IMPLEMENTATION OF THE ECONOMIC ORDER QUANTITY (EOQ) METHOD ON CV ANUGRAH SAKTI

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Abstract:
The purpose of this study is to determine the cost of raw material inventory which is more efficient by using the Economic Order Quantity (EOQ) method at CV Anugrah Sakti. Data collection methods in this study are interviews, observation, and documentation. This research uses comparative data analysis test to assess whether or not the efficiency of raw material inventory costs at CV Anugrah Sakti is significant. The results of this study indicate that the difference in inventory costs between the company's calculations with the Economic Order Quantity (EOQ) method for chicken feather raw materials is more efficient IDR. 189,043,691 and bread raw materials with EOQ are more efficient IDR. IDR1,457,285,871. With a frequency of ordering for chicken feather raw materials as much as 7 times, with orders made once every 41 days. While the raw material for bread waste is 3 times a year, once every 106 days.

Keywords: Economic Order Quantity (EOQ), Efficiency, Inventory Cost.

INTRODUCTION

Introduction
In manufacturing companies, supply chain control is very important to maintain the smooth running of the production process and anticipate uncertainty in market demand. Proper inventory control is one of the strategies in maintaining a smooth supply chain. Heizer et al. (2017:490) one of the most expensive assets invested by the company is inventory, which is 50% of the total capital. The company can reduce total costs by reducing the amount of inventory at an economical capacity.

Strict supervision is necessary to manage inventory in order to avoid critical situations due to lack of inventory for production. Stevenson & Chuong (2007:558) says that inventory shortages result in missed deliveries, lost sales, dissatisfied customers, and production bottlenecks. Costs resulting from overstocking inventory can be more productive to allocate to other operations. The proper composition of the amount of inventory can help in improving the efficiency of inventory costs.

CV Anugrah Sakti is a manufacturing business entity engaged in the manufacture of animal feed raw materials. The main products of CV Anugrah Saktia are Chicken Feather Flour and Bread Flour, which have been produced continuously every day. This causes the availability of raw materials in the warehouse to be important to maintain so that the production process can run smoothly. Based on observations, previously CV Anugrah Sakti had experienced an overstock of raw materials inventory so that the supply of raw materials for CV Anugrah Sakti had not been planned properly. In addition, the company has also not set a reorder point for inventory. This can lead to a waste of inventory costs, because the purchase of...
raw materials is carried out in large quantities with irregular frequency, which has an impact on swelling the cost of ordering raw materials.

Hanna et al. (2019) showed that the results of calculating the average total cost of inventory using the EOQ method with the average cost of inventory using the conventional method of IDR. 1,730,081,816.82 greater than the average cost of inventory using the EOQ method of IDR. 1,726,239,788.60. It can be concluded that the Economic Order Quantity (EOQ) method can increase the cost of inventory of the company's raw materials.

Based on this background, this research will take the title "IMPLEMENTATION OF THE ECONOMIC ORDER QUANTITY (EOQ) METHOD TO INCREASE THE EFFICIENCY OF RAW MATERIAL INVENTORY COSTS ON CV ANUGRAH SAKTI".

Research purposes
First this research purposes to analyze the level of quantity of economical purchase of raw materials on CV Anugrah Sakti with the Economic Order Quantity (EOQ) method. Second, to analyze the cost of raw material inventory of CV Anugrah Sakti using the Economic Order Quantity (EOQ) method. Finally, to analyze the level of inventory cost efficiency of CV Anugrah Sakti using The Economic Order Quantity (EOQ) Method.

LITERATURE REVIEW
Inventory
According to Parmono et al.(2007:6.4) said that the existence of inventory makes customer demands quickly met, so that the level of customer satisfaction increases, not only can maintain sales, but also can increase sales.

According to Haming & Nurnajamuddin (2017: 376) inventory is a physical economic resource held and maintained by the company to support smooth production, which consists of raw materials, finished products, component components, auxiliary materials, and goods in process (working in process inventory). According to (Herjanto (2007:6.4) said that inventory is an item that is stored for a specific purpose, such as the production or assembly process, for resale and as a spare part of equipment or machinery.

