Analysis of Raw Material Inventory Control with Using Economic Order Quantity (EOQ) Method

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Abstract

The Home Industry Karya Mandiri has struggled with inventory control, often resulting in excess raw materials. To address this issue, this research implements the Economic Order Quantity (EOQ) method as a strategic approach for optimizing raw material inventory, specifically coffee beans. The objective is to efficiently minimize total inventory costs. This descriptive quantitative research employs interviews and documentation for data collection, while the EOQ method is utilized for data analysis. This includes determining economic order quantities, order frequencies, safety stock levels, reorder points, and total inventory costs. Research findings indicate that applying the EOQ method reduced the frequency of raw material orders from 12 to 4 annually for the years 2022 and 2023. Consequently, it is projected that in 2024, Home Industry Karya Mandiri will maintain this order frequency, thereby preventing excess raw materials based on the actual needs data from 2022 and 2023. Additionally, the EOQ method successfully reduced total inventory costs by 48.58% in 2022 and 49.05% in 2023. Therefore, it is recommended that Home Industry Karya Mandiri continue utilizing the EOQ method for effective raw material inventory control.

Keywords: Control, Raw Material Inventory, Economic Order Quantity, Safety Stock, Reorder Point

Introduction

In the current expansive economic landscape, companies must achieve their objectives of maximizing profit and fostering long-term growth. One crucial factor in this process is inventory control, particularly for raw materials and merchandise (Handoko, 2014). Effective inventory control is essential for the smooth operation of any business. Inventory, encompassing raw materials, auxiliary materials, work-in-progress, and finished goods or spare parts, is a vital asset that ensures the continuity of production processes (Santosa et al., 2018).

Inventory refers to assets comprising items intended for sale within a specific period or those still in production or awaiting use in production (Rangkuti, 2015). It includes raw materials and semi-finished goods prepared by the company to meet consumer demand (Ratningsih, 2021). Proper inventory management ensures the smooth functioning of production systems by maintaining sufficient raw material stocks (Tipaka et al., 2017).

Adequate raw material inventory facilitates seamless production processes, guaranteeing the effectiveness of marketing activities by satisfying customer needs. If products are unavailable, companies miss market opportunities and fail to supply goods optimally (Unsulangi et al., 2019). Raw materials are crucial for company operations; without them, industrial activities cannot proceed (Umami et al., 2018). Compared to other assets, raw material inventory often represents a substantial portion of a company's assets. It is a current asset that typically turns over within a year, necessitating robust inventory control (Rakian, 2015).

A common challenge in companies is the lack of effective raw material inventory control, which can disrupt production processes (Rakian, 2015). Additionally, companies aim to minimize production costs, influencing decisions on order quantities, order frequency, reorder timing, minimum safety stock levels to prevent production delays, and maximum inventory levels to avoid excessive holding costs (Deftania et al., 2022). Inventory control involves collecting and storing commodities to meet demand over time. This includes raw materials, components, and semi-finished goods (Tipaka et al., 2017). Effective inventory control optimizes raw material availability, preventing shortages or surpluses and aligning inventory levels with production needs (Yudhanto et al., 2020).

Home Industry Karya Mandiri, a powdered coffee home industry in Pringsewu, Lampung, was established in 2020. It relies on high-quality coffee beans packaged under the "Putra Desa" brand, which has a P-IRT license. The final products are distributed to various sub-districts in Pringsewu by sales representatives. Continuous availability of raw and supporting materials is crucial for uninterrupted production, emphasizing the need for optimal inventory control to ensure long-term profitability. A pre-survey interview with the owner of Home Industry Karya Mandiri on August 10, 2023, revealed that the company's raw material inventory planning was inadequate. The company relied on conventional methods based on experience and warehouse observations, resulting in purchases based on estimates without clear calculations. When inventory levels were low, large orders were placed, often leading to excess raw materials in the warehouse (Sudarmanto et al., 2023).

The company ordered 500 kg of coffee beans monthly from a supplier in Lampung, with a one-day delivery time. In 2022, total raw material purchases were 6,150 kg, with consumption at 6,060 kg, leaving 90 kg unused. This excess inventory indicates inefficient inventory management, incurring significant holding costs and reducing profitability. This situation underscores the need for effective raw material inventory control at Home Industry Karya Mandiri.

