framework

C. Design and Research Approach

The research carried out was a process from Customer Order to Production at PT VIF in a descriptive exploratory manner. The research method used in this study uses a qualitative and quantitative approach, where the results obtained are analyzes that are useful for system development.

The selection of research methods is considered for three conditions, namely the type of research question proposed, the control that the researcher has over the events that will be examined and the focus on the ongoing events.

D. Data analysis

a. Business process

This analysis is used to identify the mechanism of work that is currently done at PT VIF, so that activities can be identified that are inconsistent and carried out repeatedly so that they can be eliminated.

b. Fish Bone Analysis

This analysis is used to identify possible causes of problems and especially when teams tend to fall into thinking in routines. In this case it is waste that occurs like activities that are carried out repeatedly so that it requires longer time and the possibility of human error which eventually causes overstock in the inventory. [7]

c. Inventory Analysis

This analysis is used based on the investment value of inventory used in one period. Usually these supplies are divided into three classes, namely A, B, and C so that this analysis is known as the ABC Classification

d. Calculation of Effectiveness and Efficiency

This analysis is used to find out how much the level of efficiency and effectiveness of each department in a single request the customer order to the production process. [8]

III. RESULT AND DISCUSSION

A. PPIC Process

Based on the PPIC process can be explained about the problems that exist in the current business process, namely by giving a red mark for activity replication and yellow marks for inventory data.

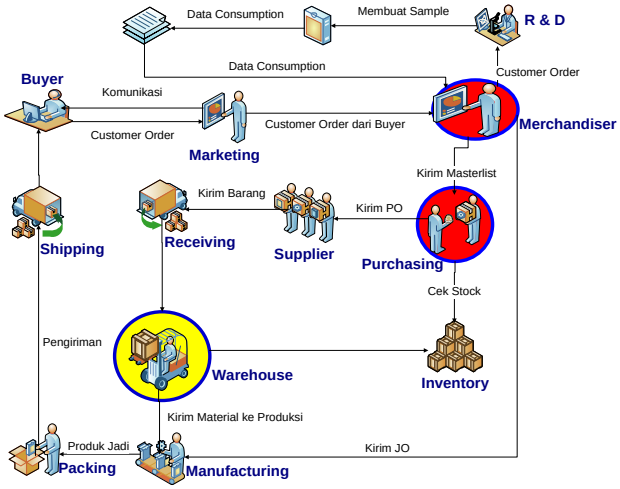

Fig. 2 PPIC Process

B. Current Materials Merchandising and Purchase Order

After obtaining the supporting data, the next step is the document making process of Flow Merchandising. This is the first step as a basis for knowing the ongoing process, investigating and identifying existing problems.

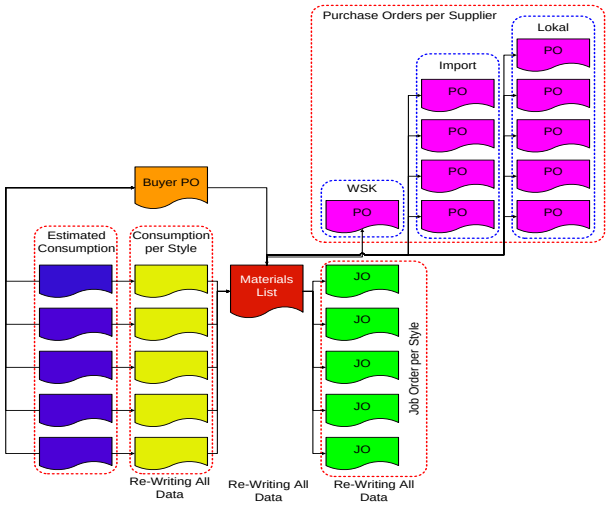

Fig. 3 Recurring Activities in Materials Merchandising and Purchase Orders

C. Problem analysis

With the collected data needed, the next process is to analyze each data presented above in order to get a clear picture of the data presented, so as to provide improvements in the future.

a. Business Process Analysis

To avoid overstocking and replicating activities in the future, then based on the analysis that has been carried out there needs to be a change in the business process using an ERP system. Based on the results of observations made, there are some problems that can lead to replication of activities so that it can lead to overstock and can be prevented by an ERP system, namely as follows:

1. Making a Job Order

Making this Job Order was initially carried out after the completion of the materials list was formed, so that the process of creating a Job Order must wait (idle time). Because of that, it is necessary to analyze the changes in the running business process, namely by making a Job Order that can be done at the beginning after the consumption process is completed and the PO Buyer is received by PT VIF. So there will be no more idle time activity.

With an ERP system, creating a Job Order can be done by calling the Buyer PO data and Consumption data, so that it can eliminate the replication of activities and eliminate human errors in the data input process.

2. Making Materials List

Making Materials List is the initial stage before the research is carried out after the Buyer PO and Consumption stages are received, so that subsequent processes must wait for the stages to be completed. To overcome idle time, it can be analyzed that the process of making Materials List can be done with an ERP system autogenerate from the results of making a Job Order and Buyer Purchase Order, so that it can eliminate waste in the form of activity replication, idle time, and human error.

