

COMPARATIVE INVENTORY CONTROL ANALYSIS WITH ECONOMIC ORDER QUANTITY (EOQ) AND JUST IN TIME METHOD TO MINIMIZE INVENTORY COSTS AT UD. MELATI JAYA

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Abstract: *The research discusses how To Compare Inventory Control Analysis With Economic Order Quantity (EOQ) Method and Just In Time (JIT) Method To Minimize Inventory Costs At UD. Melati Jaya. This study discusses a comparative analysis of the Economic Order Quantity method and the Just In Time method to minimize inventory costs at UD. Jasmine jaya. The data analysis method used is descriptive qualitative method with comparative research that compares the Economic Order Quantity (EOQ) method with the Just In Time (JIT) method to the cost efficiency at UD. Melati Jaya. The analysis results from the comparative calculation of inventory control show that the Just In Time Inventory Control method is more appropriate to be applied to Ud. Melati Jaya because the total cost of the inventory is smaller than the total cost of the inventory when using the Economic Order Quantity (EOQ) method.*

Keywords: *Inventory Control, Economic Order Quantity (EOQ), Just In Time Method (JIT), Inventory Costs, UD. Melati Jaya*

Introduction

Inventory is an important asset in the company that can determine the company in achieving the desired profit. Therefore, it requires a proper inventory control process. However, for some small and medium enterprises (SMEs) inventory control has not become a concern. And if this happens further it will cause losses that will occur due to expenses that are not supposed to be incurred by the company such as factory operating costs, building rental costs, costs of lost sales opportunities and damage to raw materials due to storage too long. It requires a proper control method so that the inventory can be controlled properly.

Just in time inventory method is a method that used to minimize the use of inventory in the warehouse. With this, the costs for managing inventory and warehouse dams can also be

reduced and sales figures can be increased. The advantages of using the Just In Time method is to be able to reduce waste so that production efficiency will be achieved obtained while maintaining the quality of the product generated. Basically, a company will plan and control raw material inventories in order to save storage costs and ordering costs incurred by the company (Solihin, 2017). To minimize these costs, we can use Economic Order Quantity (EOQ) analysis, which is a method that provides an overview of the volume of economical purchases at one time and gives an idea of how much it costs and when to repurchase it. So that with this method the manager can control the inventory appropriately so that it can minimize the inventory costs that will be incurred (Indroprasto, 2012).

UD Melati Jaya is a Small and Medium Enterprise (UKM) engaged in processing corn into animal feed. So far, UD. Melati Jaya uses the estimation method for the procurement of raw material supplies. With the finished goods system, the consumer has ordered in advance so that there is no heap of finished products in the warehouse, but in the process of fulfilling the raw material inventory, delays often occur due to the absence of raw materials in the market. This causes the production process to be hampered and if this happens it will increase the possibility of losses that will be experienced by UD. Melati Jaya.

In writing this study the authors only limit the problem of controlling the supply of raw corn raw materials and inventory costs in the form of storage costs and ordering costs from January to March 2020. The purpose of this study is to determine inventory analysis using the EOQ method to minimize inventory costs the trade business of UD. Melati Jaya.

Theoretical Framework

Control

Welsch et al., states that "Control is a process of ensuring efficient performance to achieve company goals". This control includes setting various company goals and standards, comparing measured performance with the goals and standards that have been set. As well as encouraging the success of various company weaknesses (Apriyani & Muhsin, 2017).

Inventory

According to Handoko, "inventory (inventory) is a general term that shows all the organizational resources stored in anticipation of demand fulfillment" (Handoko, 2000). According to Herjanto, inventory control is a series of control policies to determine the level of inventory that must be maintained, when an order to increase inventory must be made. Control of the right inventory in the right quantity (Schroeder, 2000).

The inventory has the following functions according to Berry & Haizer, inventory has an important function in increasing the flexibility of a company's operations, namely (Haizer, 2011):

- a. To maintain stock of goods so that the company can meet anticipated demand arising from consumers.
- b. To keep production with a stable distribution.
- c. To take advantage of the discount when purchasing a large quantity.
- d. To hedge against inflation and price changes.
- e. To avoid stock shortages caused by weather changes, shortages of supply, quality problems and delays in the delivery of supplies.
- f. To keep the company's operations running smoothly.