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Unstable inventory in 2022 led to increased storage and ordering costs for the company, including electricity, telephone, shipping, and unloading expenses. The company's unstructured inventory management resulted in frequent excess raw materials, causing warehouse stockpiling. Interviews with the owner confirmed that raw material ordering was based on previous demand, occasionally delayed by shipment issues, disrupting production.

To address these challenges, Home Industry Karya Mandiri needs a strategic approach to maintain continuous production without raw material shortages. One effective method is the Economic Order Quantity (EOQ) model, introduced by Ford W. Harris in 1915. The EOQ model minimizes total costs by determining the most economical order quantity, reducing unnecessary inventory purchases, and minimizing storage costs (Yudhanto et al., 2020). Implementing the EOQ method at Home Industry Karya Mandiri can help optimize raw material order quantities, determine reorder points, and establish safety stock levels, ensuring uninterrupted production. Effective raw material inventory control is crucial for cost efficiency, directly impacting business profitability. While EOQ determination is essential, companies must also establish reorder points to ensure timely raw material procurement (Deftania, 2022). Safety stock protects against inventory risks, while reorder points monitor inventory levels, ensuring timely orders (Umami et al., 2018; Ratningsih, 2021).

Previous studies support the effectiveness of the EOQ method. Tipaka et al. (2017) found that EOQ reduced inventory costs by IDR 25,960,070 compared to the EPQ method's IDR 25,983,200. Ratningsih (2021) reported EOQ savings of IDR 4,793,548,505, and Umami et al. (2018) found EOQ reduced packaging costs by 13.84% for 240 ml cups and 5.88% for carton boxes. These studies highlight a research gap; while Tipaka et al. (2017) found EPQ more cost-effective than EOQ, Ratningsih (2021) and Umami et al. (2018) confirmed EOQ's cost-saving benefits over company policies. This suggests EOQ's general efficacy in minimizing inventory costs. This study focuses on improving the company's inventory control. Currently, the company buys raw materials based on previous demand, causing excess inventory and stockpiling (Dantes, 2023). There are also delays in shipments due to improper ordering, disrupting production. The main issue is to determine if the EOQ method can effectively reduce total inventory costs. The research aims to evaluate EOQ's effectiveness in minimizing costs and improving inventory management. The benefits of this study include enhancing the researcher's knowledge of efficient inventory management using EOQ, providing the company with a tool to optimize inventory and reduce costs, and serving as a reference for future research on inventory control with the EOQ method.

Literature Review

Operation management

According to Heizer and Render (2014), production involves creating goods and services, while operation management encompasses activities that add value by transforming inputs into outputs. In organizations that don't produce physical products, the production function might not be obvious, such as in banks, hospitals, airlines, or educational institutions.

Regardless of whether the final product is a good or service, production activities in organizations are generally referred to as operations or operation management. This highlights the importance of managing these activities to ensure efficient and effective value creation (Heizer & Render, 2014).

Inventory Management

Inventory generally refers to goods available for sale, especially in trading companies. In manufacturing companies, inventory can include raw materials, auxiliary materials, work-in-progress, and finished goods (Hakim, 2014). Inventory is crucial in the industrial world; without proper inventory, industrial activities cannot proceed smoothly (Umami et al., 2018). Poor inventory management can result in lost profit opportunities due to stockouts or excessive holding costs. Therefore, it is essential to maintain a balanced inventory to minimize storage costs and ensure smooth production processes. According to Ristono (2013), a well-managed inventory system helps to streamline production, reduce holding costs, and avoid disruptions in the production process due to material shortages (Masyhuri, 2023).

Inventory is an idle resource awaiting further processing, which could include production in an industrial system, marketing in a distribution system, or consumption in a household system (Hakim, 2014). It represents an asset, including goods for sale within a specified period, goods in production, or raw materials awaiting use in production (Rangkuti, 2015). Inventory is essential for companies of all sizes, although the amount and type of stored goods vary. Handoko (2014) categorizes manufacturing inventory into raw materials, work-in-progress, finished goods, assembled components, and auxiliary supplies. Proper inventory management, as noted by Sunyoto (2012), aims to eliminate uncertainties, provide leeway for production and purchasing management, anticipate demand and supply changes, and mitigate risks associated with late deliveries and price increases.

