

Analysis of Inventory Management with the EOQ Method in Optimizing Fabric Inventory at XYZ Stores

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ARTICLE INFORMATION

Article history:

Received: February 10, 2023

Revised: February 24, 2023

Accepted: March 25, 2023

Keywords:

**EOQ,
Textile Industry,
Cost,
Inventory.**

ABSTRACT

XYZ Store is a company engaged in the textile industry, whose main activity is the production of printed fabrics. The raw materials used in the textile production process are fabrics and in the implementation of the production process these raw materials are always available for the smooth running of the production process. Therefore it is necessary to carry out planning and control of raw materials that are more efficient, then an analysis is carried out using the EOQ method as an option as a comparison between policies that have been implemented so that companies can choose which policy is more efficient in terms of spending on inventory costs or total inventory costs. After doing the calculations, it can be seen that the costs incurred by the company amounted to IDR 7,876,464.1. Meanwhile, the total inventory cost incurred by the company when using the EOQ method is IDR 3,564,927.2. it can be seen that the savings are IDR 4,311,536.9 when using the EOQ method. While the obstacle in this research is that the EOQ method that has been disclosed by the author in this study cannot be implemented at the XYZ Store due to the agreement factor from the supplier who sends materials once a month. Even though the storage facilities owned by Store XYZ are very adequate, so that the minimum inventory limit that must be stored according to the EOQ calculation can be carried out in field conditions.

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INTRODUCTION

Inventory as a company's assets, has an important role in business operations. In the factory (manufacturing), inventory can consist of: Inventory of raw materials, auxiliary materials, work in progress (WIP), finished goods and spare parts inventory. In an organization, such as a textile company, most of them have inventory in order to be able to provide the best service to customers. In a good company must be able to maintain raw material supplies, in order to carry out the production process smoothly, and the most important thing is to be able to meet consumer demand.

In this system, we must first have raw materials and supplies in order to carry out the production process. If we are to be able to produce something at the least cost and according to the required schedule, then these goods and supplies must be available. Because of that we have to put in place policies that define when to complete these and how much to order at a time. These problems are related to price cuts and to the need for assurance that delays in supply times and temporary increases in needs will not disrupt operations to be carried out. Supposedly with the existence of a raw material inventory policy implemented in the company, the cost of the inventory can be reduced as small as possible. In order to minimize the cost of inventory, an analysis of "Economic Order Quantity" (EOQ) can be used. EOQ is the most economical volume or number of purchases to be made at each purchase.

The EOQ method seeks to achieve minimum inventory levels, lower costs and better quality. Planning the EOQ method in a company will be able to minimize the occurrence of out of stock so that it does not interfere with processes within the company and is able to save on inventory costs incurred by the company due to the efficiency of raw material supplies in the company concerned. In addition, with the implementation of the EOQ method, the company will be able to reduce storage costs, save space, both for warehouse space and work space, solve problems that arise from the large amount of inventory that has accumulated thereby reducing the risks that can arise. This EOQ analysis can be used easily and practically process are fabrics and in the implementation of the production process these raw materials are always available for the smooth running of the production process. Therefore it is necessary to carry out planning and control of raw materials that are more efficient, then an analysis is carried out with the EOQ method as an option as a comparison between the policies that have been implemented. So that companies can choose which policy is more efficient in terms of spending inventory costs or total inventory costs.

The XYZ Store has 2 types of products, namely dyed fabrics and printed fabrics. Dyed fabric (plain cloth) is white cloth which is processed by dissolving the dye in water or another medium. Then put the textile material into the solution, so that there is absorption of the dye into the fabric fibers. Printing fabric is white cloth which is further processed by attaching dyes to give rise to certain patterns. While white cloth (Grey) is a cloth made from fiber and left raw/no need to be processed again into dyed cloth or printed cloth. This company carries out two production processes, namely washing plain fabrics (gray fabrics) which are then sold directly to other companies and printed or stamped fabrics in which plain fabrics from weaving are then stamped or printed to create new patterns. The printed fabrics also vary, of course with different constructions. The product or type of fabric printed at this factory is construction fabric:

- a. POLY TC 46 X 44 X 90
- b. POLY KT 46 X 44 X 90
- c. POLY TC 50 X 44 X 90
- d. POLY KT 50 X 44 X 90
- e. Flannel / FB Poly Tc POLY TC 46 X 30 X 90
- f. POLY TC 50 X 38 X 90
- g. PLOY TC 50 X 40 X 90
- h. POLY TC 50 X 42 X 90
- i. POLY KT 50 X 42 X 90

RESEARCH METHODS

The XYZ shop procures flannel type fabrics by ordering once a month from suppliers in Sleman Regency who have been partners so far. The data obtained from the company regarding the need for raw materials in one year can be seen below

Table 1. Flannelette Raw Material Needs (meters)

2022 period	Meters
January	98,246
February	84,523
March	57,020
April	92,051
May	70,475
June	82,510
July	78,020
August	62,517
September	123,029
October	98,572
November	154,064
December	136,218
Totals	1,137,245

Calculation of the Company's Total Inventory Cost (TIC) and EOQ

a. Order Fee

Ordering costs Are costs associated with efforts to obtain raw materials or goods from outside.

Table 2. Details of XYZ Store Order Fees

Type	Cost Amount (IDR)
Listing Fee	450,000
Administrative Fee	600,000
Telephone Fee	400,000
Shipping Fee	6,000,000
Totals	7,450,000

b. Storage Fee

Storage costs (carrying costs or holding costs) Is a cost that has main components, namely the cost of capital, storage costs, and risk costs.

Table 3. Details of XYZ Store Storage Fees

Type	Cost Amount (IDR)
Warehouse electricity	1,200,000
Warehouse Labor	6,000,000
Damaged Backup	3,000,000
Totals	10.200.000

c. Calculation of Ordering Costs and Holding

1) Costs Order fee each time the message (S)

$$= (\text{Total Order Cost}) / (\text{Order Frequency}) \dots\dots\dots(1)$$

$$= (\text{IDR } 7,450,000) / 12$$

$$= \text{IDR } 620,833,-$$

2) Storage cost per raw material unit (H)

$$= (\text{Total Storage Cost}) / (\text{Total Raw Material Requirement}) \dots\dots\dots(2)$$

$$= (\text{Rp } 10,200,000) / (1137245 \text{ meters})$$

$$= \text{IDR } 9,-/ \text{ meter.}$$

The XYZ store places orders 12 times a year. This company takes the flannel fabric it needs as the primary raw material in the manufacture of printing fabrics. This company does not manufacture its own fabrics. However, he bought cloth from a supplier who came from the Yogyakarta area, who had been his co-worker.

- a. Purchase of raw materials (Q) can be calculated based on company policies that place orders once a month, it can be seen as follows:

$$= (\text{Total Raw Material Needs})/(\text{Order Frequency}) \dots\dots\dots(3)$$

$$= (1137245 \text{ meters})/12$$

$$= 94770.4 \text{ meters}$$

So the amount of raw material purchases at this XYZ Store in one order is 94770.4 meters.
- b. Total Inventory Cost In order to calculate the cost of inventory needed by the company, it known:
 - 1) Total raw material requirements (D) = 1137245 meters.
 - 2) Average purchase of raw materials (Q) = 94770.4 meters.
 - 3) The cost of ordering one message (S) = IDR 620,833
 - 4) Cost of storage per meter (H) = IDR 9,-/ meter.

Total Inventory Cost (TIC) as follows:

$$\text{TIC} = [D/Q s] + [Q/2 H] \dots\dots\dots(4)$$

$$= [1137245/94770.4 \text{ IDR } 620,833,-] + [94770.4/2 \text{ IDR } 9,-]$$

$$= \text{IDR } 7,449,997.3 + \text{IDR } 426,466.8$$

$$= \text{IDR } 7,876,464.1$$

So the total cost of inventory that must be borne by Store XYZ is IDR 7,876,464.1.

