CONTROL ANALYSIS OF 600D BAG RAW MATERIAL INVENTORATION USING ECONOMIC ORDER QUANTITY (EOQ) METHOD IN CV. MCEE PROMOSINDO BAG CONVECTION, KAWASAN PIK PULOGADUNG, JAKARTA TIMUR

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Abstract - *Raw materials are important factors that must be used effectively and efficiently in an effort to create profits for the company. One way to use it is by controlling the inventory of raw materials. This study uses the Economic Order Quantity (EOQ) method approach to determine the optimal amount of inventory. The objectives expected from this study are to determine the supply of raw materials, determine the frequency of purchasing raw materials and the optimal amount of raw material requirements, determine the safety stock, determine the point of reordering raw materials during the grace period, and to determine the company's total inventory costs.*

The calcalution results show that the total cost of raw material inventory using the EOQ method is smaller than the company method. By using the Economic Order Quantity (EOQ) method, the company can save the total cost of raw material inventory in 2018 of IDR 22.298.372,- the frequency of orders is reduced to 5 times a year which result in a smaller number of orders for raw material each time an order is 2912 meters and the application is safety stock of 1965 meters and reorder point of 4103 meters which previously did not exist in company policy. The conclusion is that the application of control and the EOQ method can help companies in making inventory decisions, saving cost and controlling raw materials that can support the smooth running of production activities

Keywords: Economic Order Quantity, Raw material inventory, Safety Stock, Re Order Point

Abstrak– Bahan baku merupakan faktor penting yang harus dimanfaatkan secara efektif dan efisien dalam usaha menciptakan keuntungan bagi perusahaan. Salah satu cara memanfaatkanya adalah dengan pengendalian persediaan bahan baku. Penelitian ini menggunakan pendekatan metode *Economic Order Quantity* (EOQ) untuk menentukan jumlah persediaan yang optimal. Tujuan yang diharapkan dari penelitian ini adalah untuk mengetahui persedediaan bahan baku, mengetahui frekuensi pembelian bahan baku dan jumlah kebutuhan bahan baku yang optimal, mengetahui persediaan pengaman, mengetahui titik pemesanan kembali bahan baku selama masa tenggang, serta untuk mengetahui total biaya persediaan perusahaan.

Hasil perhitungan menunjukan bahwa total biaya persediaan bahan baku dengan menggunakan metode EOQ lebih kecil dibandingkan dengan metode perusahaan. Dengan menggunakan metode *Economic Order Quantity* (EOQ) perusahaan dapat menghemat total biaya persediaan bahan baku kain 600D pada tahun 2018 sebesar Rp 22.298.372,- frekuensi pemesanan berkurang menjadi 5 kali setahun yang berakibat lebih kecilnya jumlah pemesanan bahan baku setiap kali pesannya sebesar 2912 meter dan

penerapan *safety stock* sebesar 1965 meter serta *reorder point* sebesar 4103 meter yang sebelumnya tidak ada pada kebijakan perusahaan. Kesimpulan yang diperoleh bahwa penerapan pengendalian serta metode EOQ dapat membantu perusahaan dalam pengambilan keputusan persediaan, penghematan biaya serta pengendalian bahan baku yang dapat menunjang kelancaran aktifitas produksi.

Kata kunci : Economic Order Quantity, Persediaan bahan baku, Safety Stock, Re Order Point.

I. PRELIMINARY

A company has the main objective, which is to make a profit. In the process of achieving these goals will be influenced by various factors, one of which is the smooth running of production. Achieving company goals will face certain obstacles so that the company must have good management. Basically, good management has a very important function in the company in order to make decision choices as well as control the company's activities so that it runs effectively and the company is able to obtain optimal profits. One way for the company to be able to obtain optimal profits is to implement a management policy by taking into account the optimal inventory. With optimal inventory, the company is able to determine how much raw material inventory is appropriate, so as not to cause waste of costs because it is able to balance the need for raw materials that are not too much and supplies that are not too little. Optimal inventory is able to streamline company expenses such as ordering and storage costs for raw materials. So that management policies regarding inventory will help the company.

CV.MCEE PROMOSINDO Bag Convection Business is located in Small Industrial Village (PIK). This company is a type of home industry business that is engaged in handicrafts whose products are bags. Companies are faced with a variety of products according to consumer wishes or orders.

The company carries out its production process according to customer orders, it is very important for the company to know in advance the costs that must be incurred for these products so that they can determine an accurate selling price, according to the above characteristics to increase cost efficiency and to obtain the cost of goods manufactured. accurate, then the company can use *economic order* quantity to find out the raw materials for each customer or consumer order.

