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DESIGN AND BUILD AN INVENTORY CONTROL ANALYSIS APPLICATION SYSTEM USING THE ECONOMIC ORDER QUANTITY (EOQ) METHOD IN UD. JASMINE JAYA STARTUP-BASED

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Abstract

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Ud. Melati Jaya is a Small and Medium Enterprise (UKM) engaged in processing ja-gung into animal feed. So far, the method of estimating raw material inventory has been UD's choice. Melati Jaya in the procurement of supplies, with the finished goods system has been ordered in advance by consumers so that there is no accumulation of finished goods in warehouses or pre-order systems, but in the process of fulfilling raw material inventories there are often delays due to shortages of raw materials in the market. This hampers the production process and if it occurs continuously will increase the chances of UD losses. Jasmine Jaya. In previous studies, it can be explained that the results of calculations in reducing UD inventory costs. Melati Jaya, specifically with a January demand supply of 73,993 kg, can be minimized with an optimal purchase of 16,058 kg with a frequency of 5 purchases per month and a safe supply of 2,963 kg. and place an order again when the quantity reaches 8,650 kg. The inventory cost that can be saved is Rp.17,504,704 using the EOQ (Economic Order Quantity) method which is a technique for procuring raw material inventory at a company according to the number of orders. But in the bookkeeping records of UD. Melati Jaya from February to March 2020 is still not good so there are some transactions that are not recorded properly, so the calculation results in that month are inefficient [1]. The purpose of this study is to find out how to control inventory using the collaboration of the EOQ and RAD (Rapid Application Develop-ment) methods as a technology implementation that will make it easier to analyze inventory in real time. The data analysis method used is a quantitative descriptive method. The data obtained from the measurement results can be used as an analysis of the next program situation by using test analysis using SPSS on the running system and turning it into an automation and realtime system. This Application System is built using the PHP programming language, and the CodeIgniter framework and uses a MySQL database server.

Keywords: Inventory, EOQ, RAD, Application System, Android

A. Introduction (time new Roman, bold, 11)

Inventory is an important asset in the company that can determine the direction of the company in achieving the desired profit. Therefore, a proper inventory control process is needed. However, for some small and medium-sized enterprises (SMEs) inventory control has not been a center of caution. And if this happens further, it will cause losses that will occur due to the expenditure of undue costs incurred by the company such as factory operating costs, building rental costs, the cost of losing sales opportunities and damage to raw materials due to being stored for too long. Therefore, an appropriate control method is needed so that inventory can be controlled properly. To minimize these costs, an Economic Or-der Quantity (EOQ) analysis can be used, which is a method that provides an overview of the volume of economic purchases once ordered and provides an idea of how much it will cost and when repurchase should be made. With the finished goods system, it has been ordered in advance by consumers so that there is no accumulation of finished products in the warehouse, but in the process of fulfilling the supply of raw materials, there are often delays due to the unavailability of raw materials in the market. This causes the production process to be hampered and if this happens continuously, it will increase the possibility of losses. In the previous study, problems were discussed in controlling the inventory of corn raw materials and inventory costs in the form of storage costs and ordering costs from January to March 2019 [2]. The purpose of this study is to determine inventory analysis using the EOQ method to minimize inventory costs at UD. Melati Jaya by utilizing android-based technology (startup) and implementing the Rapid Application Development (RAD) method to make it easier in terms of analyzing inventory control in real time.

A. Needs Analysis

Data Collection

Data collection is important because with data collection, results will be obtained that are analyzed carefully and in accordance with the situation in the field, because good analysis results will be obtained if the information obtained is also adequate. The data used in this study are primary data and secondary data.

a. Primary Data
Primary data is a source of research data obtained directly from the original source in the form of interviews, polls from individuals or groups (people) or observation results of an object, event or test result.

b. Secondary Data
Secondary data is data obtained from records, books, and magazines in the form of government reports, articles, books as theory, magazines, and so on. The data obtained from this secondary data does not need to be processed anymore because the source does not directly provide data to the data collector.

B. Analysis of Running Systems

Based on the results of previous research, the ongoing system utilizes inventory control analysis calculations using the Economic Order Quality (EOQ) method for the period January to March 2020 with the following results detailed:

1.Calculation of Inventory Purchase by Economic Order Quantity (EOQ) Method
   a.Calculation of the optimal purchase amount using the EOQ method
   b. Calculation of total inventory cost (Total Inventory Cost)
   c. Provision of safety materials (Safety Stock)
   d. Re-order Calculation
2.UD Data Comparison Discussion. Melati Jaya with EOQ Method in January 2020

C. Learning Model Planning Development Design

This research design on learning planning refers to a blended learning model with a constructive approach. Starting with System Analysis, System Design, System Implementation, to Operation and Maintenance. The learning model planning research flow is depicted in the following chart figure 1.