The things that must be taken into account in using the EOQ method are as follows:

- a. Economic purchase of raw materials

This economical purchase of raw materials is based on:

 - 1) Total raw material requirements (D) = 1137245 meters.
 - 2) The cost of ordering one message (S) = IDR 620,833
 - 3) Cost of storage per meter (H) = IDR 9,-/ meter

So after knowing the things listed above, the amount of economical raw material purchases using the EOQ method is as follows:

$$Q^* = \sqrt{2DS/H} \dots\dots\dots(5)$$

$$= (2 \times 1137245 \times \text{IDR } 620,833)/9$$

$$= 396103 \text{ meters.}$$

So the amount of economical raw material purchases using the EOQ method is 396103 meters.
- b. Frequency of Ordering Raw Materials

By using the EOQ method, it can be calculated that the number of order frequencies in one year or often called the frequency of purchases can be calculated as follows:

$$F = D/(Q^*) \dots\dots\dots(6)$$

$$F = 1137245/396103$$

$$F = 2,8 \sim 3 \text{ Times}$$

So the frequency of ordering raw materials according to the EOQ method is 3 times a year.
- c. Total Inventory Cost

In order to calculate the cost of inventory, it is first known:

 - 1) Total raw material requirements (D) = 1137245 meters.
 - 2) The cost of ordering one message (S) = IDR 620,833
 - 3) Saving cost per meter (H) = IDR 9,-/ meter
 - 4) Economical purchase of raw materials (Q*) = 396103 meters.

$$\text{TIC} = [D/Q s] + [Q/2 H] \dots\dots\dots(7)$$

$$= [1137245/396103 \text{ IDR } 620,833,-] + [396103/2 \text{ IDR } 9,-]$$

$$= \text{IDR } 1,782,463.7 + \text{IDR } 1,782,463.5$$

= IDR 3,564,927.2

So the total raw material inventory for XYZ store when using the EOQ method is IDR 3,564,927.2

RESULTS AND DISCUSSION

Method From the results that have been analyzed above, it is known that the comparison between the total costs incurred when using company policies and policies using the EOQ method is known. For more details, see below: Comparison of Company Policy with the EOQ Method No. Description of Company Policy EOQ Method 1 Average purchase of raw materials 94770.4 meters 396103 meters 2 Total inventory costs Rp 7,876,464.1 Rp 3,564,927.2 3 Order frequency 12 3 Source: Processed primary data From the table above it can be seen that the costs incurred by the company amounted to IDR 7,876,464.1. Meanwhile, the total inventory cost incurred by the company when using the EOQ method is IDR 3,564,927.2. it can be seen that the savings are IDR 4,311,536.9 when using the EOQ method.

While the obstacle in this research is that the EOQ method that has been disclosed by the authors in this study cannot be implemented at the XYZ Store due to the agreement factor from the supplier who sends materials once a month. Even though the storage facilities owned by Store XYZ are very adequate, so that the minimum inventory limit that must be stored according to the EOQ calculation can be carried out in field conditions. Therefore, the use of the EOQ method at Store XYZ is an Opportunity Cost for the company because by implementing the raw material inventory policy that has been implemented by the company so far, the company sacrifices cost savings if it does not use the EOQ method.

CONCLUSION

From the results of the research and discussion in the previous chapter, the following conclusions can be drawn: 1. The frequency of purchasing raw materials for XYZ Stores when using the EOQ method is 3 times purchasing raw materials in one period (1 year), while company policy is 12 times in one year. 2. The total cost of the company's raw material inventory when calculated according to the EOQ is IDR 3,564,927.2 while the company policy is IDR 7,876,464.1 3. Cost savings when using the EOQ method is IDR 4,311,536.9.

Based on the conclusions above, the researcher can provide advice to companies that can be used as material for consideration, namely the company should review the raw material inventory policy that has been carried out by the company so far, namely:

- 1) Companies should apply the EOQ method which has been proven to produce a more efficient total inventory cost.
- 2) The company should apply the EOQ method, because the company has a warehouse where raw materials are stored which is quite extensive. With an order quantity of 396103 meters, XYZ's warehouse is able to store it because the warehouse is very large and still has spare storage space.

ACKNOWLEDGMENT

Praise the authors pray to the presence of Allah SWT, for His blessings and mercy. So that the writer can complete this research smoothly. The author also thanks XYZ Store for being the case study material in this research. The authors also thank the Industrial Engineering Study Program, Faculty of Engineering and Computer Science, Indraprasta University PGRI Jakarta, which has supported this research.

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