Based on the above background, in this study the authors are interested in the company's production process to compile a thesis with a title **"Analysis of Inventory Control of 600D Bag Fabric Raw Material With Economic Order Quantity (EOQ) Method In CV.MCEE PROMOSINDO Bag Convection".**

1.1. Formulation of the problem

To support research on the problems that have been raised, the following research questions were formulated:

1. What is the frequency in one period of purchasing raw materials when CV.MCEE PROMOSINDO establishes the Economic Order Quantity (EOQ) method?
2. What is the total cost of raw material inventory if CV.MCEE PROMOSINDO establishes the Economic Order Quantity (EOQ) method policy?
3. What is the Safety Stock and Re Order Point of CV.MCEE PROMOSINDO in the calculation of the Economic Order Quantity (EOQ) method?
4. How is the total cost of raw material inventory using company policy compared to using the Economic Order Quantity (EOQ) method?

1.2. Research purposes

Based on the formulation of the problem above, the purpose of this paper is as follows:

1. To find out the frequency of purchasing raw materials and the optimal amount of raw material requirements by using the Economic Order Quantity (EOQ) Method in CV.MCEE PROMOSINDO Bag convection?
2. To find out the total cost of supplies by using the Economic Order Quantity (EOQ) method on CV.MCEE PROMOSINDO bag convection?
3. To find out the safety stock and re-order points by using the Economic Order Quantity (EOQ) method on the CV.MCEE PROMOSINDO bag convection?
4. To find out the comparison between the total cost of inventory using company policy with the policy using the Economic Order Quantity (EOQ) method.

II. LITERATURE REVIEW

2.1. Operational Management

Another opinion from the book Operation Management (Stevenson, 2011: 72) the problem is the basic input / input in the decision-making process from operations management because forecasting provides information in future requests. One of the main objectives of operations management is to balance supply and demand, and having an estimate of future demand is very important to determine what capacity or supply is needed to balance demand.

2.2. Definition of Inventory

The definition of inventory has a different meaning for each company. This definition depends on the business and activities of the company. According to Walter T Harrison Jr. Charles T. Hongren, C. William Thomas, and Themin Suwardi (2012: 339), translated by Gina Gania, the definition of inventory is: "Inventory as an asset (a) is stored for sale in the company's routine operations (b) in the production process for sale or (c) in the form of materials or accessories to be consumed during the production or delivery process.

Haming and Nurnajamuddin (2007: 4) that inventory is defined as a physical economic resource that needs to be procured and maintained to support smooth production, including raw materials, finished products, assembled components, and materials. assistant (substance material), and the goods are in the process of working (working in process inventory)

2.3. Inventory Function

There are also other supply functions. Inventory functions according to Freddy Rangkuty (2004: 15) include:

1. The decoupling function is a supply that allows a company to meet customer demands without depending on a supplier.
2. Economic Lot Sizing function, this inventory needs to consider savings or discounts on purchases, lower freight costs per unit and so on.
3. Anticipation function, when the company faces fluctuations in demand that can be predicted and predicted based on experience or past data, namely seasonal demand.

2.4. Inventory Type

Raw goods inventory has been purchased, but has not been processed. The raw materials can be used from the production process for different suppliers. However, the preferred approach is to eliminate variability of suppliers in terms of quality, quantity or delivery time so that no separation is required. The work-in-progress inventory has undergone some changes, but is not yet complete. WIP exists because it takes time to make a product (called the cycle time). Reduced cycle times result in reduced WIP supplies. Often this is not difficult to do, because most of the time the “road” is a small part of the raw material flow time, maybe only 5%. MRO is an inventory devoted to maintenance /

repair / operation equipment. This MRO exists because the time and need for maintenance and repair of some equipment cannot be determined. Although the demand for other supplies needs to be anticipated. Likewise, the finished goods inventory is finished and waiting to be shipped. Finished goods are put into inventory because consumer demand for a certain period of time may not be known.

2.5. Relationship between Research Variables

The research variable is the object of research which becomes the research point of attention. In this study, the variables are:
The actual use of raw materials is calculated in Kg units
Raw material inventory, calculated in units of Kg
EOQ (Economic Order Quantity):

a) Storage Costs
b) Order Fee
c) Reorder point
d) Ordering Fee (safety stock)

This study uses independent variables as observed variables and becomes the basis for calculations. Independent variables are variables that do not have a relationship between one variable and another in terms of relationship, influence or comparison. The independent variable in this study is the supply of raw materials. In measuring the supply of raw materials, calculations using certain methods are used.