Use of Raw Materials

Raw materials are essential for any company producing goods, as they are the inputs necessary for the production process. A shortage of raw materials can halt production, while excessive raw material inventory can lead to high holding costs and potential risks. Raw materials, according to Assauri (2016), play a critical role in determining production costs and ensuring smooth production processes. They are integral to the final product and can be easily traced in terms of cost. Raw materials are the primary components in the production process, forming part of the finished product (Mulyadi, 2011). Therefore, raw materials encompass all items used in the production process owned by the company.

Understanding the usage rate of raw materials is crucial for forecasting and managing raw material requirements in a company. Accurate knowledge of the current usage rates enables company management to estimate future raw material needs efficiently (Mulyadi, 2011). The main function of raw material inventory is to facilitate the smooth operation of the production process, ensuring continuity from raw materials to finished goods. This inventory helps mitigate risks such as delays in material deliveries, poor quality materials that need to be returned, and seasonal availability of certain materials. Maintaining adequate raw material inventory ensures stability in operations and uninterrupted production flows (Mulyadi, 2011).

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Economic Order Quantity (EOQ) Method

The Economic Order Quantity (EOQ) method is a renowned and straightforward inventory management technique. EOQ aims to determine the optimal order quantity that minimizes total inventory costs, which include ordering and holding costs. According to Rangkuti (2015), EOQ involves ordering raw materials in quantities that result in the lowest possible costs. Heizer and Render (2014) further explain that EOQ addresses two critical questions: when to order and how much to order. This method, also known as the fixed order quantity model, is simple yet effective in minimizing direct holding costs and indirect ordering costs, ultimately optimizing inventory management (Handoko, 2014).

Implementing the EOQ method allows companies to reduce storage and ordering costs, thus resolving inventory-related issues and minimizing risks associated with holding inventory in warehouses. The EOQ analysis assists in planning the frequency and quantity of orders efficiently. However, the EOQ model operates under certain assumptions, such as constant and uniform product demand, constant unit prices, fixed annual holding costs, fixed order costs, constant lead times, and no stockouts (Handoko, 2014). These assumptions highlight the model's limitations, and understanding them is crucial for managers to make informed inventory decisions. To achieve the lowest inventory costs, companies must consider both ordering and holding costs, using the EOQ formula to balance these expenses effectively (Ristono, 2013).

Safety Stock and Re-order Point

Safety stock is a method utilized to protect companies from various risks associated with inventory management. According to Umami et al. (2018), safety stock helps mitigate the risks of stockouts that can disrupt production or sales. The time interval between ordering and receiving goods, known as lead time, can vary significantly from a few hours to several months, depending on the availability of the goods and the distance between the buyer and supplier (Yudhanto et al., 2020). To calculate the amount of safety stock needed, Heizer and Render (2014) propose the formula: $SS = Sd \times Z$, where SS is the safety stock, Sd is the standard deviation of demand, and Z represents the desired service level.

The concept of the reorder point (ROP) is critical in inventory management to ensure timely reordering and receipt of materials. Heizer and Render (2014) define the reorder point as the inventory level at which a new order should be placed to replenish stock before it runs out. This point considers the lead time, ensuring that new stock arrives just in time to prevent stockouts (Ratningsih, 2021). The reorder point is calculated using the formula $ROP = (LT \times AU) + SS$, where LT is the lead time, AU is the average usage rate over a specific period, and SS is the safety stock (Oktavia et al., 2021). This calculation helps companies maintain optimal inventory levels and prevent disruptions in their operations.

Research Method

This research employs field research to understand phenomena in their natural social contexts, emphasizing deep communicative interactions between the researcher and the subject. The researcher collected data directly from the Home Industry Karya Mandiri. The study uses a descriptive method with a quantitative approach. According to Suliyanto (2018), descriptive research analyzes one or more variables without making comparisons or linking variables. As Sugiyono (2013) explains, quantitative research is based on positivist philosophy, examining specific populations or samples, using research instruments for data collection, and applying statistical analysis to test predefined hypotheses.

