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Inventory Control to Reduce Product Damage Using the Periodic Order Quantity (POQ) Method at PT Indomarco, Indomaret Abdul Muis Branch

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ABSTRACT

This study aims to analyze the inventory control system at PT Indomarco, Indomaret Abdul Muis branch, in order to reduce product damage and minimize costs resulting from overstocking. A descriptive method with a quantitative approach was used to evaluate return and sales data from 2022, comparing the company's current policy with the Periodic Order Quantity (POQ) method. The results show that the current company policy, with 180 delivery frequencies per year, incurs a total inventory cost (TIC) of IDR 43,150,000 annually. In contrast, the proposed POQ method, with 24 deliveries per year, results in a significantly lower TIC of IDR 2,585,625. It is concluded that implementing a structured inventory model can reduce costs by over 94%. The POQ method is recommended as the most balanced solution between cost efficiency and smooth store operations.

Keywords : Inventory Control; Product Damage; Periodic Order Quantity (POQ); Inventory Cost.

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INTRODUCTION

The rapid growth of the retail industry demands that every business actor maximize sales while maintaining service quality. This is not only limited to achieving sales targets but also ensuring store cleanliness, product freshness, and availability of goods according to consumer needs. Increasingly tight competition in modern retail, along with the convenience of e-commerce shopping, presents significant challenges for companies to retain consumer interest.

According to Kotler (2011), consumer purchasing decisions are influenced by various factors, including product quality, price, and brand reputation. Product quality is one of the most important indicators for enhancing customer satisfaction and competitive advantage. Therefore, companies must implement effective quality and inventory control to prevent damage, expiration, and overstocking.

PT Indomarco Prismaatama (Indomaret) is one of Indonesia's largest retail companies, operating over 21,000 outlets in 2022. Products are distributed through 37 distribution centers and 27 depots, supplying more than 6,000 types of items. In practice, however, overstock problems frequently occur at store level. At Indomaret Abdul Muis branch, deliveries from the distribution center are made every two days regardless of actual sales capacity. This leads to excessive returns, particularly from damaged or expired goods.

To address this issue, the store has applied several techniques such as FIFO (First In First Out), CSB (Product Freshness Check), and ITT (Undisplayed Items). However, these efforts have not been fully effective in reducing returns, which often exceed the company's 4% tolerance limit of monthly sales targets. Hence, a more efficient inventory control method is required, one of which is the Periodic Order Quantity (POQ). This method helps balance order frequency with actual demand, reducing costs and minimizing the risk of product damage.

Based on the description above, this study is focused on three main objectives:

1. Identifying obstacles in the inventory control process at Indomaret Abdul Muis branch.
2. Analyzing the application of POQ as a strategy to reduce product damage caused by overstocking.
3. Evaluating the level of cost efficiency in inventory control using POQ.

This study is expected to provide practical contributions for Indomaret management to optimize its inventory control system, particularly in reducing returns and improving product quality. Theoretically, it also contributes to the literature on POQ implementation in modern retail, where inventory management plays a vital role in ensuring customer satisfaction and competitiveness.

LITERATURE REVIEW

1. Operations Management

A. Definition of Operations Management

Operations management refers to activities for planning, monitoring, and directing the production of goods or services to ensure they are valuable and beneficial to consumers. Several scholars define it as follows:

- Griffin & Ebert (2015): a system and supervision of processing resources that provide value to consumers.
- Assauri (2016): the management of organizational units responsible for producing goods or services.
- Heizer & Render (2015): a series of activities that transform inputs into outputs (products).

B. Scope of Operations Management

The scope of operations management includes production planning, procurement of raw materials, labor, and machinery, until products are ready to be marketed. Sales activities and labor recruitment are not included. The scope covers:

- Production system planning: products, standards, plant location.
- Production control systems: production processes, raw materials, quality.
- Production information systems: production based on customer orders.

2. Inventory Management

A. Definition of Inventory

Inventory refers to company assets intended for sale or use in the production process. According to several experts:

- Ahmad (2018): the process of storing materials to achieve specific objectives.
- Mulyono (2017): resources stored for future needs.
- Handoko (2011): all organizational resources kept to meet demand.