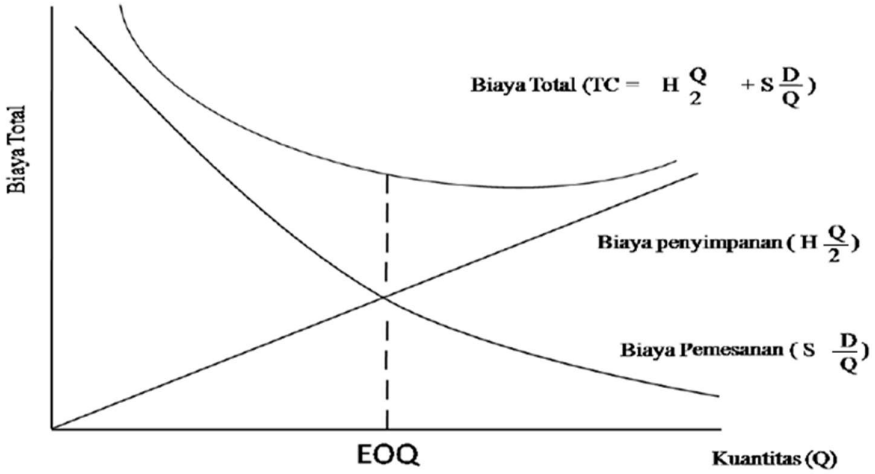
2.6. Hypothesis Development

This research is a descriptive study that aims to explain and describe the independent variables so that in this study, the formulation of a research hypothesis is not required.

2.7. Research Conceptual Framework

The relationship between the two types of costs (order costs and storage costs), with the number of orders can be seen in the following figure:

Figure 2.4
EOQ Raw Material Control Methods



Source: Heizer & Render

The picture above shows that Heizer & Render (2010: 93-94) if the order quantity is reduced. Conversely, the cost of the order quantity decreases, the storage costs are also reduced but the order cost increases. The optimum order quantity occurs at the point where the storage cost curve and the ordering cost curve intersect.

III. RESEARCH METHOD

3.1. Research Strategy

The strategy used in this research is a descriptive strategy, which is systematic, accurate description, description or painting regarding facts, properties, and relationships between the phenomena under study or in other words, describes the object under study in a situation according to the facts. .

The reason for this research strategy is because the research used is case research involving bag product business owners, namely by conducting field observations directly to CV. MCEE PROMOSINDO Bag Convection, Pulogadung in order to obtain actual data and information related to the research title regarding "Control Analysis. 600D Bag Raw Material Using Economic Order Quantity (EOQ) ".

3.2. Population and Sample

According to Azwar (2012: 6). Population is the source of data in a study that has a large number and area. The entire amount consisting of objects or subjects that have certain characteristics and qualities that are determined by the researcher to be examined and then draw conclusions.

The population in this study are companies engaged in manufacturing that produce bags made of cloth.

The sample is part of a number of characteristics possessed by the population used for research (Sujarweni, 2014: 65) while the sample used in this study is the purchase of raw materials for one year, from January 2019 to December 2019.

3.3. Data Analysis Method

The data analysis used in this study are:

3.3.1. Data Processing Methods

The data obtained from the company is in the form of data regarding the raw material procurement system which includes the purchase and use of raw materials which will be analyzed quantitatively and described in the form of a description. In formulating the raw material inventory control model, the data is processed using a program*QM software* with the aim of simplifying the calculation of the collected data.

3.3.2. Data Presentation Method

In this study, the presentation of data used by researchers using tables. This aims to make it easier for researchers to understand and analyze the data that has been processed by researchers.

3.3.3. Data Analysis Tools

According to Heizer & Render (2016: 561) EOQ Model (*economic order quantity*) is one of the inventory control techniques that can minimize the total cost of ordering and storage. The inventory model aims to minimize total costs. The most significant costs are ordering costs and storage costs which can be formulated as follows:

1. The optimal number of orders

The optimal order size will appear at a point where the ordering cost point is the same as the storage cost, so that after deriving the equation for the optimal order quantity, we get the EOQ formula, namely:

$$\text{EOQ} = \sqrt{\frac{2 \,.\, D \,.\, S}{H}}$$

2. Annual ordering fee = $\frac{D}{Q}S$
3. Annual storage fee = $\frac{Q}{2}H$
4. Total cost

The optimal order quantity is determined when the ordering costs are the same as the storage costs, namely:

TIC = $+\frac{D}{Q}S\frac{Q}{w}H$

5. Maximum Inventory

To determine the minimum and maximum points, you can use the following formula:

Maximum Inventory = Safety Stock + EOQ

Information :

EOQ = Optimal purchase quantity (m)
TIC = Total cost of inventory (Rp / m)
D = Quantity of usage per period (m / year)
S = Cost per order (Rp / m)
H = Storage costs per unit per period (Rp / m / year)
Q = Average raw material usage per day (m / day)
N = Number of orders expected (times)

6. Safety stock

According to Heizer & Render (2016: 567) safety stock is an additional supply that allows demand inequality. Safety stock can be calculated by the formula:

SS = α x Z

Information:

SS = Safety stock
α = Standard deviation
Z = The security factor is formed on the basis of the company's capabilities

7. Reorder Point

According to Heizer & Render (2016: 567) reorder point is the level of inventory where action is taken to refill the inventory of goods, so the decision when to order is stated using the reorder point which is formulated as follows:

ROP = (dx L) + Safety Stock

Information :

ROP = Reorder point (m)
d = Average demand per period
L = Waiting time (days)

3.6. Data Analysis Using QM V5 (Software)

This method is done by likening a problem to a tree, then the problem is divided or made branches (branchesing) into a more subset.