Data required for this research consists of total inventory costs (holding and ordering costs). Two sources of data are utilized: primary and secondary. Primary data, collected directly by the researcher from Home Industry Karya Mandiri in 2022 and 2023, was obtained through direct interviews with the company's owner on January 19, 2024. Secondary data, sourced from existing literature, records, and company inventory documents over specific periods, complement the study. Data collection methods included direct interviews for firsthand information and literature review to gather relevant insights and information related to the research topic.

The research employs quantitative descriptive analysis, focusing on inventory management, specifically using the Economic Order Quantity (EOQ) method. According to Heizer and Render (2014), EOQ is calculated as the square root of (2DS/H), where D represents annual demand, S is ordering cost per order, and H denotes holding cost per unit per year. The study also includes calculating total inventory costs, comprising ordering and holding costs. Safety Stock is determined using Heizer and Render's formula SS = Sd x Z, with SS representing safety stock, Sd as standard deviation, and Z as confidence level. Additionally, the Reorder Point (ROP) is calculated using Handoko's formula ROP = (LT x AU) + SS, where LT stands for lead time and AU for average usage over a specified period.

Results

Overview of Home Industry Karya Mandiri

Home Industry Karya Mandiri, established in 2020 and located in Jalan Jendral Sudirman, Pringsewu Selatan, Lampung, specializes in producing powdered coffee. Founded by Mr. Mukhsin, the company operates production activities for 20-25 days each month, with approximately 6 hours of work per day, yielding 30-35 kg of coffee beans daily. The products are distributed across Lampung Province, including Lampung Tengah, Lampung Timur, Pesawaran, Bandar Lampung, Metro, and Tanggamus, as well as outside the province. The organizational structure includes the owner overseeing operational leadership, production responsible for transforming raw materials into finished products, and marketing ensuring product distribution throughout Pringsewu's districts.

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Production process

Home Industry Karya Mandiri follows a production process for powdered coffee that involves several stages starting from raw material procurement. The owner directly orders raw materials when stock levels in the warehouse are low, estimating quantities based on current inventory. Upon delivery, the owner inspects the received goods for conformity. The production phase begins with sorting and roasting selected coffee beans over a wood-fired stove for 2-3 hours, followed by cooling and further sorting. The best beans are then ground to a fine powder and sifted to separate fine and coarse particles. Finally, the powdered coffee is packaged in small branded plastic packets, pressed for durability, and bundled into larger packs of 10 for distribution.

Raw Material Inventory Policy

Home Industry Karya Mandiri currently manages its inventory using conventional methods, relying on warehouse observations and estimates based on remaining raw materials from the previous month. The company orders coffee beans once monthly, averaging 500 kg per order depending on available stock. Prior to production, necessary materials including coffee beans, firewood, plastic, pressing tools, and coffee grinders are prepared. The production process for coffee powder typically takes 1-2 days before the product is ready for market.

Purchase and Use of Raw Materials

In analyzing inventory control at Home Industry Karya Mandiri, data was gathered on the purchase and usage of raw materials from 2022 to 2023. According to the documentation, in 2022, the company bought a total of 6,150 kg of coffee beans, increasing slightly to 6,300 kg in 2023. These purchases varied monthly, influenced by production forecasts and existing warehouse stock levels. Similarly, usage data indicated that in 2022, 6,060 kg of coffee beans were utilized, rising to 6,275 kg in 2023. Throughout both years, usage consistently remained below the purchased quantities. Assumptions for 2024 suggest a calculated need based on 2022 and 2023 data, ensuring adequate inventory management without shortages or excesses.

Raw Material Inventory Costs

In managing inventory, Home Industry Karya Mandiri currently relies on conventional methods without employing any economic models. This approach involves intuitive observations in the warehouse and ordering based on estimates or leftover raw materials from the previous month, lacking a systematic calculation for future monthly orders. Specifically, the company orders coffee bean raw materials once every month, typically averaging 500 kg per order depending on the remaining stock in the warehouse. Before the production process begins, the production department requires specific materials as outlined in Table 4.1, including coffee beans, fuelwood, plastic, pressing tools, and coffee grinding machines, essential for producing powdered coffee that takes about 1-2 days to process for market readiness.

