INVENTORY MANAGEMENT IN AN MANUFACTURING INDUSTRY: A CASE STUDY

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***Abstrak*—Inventory control is significant to ensure smooth running of a company. Uncontrolled inventory would cause various type of problem to the company especially waste of costs, material and time. Good inventory would be able to certify the stock is always in a minimum level. The factor that should be taken in inventory control are policy demand that been practice and also system approach that been used. Thus, this study was to review the inventory management in manufacturing industry to identify the lack and also to improve efficiency in inventory management system in certain manufacturing industry field. Certain company in manufacturing is made studies in this study case. Based on the observation and information obtained, the best choices are on the cost of providing and lack of lowest cost; because it would provide the lowest average in total costs although the value such as holding costs and inventory level are high. In addition, this study also shows the pattern of demand conducted by organization in determining the best approach like Economic Order Quantity model (EOQ), Material Requirement Planning (MRP) and Just-In-Time (JIT) system to improve inventory management system.**

***Keywordi*— Case Study, Inventory, Material Requirement Planning, Manufacturing Industry.**

I. INTRODUCTION

IN a manufacturing activity, inventories control plays an important role in ensuring the smooth running of a company. The world market forced all organizations to compete not only in price or quality, but also in technology, innovation, reliability and information technology. Good inventory control can not only save costs but also helps the organization to serve the demand of their customers quickly and efficiently. Inventories represent investment designed to assist in production activities and/or serve customers, without any doubt, inadequate supply of inventories may grind manufacturing operations into a halt [1]. Inventory management is not the same as management of resources those cannot be controlled, such as buildings, machinery and equipment because it is investment and difficult to make modification in a short time. In addition, the effect of inventory will cause problems such as the cost of store space, insurance costs, depreciation costs, damages, costs and cost out of stock, or purchase order. This problem can be overcome if the functions of inventory control system are understood properly[2, 3, 4, 5]

Every organization requires inventory for smooth running of its activities or we can say processes. The inventory is link between the production and the distribution process. The role of inventory management is to check the availability of material as and when required the quantity of the inventory and if it's possible to minimize the investment in inventory[6].

The main objective of this research is to identify key factors that influence the performance of inventory management, and to identify component of inventory management that possible to be improved from the existing inventory management system. The scope of study is:

- Collecting the necessary data that respect to inventory management in an industry.
- Study inventory management system used in the industry to identify the components of system those can improve efficiency.

II. LITERATURE REVIEW

The literature review is the first process in conducting any study. Previous studies explain the issues those need to be studied intensively. There are many sources to this literature review activity; some of them are journals, proceedings, books, articles, theses and patents.

Based on the literature study, many references discuss a Computer Aided Inventory Management System. The first stage in the development of Computer Aided Inventory Management System includes four modules incorporating analytical techniques for ABC analysis, forecasting and the calculation of economic batch quantity and reorder level. The next stage is forecasting demand and inventory management using Bayesian time series, where its focus is to discuss the development and evaluation of a forecasting model for inventory management in advanced technology batch. Then, the right inventory management approach of a purchased item is discussed.

Deng *et.al* identify the key factors that influence inventory management practices, investigate efficient and effective inventory management approaches, and examine the impact of supplier cooperation on supply chain improvement [7].

III. METHODOLOGY

Below is the list of the methodologies that briefly explains the work progress flow chart (Figure 1):

A. Find a Suitable Factory for a Case Study

For this study, XYZ Company was used as a case study industry. XYZ Company is located Bekasi, West Java, Indonesia. The company produces manufacturing and assembly components for DVD, LCD, CTV and Digital Cameras.

B. Collect Data

The information required for this study was the elements that are related to production such as raw materials, transportation system and material storage systems.

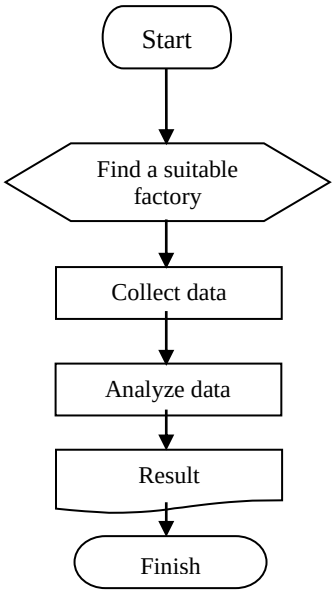

Figure 1. Methodology flowchart

C. Data Analysis

The data collected will be analyzed to make comparisons between the system used by the method of inventory management system and to the actual specifications. These data will be used as variables to compare with models of existing inventory. In addition some feedback about the lack of a used system are collected by interviewing employees until to the division level. Feedback will be reviewed and analyzed so that the next step can be implemented.

D. Result

The results of the analysis, including calculations, observations, and suggest the best method to do will be set to the industries involved. To present the results of the study and analysis was available, easily understood method is used to describe the results as tables, charts, and so on because this method is more efficient and can be understood clearly.