The POM QM program is a computer program that is used to solve quantitative problems in production and operations. An attractive graphic appearance and ease of operation make POM for Windows an alternative application to help make decisions, such as determining the appropriate production combination in order to get the maximum benefit. Determine the purchase order of goods so that maintenance costs are minimized, determine the assignment of employees to a job in order to achieve maximum results, and so on. This POM for Windows program is used as an alternative to solve the maximum and minimum problems.

IV. RESULTS AND DISCUSSION

4.1. Description of Research Object

CV.MCEE PROMOSINDO bag convection business is a home industry business engaged in handicrafts producing bags. The convection business which is located in the Small Industrial Village (PIK) Blok B No.156, the grinding village, Cakung sub-district, East Jakarta has been established since 2000 until now. The convection business that was founded by Mrs. Sandra originally only had five employees.

CV.MCEE PROMOSINDO Bag Convection is an individual company. Production activities at Mrs. Sandra's convection business are still done manually. The promotion process also only depends on direct promotion directly to consumers. From there, the CV.MCEE PROMOSINDO bag convection business grew and experienced an increase in promotion.

4.2. Research Data Analysis

4.2.1. Purchase of Raw Materials

Bag Convection CV.MCEE PROMOSINDO purchases raw materials based on purchase orders received from customers. The following is a table of raw material purchases during the period January 2018 to December 2018:

Table 4.1
Data on Purchasing 600D Fabric Raw Materials in 2018

Month	Purchase (m)	Purchase frequency (times)	Average purchase per order (m)
January	1,290	3	430
February	1,150	2	575
March	1,270	2	635
April	750	3	250
May	988	4	247
June	1,820	4	455

July	1,532	2	766
August	1,761	3	587
September	1,672	2	836
October	790	2	395
November	1,626	3	542
December	1,461	3	487
Total	16,086	33	6,205
Average purchases per month			1.340.5
Average purchase per order			487.45

Source: Processed Convection Internal Data

Based on table 4.2, it can be seen that every month the company does not always buy the same amount. In 2018 the company made 33 purchases with a total purchase for one year of 16,086 meters with an average monthly purchase of 1,340.5 meters and an average purchase of 487.4 meters each time. This purchase is based on the needs of the company which changes every month depending on the number of customer orders received.

4.2.2. 600D Fabric Raw Material Needs

600D fabric raw material is one of the main raw materials used by companies in the production process of bag products. So to find out how much the amount of 600D fabric raw material inventory needs according to the company's method, data is needed regarding the amount of use or the need for 600D fabric raw material. According to the company owner the need for 600D fabric raw material in 2018 is volatile and uncertain which can be explained in the following table:

Table 4.2
600D Fabric Raw Material Needs in 2018

Month	Meter
January	1,150
February	980
March	870
April	710
May	865
June	1,780
July	1,346
Agutus	1,535
September	1,478
October	645
November	1,535
December	1,278
Total	14,172
Average	1,181

Source: Processed Convection Internal Data

Based on table 4.3 above, the highest use of 600D fabric was in June with a total raw material requirement of 1,780 meters. The lowest use of 600D fabric was in April with a total raw material requirement of 710 meters. Meanwhile, the total raw material requirement for 600D fabric in 2018 is 14,172 meters with an average monthly raw material requirement of 1,181 m.

4.3. Order Fee

Ordering costs are costs incurred by the company because of the ordering of raw materials from suppliers, starting from the order process until the goods arrive at the

warehouse. The company booking fee consists of telephone charges, administration fees and shipping costs. The details are as follows:

Table 4.3
Details of the Cost of Ordering 600D Fabrics in 2018

No.	Type of Fee	Amount (Rp)
1	Telephone Fee	IDR 300,000
2	Administrative costs	IDR 800,000
3	Shipping costs	IDR 1,200,000
	total	IDR 2,300,000

Source: Processed Convection Internal Data

Based on the details of the ordering costs incurred by the company during the period January to December 2018 amounting to IDR 2,300,000

4.3.1. Storage Costs

Storage costs are costs incurred by the company in storing raw material inventories within a certain period of time.

Table 4.4
Details of the 600D Fabric Storage Cost in 2018

No.	Type of Fee	Amount (Rp)
1	Warehouse Maintenance Costs	IDR 600,000
2	Electricity cost	IDR 1,200,000
3	Damage Costs	IDR 1,500,000
	total	IDR 3,300,000

Source: Processed Convection Internal Data

Based on the details of the storage costs incurred by the company for the period January to December 2018 amounting to IDR 3,300,000

4.4. Data analysis

4.4.1. Calculation of data analysis in accordance with company policy

Bag Convection CV.MCEE PROMOSINDO conducted a frequency of purchasing raw materials 33 times during the period January 2018 to December 2018. The amount of raw material usage, raw material prices, ordering costs per order and the amount of storage costs. CV.MCEE PROMOSINDO place orders based on data and experiences from the past.