Inventory Function
According to Rangkuti (2004:14) there are three functions of inventory, namely:

1. Decoupling Function
   Inventory allows companies to meet customer needs without having to rely on suppliers.

2. Economic Lot Sizing Function
   The amount of inventory held exceeds the amount required in order to obtain a discount on the purchase, and the cost of transport per unit becomes cheaper.

3. Anticipation Function
   At a time when the company experiences anticipated demand fluctuations based on historical data, the company holds seasonal inventory (Seasonal Inventories).

Costs in Stock
Heizer et al. (2017:205) say that the most significant costs incurred in inventory costs are as follows: Cost of the items, Cost of Ordering, Cost of Carrying, or holding and Cost of Stockouts

Economic Order Quantity (EOQ) Method
Stevenson (2010:564) mentions that the Economic Order Quantity (EOQ) method is used to identify fixed ordering rates that can minimize annual costs for storage costs and inventory ordering costs.

The Economic Order Quantity (EOQ) method according to Heizer et al. (2017: 496) can be relatively easy to use with the following assumptions:
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1. The demand for goods is known, quite constant, and does not depend on the number of other items.
2. Lead Time, is the time between placing and receiving orders that can be known and has a consistent range.
3. Ordered goods can arrive in one batch at a time.
4. Discounting the quantity of deduction is not possible.
5. Variable costs are set up or ordering costs.
6. Stockouts (shortages) can be avoided if the order is placed at the right time.

According to Haming et al. (2017:378) Economic Order Quantity (EOQ) is the amount of material obtained from a supplier company at a certain time. With the following equation:

\[ EOQ = \sqrt{\frac{2DS}{H}} \]

Annotation:
EOQ = Number of orders with minimum cost
D = Number of needs per year (in units)
S = Ordering Cost
H = Holding Cost

Reorder Point (ROP)

Heiser et al. (2017:501) say that if in a simple inventory model there is an assumption that, a company can order when the inventory level is 0 (zero) and the order item is received directly. The following is the formula of the Reorder Point (ROP):

\[ ROP = d \times L \]

Annotation:
d = Order needs per day (each time a message)
L = Waiting time for next booking (days)

RESEARCH METHODOLOGY

The research method used is to go through several stages as follows:
1. Identifying Problems
   Carry out planning as well as problem formulation and determine the methods used.
2. Data collection
   Data collection is carried out by reviewing related literature, making observations, interviews, and documentation on research objects.
3. Data analysis
   Based on the data and information obtained, an analysis is carried out to solve the problems that have been formulated.
4. Implementation of the Economic Order Quantity (EOQ) Method
   It is carried out by comparing the cost of inventory according to company policy and according to the Economic Order Quantity (EOQ) method to see the level of efficiency that the company can obtain.

RESULTS AND ANALYSIS

Use of Raw Materials

Raw materials that are in the inventory warehouse are not fully used in the production process. There are safety raw materials stored, if at any time there is a shrinkage of raw
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materials or there is an increase in demand. shrinkage of raw materials or there is an increase in demand. The following is data on the use of raw materials for CV Anugrah Sakti.