IV. RESULT AND DISCUSSION

A. EOQ Analysis

In most cases, XYZ Company has processing operation for 311 days each year. While the annual demand of 100,000 components, annual carrying cost is IDR 900 per component and the ordering cost is IDR 630,000. A working day is 311 days per year. Using a manual count of Economic Order Quantity model (EOQ), the optimal size of the request can be determined [8, 9, 10, 11]

C_c = IDR 900
C_o = IDR 630000
D = 100000 units

Optimal order size:

$$Q_{opt} = \sqrt{\frac{2C_oD}{C_c}}$$

$$= \sqrt{\frac{2(630000)(100000)}{900}}$$

= 11833 units

The total annual cost of recovery:

$$TC_{min} = \frac{C_oD}{Q_{opt}} + \frac{C_cQ_{opt}}{2}$$

$$= \frac{(630000)(100000)}{11833} + \frac{(900)(11833)}{2}$$

= IDR 127393200

Total order per year: $N = \frac{D}{Q_{opt}} = \frac{100000}{11833} = 9$

Order cycle time: $T = \frac{311}{9} = 35\ days$

However, if each day the plant producing 500 units the components, the optimum size of the request, the total cost of inventory, the period for receipt of the request, the number of requests each year and the maximum level of inventory can be determined by counting manually as follows:

$$d = \frac{100{,}000}{311} = 322\ units/day\ ; \qquad p = 500\ units/day$$

Optimal order size:

$$Q_{opt} = \sqrt{\frac{2C_oD}{C_c(1-\frac{d}{p})}} = \sqrt{\frac{2(630000)(100000)}{900(1-\frac{322}{500})}} = 19830\ units$$

Total minimum annual cost of preparation:

$$TC_{min} = \frac{C_oD}{Q_{opt}} + \frac{C_cQ_{opt}}{2}(1-\frac{d}{p})$$

$$= \frac{(630000)(100000)}{19830} + \frac{(900)(19830)}{2}(1-\frac{322}{500})$$

$$= IDR\ 35390$$

Production time: $\frac{Q_{opt}}{P} = \frac{19830}{500} = 40\ days/booking$

Total time production: $\frac{D}{Q_{opt}} = \frac{100000}{19830} = 5\ production/year$

Maximum inventory level:

$$Q\left(1 - \frac{d}{p}\right) = 19830\left(1 - \frac{322}{500}\right) = 7059\ units$$

Reorder point if the time ordered and received is 10 days:

$$R = d.L = (322)(10) = 3220\ units$$

B. Result and Comparison of Inventory System at XYZ Company

In order to increase the efficiency of inventory management systems, there are several factors that can be improved for long-term effects. If these factors are ignored, the efficiency of the inventory will be reduced and may result in the loss at the company.

Table 1.
Study result of inventory system implementation at XYZ Company

No.	Factors that influence the inventory system	System that implement in XYZ Company	Suggestions for Improvement
1	Environment	Storage is not in order, hot and dark.	Improve by adding more lighting to work with all employees more comfortable and safe.
2	Technology	Using the manual method to calculate and record the data of stock components in and out.	Make improvements by using a bar code (barcode) to avoid the mistakes quantity.
3	Systems and Procedures	Using the manual method to request and delivery of goods.	Using the online system to avoid confusion.

V. CONCLUSION

In general, inventory control is closely related to each process. Operating cycle usually occurs in a factory are (a) delivery of an item from the supplier. (b) delivery is usually in large quantities, it is subdivided into smaller units, (c) unit will be held in stock until needed, (d) customer provides to demand for the item, (e) goods are removed from stock when there is demand, (f) at the time, the order is made and accepted it.

The implementation of inventory system is very important for a certain manufacturing industry. The inventory system as a part of MRP systems has many benefits for the industry. Some of this benefits are (a) planning is very thorough in every process, whether at the initial stage till the delivery of products, (b) ensure that all required materials are sufficient, (c) the production done in time (no delay).

DAFTAR PUSTAKA

[1] S. O. Unyimadu. (2014). Inventory management practices in manufacturing firms, ISSN 2225-0581 [online]. Available: Industrial Engineering Letters, http:// www.iiste.org

[2] Q. Deng, H. Shen,, R. Lao, and S. Wu. (2017, April). A Case Study of Inventory Management in a Manufacturing Company in China [Online}

[3] *"A C*omputer-Aided Inventory Management System – Part 1: Forecasting" C. Liu, and K. Ridgway. Emerald (1996).

[4] "Forecasting Demand and Inventory Management Using Bayesian Time Series". T.A. Spedding, and K.K. Chan. Emerald (2000).

[5] "Principles of Inventory and Materials Management". In PTR 4th edition., R. J. Tersine. Prentice Hall. (1994).

[6] A. Sharma, and V. Arya. (2016, June). Study of inventory management in manufacturing industry. *International Journal of Advanced Engineering and Global Technology*.Vol. 04 (03) Available: http://www.ijaegt.com

[7] Operations management, process and value chains". L.J. Krajewski, L.J., L.P. Ritzman, and M.K. Malhotra, 8th ed. Upper Saddle River, Prentice Hall. NJ: (2005).

[8] "Automation, Production systems, and Computer Integrated Manufacturing." Groover, M.P. Englewood Cliffs, N.J.; Prentice Hall. .(1987).

[9] "The Effect of Inventory Management on Firm Performance". D. P. Koumanakos. Emerald. (2008).

[10] "Inventory Control and Management".C.Waters. 2nd Ed. John Wiley & Son Limited. England. (2003

[11] Impact of Just-In-Time Inventory Systems On OEM Suppliers" J. F. Kros, M. Falasca, and S. Nadler. Emerald (2006).

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