4.4.1.1. Total purchase frequency

$$Q^* = \sqrt{\frac{2\,D\,S}{H}}$$

$$Q^* = \sqrt{\frac{2\,x\,16.086\,x\,2.300.000}{3.300.000}}$$

= 149.7 = 150 meters

1. The number of orders you want

$$N = \frac{Permintaan}{Jumla\ \ unit\ yang\ dipesan}$$

$$= \frac{16.086}{150}$$

= 107.24 meters

So the total frequency of purchasing 600D fabric is 107.24 meters.

2. The amount of time between orders you want

$$T = \frac{Jumlah\ hari\ kerja\ perha}{N}$$

$= \frac{296}{107,24}$
= 2,760

4.4.1.2. Ordering and storage costs

1. Order fee every time you place an order

$= \frac{Total\ biaya\ pemesanan}{Frekuensi\ pemesanan}$
$= \frac{Rp\ 2.300.000}{33}$
= IDR 69,700, -

So the costs incurred every time you place an order is IDR 69,700

2. 600D per (m) fabric storage cost

$= \frac{Total\ biaya\ penyimpanan}{Jumla\ \ persediaan}$
= Rp $\frac{3.300.000}{14.172}$
= IDR 233, -

So, the costs incurred for each time you save Rp. 233, - per meter.

4.4.1.3. The average purchase of raw materials for cloth is 600D

$= \frac{Total\ kebutuhan\ baha\ \ baku}{Frekuensi\ pemesanan}$
$= \frac{14172}{33}$
= 43 meters

So the amount of raw material purchases the company average in placing an order is 43 meters.

4.4.1.4. Total inventory cost

The data that has been collected from the company are as follows:

1. The total requirement for fabric is 600D = 14,172 meters
2. Average purchase of fabric 600D = 43 meters
3. Cost per message = IDR 69,700
4. Cost of storage per meter = IDR 233, -

The total cost of inventory (TIC) is as follows:

TIC $= \left[\frac{D}{Q}S\right] + \left[\frac{Q}{2}H\right]$
$= \left[\frac{14.172}{43}69.700\right] + \left[\frac{43}{2}233\right]$
= IDR 22,971,823 + IDR 5,010
= IDR 22,976,833, -

So the total cost of inventory that must be incurred by the company is IDR 22,976,833

4.5. 600D Fabric Purchase Analysis Based on the EOQ Method

4.5.1. Purchase of raw materials

The EOQ model in this study aims to calculate the optimal raw material requirements and costs for each order.

Data on the use of 600D fabric raw materials from January to December 2018 are as follows:

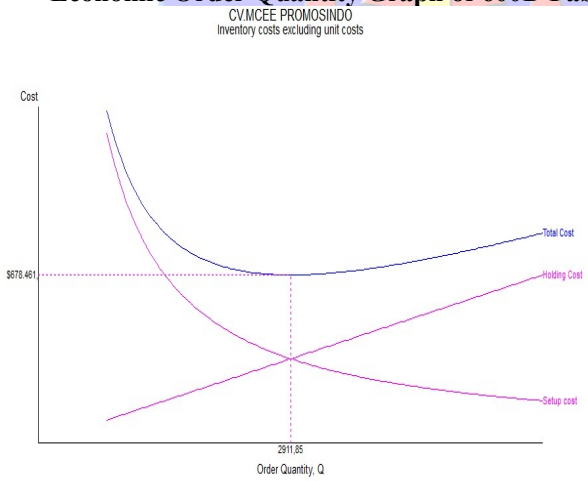
1. The total requirement for fabric is 600D = 14,172 meters
2. Cost per message = IDR 69,700
3. Cost of storage per meter = IDR 233, -

Table 4.5
Total Cost of 600D Fabric Inventory in 2018

Data (Parameters)	Value
Demand rate (D)	14172
Setup / ordering cost (S)	69700
Holding / carrying cost (H)	233
Unit cost	0
Result	
Optimal order quantity (Q *)	2911.85
Maximum Inventory Level (Imax)	2911.85
Average Inventory	1455.93
Orders per period (year)	4.87
Annual Setup cost	339230.5
Annual holding costs	339230.5
Total Inventory (Holding + Setup) Cost	678461
Unit Cost (PD)	0
Total Cost (including units)	678461

Source: Data Processed (2020)

Figure 4.2
Economic Order Quantity Graph of 600D Fabric in 2018



Source: Data Processed (2020)

From Figure 4.2, it can be seen that the graph of storage costs decreases and ordering costs increase, and the total cost initially starts to increase but after reaching the meeting of the storage cost lines then decreases. The low point of the total cost of inventory is reached when ordering and storage costs intersect, that is, when the order quantity is 2,912 meters.