According to Ristono (2013), inventory costs comprise purchasing, ordering, and holding costs, crucial for determining the economic order quantity (EOQ). These costs are significantly influenced by order frequency and the quantity ordered, directly impacting the

overall inventory expenses incurred by Home Industry Karya Mandiri. For instance, the company's annual ordering costs, detailed in Table 4.4, amount to Rp. 3,360,000 due to 12 monthly orders for coffee bean inventory, covering expenses such as telephone, unloading, and delivery charges. Calculating per-order costs reveals that each procurement of coffee beans costs Rp. 280,000, indicating the financial impact of their ordering strategy.

Moreover, storage costs, another component of inventory expenses, encompass expenditures like warehouse rent, staff salaries, and utilities. Specifically, Home Industry Karya Mandiri spends Rp. 6,000,000 annually on electricity for storage purposes, detailed in Table 4.6. Assessing the per-unit storage costs for coffee beans in 2022 and 2023, the company incurred Rp. 990.09/kg and Rp. 956.17/kg, respectively, reflecting variations in annual demand. Assumptions for 2024 project a storage cost of Rp. 972.84/kg, demonstrating the ongoing financial considerations required for maintaining optimal inventory levels. This systematic breakdown underscores the importance of calculating and managing inventory costs effectively to enhance operational efficiency and financial sustainability.

Data analysis

Determination of Total Inventory Cost According to Company Policy

Table 1. Total Inventory Cost According to Company Policy

No	Types of goods	Year		
		2022	**2023**	**(Assumption) 2024**
1.	Coffee beans	Rp. 3.564.539,83	Rp. 3.597.661,28	Rp. 3.610.050,03

TIC calculation results according to company policy are in Table above, the total inventory cost for 2022 using company policy is IDR. 3,564,539.83 then in 2023 it will be IDR. 3,597,661.28 and in 2024 it is assumed to incur total inventory costs of Rp. 3,610,050.03 but the data for 2024 has not yet occurred in reality. In 2023 the company will incur higher inventory costs than in 2022 because in 2023 the company will hold more inventory than in 2022 so inventory costs will be higher.

Economic Order Quantity (EOQ) Method Analysis

Table 2. Recapitulation of EOQ and Order Frequency

No	Types of goods	Year					
		2022		**2023**		**(Asumsi) 2024**	
		EOQ	**Order Frequency**	**EOQ**	**Order Frequency**	**EOQ**	**Order Frequency**
1.	Coffee beans	1851 Kg	4 times	1917 Kg	4 times	1884 Kg	4 times

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In Table Above you can see the number of economic orders per order and the frequency of orders made per year. In 2022 the number of economic orders will be 1851 Kg per order with a frequency of ordering 4 times, while in 2023 the number of economic orders will be 1917 Kg per order with a frequency of ordering 4 times and in 2024 it is assumed that Home Industry Karya Mandiri will make an order frequency of 4 times because it is assumed to be necessary in 2024 the 2022 need is 6,060 Kg plus the 2023 need of 6,275 Kg divided by 2 with the EOQ result being 1884 Kg. However, the data for 2024 has not yet come true.

Determination of Safety Stock

Table 3. Safety Stock Recapitulation for 2022 - 2023

Types of goods	Year					
	2022			2023		
	Safety Stock per year	*Order Frequency*	*Safety Stock per order*	*Safety Stock per year*	*Order Frequency*	*Safety Stock per order*
Coffee beans	43 Kg	4 times	10 Kg	12 Kg	4 times	3 Kg

In Table 4.12. above, you can find out the amount of safety stock per year and how much safety stock must be ordered each time you place an order based on the Economic Order Quantity method. To find out how much Safety Stock per order is to divide the number of Safety Stock per year by the order frequency based on the order frequency which has been calculated using the EOQ frequency. In 2022, the Safety Stock of coffee beans will be 43 Kg with the Safety Stock per order being 10 Kg. Meanwhile, in 2023, the Safety Stock of coffee beans will be 12 Kg with the Safety Stock per order being 3 Kg. Because Home Industry Karya Mandiri has not carried out inventory control well but the remaining inventory is above the existing Safety Stock, the company is safe in its safety stock, but the company must also determine safety stock in the future to avoid stock outs or shortages of raw materials.

