

## APPLICATION OF THE ECONOMIC ORDER QUANTITY (EOQ) METHOD IN CONTROLLING MORINGA LEAF RAW MATERIALS (CASE STUDY: CV. ATLANTIC NORTH ACEH DISTRICT)

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### Abstract

*This research was conducted to know how many orders for raw materials for Moringa leaves to get optimal costs using the Economic Order Quantity (EOQ) method that occurred at CV. Atlanti in Tanjung Ara Village, Tanah Jambo Aye District, North Aceh District. Primary data was obtained by observation and interviews using direct questionnaires with respondents. Secondary data was obtained through journals, books, and company records for one year (January-December 2022). This study has one sample, namely the owner or director of CV. Atlantic. The determination of the sample used in the study used the case study method where the number of samples taken only came from internal informants, namely the Director and Deputy Director of CV. Atlantic. The data analysis method used in this study is the Economic Order Quantity (EOQ), Safety Stock (SS), and Reorder Point (ROP) methods. The research results obtained on the EOQ method were as much as 32.16 kg with a frequency of purchasing moringa leaf raw materials 16 times in one year. The total cost of raw material inventory is based on CV. Atlantic, which is IDR 7,378,764.00, while based on calculations using the EOQ method, the total cost of raw material inventory for moringa leaves is IDR 580,731.25, so using the EOQ method CV. Atlantic can save as much cost IDR 6,789,032.75. Safety Stock based on the EOQ method of 2.35 kg/month of moringa leaf raw material. Reorder Point based on the EOQ method of 3.78 kg.*

**Keywords:** Inventory Control, Raw Materials, EOQ

## INTRODUCTION

Indonesia has entered the era of the ASEAN Economic Industry so that outside economies can enter freely into Indonesia with all its advantages and disadvantages. The company's survival in intense competition requires good handling and management. Good handling and management can be done by good and professional management. One of the main factors in the company's running is the availability of raw material supplies.

According to Heizer and Render (2015), inventory is one of the most expensive assets of many companies, reflecting as much as 50% of total invested capital. Inventory is goods or materials that must be stored in the coming period. With inventory, entrepreneurs will face the risk that their company can sometimes fulfill consumers' wishes. Every company, be it a manufacturing company or a trading company, must maintain a sufficient inventory of raw materials to run smoothly and efficiently. So that in the company must be able to control and plan in carrying out raw material inventory so that the company will not lack raw materials.

Astyningtyas (2015) states that control can be defined as determining what must be achieved, namely standards, what is being done, namely implementation, assessing implementation, and, if necessary, making improvements to follow the plan, aligned and standardized. Raw material inventory is intended to save the company's storage and ordering costs. Many methods can be used in controlling raw materials. One approach that is quite efficient in managing the cost control of raw material inventory is the "Economic Order Quantity (EOQ)" method. EOQ is the most economical purchase amount to make at each

purchase. According to Siswanto (2007), "EOQ is an inventory model that will help management to make decisions about the units to be ordered so that there is no excessive investment invested in inventory and so that the company does not run out of inventory which results in production stops, delays in ordering and loss of potential profits."

With the EOQ method, the costs incurred for inventory procurement will be minimal. The company must also pay attention to the amount of the final balance of the inventory, whether it includes safety stock, to avoid the company running out of list and determine the reorder point so that the arrival of the ordered merchandise is suitable when the inventory is at the Level of Safety Stock expected by the company.

CV. Atlantic is a Micro, Small, and Medium Enterprise (MSME) that utilizes its biodiversity to be used in sales that are useful and beneficial to the community, such as moringa plants produced by CV. Atlantic into herbal teas that have many benefits and properties. CV Atlantic produces moringa leaves in herbal tea with two flavors: original flavor and red ginger flavor. The company obtains Moringa raw materials from its land but is insufficient and still depends on suppliers. CV Atlantic buys moringa raw materials from suppliers, namely the local community.