4.5.2. 600D fabric inventory based on the EOQ method in January-December 2018
January

Total Cost of 600D Fabric Inventory for January 2018

Data (Parameters)	Value

Demand rate (D)	1150
Setup / ordering cost (S)	69700
Holding / carrying cost (H)	233
Unit cost	0
Result	

Optimal order quantity (Q *)	829.47
Maximum Inventory Level (Imax)	829.47
Average Inventory	414.74
Orders per period (year)	4.87
Annual Setup cost	96633.63
Annual holding costs	96633.63
Total Inventory (Holding + Setup) Cost	193267.63
Unit Cost (PD)	0
Total Cost (including units)	193267.63

February

Total Cost of 600D Fabric Inventory for February 2018

Data (Parameters)	**Value**
Demand rate (D)	980
Setup / ordering cost (S)	69700
Holding / carrying cost (H)	233
Unit cost	0
Result	

Optimal order quantity (Q *)	765.71
Maximum Inventory Level (Imax)	765.71
Average Inventory	382.86
Orders per period (year)	1.28
Annual Setup cost	89205.66
Annual holding costs	89205.66
Total Inventory (Holding + Setup) Cost	178411.3
Unit Cost (PD)	0
Total Cost (including units)	178411.3

March

Total Cost of 600D Fabric Inventory for March 2018

Data (Parameters)	**Value**
Demand rate (D)	870
Setup / ordering cost (S)	69700
Holding / carrying cost (H)	233
Unit cost	0
Result	

Optimal order quantity (Q *)	721.46
Maximum Inventory Level (Imax)	721.46
Average Inventory	360.73
Orders per period (year)	1.21
Annual Setup cost	84050.24
Annual holding costs	84050.24
Total Inventory (Holding + Setup) Cost	168 100.5
Unit Cost (PD)	0

Total Cost (including units)	168 100.5

April

April 2018 Total Cost of Fabric 600D Fabrics

Data (Parameters)	**Value**
Demand rate (D)	710
Setup / ordering cost (S)	69700
Holding / carrying cost (H)	233
Unit cost	0
Result	

Optimal order quantity (Q *)	651.75
Maximum Inventory Level (Imax)	651.75
Average Inventory	325.88
Orders per period (year)	1.09
Annual Setup cost	75929.15
Annual holding costs	75929.15
Total Inventory (Holding + Setup) Cost	151858.3
Unit Cost (PD)	0
Total Cost (including units)	151858.3

In May

Total Cost of 600D Fabric Inventory for May 2018

Data (Parameters)	**Value**
Demand rate (D)	865
Setup / ordering cost (S)	69700
Holding / carrying cost (H)	233
Unit cost	0
Result	

Optimal order quantity (Q *)	719.39
Maximum Inventory Level (Imax)	719.39
Average Inventory	359.69
Orders per period (year)	1,2
Annual Setup cost	83808.37
Annual holding costs	83808.37
Total Inventory (Holding + Setup) Cost	167616.8
Unit Cost (PD)	0
Total Cost (including units)	167616.8

June

Total Cost of 600D Fabric Inventory for June 2018

Data (Parameters)	**Value**
Demand rate (D)	1780
Setup / ordering cost (S)	69700
Holding / carrying cost (H)	233
Unit cost	0
Result	

Optimal order quantity (Q *)	1031.96

Maximum Inventory Level (Imax)	1031.96
Average Inventory	515.98
Orders per period (year)	1.72
Annual Setup cost	120233.5
Annual holding costs	120233.5
Total Inventory (Holding + Setup) Cost	240447
Unit Cost (PD)	0
Total Cost (including units)	240447

July

Total Cost of 600D Fabric Inventory for July 2018

Data (Parameters)	**Value**
Demand rate (D)	1346
Setup / ordering cost (S)	69700
Holding / carrying cost (H)	233
Unit cost	0
Result	

Optimal order quantity (Q *)	897.38
Maximum Inventory Level (Imax)	897.38
Average Inventory	448.69
Orders per period (year)	1.5
Annual Setup cost	104544.7
Annual holding costs	104544.7
Total Inventory (Holding + Setup) Cost	209089.3
Unit Cost (PD)	0
Total Cost (including units)	209089.3

August

Total Cost of 600D Fabric Inventory for August 2018

Data (Parameters)	**Value**
Demand rate (D)	1535
Setup / ordering cost (S)	69700
Holding / carrying cost (H)	233
Unit cost	0
Result	

Optimal order quantity (Q *)	958.31
Maximum Inventory Level (Imax)	958.31
Average Inventory	479.16
Orders per period (year)	1.6
Annual Setup cost	111643.5
Annual holding costs	111643.5
Total Inventory (Holding + Setup) Cost	223287.0
Unit Cost (PD)	0
Total Cost (including units)	223287.0

