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

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Abstract:

The purpose of thi 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 inlarge quantities with irregular frequency, which has animpact 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, butalso can increase sales.

According to Haming & Nurnajamuddin (2017: 376) inventory is a physical economic resourceheld 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 (2008:219) mentions that inventory is an item that is stored for a specific puIDRose, such as the productionor 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 (*Seasional 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 annualcosts for storage costs and inventory ordering costs.

The *Economis Order Quantity* (EOQ) method according to Heizer et al. (2017: 496) can be relativelyeasy to use with the following assumptions:

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:

$$EOQ = \sqrt{\frac{2 \times D \times S}{H}}$$

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**)

Heizer 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

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

| | | Types of Raw Materials | |
No.	Month	Chicken Feathers (kg)	Bread Waste (kg)
1.	June	33. 958.9	264. 663
2.	July	35. 434.9	315. 327
3.	August	44. 268.99	320. 643.2
4.	September	43. 145.44	291. 739's
5.	October	48. 713.6	343. 587
6.	November	33. 208.6	324. 687
7.	December	56. 553.3	363. 106th
8.	January	42. 827.27	325. 826
9.	February	59. 792.8	380. 314's
10.	March	59. 623.9	424. 486
11.	April	74. 539.6	377. 811
12.	May	33. 836.8	266. 296's
	Sum	565. 904.1	3. 998. 485.2
	Average monthly inventory	47. 158.68	333. 207.10

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

Information	Chicken Feather Raw Materials	Bread Waste Raw Materials
Quantity	565. 904.1	3. 998. 485.2
Price per Unit	IDR 1,833.80	IDR 2,503.20
Purchase Cost	IDR 1,037,754,939	IDR 10,009,008,153
Orders Frequency	142 times	346 times

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.

Table 3: Recapitulation of Raw Material Order Costs for the Period June 2021-May 2022

Types of Fees	Chicken FeatherRaw Materials	Bread WasteRaw Materials
Shipping Costs	IDR 127,314,420	IDR 1,210,149,000
Loading and Unloading Costs	IDR 19,880,000	IDR 48,440,000
Internet costs	IDR 1,200,000	IDR 1,200,000
Sum	IDR 148,394,420	IDR 1,259,789,000

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

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

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

$= Order\ cost\ per\ year$

~~Order frequency per year~~

= IDR 148,394,420 / 142

= IDR1,045,031.13

Holding Cost per unit per year

$$= \frac{Holding\ cost\ per\ year}{Average\ Inventory}$$

$$= \frac{IDR.55.941.128}{282.952,05}$$

= 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:

$$EOQ = \sqrt{\frac{2 \times D \times S}{H}}$$

$$EOQ = \sqrt{\frac{2\ X\ 565.904,10\ X\ IDR1.045.031,13}{IDR.197,71}}$$

EOQ = 77,345.79kg.

2. Bread Waste Raw Materials

Annual Demand = 3.998.485.20 kg.

Orders Frequency = 346 times Ordering Cost per unit per year

$= Order\ cost\ per\ year$ / $Orders\ frequency\ per\ year$

= IDR 1,259,789,000.00 / 346

= IDR 3,641,008.67

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

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

Table 5: Recapitulation of EOQ Method Implementation,
Order Frequency, *ReorderPoint* (ROP), and inventory costs

Information	Chicken FeatherRaw Materials	Bread WasteRaw Materials

Economic Order Quantity (EOQ)	77345,79	1416576,05
Frequency	7,32	2,82
Length of timeout EOQ	40,73	105,57
Reorder Point (ROP)	1899,01	13417,74
Inventory Costs	IDR. 15,291,857	IDR20,553,799

Source : Data processed, 2022

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 77,345.79kg and an inventory cost of IDR. 15,229,902 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 1,416,576.05kg kg and the inventory costs incurred by the company are IDR. 20,544,007 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 6 : Recapitulation of Inventory Cost Efficiency

Types of Raw Materials	Information	Supplies		Inventory Cost Efficiency
		Persahaan Policy	EOQ	
Chicken Feathers	Orders Frequency	142 times	7.32 times	
	Ordering Cost	IDR 148,394,420	IDR 7,646,019	IDR 140,748,401
	Storage Costs	IDR 55,941,128	IDR 7,645,837	IDR 48,295,291
	Purchase Cost	IDR 1,037,754,939	IDR 1,037,754,939	IDR -
	Total Cost	IDR 1,242,090,487	IDR 1,053,046,796	IDR 189,043,691
Bread Waste	Orders Frequency	346 times	2.82 times	
	Ordering Cost	IDR 1,259,789,000	IDR 10,277,259	IDR1,249,511,741
	Storage Costs	IDR 29,006,979	IDR 10,276,540	IDR 18,730,439
	Purchase Cost	IDR10.009.008.153	IDR 10,009,008,153	IDR -
	Total Cost	IDR 11,297,804,132	IDR 10,029,561,952	IDR 1,268,242,180
	Total Inventory Cost	IDR 12,539,894,619	IDR 11,082,608,748	IDR 1,457,285,871

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 thecompany 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'sstorage costs of IDR.55,941,128 and storage costsaccording to EOQ of IDR. 7,645,837.

The cost of inventory of raw materials for breadwaste experienced an efficiency of IDR

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 whileaccording 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.

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