CV. Atlantic can buy Moringa raw materials once the production can reach 20 kg of green moringa leaves, and if it has been dried in the oven, the weight of moringa leaves will decrease to 6-7 kg of dried moringa leaves. The supply of Moringa raw materials that have been dried is only a little or none because the green Moringa raw material is insufficient. CV. Atlantic harvests moringa leaves from its land only 3-5 kg, so CV. Atlantic must buy moringa leaves every time it produces moringa tea.

There needs to be more raw materials in producing moringa tea, and it often causes delays if consumers order a lot due to a lack of raw materials because the sales system orders first, and if only a little is produced, it will experience delays in product delivery. In the current condition, the business is owned by CV. Atlantic, located in Tanjung Ara Village, Tanah Jambo Aye District, North Aceh Regency, needs help supplying raw materials. Where the moringa leaf plant is still quite challenging to find in Panton Labu City, Tanjung Ara Village, Tanah Jambo Aye District, North Aceh Regency if it is to fulfill many consumer orders so that it must buy from outside the area while the moringa leaf plant cannot be left for too long.

## RESEARCH METHODS

### Research Location and Time

The research was conducted in December 2022. The location of the research site is CV Atlantic North Aceh Regency. This company was chosen because it is a company that produces herbal tea in North Aceh Regency and is still a simple business and is still experiencing difficulties in the supply of raw materials.

### Data Types and Sources

The data collected in this study consisted of primary data and secondary data. Preliminary data is data obtained directly by researchers using observation and interview methods. Secondary data is data obtained from the documentation of research objects, journals, books, and recording other important things related to research variables, namely the number of raw material orders, ordering costs, the number of goods needed, storage costs, average usage, average usage and waiting time for orders.

### Data Analysis

The data analysis method used in this study is as follows:

#### Economic Order Quantity (EOQ) Method

The Economic Order Quantity (EOQ) method is an inventory model that will help management to make decisions about the units to be ordered so that there is no excessive investment invested in inventory and so that the company does not experience excess inventory, which results in production stops, order delays and loss of potential profits (Siswanto, 2015).

To determine the economic order quantity, EOQ can be calculated by the formula:

$$EOQ = \sqrt{\frac{2.S.D}{H}} \dots\dots\dots(1)$$

Description:

- EOQ/Q\* = Order quantity (kg/order)
- S = Ordering cost (rupiah/order)
- D = Total demand for goods (kg/year)
- H = Storage cost (rupiah/unit)

**Determining Safety Stock**

The formula for calculating safety stock, according to Assauri in Listyorini (2016), is as follows:

$$SS = Z.d.L \dots\dots\dots(2)$$

Description:

- SS = Safety Stock
- Z = Service level
- d = Average usage
- L = Lead time

**Determining the Reorder Point**

The formula for determining the reorder point, according to Sudana (2011), is as follows:

$$ROP = (d \times L) + SS \dots\dots\dots(3)$$

Description:

- ROP = Reorder point
- d = Average Usage
- L = Lead time
- SS = Safety Stock

**Total Inventory Cost**

Total Inventory Cost is the total cost of inventory. To find out how much the total cost is, we calculate the sum of the ordering cost and storage cost. According to Elia, Nor, and Acep (2019), the following formula is used:

$$TIX = (\bar{X} \times H) + (n \times S) \dots\dots\dots(4)$$

$$TIC = H \left(\frac{Q}{2}\right) + S \frac{D}{Q} \dots\dots\dots(5)$$

Description:

- H = Raw Material Storage Cost (IDR)
- Q = Economical Raw Material Purchase (Kg)
- S = Raw Material Ordering Cost (IDR)
- D = Raw Material Usage / Year (Kg)