September

Total Cost of 600D Fabric Inventory for September 2018

Data (Parameters)	**Value**
Demand rate (D)	1478

Setup / ordering cost (S)	69700
Holding / carrying cost (H)	233
Unit cost	0
Result	

Optimal order quantity (Q *)	940.35
Maximum Inventory Level (Imax)	940.35
Average Inventory	470.18
Orders per period (year)	1.57
Annual Setup cost	109551.1
Annual holding costs	109511.1
Total Inventory (Holding + Setup) Cost	219102.1
Unit Cost (PD)	0
Total Cost (including units)	219102.1

October

Total Cost of 600D Fabric Inventory for October 2018

Data (Parameters)	**Value**
Demand rate (D)	645
Setup / ordering cost (S)	69700
Holding / carrying cost (H)	233
Unit cost	0
Result	

Optimal order quantity (Q *)	621.2
Maximum Inventory Level (Imax)	621.2
Average Inventory	310.6
Orders per period (year)	1.04
Annual Setup cost	72370.1
Annual holding costs	72370.1
Total Inventory (Holding + Setup) Cost	144740.2
Unit Cost (PD)	0
Total Cost (including units)	144740.2

November

Total Cost of 600D Fabric Inventory for November 2018

Data (Parameters)	**Value**
Demand rate (D)	1535
Setup / ordering cost (S)	69700
Holding / carrying cost (H)	233
Unit cost	0
Result	

Optimal order quantity (Q *)	958.31
Maximum Inventory Level (Imax)	958.31
Average Inventory	479.16
Orders per period (year)	1.6
Annual Setup cost	111643.5
Annual holding costs	111643.5

Total Inventory (Holding + Setup) Cost	223287.0
Unit Cost (PD)	0
Total Cost (including units)	223287.0

December

Total Cost of 600D Fabric Inventory for December 2018

Data (Parameters)	**Value**
Demand rate (D)	1278
Setup / ordering cost (S)	69700
Holding / carrying cost (H)	233
Unit cost	0
Result	

Optimal order quantity (Q *)	874.42
Maximum Inventory Level (Imax)	874.42
Average Inventory	437.21
Orders per period (year)	1.46
Annual Setup cost	101869.6
Annual holding costs	101869.6
Total Inventory (Holding + Setup) Cost	203739.3
Unit Cost (PD)	0
Total Cost (including units)	203739.3

4.5.3. Safety Stock

According to Sofjan Assauri (2011: 186), safety stock is an additional supply that is held to protect or maintain the possibility of a shortage of raw materials (stockout). According to Heizer & Render (2015: 58) the purpose of safety stock is as an anticipation of a shortage of inventory, thus ensuring the smooth running of a production process and is used to overcome delays in the arrival of raw materials. The safety stock for raw materials can be expected so that the production process is not disturbed by the uncertainty of materials. In determining the amount of safety stock, it can be done by comparing the average use of raw materials then looking for the standard deviation using statistical methods then the amount of deviation analysis will be determined.

Table 4.6

Calculation of the Standard Deviation of 600D fabric in 2018

No.	Month	Usage (m)	$\overline{X}$	(X - $\overline{X}$)	(X - $\overline{X}$) ²
1	January	1,150	43	1,107	1,225,449
2	February	980	43	937	877,969
3	March	870	43	827	683,929
4	April	710	43	667	444,889
5	May	865	43	822	675,684
6	June	1,780	43	1,737	3,017,169
7	July	1,346	43	1,303	1,697,809
8	August	1,535	43	1,492	2,226,064
9	September	1,478	43	1,435	2,059,225
10	October	645	43	602	362,404
11	November	1,535	43	1,492	2,226,064
12	December	1,278	43	1,235	1,525,225
	total	14,172			17,021,880

Source: Data Processed (2020)

How to determine the amount of safety stock using the following formula:

$$SD = \sqrt{\frac{\sum(X - \overline{X})^2}{n}}$$

$$SD = \sqrt{\frac{17021880}{12}}$$

SD = 1,191

Assuming that the company uses two storage standards or 5% storage that is not tolerated and uses one side of the normal is 1.65 standard deviation from the mean. To calculate the safety stock is as follows:

SS = α xz
= 1.191 x 1.65
= 1965 meters

So, the optimal safety stock that must be provided by the company is 1965 meters.

4.5.4. Reorder Point

According to Heizer & Render (2015: 567), the reorder point is the level of inventory where when the inventory reaches a certain level late and an order must be made.

At the CV.MCEE PROMOSINDO Bag Convection, the waiting time between the customer and the receipt of raw materials is 3 days. Calculation of average days assuming 296 working days in a year.