B. Objectives of Inventory

The objectives of inventory are to facilitate and ensure smooth production processes, including:

1. Reducing the risk of delays or poor-quality materials.
2. Anticipating seasonal fluctuations of materials.
3. Maintaining operational stability and increasing sales.
4. Providing optimal service to customers.
5. Controlling storage costs to prevent excess.

C. Types of Inventory

- Raw Materials: primary components in production.
- Purchased Parts/Components: items assembled into final products.
- Supplies: supporting materials used in production but not part of the final product.
- Work in Process: semi-finished goods that require further processing.
- Finished Goods: completed products ready for sale.
- Anticipation Stock/Stabilization Stock: prepared for fluctuating demand.

D. Functions of Inventory

- Serving as a link and buffer in the production process.
- Stabilizing prices and market demand.
- Supporting cost efficiency and reducing transportation costs.

E. Inventory Recording Systems

There are two primary methods:

- Perpetual method (Book): detailed records of inventory flows, with balances available at any time.
- Periodic method (Physical): inventory counts conducted at the end of a period through stock opname.

Inventory valuation methods may use:

- FIFO (First In First Out)
- LIFO (Last In First Out)
- Weighted Average
- Specific Identification

3. Quality Control

A. Definition of Quality Control

Quality control is the effort to ensure that products or services meet established standards through monitoring, testing, and process improvement.

B. Dimensions of Product Quality (Garvin, 1984)

- Performance, Features, Reliability, Conformance, Durability, Serviceability, Aesthetics, and Perceived Quality.

C. Objectives of Quality Control

- Ensuring products comply with standards.
- Minimizing inspection and design costs.
- Optimizing production processes.

D. PDCA Quality Control Cycle

- Plan: planning for process improvements.
- Do: implementing improvements.
- Check: evaluating improvement results.
- Action: standardizing procedures if improvements are successful.

E. Factors Affecting Quality

Various internal and external factors, including processes, raw materials, human resources, and environmental conditions.

F. Quality Control Process (Mockler, 1972)

Steps include: setting objectives, determining scope, setting standards and criteria, establishing information systems, analyzing results, and implementing corrective actions.

4. Periodic Order Quantity (POQ) Method

POQ is a lot-sizing method used to determine the number of demand periods covered by each order, aiming to minimize inventory costs and regulate order frequency optimally (Divianto, 2011; Yamit, 2005).

5. Previous Studies

Several previous studies have examined inventory control using the Periodic Order Quantity (POQ) or Economic Order Quantity (EOQ) methods: Sutoni (2018): Studied inventory management using POQ at B.B. Barokah Cianjur, showing that optimal order strategies can be achieved through POQ, including order period, ordering costs, and total costs.

Pratama & Handayani (2020): Applied POQ in production planning at CV. ABC and successfully reduced total inventory costs through more efficient batch production.

Fatkhturozi (2015): Highlighted the importance of inventory management information systems for paddy seed management at UD. Harapan Tani, with POQ helping to solve stock problems.

Iskandar & Octaria (2024): Compared POQ, EOQ, and LFL in raw material control, finding that POQ achieved the largest cost savings of 6.78%.

Andriansyah (2025): Applied POQ for submersible pump inventory at Toko XYZ, showing that POQ reduced inventory costs, order frequency, and stockout risk.

Conclusion of previous studies: Both POQ and EOQ offer advantages depending on product characteristics and company needs. This study aims to apply POQ in retail inventory management to determine optimal ordering strategies while reducing total inventory costs.

METHOD

Research Time and Location

The research period runs from September 2023 to February 2025. The research location is PT ABPI, located in Tangerang. This study was conducted over approximately three months, from April 2022 to June 2022. The data used in this research were obtained from Indomaret Abdul Muis Branch, located at Jl. Abdul Muis No. 90, Petojo Selatan, RT 1/RW 1, Gambir District, Central Jakarta.

Research Design

According to Silaen (2018, p. 87), "Population refers to the entire set of objects or individuals possessing certain characteristics that are the focus of the study. Population, also known as universum (universe), means the whole, and may consist of living or non-living entities."

The population in this study comprises all product return reports from January 2022 to December 2022. Based on the research problem, this study employed a descriptive-qualitative method to provide a clear picture of inventory control and the fluctuating return rates at the store.

