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INVENTORY MANAGEMENT OF SMALL AND MEDIUM ENTERPRISES (SMEs) IN FASHION INDUSTRY (A CASE STUDY IN WEAR.LABEL)

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Abstract: In this modern era, there are many Small and Medium Enterprises (SMEs) that produce shirts, t-shirts, and pants for young people. Most of SMEs produce their product with home-based production that has not used an inventory management system. Inventory Management is one of the functions that can be solved by quantitative calculation methods. WEAR.LABEL is one of SMEs in the fashion sector in Jakarta-Indonesia, which processes fabric which is used as a raw material to become finished goods such as clothes, pants, and other accessories. WEAR.LABEL is one of the SMEs that has not used inventory management to manage their raw material. In this study, we determine the optimal quantity and total inventory cost for Casual Culotte products and re-order point for the raw material. Based on the results of the study, it was concluded that the cheapest total inventory cost was by choosing the 4th discount price of Rp 25.000 which resulted in a total inventory cost of Rp 89.326.139 and the optimal quantity was 594 Meters and the optimal ordering time based on the analysis that has been done. This is done by using the Re-Order Point method, which is when the inventory is at 421 meters.

Keywords: Inventory Management, EOQ, Quantity Discount factor, SMEs, Fashion Sector, Re-Order Point

Introduction

In this modern era, there are many Small and Medium Enterprises (SMEs) that produce shirts, t-shirts, and pants for young people. Most SMEs produce their product with home-based production that has not used an inventory management system to face the competition to survive the market. The Inventory management system is very important in calculating the optimal amount of inventory level required, optimal inventory cost, and effective inventory.

SMEs are recognized as instruments for economic growth and employment generation. Therefore, the existence of SMEs has an important role in

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Indonesia's economic development. According to the International Labor Organization (ILO) reports (ILO,2018) that 60% of workers in developing cities are absorbed by informal enterprises and SMEs. The important role of SMEs in the Indonesian economy is their position as major players in economic activity in various sectors. SMEs as instruments for employment generation that will reduce poverty levels, create markets, develop trade, manage natural resources, build communities, and support their families without control and facilities from the local government (ILO,1991).

WEAR.LABEL is one of the SMEs in the fashion sector in Jakarta-Indonesia, which processes fabric which is used as a raw material to become finished goods such as clothes, pants, and other accessories. WEAR.LABEL is one of the SMEs that has not used inventory management to manage their raw material. This is indicated by the high market demand but the stock that is ready to be marketed has not been able to meet consumer demand or even frequently runs out of stock. Therefore, inventory management is important in the operational activities of WEAR.LABEL, so that there is no shortage or excess of goods that affect the cost.

Inventory is the most important aspect of logistics and has taken SMEs to implement various inventory management techniques that best suit their organizations to maximize the best results and manage their inventory (Beck & Kunt, 2009). WEAR.LABEL needs to manage the inventory to make the finished goods inventory more optimal. By looking at the uncertainty of customer demand for their products, which often changes, therefore a method is needed to determine how much inventory of finished goods with using the Probabilistic Economic Order Quantity (EOQ) method with a quantity discount factor.

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Method

The method used in this research is using Economic Order Quantity (EOQ) with quantity discount factor. Researchers used this method because the model of EOQ is a mathematical model to determine the number of items that need to be ordered to fulfill projected demand with the cost of inventory minimized. The quantity discount factor is a discount given by the supplier with the terms of a certain purchase scale. The larger the scale of the purchase, the greater the discount or price discount provided by the supplier. In the process, this method uses the EOQ model to find the optimal Q of each discounted price and then calculates the total cost of inventory each year from each discounted price to get the lowest cost. EOQ Quantity Discount is a quantity discount that is simply a reduction in the price of an item if purchased in large quantities (Heizer and Render, 2015). This research focuses on the optimal quantity of fabric used to make a causal culotte in WEAR.LABEL, Re-Order point the fabric, and the optimal total inventory cost.

Discussion and Result

EOQ Quantity Discount

Economical Order Quantity (EOQ) is one of the oldest and most widely known inventory control techniques, this inventory control method answers two important questions, namely when to order and how much to order (Heizer dan Render 2011: 68). Model for calculating the Economic Order Quantity (EOQ) according to Siswanto (2007:126) can be described as follows.

$$\frac{D}{Q}S = \frac{Q}{2}h$$

$$Q^2 = \frac{2DS}{H}$$

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$$Q = \sqrt{\frac{2DS}{H}}$$

Notations:

Q = Quantity

S = Order cost of placing an order

D = Demand (annual)

H = Holding cost / Storage cost

Processing the data using the EOQ model to find the optimal quantity of each discount price provided by the fabric supplier. Before we calculate the EOQ, the data of discounted price can be seen in table 1 and data on casual culotte historical demand in 2021 can be seen in table 2.

Table 1. Discounted Price

No	Quantity Discount	Price
1	1-25 / Meter	Rp 32.000
2	25-50 / Meter	Rp 30.000
3	50-100 / Meter	Rp 27.000
4	≥ 100 Meter	Rp 25.000

Table 2. Casual culotte historical demand in 2021

No	Period (month)	Demand 2021 (unit)
1	January	676
2	February	1.049
3	March	1.570
4	April	3.496
5	May	3.000
6	June	3.920
7	July	2.484
8	August	2.030
9	September	1.829
10	October	1.903
11	November	1.521
12	December	1.375

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Casual culotte historical data demand assumption in 2021 by eliminating extreme demand and then calculating the average which produces 1.604 units and converted to meters to 3.208 meters. We can find out the demand for casual culotte is 3.208 meters. The order cost is Rp 550.000 per order and the estimation of holding cost is 20% of the selling price of the casual culotte. The result of EOQ discount can be seen in table 3.