To calculate the reorder point, you must first find the average raw material usage per day as follows:

$$d = \frac{Total\ Kebutuha\quad Bahan\ Baku}{296}$$

$$d = \frac{14172}{296}$$

d = 48 meters / day

Then the reorder point (ROP) is as follows:

ROP = (dx L) + Safety Stock
= (48 x 3) + 1191
= 1335 meters

So, the company must reorder 600D fabric raw materials when the raw material inventory in the warehouse is 1335 meters.

4.5.5. Determination of Maximum Inventory (*Maximum Inventory*)

The maximum inventory is required by the company to determine the quantity of inventory in the warehouse so that there is no excess stock of goods so that it does not waste working capital. To find out the maximum amount of inventory, the formula is as follows:

Maximum Inventory = 1191 meters + 2912 meters
= 4103 meters

So, the maximum supply of 600D cloth obtained by the company is 4103 meters.

4.6. Comparison of Company Policy with EOQ Method

From the results of calculations that have been analyzed, it is known that the comparison of raw materials between company policies using the EOQ method.

Table 4.7
Comparison of Raw Material Inventory Between Company Policy and 2018 EOQ Model

No.	Information	Company policy	EOQ method
1	Purchase Quantity	14172 m	2912 m
2	Purchase Frequency	33 times	5 times

3	Rebooking Point	-	1335 m
4	Total Inventory Cost	IDR 22,976,833	Rp. 678,461
5	Safety Supplies	-	1965 m
6	Maximum Inventory	-	4103 m

Source: Data Processed (2020)

Based on Table 4.8 above, it can be seen that the comparison between the policies used by companies using the EOQ method, namely in January 2018 to December 2018 shows that the quantity of raw material purchases using the EOQ method is 2912 meters smaller than the quantity of company purchases of 14172 meters. The total cost incurred by the company is Rp. 22,976,833, - while the total cost of inventories incurred by the company using the EOQ method is Rp. 678,461, - so the company can save Rp. 22,298,372, -. The frequency of company orders was 33 times, while using the EOQ method was 5 times. At the reorder point (Reorder Point) of 1335 meters. The safety stock and the maximum supply are 1965 m and 4103 meters, respectively.

4.7. Research Findings

The results of this study indicate that the control of raw material inventory at CV.MCEE PROMOSINDO Bag Convection is not optimal and the company needs to monitor the inventory control system. Raw material inventory is an element in determining the smooth running of production activities at each company. The amount of raw material is very important in determining how efficient and effective the company is in processing the products that have been planned. In CV.MCEE PROMOSINDO Bag Convection, the policies in the procurement of raw material supplies that have been carried out so far have not shown a minimum cost, which means that the inventory costs are still large compared to if the company uses the EOQ method.

The results in this study are in accordance with previous studies. Kevin, Noortje and London (2018) state that the raw material inventory control policy is not efficient because the company's inventory costs are greater than the results of the EOQ method. The results of this study are also in accordance with the research of Fahmi and Nanda (2015) which states that by using the EOQ method the company obtains the optimal amount of 600D fabric inventory purchase is the EOQ method. Andreno, Indrie, and Merlyn (2018) the total cost of raw material inventory using the EOQ method is smaller than using the method used by the company and in the EOQ method the company can minimize buyers.an inventory cost of raw materials.

From the results of the EOQ calculation, it is known that reorder points in purchasing raw materials during the period January to December 2018 CV.MCEE PROMOSINDO Bag Convection shows that companies should purchase raw materials when raw material supplies are 1335 meters with a lead time of 5 times. . To avoid excess raw materials, the total purchase to be made is 2912 meters. The total cost of inventory using the EOQ method is smaller than the total cost of inventory issued by CV. MCEE PROMOSINDO during January to December 2018, where the purchase of raw materials using the EOQ method costs Rp. 678,461, - this amount is smaller than the costs incurred by company amounting to Rp 22,976,833, -.

V. CONCLUSIONS AND SUGGESTIONS

5.1. Conclusion

Based on the results of research conducted by researchers, it can be concluded as follows:

1. The optimal purchase of raw materials using the EOQ method in the period January to December to December 2018 is 2912 meters.
2. The total cost of the company's raw material inventory if calculated using the EOQ method is Rp. 678,461, - and when calculated with company policy it is Rp. 22,976,833, -. From the results of the total cost value, it can be seen that there is a total

cost savings when using the EOQ method of IDR 22,298,372 during the period January to December 2018.

3. The frequency of ordering raw materials if calculated based on company policy is 33 times a year, while using the EOQ method there are 5 times a year and with reorder points when raw material supplies are 1335 meters.

5.2. Suggestion

Companies should use the EOQ method in raw material procurement policies because it has been proven to produce an efficient total cost and optimal raw material purchases compared to using company policies.

5.3. Limitations and PengFurther research development

This research has limitations, namely that this research is only conducted in one field of business, so the sample in this study is very small, for further researchers it is better to increase the number of samples and enlarge the scope of research so that future research has a wider scope, so that the results produced are more good.

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