Table 1: Use of Raw Materials for the Period of June 2021- May 2022

<table>
<thead>
<tr>
<th>No.</th>
<th>Month</th>
<th>Chicken Feathers (kg)</th>
<th>Bread Waste (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>June</td>
<td>33.958.9</td>
<td>264.663</td>
</tr>
<tr>
<td>2.</td>
<td>July</td>
<td>35.434.9</td>
<td>315.327</td>
</tr>
<tr>
<td>3.</td>
<td>August</td>
<td>44.268.99</td>
<td>320.643.2</td>
</tr>
<tr>
<td>4.</td>
<td>September</td>
<td>43.145.44</td>
<td>291.739's</td>
</tr>
<tr>
<td>5.</td>
<td>October</td>
<td>48.713.6</td>
<td>343.587</td>
</tr>
<tr>
<td>6.</td>
<td>November</td>
<td>33.208.6</td>
<td>324.687</td>
</tr>
<tr>
<td>7.</td>
<td>December</td>
<td>56.553.3</td>
<td>363.106th</td>
</tr>
<tr>
<td>8.</td>
<td>January</td>
<td>42.827.27</td>
<td>325.826</td>
</tr>
<tr>
<td>9.</td>
<td>February</td>
<td>59.792.8</td>
<td>380.314's</td>
</tr>
<tr>
<td>10.</td>
<td>March</td>
<td>59.623.9</td>
<td>424.486</td>
</tr>
<tr>
<td>11.</td>
<td>April</td>
<td>74.539.6</td>
<td>377.811</td>
</tr>
<tr>
<td>12.</td>
<td>May</td>
<td>33.836.8</td>
<td>266.296's</td>
</tr>
<tr>
<td></td>
<td>Sum</td>
<td>565.904.1</td>
<td>3.998.485.2</td>
</tr>
</tbody>
</table>

Average monthly inventory

Source: Data processed, 2022

Purchase Cost

Purchase costs are the costs that a company incurs to hold inventory items in the warehouse purchased from suppliers.

In table 2, the following is data on the purchase of raw materials on CV Anugrah Sakti for the period of June 2021- May 2022.

Table 2: Purchase Cost and Frequency of Ordering Raw Materials

<table>
<thead>
<tr>
<th>Information</th>
<th>Chicken Feather Raw Materials</th>
<th>Bread Waste Raw Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity</td>
<td>565.904.1</td>
<td>3.998.485.2</td>
</tr>
<tr>
<td>Price per Unit IDR</td>
<td>1,833.80</td>
<td>2,503.20</td>
</tr>
<tr>
<td>Purchase Cost IDR</td>
<td>1,037,754,939</td>
<td>10,009,008,153</td>
</tr>
<tr>
<td>Orders Frequency</td>
<td>142 times</td>
<td>346 times</td>
</tr>
</tbody>
</table>

Source: Data processed, 2022

Ordering Cost

Ordering costs are costs incurred by the company from ordering raw materials to suppliers. The ordering costs incurred on CV Anugrah Sakti are shipping costs, internet costs, loading costs and unloading costs. Table 3 below is a recapitulation of the cost of ordering raw materials on CV Anugrah Sakti.
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Table 3: Recapitulation of Raw Material Order Costs for the Period June 2021-May 2022

<table>
<thead>
<tr>
<th>Types of Fees</th>
<th>Chicken Feather Raw Materials</th>
<th>Bread Waste Raw Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Costs</td>
<td>IDR 127,314,420</td>
<td>IDR 1,210,149,000</td>
</tr>
<tr>
<td>Loading and Unloading Costs</td>
<td>IDR 19,880,000</td>
<td>IDR 48,440,000</td>
</tr>
<tr>
<td>Internet costs</td>
<td>IDR 1,200,000</td>
<td>IDR 1,200,000</td>
</tr>
<tr>
<td>Sum</td>
<td>IDR 148,394,420</td>
<td>IDR 1,259,789,000</td>
</tr>
</tbody>
</table>

Source: Data processed, 2022

Storage Costs

The costs arising from the hoarding of raw material supplies in the warehouse are called storage costs. Storage costs on CV Anugrah Sakti include electricity costs, water costs, depreciation costs of storage warehouses, UN warehouse costs. In Table 4 is a breakdown of the cost of storing raw materials on CV Anugrah Sakti.