**Inventory Cost Efficiency**



$$= \frac{\text{Idr. 7.200.000}}{500 \text{ Kg}}$$

$$= \text{Idr. 14.400/Kg}$$

### Analysis of Raw Material Requirements with the EOQ Method

Calculating raw material inventory control using the EOQ method aims to determine the optimal level of raw material purchases at CV. Atlantic in North Aceh Regency which can minimize costs in a way:

#### Economic Order Quantity (EOQ) :

$$\text{EOQ} = \sqrt{\frac{2.S.D}{H}} = \sqrt{\frac{2.(14.897).(500)}{14.400}} = \sqrt{\frac{14.897.000}{14.400}} = \sqrt{1.034,51} = 32.16 \text{ Kg}$$

#### With Optimal Purchase Frequency :

$$F^* = \frac{D}{Q^*} = \frac{500}{32,16} = 15.5 \text{ times}$$

$$= 16 \text{ times}$$

#### Safety Stock Calculation

The average amount of moringa raw material usage per day

$$d = \frac{D}{\text{number of working days}}$$

$$d = \frac{500}{348}$$

$$d = 1,436$$

Calculation of safety stock on Moringa raw materials:

$$\text{SS} = Z . d . L$$

$$\text{SS} = 1,64 . 1,436 . 1$$

$$\text{SS} = 2.35 \text{ kg/month}$$

#### Reorder Point (ROP) Calculation

$$\text{ROP} = (d.L) + \text{SS}$$

$$\text{ROP} = (1,436 . 1) + 2,35$$

$$\text{ROP} = 1,436 + 2,35$$

$$\text{ROP} = 3.78 \text{ kg}$$

#### Inventory Cost Efficiency Calculation

Calculation of the total inventory cost or total inventory cost of moringa raw materials at CV. Atlantic before calculating using the EOQ method using the formula, namely:

$$\text{TICper} = (\bar{X} \times H) + (n \times S)$$

$$= (500 \times 14,400) + (12 \times 14,897)$$

$$= 7.200.000 + 178.764$$

$$= \text{IDR } 7,378,764.00.$$

Calculation of the total inventory cost of Moringa raw materials after calculating with the EOQ method using the formula, namely:

$$\begin{aligned} \text{TIC} &= H \left( \frac{Q}{2} \right) + S \frac{D}{Q} \\ \text{TIC} &= 14,400 \left( \frac{16}{2} \right) + 14,897 \left( \frac{500}{16} \right) \\ \text{TIC} &= 14.400 (8) + 14.897 (31,25) \\ \text{TIC} &= 115.200 + 465.531,25 \\ \text{TIC} &= \text{IDR } 580,731.25 \end{aligned}$$

### Inventory Cost Efficiency Calculation

$$\begin{aligned} \text{Inventory cost efficiency} &= \text{TIC before EOQ} - \text{TIC after EOQ} \\ &= \text{IDR } 7,378,764.00 - \text{IDR } 580,731.25 \\ &= \text{IDR } 6,798,032.75. \end{aligned}$$

### CONCLUSIONS AND SUGGESTIONS

The optimal amount of raw material purchased using the EOQ method is 32.16 kg. The frequency of buying moringa raw materials based on the EOQ method is 16 times yearly. The total cost of moringa raw material inventory based on calculations using the EOQ method is IDR 580,731.25. Using the EOQ method CV. Atlantic can save or minimize costs of Rp 6,798,032.75, which can be used for other purposes. Based on the EOQ method, safety stock is 2.35 kg/month of moringa raw materials. The reorder point based on the EOQ method is 3.78 kg. Based on this value, the efficiency level of raw material inventory costs after analyzing raw material inventory with the EOQ value is efficient so that previously incurred costs can be minimized and used for other expenses.

To avoid ordering excessive Moringa raw materials resulting in high and non-optimal costs incurred by the company, so the company is expected to use the Economic Order Quantity (EOQ) method in the moringa raw material inventory control system. CV. Atlantic must also consider the amount of safety stock and reordering (Reorder Point) to avoid running out of natural or excess raw materials.

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