EOQ Discount 1 = $\sqrt{\frac{2x3208x550000}{12800}}$ = 525

EOQ Discount 2 = $\sqrt{\frac{2x3208x550000}{12000}}$ = 542

EOQ Discount 3 = $\sqrt{\frac{2x3208x550000}{10800}}$ = 572

EOQ Discount 4 = $\sqrt{\frac{2x3208x550000}{10000}}$ = 594

Table 3. EOQ casual culotte

No	Quantity Discount	Price	EOQ (Meter)
1	1-25 / Meter	Rp 32.000	525
2	25-50 / Meter	Rp 30.000	542
3	50-100 / Meter	Rp 27.000	572
4	≥ 100 Meter	Rp 25.000	594

Safety Stock

Safety Stock is additional inventory held to protect or maintain the possibility of material shortages or stock outs (Rangkuti, 2004:10). According to Senator Nur Bahagia (2006), to determine the safety stock or safety stock can be calculated using the following formula:

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Safety Stock = ZxSx√t

Notations:

Z = Number of standard deviations for a specified service probability

S = Optimal quantity

t = Lead time

Calculated as follows with known data:

S = 1.078 Meter

Zα = 95% = 1.60

Lead Time = 1/30 = 0.033

SS = Zα x S x √t

SS = (95% = 1.60) x 1078 x √0.033

SS = 315 meter

Order cost with discount factor

Ordering cost with the following calculation:

$$\boldsymbol{Order\ Cost = \frac{(DxS)}{Q}}$$

Notations:

D = Demand (unit)

S = Order/setup cost per order

Q = EOQ

The order cost per year can be seen in table 4.

Table 4. Order Cost

No	Dicount Factor	Order Cost
1	Discount 1	Rp 3.360.497
2	Discount 2	Rp 3.253.788
3	Discount 3	Rp 3.086.814
4	Discount 4	Rp 2.970.288

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Holding cost with discount factor

Holding cost with the following calculation:

$$\boldsymbol{Holding\ Cost = H\ x\ \left(SS + \left(\frac{Q}{2}\right)\right)}$$

Notations:

H = Holding cost

SS = Safety stock

Q = EOQ

The holding cost per year can be seen in table 5.

Table 5. Holding Cost

No	Dicount Factor	Holding Cost
1	Discount 1	Rp 7.392.507
2	Discount 2	Rp 7.033.796
3	Discount 3	Rp 6.488.822
4	Discount 4	Rp 6.120.295

Setup Cost

Setup cost is the cost used to carry out the production process. Such as production preparation of each unit and raw material needs. Holding cost with the following calculation:

$$\boldsymbol{Setup\ cost}$$
$$\boldsymbol{= D\ x\ (Discounted\ price\ x\ fabric\ material\ need\ per\ unit}$$

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The setup cost per year can be seen in table 6.

Table 6. Setup Cost

No	Dicount Factor	Setup Cost
1	Discount 1	Rp 102.663.111
2	Discount 2	Rp 96.246.667
3	Discount 3	Rp 86.622.000
4	Discount 4	Rp 80.205.556

Shortage Cost

It is possible to run out of raw material inventory, so it is necessary to calculate the shortage cost with the following calculation:

$$\boldsymbol{Shortage\ cost = Shortage\ cost\ per\ unit\ x\ N}$$

$$N = s\sqrt{L}[f(Z_\alpha) - Z_\alpha \in (Z_\alpha)]$$

Shortage cost = Rp 2.000 x 15 = Rp 30.000

Total Inventory Cost

Total Inventory Cost with the following calculation:

$$\boldsymbol{TC = Order\ Cost + Holding\ Cost + Setup\ Cost + Shortage\ Cost}$$

So that the total cost with discount factor can be seen in table 7. The discounted price chosen is the 4th discount price with a total inventory cost of Rp 89.326.139 and the optimal quantity is 594 meters.

Table 7. Total Inventory Cost

No	Order Cost	Holding Cost	Setup Cost	Shortage Cost	Total Cost
1	Rp 3.360.497	Rp 7.392.507	Rp 102.663.111	Rp 30.000	Rp 113.446.115
2	Rp 3.253.788	Rp 7.033.796	Rp 96.246.667	Rp 30.000	Rp 106.564.251
3	Rp 3.086.814	Rp 6.488.822	Rp 86.622.000	Rp 30.000	Rp 96.227.636
4	Rp 2.970.288	Rp 6.120.295	Rp 80.205.556	Rp 30.000	Rp 89.326.139

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Re-Order Point

According to Carter (2009: 319), Re-Order Point is when the amount of inventory available and the amount of inventory to be received is equal to the amount of inventory that will be used during the waiting time and the amount of safety stock. The re-order point with the following calculation:

$$\boldsymbol{ROP = (Dxt) + SS}$$

$$\boldsymbol{ROP = (3.208x0.033) + 315 = 421\ meter}$$

Notations:

D = Demand (unit)

t = Lead time

SS = Safety stock

So, for reorder points or reordering is done when the remaining 421 Meters of stock.

Conclusion

Based on analysis, the conclusions of this research by using EOQ quantity discount method, the optimal quantity is 594 meters and the discounted price chosen is the 4th discount price with a total inventory cost of Rp 89.326.139. Optimal ordering time based on the analysis that has been done using the Re-Order point method, which is when the inventory is at 421 meters.

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