Basically, all companies that hold a production process will procure supplies for the continuity of the company's production process. According to Mustafa, several things that cause companies to stock up on raw materials are as follows (Musthafa, 2017):

- a. Allows companies to achieve economies of scale.
- b. Balancing supply and demand.
- c. Specializes in production.
- d. Protects against uncertain demand and order cycle.
- e. Critical buffer between distribution channels

In addition, the logistics management in the company will always be faced with costs that cannot be avoided in the procurement of raw material supplies. As for Sutraman these costs are as follows (M.Sutarman, 2017):

a. Saving costs

The cost of saving is the cost incurred as a result of having inventory, this cost includes the cost of warehouse, employee wages, electricity, saved capital, and the amount is usually measured from the percentage of the value of the stored goods, the unit is Rp / unit in units of time (years) (Gito Sudarmo, 1995).

b. Order Fee (biaya pesan)

Message costs are costs that must be incurred in connection with the order procurement process, these costs include transportation costs, administrative costs, telephone costs, fax costs, and other costs associated with ordering.

c. Shortage cost

The cost of shortage of inventory is the cost that the company is forced to spend as a result of a shortage of stock, with the lack of stock of raw materials it will have an impact on the cessation of production activities, even though the cost of labor, machinery, and other supporting tools is ready to operate (Chiu, 2005).

Economic Order Quantity (EOQ) Method

A company must determine policies in the provision of appropriate raw materials. Therefore, we need a method to regulate the supply supply policy. One of these methods is the Economic Order Quantity (EOQ) method (Sulaiman & Nanda, 2015).

According to Riyanto Economic Order Quantity (EOQ) is a technique for procuring raw material supplies at a company which determines how much economical orders are for each order with a predetermined frequency and when to reorder (Riyanto, 2015).

The EOQ formula according to Musthafa is as follows (Musthafa, 2017):

$$EOQ = \sqrt{\frac{2 \times R \times S}{P \times I}}$$

Information:

R = the amount (in units) needed during a certain period

S = Message cost per message

C = storage cost per unit

The terms of purchase based on EOQ are (Utami & Setyaningsih, 2019):

1. The purchase price per unit is constant
2. Raw materials are available in the market
- 3 The amount of production is stable so that raw material requirements are also stable

Just In Time (JIT) Method

“Just in time (JIT) is a philosophy of time that focuses on the activities required by other internal segments within the organization (Surjadi, 2013). Or it can also be said to be a philosophy centered on reducing costs through the elimination of supplies. (stockless production / lean production / zero inventory production) which is the concentration of JIT”. Schenierdejans, M.J (Quoted from Mayora Hayundra Maharani, 2015: 51), suggests a way to determine costs based on the Just In Time (JIT) method.

- 1) Determine the quantity of JIT purchases in each n shipment = $Q_n = \sqrt{n} \cdot Q$
- 2) Calculating the optimal frequency of raw material purchases using the $JIT = F = R / Q_n$ method
- 3) The calculation of the total cost of inventory using the JIT method can be calculated by $T_{JIT} = 1 / \sqrt{n} \cdot (T)$
- 4) The calculation of the total cost savings in the JIT method can be calculated by way $= s = 1 - T_{JIT}$

Information:

Q_n = Quantity of JIT purchases per shipment n = Amount optimal purchase (times)

T_{jit} = Total inventory cost of the JIT method.

Methodology

This research at UD. Melati Jaya, located at Jalan Melati, Delima alley, Perbaungan districts Serdang Bedagai. The type of data used in this study is primary data, namely data obtained from the bookkeeping division of UD. Melati Jaya and secondary data in the form of books that support this research. Data collection techniques used were observation, interviews, and documentation. The data analysis method used is descriptive quantitative method with comparative research (comparing), namely research that is conducted to compare between two groups or more of a particular variable. In this study, researchers compared the Economic Order inventory control methods Quantity (EOQ) and Just In Time (JIT) which will then be analyzed and compared the results in terms of minimizing inventory costs and risk of loss due to the procurement of raw materials and to determine the most appropriate and efficient method of controlling raw material inventory for the procurement of raw materials in UD. Melati Jaya. According to (Reksohadiprojo, 2000), in calculating the most economical purchases so that can minimize the total cost of inventory are as follows:

Formula:

$$TIC = TCC + TOC$$

$$\text{Frequency of purchase (F)} = R / Q$$

$$\text{Average inventory} = Q/2$$

$$\text{Total Storage Cost (TCC)} = (Q/2) \cdot C$$

$$\text{Total Ordering Cost (TOC)} = (R/Q) \cdot O$$

From both equations between (TCC and TOC), Total Inventory Cost (TIC) can make new formula = $(Q/2) \cdot C + (R/Q) \cdot O$