Determination of Reorder Point

Table 4. Average Usage (AU) 2022-2023

Types of goods	Average Waiting Time per Order (LT)	Tahun					
		2022			2023		
		Raw Material Usage per Day (AU)	*Safety Stock per Year*	*Safety Stock per Order*	*Raw Material Usage per Day (AU)*	*Safety Stock per Year*	*Safety Stock per Order*
Coffee beans	3 days	30 Kg	43 Kg	10 Kg	31 Kg	12 Kg	3 Kg

In Table 4.14. You can find out the Reorder Point (ROP) or reorder point for coffee beans in 2022 and 2023 based on the ROP calculation above. In 2022 the reorder point or Reorder Point will be 100 Kg, while in 2023 the reorder point will be 96 Kg. Therefore, Home Industry Karya Mandiri will make 4 orders in 2024 based on the reorder point or ROP for 2022 and 2023 or can be done every 3 months. One important factor that must be considered when determining the ROP or reorder point is Safety Stock. In the calculation above, researchers used Safety Stock per order in calculating ROP. This is because Safety Stock for each type of item is held every time an inventory is procured, and not held all at once in one order per year.

Total Inventory Cost Menurut Metode EOQ

Table 5. Total Inventory Cost According to the EOQ Method

No	Types of goods	Year		
		2022	**2023**	**(Assumption) 2024**
1	Coffee beans	Rp. 1.833.021,97	Rp. 1.833.025,19	Rp. 1.833.028,86

The results of the Total Inventory Cost calculation using the EOQ method in Table 4.17 above, the total inventory cost in 2022 using the EOQ method is IDR. 1,833,021.97, in 2023 it will be IDR. 1,833,025.19 and in 2024 it is assumed that the total inventory cost using the EOQ method is Rp. 1,833,028.86 but the data for 2024 has not yet occurred in reality.

Discussion

Company Raw Material Inventory Policy

Home Industry Karya Mandiri currently manages inventory without utilizing any formal method. The company bases its raw material orders on historical inventory data and monthly sales figures to estimate monthly requirements. In 2022, the company purchased 6150 kg of coffee beans, and in 2023, this increased to 6300 kg, with orders placed once per month or twelve times annually. The company does not establish Safety Stock or Reorder Points due to its monthly ordering schedule, replenishing inventory when levels are deemed low. Consequently, the Total Inventory Cost (TIC) incurred by the company was Rp. 3,564,539.83 in 2022 and Rp. 3,597,661.28 in 2023, with an estimated cost of Rp. 3,610,050.03 for 2024 calculated using the Total Inventory Cost (TIC) formula by Heizer and Render (2014).

This approach reflects a need for Home Industry Karya Mandiri to consider adopting inventory management methods like Economic Order Quantity (EOQ) to optimize costs and enhance efficiency. Implementing EOQ would involve determining optimal order quantities and safety stock levels, thereby minimizing both ordering and holding costs. Additionally, establishing a Reorder Point would ensure timely replenishment of inventory, aligning with production and sales demands more effectively. These steps can significantly streamline operations and reduce overall inventory expenses, providing a structured approach to inventory management for sustainable growth and profitability.

Raw Material Inventory Policy According to EOQ

The research findings demonstrate that implementing the Economic Order Quantity (EOQ) method significantly reduces Total Inventory Cost (TIC) at Home Industry Karya Mandiri. EOQ aims to minimize overall inventory costs by optimizing order quantities and reducing ordering frequency. For instance, while the company traditionally ordered raw materials 12 times annually, EOQ reduced this to just 4 orders per year for 2022, 2023, and an estimated 2024. This approach results in lower annual ordering costs and minimizes total inventory expenses effectively.