Table 4: Recapitulation of Raw Material Storage Costs for the Period of June 2021-May 2022

<table>
<thead>
<tr>
<th>Types of Fees</th>
<th>Chicken Feather Raw Materials</th>
<th>Bread Waste Raw Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity Costs</td>
<td>IDR 2,317,500</td>
<td>IDR 7,593,343</td>
</tr>
<tr>
<td>Water Costs</td>
<td>IDR 1,200,000</td>
<td>IDR 4,200,000</td>
</tr>
<tr>
<td>UN fees Warehouse depreciation Fee</td>
<td>IDR 173,628</td>
<td>IDR 588,636</td>
</tr>
<tr>
<td>IDR 52,250,000</td>
<td>IDR 16,625,000</td>
<td></td>
</tr>
<tr>
<td>Amount of Deposit Fee Total Number</td>
<td>IDR 55,941,128</td>
<td>IDR 29,006,979</td>
</tr>
<tr>
<td>IDR 84,948,107</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Data processed, 2022

Economic Order Quantity (EOQ)

The Economic Order Quantity (EOQ) method is a method used in inventory management to establish an economical order quantity in minimizing inventory costs. The following is the calculation of the Economic Order Quantity (EOQ) for each raw material for chicken feathers and bread waste during the period June 2021-May 2022.

1. Chicken Feather Raw Materials

Here are the basic calculations in the purchase of economical raw materials.

Annual Demand (D) = 565,904.10 kg.

Order Frequency (f) = 142 times Ordering cost per unit per year

= Order cost per year
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**Order frequency per year**

= IDR 148,394,420 / 142

= IDR1,045,031.13

**Holding Cost per unit per year**

\[
\frac{\text{Holding cost per year}}{\text{Average Inventory}}
\]

= IDR 55,941,128

282,952,05

= IDR 197,71

Based on the calculation results above, the amount of purchase of economical chicken feather raw materials using the Economic Order Quantity (EOQ) method for 2021 is as follows:

\[
\text{EOQ} = \sqrt{2 \times D \times S}\]

\[
\text{H}
\]

\[
\text{EOQ} = \sqrt{2 \times 565,904,10 \times IDR 1,045,031,13}\]

IDR 197,71

\[
\text{EOQ} = 77,345.79 \text{kg.}
\]

2. Bread Waste Raw Materials

Annual Demand = 3,998,485.20 kg.

Orders Frequency = 346 times Ordering Cost per unit per year

\[
\frac{\text{Order cost per year}}{\text{Orders frequency per year}}
\]

= IDR 1,259,789,000.00 / 346

= IDR 3,641,008.67

**Inventory Comparison Between Company Policies and Economic Order Quantity (EOQ) Method**

In table 5, the following is a recapitulation of inventory by the EOQ method based on previous calculations.

<table>
<thead>
<tr>
<th>Information</th>
<th>Chicken FeatherRaw Materials</th>
<th>Bread WasteRaw Materials</th>
</tr>
</thead>
</table>

---

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Table 5 shows the calculation results using the Economic Order Quantity (EOQ) method in inventory control at CV Anugrah Sakti. Based on calculations, the number of economical orders for chicken feather raw materials was 77,345.79 kg and an inventory cost of IDR. 15,291,857 was obtained with an order frequency of 7.32 times or 7 times a year, orders were made every 40.73 days or 41 days. Reordering was made for each available inventory of 1,899.01 kg.

The most economical order for bread waste raw materials is 1,416,576.05 kg and the inventory costs incurred by the company are IDR. 20,553,799 with an order frequency of 2.82 times or 3 times a year. Orders for bread waste raw materials can be made every 105.57 days or once every 106 days, as well as orders made at a time when the amount of inventory is 13,417.74 kg.

In Table 6, the following is a comparison of inventory costs between the calculation of company policies and the Economic Order Quantity (EOQ) method.