3. Making Purchase Order

Prior to the existence of an ERP system, making Order Mail was done by repeating activities taken from Materials List. Based on the results of observations made, using an ERP system for making Mail Orders can be done autogenerate from the results of Materials List, so that it can eliminate non-value added activities.

With an ERP system, making Letter Orders for the same material can be combined, so that it can follow the MOQ and / or MCQ (Minimum Color Quantity) so that it can inspect overstock.

4. Material Acceptance

Before the existence of ERP, material acceptance was carried out by repetition of activities. Based on the results of

observations made, using an ERP system basically making material acceptance can be done directly from the results of the Order Letter data input, so that it does not re-input data and can eliminate non-value added activities.

b. *Business Process Analysis*

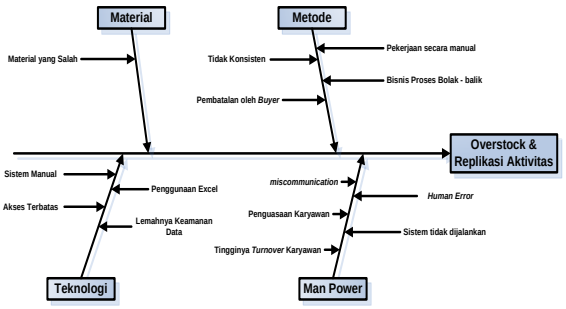

Fig. 4 Fish Bone

From the analysis above, the ERP system can eliminate waste in the form of: activity replication, waiting time, material errors due to incorrect input data ordering, human error in the data input process, all departments can access data simultaneously and in real time. , the next step is to analyze 5W + 1H for improvement plans, as in the table below.

TABLE I
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What	Why	Where	When	Who	How
Metode	Pekerjaan bersifat manual	Seluruh Departemen	2014	Seluruh Departemen	Pembuatan Sistem ERP
	Tidak konsisten				
	Aktivitas yang berulang				
Teknologi	Sistem Manual	IT	2014 - 2015	IT	
	Akses data terbatas				
	Penggunaan aplikasi Spreedsheet				
Man Power	Miscommunication	Seluruh Departemen	2015	Seluruh Departemen	Memberikan pelatihan penggunaan sistem ERP
	Turnover karyawan				
	Human Error				
	sistem				
	Penguasaan karyawan terbatas				

D. *Future Materials Merchandising and Purchase Orders*

After making the current Materials Merchandising and Order Letter, as well as analyzing the process with no added value identified, the next process is a description of the process that has been repaired so as not to replicate the activity. The following are pictures of Future Materials Merchandising and Letter of Order as a result of improvements that researchers have made

