Improvement of Inventory System Using First In First Out (FIFO) Method

Anita C Sembiring\textsuperscript{1*}, J Tampubolon\textsuperscript{1}, D Sitanggang\textsuperscript{2}, Mardi Turnip\textsuperscript{2}, Subash\textsuperscript{1}

\textsuperscript{1}Department of Industrial Engineering, Faculty of Technology and Computer Sciences, Universitas Prima Indonesia, Indonesia
\textsuperscript{2}Department of Computer Science, Faculty of Technology and Computer Sciences, Universitas Prima Indonesia, Indonesia

E-mail : anitakembaren@unprimdn.ac.id

Abstract. Inventory recording must be done by the company to find out the available stock, so that the company can know when to order goods from the supplier. With the existence of a good inventory system planning, it will be easier for the company to carry out the planned and controlled in and out of the goods process. A distributor of chemicals in recording and inventorying raw materials is still very simple resulting in many products being expired. The purpose of this research is to help companies systematically, precisely and accurately in inventory data collection to reduce expired products. By designing a raw material inventory information system using Visual Studio 2010 programming language and SQL Server 2008 R2 database, then the report form is generated using the Crystal Report 2010 version version 13.02. With the new information system is expected to be able to provide inventory reports quickly and accurately, and can notify when there are raw materials that will be expired. With the existence of a database based on SQL server, each user will be more effective at work.

1. Introduction
Inventory is goods that are provided to meet customer demand. Inventory control is very important for almost all types of industries, both in the service or product industry. Recording of incoming and outgoing raw material inventories must be done by the company to find out the existing stock so that the company knows when to order goods from suppliers to minimize inventory void when customers order goods. Generally stock recording is still done manually by several companies and this is less effective for the company because in making reports it is often not timely and there is an error in recording the stock of raw materials so that it harms the company.

The greater the amount of inventory stored, the greater the cost of storage. Vice versa if the investment is too small, it can also reduce the company's profits because of the stock out costs, namely costs incurred due to the company running out of inventory which includes the loss of opportunities to gain profits because consumer demand is not met and overtime costs because production does not run efficiently. The main problem that is often faced in planning and controlling raw materials is in determining the most appropriate raw material inventory so that it does not disturb the production process. As for the problem, namely in determining how much quantity to buy, how much quantity...
will be purchased each time the purchase, when ordering the material must be done, what quantity of material is always in stock (safety stock) to avoid production bottlenecks.

A chemical raw material distributor has problems in the preparation of raw material stocks so that the impact on the number of stocks that are close to expire and has expired because the preparation of the stock is not right. Separation of newly entered stocks and old ones in the warehouse will make it easier for companies to check and take stock. Therefore the preparation of inventory by classifying items that first enter with goods that first come out is very necessary. Research for the supply of raw materials using the first in first out (FIFO) method has been carried out, drug supplies in pharmacies using client server-based information systems are able to provide inventory reports quickly and accurately, and can notify if there are drugs that will expire [1,2]. Inventory control at Bobo Bread Company uses the EOQ method (Economic Order Quantity), to achieve a minimum inventory level, low cost, and better quality [3].

Stock control has also been studied in the textile world especially in Nigeria using the FIFO method by distributing questionnaires and calculating the average value (WAP) and getting better results using FIFO because it provides information about stock [5-7]. Management control of inventory is also regulated and reviewed in several studies because it considers inventory control to be very important in the industry of products and services that will have an impact on company profits and minimization of continuous production costs [8-11].

In this study, we will discuss how we conduct demand forecasting in the last 3 years, namely 2015-2017 on the raw material requested. From the results of the request, we will calculate the inventory using a computer-based EOQ method that will facilitate access to search for raw materials. In previous research, still using the manual book and devoted to the final product. But the specificity of this research is to study raw material stocks.

2. Methodology/Experimental
The type of research used is descriptive research (descriptive research), namely research that seeks to provide information for future actions and also describes various problems that occur systematically, factually, and accurately based on data. The object of research that is known is the raw material used and stored in the warehouse. The data taken is primary data which is data that can be obtained from objects, namely raw materials and the amount of inventory in the warehouse and secondary data available in the form of data processed by the company. Other data used in this study are the time of raw material from suppliers entering the company's warehouse and the time of raw material goods to customers if there are orders, data on sales of raw materials to customers, and data on raw material purchases from suppliers.