Table 6. Comparison of Quantities per Order in 2022

Types of goods	Company Policy 2022		EOQ Method 2022	
	Amount	**Order Frequency**	**Amount**	**Order Frequency**
Coffee beans	512,5 Kg	12 times	1851 Kg	4 times

Table 7. Comparison of Quantities per Order in 2023

Types of goods	Company Policy 2022		EOQ Method 2022	
	Amount	**Order Frequency**	**Amount**	**Order Frequency**
Coffee beans	525 Kg	12 times	1917 Kg	4 times

Table 8. Assumed Comparison of Quantities per Order in 2024

Types of goods	Company Policy 2022		EOQ Method 2022	
	Amount	**Order Frequency**	**Amount**	**Order Frequency**
Coffee beans	513,95 Kg	12 times	1884 Kg	4 times

Furthermore, EOQ introduces Safety Stock to mitigate stockouts due to unforeseen demand fluctuations. In 2022, the annual Safety Stock for coffee bean raw materials was 43 kg, decreasing to 12 kg in 2023. Additionally, EOQ determines the Reorder Point (ROP), ensuring timely reordering to avoid stockouts and maintain smooth business operations.

Table 9. Comparison of TIC According to EOQ Method and Company

Types of goods	2022		2023	
	Company Policy	**EOQ Method**	**Company Policy**	**EOQ Method**
Coffee beans	3.564.539,83	1.833.021,97	3.597.661,28	1.833.025,19

The table above shows that in 2022, the total inventory cost according to the company's policy was Rp. 3,564,539.83, while the total inventory cost calculated using the Economic Order Quantity (EOQ) method was Rp. 1,833,021.97. This calculation indicates that using the EOQ method results in cost savings of Rp. 1,731,517.86, which is 48.58% lower compared to the total inventory cost under the company's policy.

Cost efficiency percentage

Cost efficiency 2022 = $\frac{\text{(Company TIC} - \text{TIC EOQ)}}{\text{Company TIC}}$ x 100%

Cost efficiency 2022 = $\frac{(3.564.539,83 - 1.833.021,97)}{3.564.539,83}$ x 100%

Cost efficiency 2022 = $\frac{(1.731.517,86)}{3.564.539,83}$ x 100%

Cost efficiency 2022 = 0,4857619616 x 100%

Cost efficiency 2022 = 48,58 %

In 2023, the total inventory cost under the company's policy was Rp. 3,597,661.28, whereas with the EOQ method, it was Rp. 1,833,025.19. Comparing these figures, the EOQ method achieves cost savings of Rp. 1,764,636.09, representing a 49.05% reduction compared to the company's policy.

Cost efficiency percentage

Cost efficiency 2023 = $\frac{\text{(Company TIC} - \text{TIC EOQ)}}{\text{Company TIC}}$ x 100%

Cost efficiency 2023 = $\frac{(3.597.661,28 - 1.833.025,19)}{3.597.661,28}$ x 100%

Cost efficiency 2023 = $\frac{(1.764.636,09)}{3.597.661,28}$ x 100%

Cost efficiency 2023 = 0,4904953392 x 100%

Cost efficiency 2023 = 49,05 %

The implementation of the EOQ method in this study allows Home Industry Karya Mandiri to determine an optimal inventory level, thus minimizing total inventory costs. Additionally, EOQ addresses demand uncertainties by incorporating Safety Stock and ensures timely reordering through the Reorder Point strategy. This strategic approach not only enhances cost efficiency but also improves inventory management practices for the company.

Conclusion

Based on the analysis conducted, it is evident that Home Industry Karya Mandiri incurs substantial inventory costs under its current policy compared to the Economic Order Quantity (EOQ) method. In 2022, the company's inventory costs were Rp. 3,564,519.83 according to its policy, whereas EOQ would have reduced this to Rp. 1,833,021.97, marking a potential

efficiency gain of 48.58%. Similarly, in 2023, the company's policy resulted in inventory costs of Rp. 3,597,661.28, whereas EOQ would have reduced it to Rp. 1,833,025.19, representing a potential efficiency gain of 49.05%. These findings underscore the effectiveness of EOQ in minimizing inventory expenses. Therefore, it is recommended that Home Industry Karya Mandiri adopts EOQ to optimize raw material inventory management, establishes appropriate Safety Stock and Reorder Points to manage demand variability, and provides training to staff on EOQ implementation to enhance efficiency and cost-effectiveness in their operations. Future research could broaden its scope by comparing EOQ implementations across various companies for further insights.

Declaration of conflicting interest

The authors declare that there is no conflict of interest in this work.

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