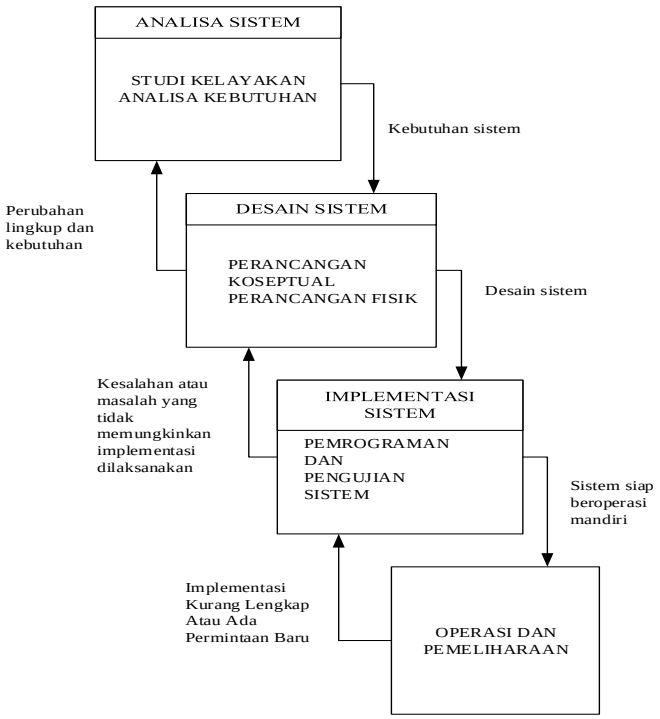

Figure 1. Research Steps

Image caption:

No	Phases (Steps)	Activities	Information
1	System Analysis	Needs Analysis Feasibility Study	System Requirements
2	System Design	Conceptual Design, Physical Design	System Design, Changes in scope and needs
3	System Implementation	System Programming and Testing	The system is ready to operate independently, check the feasibility of the system.
4	Operation and Maintenance	Trial Error and Maintenance	completeness updates or new requests

D. **Stages of Research**

In general, there are 4 main stages in the research that will be carried out can be described as follows.

1. **Preparatory Stage**
   This stage starts from reviewing existing problems, then conducting literature studies of other similar studies that have been carried out and which can be seen in table 2. State of The Art.
2. **Data Collection Stage**
   Data collection using observation methods and interviews by distributing predetermined questionnaires. This initial stage is carried out by observation, carried out by looking at the environment, situation, and conditions where records and processing are carried out, namely in the environment of Cement Companies listed on the Indonesia Stock Exchange.
3. **Stage of completion**
   At this stage that is the final stage of the research process. Where will be done making a system (trial error) to produce conclusions and suggestions.

E. Rapid Application Development

Rapid Application Development (RAD) is an approach to the development of object-oriented systems that includes a method of development as well as software that aims to shorten the time normally required in the life cycle of traditional system development to an automated and real-time form between the design and application of an information system [9].

The RAD model has 3 Stages as follows:

1. Requirement Planning, the initial stage that brings together users and analysts who aim to identify the purpose of the system and the need for information to achieve the goals. With the involvement of both parties, making this initial stage is the most important thing.
2. Design System (System Design Process), at this stage the activeness of the user who is directly involved in determining the achievement of goals. In this process, there are often improvements if there is still a design incompatibility between the user and analyst.
3. Implementation (Implementation), this stage is the stage of making a program by developing a program design that has been approved by users and analysts. This stage also conducts trial error on the program before it is applied to an organization [10].

2. Method (time new Roman, bold, 11)

Data Processing Planning Development Design

The results of the research and analysis of inventory control using the Economic Order Quantity (EOQ) method for the period January to March 2020 are as follows:

a. Calculation of Inventory Purchases using *the Economic Order Quantity* (EOQ) Method

1. Calculation of the optimal purchase amount using the EO method, even though the data on the purchase of raw material inventory is economically optimal once ordered for UD. Melati Jaya period January-March 2020.
2.

Table 1. Data The purchase of raw materials is optimal once ordered.

Moon	*Required Units(kg)*	*CostOncemessage*	*Storage costPerkg*	*QuantityPurchaseOptimal (Kg)*	*FrequencyofPurchase*

January	73.933	IDR 277,067	IDR 159	16.058	5
February	19.208	IDR 272,429	IDR 232	6.714	3
March	46.296	IDR 189,407	IDR 80	14.787	3
Total	*139.437*	*IDR 738,903*	*IDR 471*	*37.559*	*11*

Source: Processed data (2020).

3. Calculation of total inventory cost (Total Inventory Cost).

The data on the calculation of the total cost of inventory if the purchase is made using the amount of an economical purchase once ordered using the EOQ method, the total inventory cost of UD. Melati Jaya is as follows.

Table 2. *Total Inventory Cost* **Data**

Moon	UnitsNeeded(kg)	QuantityPurchaseOptimal(kg)	Cost-for-order	Storage costper unit	Total Booking Costs	Total Storage Costs	Total CostsInventory
January	73.933	16.058	IDR 277,067	IDR 159	IDR 1,276,685	IDR 1,276,611	IDR 2,553,296
February	19.208	6.714	IDR 272,429	IDR 232	IDR 901,713	IDR 660,272	IDR 1,561,985
March	46.296	14.787	IDR 189,407	IDR 80	IDR 688,129	IDR 688,120	IDR 1,376,249
Total	139.437	37.559	Rp738,903	IDR 471	R p2,866,527	IDR 2,625,003	IDR 5,491,530

Source: Processed data (2020).