<table>
<thead>
<tr>
<th>Types of Raw Materials</th>
<th>Information</th>
<th>Persahaan Policy</th>
<th>EOQ</th>
<th>Inventory Cost Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken Feathers</td>
<td>Orders Frequency</td>
<td>142 times</td>
<td>7.32 times</td>
<td>IDR 140,748,401</td>
</tr>
<tr>
<td></td>
<td>Ordering Cost</td>
<td>IDR 148,394,420</td>
<td>IDR 7,646,019</td>
<td>IDR 48,295,291</td>
</tr>
<tr>
<td></td>
<td>Storage Costs</td>
<td>IDR 55,941,128</td>
<td>IDR 7,645,837</td>
<td>IDR -</td>
</tr>
<tr>
<td></td>
<td>Purchase Cost</td>
<td>IDR 1,037,754,939</td>
<td>IDR 1,037,754,939</td>
<td>IDR -</td>
</tr>
<tr>
<td></td>
<td>Total Cost</td>
<td>IDR 1,242,090,487</td>
<td>IDR 1,053,046,796</td>
<td>IDR 189,043,691</td>
</tr>
<tr>
<td>Bread Waste</td>
<td>Orders Frequency</td>
<td>346 times</td>
<td>2.82 times</td>
<td>IDR 1,249,511,741</td>
</tr>
<tr>
<td></td>
<td>Ordering Cost</td>
<td>IDR 1,259,789,000</td>
<td>IDR 10,277,259</td>
<td>IDR 18,730,439</td>
</tr>
<tr>
<td></td>
<td>Storage Costs</td>
<td>IDR 29,006,979</td>
<td>IDR 10,276,540</td>
<td>IDR -</td>
</tr>
<tr>
<td></td>
<td>Purchase Cost</td>
<td>IDR 10,009,008,153</td>
<td>IDR 10,009,008,153</td>
<td>IDR -</td>
</tr>
<tr>
<td></td>
<td>Total Cost</td>
<td>IDR 11,297,804,132</td>
<td>IDR 10,029,561,952</td>
<td>IDR 1,268,242,180</td>
</tr>
<tr>
<td></td>
<td>Total Inventory Cost</td>
<td>IDR 12,539,894,619</td>
<td>IDR 11,082,608,748</td>
<td>IDR 1,457,285,871</td>
</tr>
</tbody>
</table>

Source: Data processed, 2022

Table 6 shows that the total cost of inventory using company policies shows a greater amount than the EOQ method. This shows that the total cost of inventory is more efficient at IDR. 1,457,285,871 if the company applies the EOQ method in controlling its inventory.

The cost of inventorying chicken feathers raw materials using the company's policy is IDR. 1,242,090,487 while according to the EOQ method the inventory cost is IDR. 1,053,046,796, so that the total efficiency of the cost of inventorying chicken feathers is IDR. 189,043,691. With the company's storage costs of IDR. 55,941,128 and storage costs according to EOQ of IDR. 7,645,837.

The cost of inventory of raw materials for bread waste experienced an efficiency of IDR.
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1,268,242,180. The calculation of the order fee according to company policy is greater by IDR.1,259,789,000 compared to the EOQ method of IDR. 10,277,259. In storage costs, there was an efficiency of IDR.18,730,439 with calculations according to company policy of IDR.29,006,979 while according to the EOQ method it was IDR. 10,276,540.

CONCLUSION
The following are the results of research that has been carried out on inventory control using the Economic Order Quantity (EOQ) method to increase inventory cost efficiency on CV Anugrah Sakti, including the following:

1. Ordering raw materials for economical chicken feathers is carried out by the company with an amount of 77,345.79 kg per purchase with orders for raw materials made 7.32 times or 7 times a year and carried out every 40.73 days. For ordering raw materials for bread waste as much as 1,416,576.05 kg with 2.82 times or 3 orders in a year, and carried out once every 105.57 days.
2. Inventory in the warehouse needs to be considered when ordering raw materials, in order to avoid stockout and overstock of raw materials. Reordering was made by the company every amount of raw materials available in the warehouse, for raw materials for chicken feathers amounting to 1899.01 kg and for raw materials for bread waste amounting to 13,417.74 kg.
3. The use of the EOQ method for ordering raw materials for chicken feathers and bread waste resulted in a total inventory cost of IDR11,082,608,748. While using the calculation of the company’s inventory of IDR12,539,894,619.

BIBLIOGRAPHY