EOQ (Q^*) will find when $TCC = TOC$, so can get with mathematic formula = $TCC = TOC = (Q/2) \cdot C + (R/Q) \cdot O$

$$= CQ2 = 2OR$$

$$= Q2 = (2OR)/C$$

$$= Q = 2OP/X$$

So it can be concluded the frequency of economic purchases (F) = R/Q

Calculation of the total cost of inventory using the method EOQ = T = (Q/2) + (R/Q).O

Information:

TIC = Total inventory costs = TCC = Total storage costs = TOC = total ordering costs

R = Total Needs

O = Order fee

C = Storage costs

Q = Purchase quantity

Q = (EOQ)

F = Frequency of purchase

T = Total cost of inventory using EOQ method

Schenierdejans, M.J (Quoted from Mayora Hayundra Maharani, 2015: 51), suggests a way to determine costs based on the Just In Time (JIT) method.

- 1) Determine the quantity of JIT purchases in each n shipment = $Q_n = \sqrt{n} \cdot Q$
- 2) Calculating the optimal frequency of raw material purchases using the JIT = $F = R / Q_n$ method
- 3) The calculation of the total cost of inventory using the JIT method can be calculated by = TJIT =
- 4) $1 / \sqrt{n} \cdot (T)$
- 5) The calculation of the total cost savings in the JIT method can be calculated by
- 6) way = $s = 1 - TJIT$

Information:

Q_n = Quantity of JIT purchases per shipment n = Amount optimal purchase (times)

Tjit = Total inventory cost of the JIT method

Finding and Result

Data Inventory On UD. Melati Jaya

Calculate the inventory cost based on policy UD. Melati Jaya.

As for total cost for raws total material sintetic skin that published by UD.Melati Jaya every month as follows :

Table 1: Purchase Data for Optimal Raw Materials Once Ordered

| Month (2020) | Purcase Quantity | Total Needs | Booking Cost | Saving Cost | Total Cost |
|--------------|------------------|-------------|--------------|-------------|------------|
| January | 376.379.200 | 73.933 | 8.312.000 | 11.746.000 | 20.058.000 |
| February | 93.814.500 | 19.208 | 1.907.000 | 4.460.000 | 6.367.000 |
| March | 201.603.800 | 46.296 | 15.330.000 | 3.713.000 | 8.827.000 |

Source: Data Processing (2020)

Table 2: Data Purchase Of Economic Order Quantity (EOQ) Method

| Month 2020 | Total Needs R | Cost Order (O) | Saving Cost (C)' | Optimal Purchase (Q*) | Total Stock Cost with EOQ (Rp) |
|------------|---------------|----------------|------------------|-----------------------|--------------------------------|
| January | 73.933 | 8.312.000 | 1.746.000 | 2.464 | 371.033.200 |
| February | 19.208 | 1.907.000 | 4.460.000 | 2.744 | 93.814.500 |
| March | 46.296 | 5.114.000 | 3.713.000 | 1.715 | 201.603.800 |

Table 3: Purchase Frequency Raw Material Metode Just In Time

| Month 2020 | Total Needs ® | Purchase Quantity (Qn) | Purchase Frequency (F) | Total Cost with Methode Just In Time (Rp) |
|------------|---------------|------------------------|------------------------|---|
| January | 73.933 | 7 | 30 | 2.217.990 |
| February | 19.208 | 7 | 7 | 134.456 |
| March | 46.296 | 27 | 82 | 3.796.272 |

Table 4: Calculations of Ratio Supplies Inventory Cost According to Provisioins UD. Melati jaya metode Economic Order Quantity (EOQ) Metode and Just In Time (JIT)

| Month 2020 | UD. Melati Jaya | EOQ (Rp) | JIT (Rp) |
|------------|-----------------|-------------|-----------|
| January | 20.058.000 | 371.033.200 | 2.217.990 |
| February | 6.367.000 | 93.814.500 | 134.456 |
| March | 8.827.000 | 201.603.800 | 3.796.272 |

Conclusions

The conclusions from the research that has been carried out, namely by comparing the inventory calculations using the Methode EOQ and Methode Just In Time (JIT), it is concluded that Methode Economic Order Quantity (EOQ) calculation method is more efficient in calculating the total cost of inventory compared to the methods used by UD. Melati Jaya. Therefore when compared, it can be seen that the calculation of inventory control using Methode Just In Time (JIT), the cost of raw material inventory is smaller than Methode Economic Order Quantity (EOQ) because Methode Just In Time (JIT) emphasizes inventory with zero value. While Methode Economic Order Quantity (EOQ) still stores inventory as a safety stock to maintain the possibility of material shortages which will increase storage costs, causing inefficient inventory costs.

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