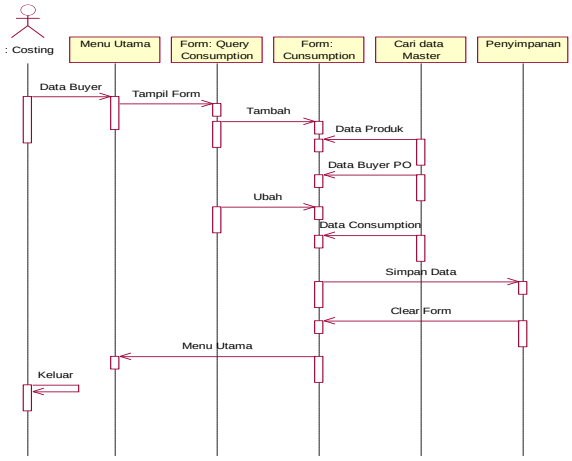

Fig. 5 Plans for Activities on Materials Merchandising and Mail Orders

E. UML

a. Input Data Consumption

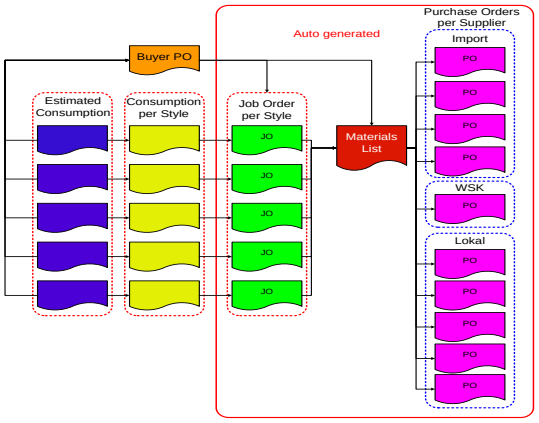

Fig. 6 Diagram Input Data Consumption

b. *Input Job Order*

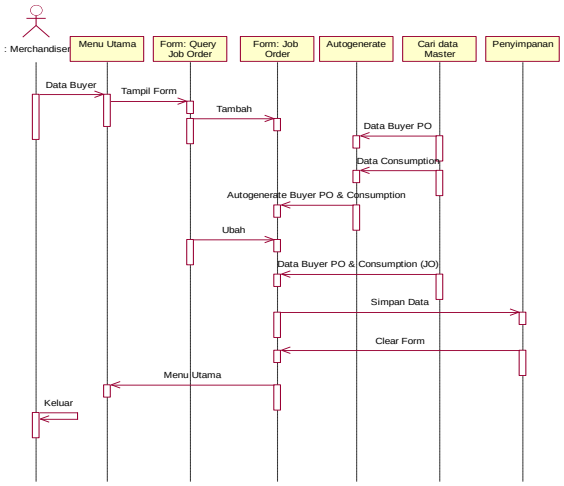

Fig. 7 Diagram Input Data Job Order

c. Input Materials List

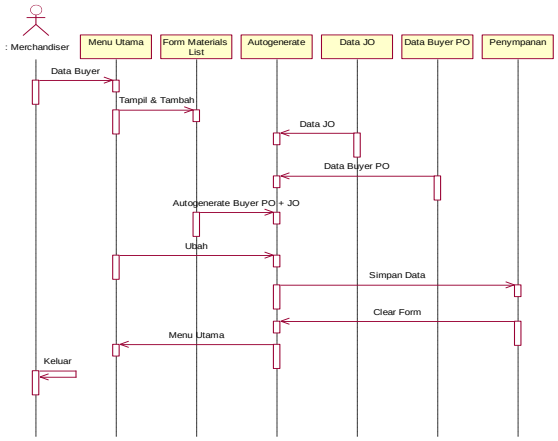

Fig. 8 Diagram Autogenerated Materials List

From the discussion above, it can be explained about what can be eliminated from the waste that occurs, including the following:

a. Repeated activity
Before using the ERP system there will be replication of activities in the manufacture of Consumption per style, Materials List, Job Orders per style, Purchase Order, and Receiving. These activities are obtained from the process of copying data on the previous process. But if you use an ERP system, the activity is only limited to calling data on a single entry database.

b. Working time
Discussion on point "a. Repeated activities "above will ultimately reduce the length of work time when the company uses an ERP system when compared to activities carried out manually, so that employees can carry out other work activities and / or can do other personal development.

c. Minimize human error
Manually using the system will show the occurrence of human error which will later affect inventory. Human errors that occur can be in the form of incorrect input data when carrying out activities in the 5 (five) discussion above. By using an ERP system, input errors that occur will be detected earlier by subsequent processes so as to minimize process errors.

d. Production idle time
Discussion on point "a. Repeated activities "above will eventually lead to idle production time due to waiting for documents to be issued by the merchandsing department. But if you use an ERP system, the production department can immediately check what materials will be used for the production process.

e. Number of employees
The use of ERP systems in companies, will automatically reduce the number of workers in departments that have used information systems.

F. ERP Advantages and Disadvantages

When a company uses an ERP system in the company's operations, there will be several benefits for the company and also losses.

Based on the results of the research that has been done, the benefits that will be obtained if using an ERP system include: (1) Minimizing data input errors made by employees, because the process carried out for data input is only one process and then only invokes data that has been inputted. [9] (2) Can eliminate replication of similar activities, because with the existence of an ERP system business processes use a common and similar database (Heizer et al, 2010) [10]. (3) Minimizing the number of workers, because with the use of ERP systems the work manually can be eliminated and use one click enough (Hurt, 2011) [11]. (4) Can know supplier lead time starts from sending Order Letter until supplier sends product to warehouse, so that later can know which supplier needs the fastest time to support the company's business process. [12] (5) Can minimize idle time in each department, because between departments can directly supervise ongoing business activities. [12] (6) Inventory conditions can be controlled and accessed by each department without any limitations, except on the basis of the limitations of each user's access rights. (7) Reducing costs incurred by the company, because using an ERP system in a company will be able to minimize the number of workers, minimize waiting time (idle time), and also can minimize timesupplier leads. [12]

In addition to the benefits obtained, there are also losses incurred with the use of ERP systems, namely: (a) If the initial process of an error occurs, it will affect the subsequent processes. (b) If the ERP system is made inhouse, then it takes a long time to make about 3 (three) to 5 (five) years (Poston et al, 2001) [13], while expensive ERP systems are needed. namely millions of dollars (Yusuf et al, 2004) [5].

IV. CONCLUSIONS

From the results of the research that has been done, it can be concluded that the root cause of the existing problems from the existence of overstock and replication of activities is the process of work carried out manually from business processes that are running on the activities of making Job Orders, Materials List, Purchase Orders, and Material Acceptance. With activities carried out manually and repeatedly, the level of human error in carrying out the work process becomes large so that it can result in invalid inventory data.

ERP system design has been built with features: (1) Customer Order that contains the number of orders given by the customer, (2) Consumption per style which contains the use of the material used when making product samples, (3) Materials List that contains entries the result of the merger of Job Order per Style and Buyer data, (4) Job Order per style is an autogenerated result between Consumption per Style and Buyer PO data, (5) Purchase Order which is an autogenerated result of similar material from Materials List data that refers Minimum Order Quantity and MCQ (Minimum Color Quantity). (6) Receiving which is the autorecieve result of a Purchase Order that has been formed.

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