3. Provision of safety materials (Safety Stock).

The provision of this safety material is carried out aimed at avoiding inventory shortages during the production process. The following is a calculation of safety stock in UD raw material inventory. Melati Jaya for the period of January to March 2020 uses the standard deviation from the standard deviation of 5% so that Z is obtained with a standard deviation table of 1.65%.

Table 3. Safety *stock data*

Moon	**Required Units(kg)**	**Frequency ofPurchase**	**DeviationsBaku**	**Standardization**	**StandardsDeviation**	***SafetyStock* (Kg)**
January	73.933	30	2.464	1.796	1,65	2.963
February	19.208	7	2.744	788	1,65	1.301
March	46.296	20	2.315	2.338	1,65	3.858
Total	139.437	57	7.523	4.922	8.122	

Source: Processed data (2020).

4. *Reorder Point* calculation

Ud. Melati Jaya has a waiting time in receiving goods messages which is 2 days with an average work of 26 days a month. Before calculating the *Reorder Point* (ROP), you must first know the

amount of raw material use / day, namely by means of the number of needs a month divided by the average working day. The calculation results have been presented in the table below.

Table 4. *Re Order Point*

Moon	Required Units	Ingredients/day	*LeadTime*	*SafetyStock*	*Re Order Point*
January	73.933	2.844	2	2.963	8.650
February	19.208	739	2	1.301	2.779
March	46.296	1.781	2	3.858	7.419
Total	139.437	5.363			

Source: Processed data (2020).

3. Results and Discussion (time new Roman, bold, 11)

The comparison of company policies and using the EOQ method is as follows:

1. Units needed for March 2020 according to UD. Melati Jaya and Policy EOQ is 46,296 kg.
2. Optimal March bookings according to UD calculations. Melati Jaya is 1,715 kg on each order. While according to the EOQ Method is 14,787 kg each time a message. From the optimal purchase results between the policy according to the company and the EOQ method, a difference of 13,073 kg was obtained. This difference is a good thing because the less frequency with which bookings are made, the less the booking costs will be incurred.
3. Purchase frequency by UD. Melati Jaya is 20 times a month, while according to the EOQ method it is 3 times a month. That resulted in a difference of 17 times. This means that it will be more economical if the order is made in 3 times a month with the amount of each message is 14,787 kg.
4. The booking fee according to the company's policy is Rp. 5,114,000 while according to the EOQ method it is Rp. 688,120. In this case, the minimization of the booking fee that can be done 5 is Rp.4,425,871. The minimized booking fee is very effective so that it can be applied.
5. The storage cost according to the company's policy is Rp.3,713,000 while according to the EOQ method it is Rp.688,129. The storage cost that can be minimized is Rp.3,024,880 This cost produces positive calculation results because it can minimize the storage costs incurred. But in actual conditions for warehouse fuel costs are not well recorded. So that the costs that can be minimized are not yet effective because the calculation has not used warehouse fuel costs even though the results obtained are positive.
6. *Safety Stock or* safety material inventory *Safety stock* or UD security material inventory. Melati Jaya is not available. Meanwhile, according to the calculation of the EOQ method, it is 2,315 kg. With the *safety stock*, it will overcome the shortage of raw materials if there is a slowdown in market demand. The amount of safety stock is also not too large so that the possibility of loss costs due to lack of raw materials can still be overcome by the existence of *safety stock.*
7. *Reorder Points* or reorders according to UD policy. Melati Jaya only estimates the amount of raw material needs needed. Meanwhile, according to the EOQ method, reordering is carried out if the amount of raw material inventory reaches 7,419 kg. So that this will minimize losses due to delays in the arrival of material orders. But the number of *reorder points* made is still too large so it needs to be considered when to reorder.

4. Conclusions (time new Roman, bold, 11)

Based on the description of the research results that have been analyzed, the conclusions that can be drawn are. The excellent data is the January data, which is with the most effective economical optimal purchase of 16,058 kg with a frequency of purchases 5 times a month. This shows a total savings in inventory costs of Rp 7,035,315 for ordering costs and Rp 10,469,389 for storage costs. If UD. Melati Jaya applies the purchase of inventory using the EOQ method so that it will be effective in minimizing the cost of inventory incurred by 17,504,704. The existence of a safety stock of 2,963 kg will also help minimize the cost of losses due to lack of production stock. Reorders are placed when the inventory has reached 8,650 kg. The calculation of inventory using the EOQ method in January is the most effective compared to other months. Data from research in February and March 2020 calculations with the EOQ method have actually been effective, it's just that in February the recording for the purchase of raw material inventory was not recorded properly. And for the month of March, the recording of warehouse fuel costs was not recorded properly. So that the results produced are not yet relevant to the actual condition of the company. But if you use the assumptions from the EOQ method, the results obtained are effective to be applied

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