The FIFO method (first in first out) is interpreted as a method of valuing First In First Out inventory assuming that the first purchased item is the first item used or sold, regardless of the actual physical flow. The strength of this method lies in the flow of data reported to the balance sheet because the first purchased item is the first one removed from the inventory account, and the remaining balance consists of items at newer cost prices, this makes the price entered into the balance sheet become balance. One of the goals of FIFO is to equalize the physical flow of goods, and the following advantages of the FIFO method are: The company cannot manipulate profits and bring the final inventory value closer to running costs. In addition to being recommended by the Government, the FIFO method is widely used by companies because: The calculation and implementation is simple, the final inventory value on the balance sheet is in accordance with current prices and can avoid damage and obsolescence of inventory.

Describing raw material demand data into the graph, it can be seen that sales demand in 2015, 2016 and 2017 is linear, which means that demand tends to fluctuate from time to time so the company does not know exactly how many requests from consumers each month. So that the forecasting process is needed to find out the estimated demand in the future. After the request data is collected then the demand for raw material is forecasted to find out the estimated demand in the next time so that the company does not feel in ordering goods so that it can save the company's cost. The graphs of
forecasting demand data in 2015, 2016, and 2017 can be seen in figure 1, using the double exponential smoothing method.

![Graph of forecasting demand data](image)

**Figure 1.** Graphs of forecasting demand data in 2015, 2016, and 2017

By looking at figure 1., the blue variable that shows actual writing is real demand data in 2015, 2016, and 2017. The red variable that shows suitable letters is a forecast for demand in the next time, namely 2018, 2019, and 2020. And accuracy measurement is known from the number:

- MAPE (Mean Absolute Percentage Error) = 37,500
- MAD (Mean Absolute Deviation) = 18.755
- MSD (Mean Squared Deviation) = 546,958

From the demand forecasting graph, it can be seen that factual data differs greatly from the forecasting results obtained, this can be used as a reference for companies in ordering raw materials from suppliers by looking at forecasting results.

3. **Methodology/Experimental**

The system for recording raw materials entering and leaving the chemical raw material distributors in their daily lives is done manually, the process can be seen in Figure 2 of the Company's Flow of Document (FOD). To find out and study the system that is running it is necessary to describe a flow of information and related parts from inside and outside the company.
3.1. Evaluation of the Ongoing System

Seeing the flow of raw materials entering and exiting from input to output can be seen that the system of manually recording goods is inefficient because there is no clear information to issue raw materials which should be first issued if there is an order from the customer. Therefore, the authors make improvements to the system of recording raw materials based on computers to improve the process of entering and leaving raw materials from within the warehouse. Input design is a design that contains input for making an information system design consisting of a list of raw material items, supplier lists, input of raw material purchases from suppliers, and input period of raw material expiration to distributors.

The design view of the list of raw material suppliers can be seen in figure 3 of the supplier’s input list function to include the names of suppliers where the company buys raw materials.

Figure 2. Flow of Document (FOD) Company

Figure 3. Form List Supplier
The input form for raw material purchases made by the company can be seen in figure 4. This form is used to input the date of purchase of raw materials, raw material entry code, type of raw material, expiration date, supplier name, and number of raw materials purchased.

![Figure 4. Form List Raw Material](image)

### 3.2. Evaluation of the Ongoing System

The results of the FIFO method that has been tested in the simulation in the previous chapter are going well, because it is clear that the system that has been designed automatically reduces the amount of stock of raw materials first purchased by the company, as shown below.

![Figure 5. Raw Material Stock](image)

Recording of raw materials based on the authors proposed provides clear information when companies make purchases from suppliers so that the company can sell raw materials to customers with pre-existing stock in the warehouse so as to reduce expired stock and provide benefits to the company in
storage costs because they do not stocking too much raw material, this is because the company already has forecasting results for the future. And the system for recording items does not have to be done by the head of the warehouse every month because the company admin can see directly from the system and immediately report it to the company manager.

4. Conclusion.
The FIFO method that is applied with the help of computers can make it easier for companies to regulate the entry and exit of raw materials from the warehouse so that there is no more accumulation that causes raw materials to expire. Companies must follow technological advances, where manual recording is almost ineffective. for now, considering the many shortcomings due to manual systems and the tendency for errors to occur due to human error, therefore a system that uses a computer base can reduce errors due to human error.

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