Data Collection Methods

The data in this study were collected using several methods:

1. Observation

Direct observation was carried out at the research site to obtain real-time data on inventory control processes and efforts to reduce fluctuating return rates at Indomaret Abdul Muis Branch.

2. Interviews

Interviews were conducted to gather more detailed information related to inventory control and product returns. The researcher prepared a list of questions for respondents, and their answers were recorded for further analysis.

The respondents in this study included:

- **Mrs. Resa Suryati** – Store Manager, responsible for sales, stock updates, and daily inventory management.
- **Mr. Cecep** – Assistant Store Manager, assisting the manager in preparing sales reports, maintaining cleanliness, and monitoring stock levels.
- **Mr. Bagas** – Merchandiser, providing critical information regarding returned goods, whether in small or large quantities.

Data Analysis Methods

The data obtained were analyzed through several methods to identify the optimal ordering strategy and inventory control:

1. Reorder Point (ROP)

ROP was used to determine the reorder level, ensuring that orders arrive exactly when inventory runs out, particularly in the EOQ method.

$$ROP = d \times L \quad (1)$$

Where:

- ROP = Reorder Point
- d = Average daily demand
- L = Lead time (waiting time for orders, in days)

2. Periodic Order Quantity (POQ)

The POQ method was used to determine the optimal order quantity within a specific period. The formula is as follows:

$$POQ = \sqrt{\frac{2S}{DH}} \quad (2)$$

Where:

- D = Total demand (units per year)
- S = Ordering cost (IDR/order)
- h = Holding cost rate (%) of item value
- C = Unit price (IDR/unit)
- H = Annual holding cost (IDR/unit/year), calculated as $h \times C$

This method was applied to analyze product return data in order to optimize the order quantity and minimize inventory costs.

RESULTS AND DISCUSSION

This section presents the findings and discussion of the research based on the methods performed by the author. The study analyzes the inventory control system at the Indomaret Abdul Muis branch, comparing the company's current policy with the Periodic Order Quantity (POQ) method to reduce costs and product damage.

Results

General Overview of the Research Subject

This research was conducted at PT. Indomarco Prismatama, Indomaret Abdul Muis branch, located at Jl. Abdul Muis No. 90, Petojo Selatan, RT.1/RW.1, Gambir District, Central Jakarta. Indomaret is a minimarket network that provides various basic and daily necessities with a sales area of less than 200 m². The first Indomaret store opened on June 20, 1988, in Ancol, North Jakarta, and has grown to have more than 20,000 outlets as of June 2022. Indomaret provides food and beverage products, household needs, health and beauty products, bill payment services, ticket sales, logistics services (Indopaketa), and a customer loyalty program through the Indomaret Member Card.

Company Profile and Organizational Structure

- **Vision:** To become a national asset in the form of a franchise retail network that is superior in global competition.
- **Mission:** To provide solutions for the community in meeting their product and service needs easily and affordably.
- **Culture:** Upholding honesty, truth, justice, teamwork, economic innovation, and customer satisfaction.
- **Motto:** Easy & Affordable.
- **Organizational Structure:** The organizational structure consists of a Store Manager, Assistant Store Manager, Merchandiser, Sales Assistant, and Cashier. Each position has its own duties, ranging from operational management, staff supervision, display arrangement, to sales transactions and product control. The Store Manager is responsible for ensuring sales targets are met and there is no cash shortage, while other staff support operations and product management to keep the store optimal.

Data on Product Returns January – December 2022

Return data for 2022 shows a total of 1,495 units with a value of IDR 12,809,920. Returns are divided into three main categories:

Figure 1. Total Returns by Reason Period

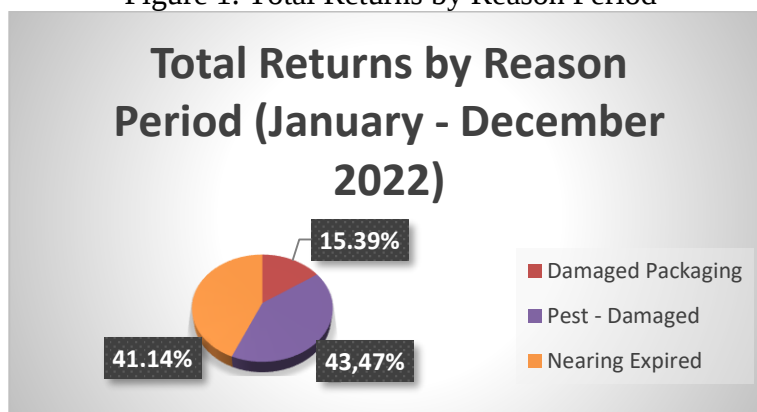


Table 1. Data on Product Returns

Category	Number of Units	Percentage	Value
Nearing Expired	650 units	43.47%	Rp. 6,633,920,-
Pest-damaged	615 units	41.14%	Rp. 3,811,600,-
Damaged Packaging	230 units	15.39%	Rp. 2,364,400,-
Total	1.495 units	100%	Rp. 12.809.920,-

A surge in returns occurred before Lebaran (April 2022), caused by large product shipments to meet high demand, but not all of them were sold, resulting in damage. This analysis emphasizes the importance of a stock control system, FIFO rotation method, pest inspection, and promotions for slow-moving products.

Inventory Cost Analysis Based on the Current Company Policy

The total inventory costs were calculated for both the current company policy and the proposed POQ method.

Table 2. POQ Method Results

item	Value
Total Product Arrivals per Year	215,600
Total Products Sold in Store	163,427

Ordering Cost per Delivery (S)

The total annual delivery cost is Rp 16,200,000. The company has 180 deliveries per year.
 $S = \text{Rp } 16,200,000 / 180 = \text{Rp } 90,000$ per delivery

Holding Cost per Unit (H)

The total annual holding cost is Rp 20,400,000. The total number of items sold is 163,427.
 $H = \text{Rp } 20,400,000 / 163,427 = \text{Rp } 125$ per item per year

Total Inventory Cost (TIC) of the Current Company Policy

The current policy's total inventory cost is calculated as:

$$\text{TIC} = (\text{Total Goods Needed} \times \text{Holding Cost}) + (\text{Ordering Cost} \times \text{Delivery Frequency}) \quad (3)$$

$$\text{TIC} = (215,600 \text{ units} \times \text{Rp } 125) + (\text{Rp } 90,000 \times 180 \text{ times})$$

$$\text{TIC} = \text{Rp } 26,950,000 + \text{Rp } 16,200,000$$

$$\text{TIC} = \text{Rp } 43,150,000 \text{ per year}$$

Total Inventory Cost with the POQ Method

The calculation for the POQ method suggests a delivery frequency of 24 times per year.

- **Total Ordering Cost (TOC)**

$$\text{TOC} = \text{Frequency} \times S \quad (4)$$

$$\text{TOC} = 24 \text{ times} \times \text{Rp } 90,000 = \text{Rp } 2,160,000 \text{ per year.}$$

- **Total Holding Cost (TCC)** The average inventory is 6,810 units.

$$\text{TCC} = (Q/2) \times H \quad (5)$$

$$\text{TCC} = (6,810 \text{ units} / 2) \times \text{Rp } 125 / \text{unit}$$

$$\text{TCC} = 3,405 \text{ units} \times \text{Rp } 125 / \text{unit} = \text{Rp } 425,625.$$

- **Total Inventory Cost (TIC) with the POQ Method**

$$\text{TIC_POQ (24 times)} = \text{TOC} + \text{TCC} \quad (6)$$

$$\text{TIC_POQ (24 times)} = \text{Rp } 2,160,000 + \text{Rp } 425,625$$

$$\text{TIC_POQ (24 times)} = \text{Rp } 2,585,625 \text{ per year}$$

Discussion

The comparison reveals that implementing the POQ method offers a cost saving of **over 94%** compared to the company's current policy. The current system's high delivery frequency results in excessive costs and product returns due to overstocking. The data shows that the current policy's total inventory cost is IDR 43,150,000, while the proposed POQ method reduces it to a significantly lower IDR 2,585,625.

By reducing delivery frequency and optimizing inventory levels, the POQ method presents a more efficient solution. This approach not only lowers financial costs but also improves operational efficiency by minimizing the risk of product damage and loss. The findings conclude that a more systematic inventory model is crucial for cost management and overall profitability.

CONCLUSION AND SUGGESTIONS

Conclusion

Based on the research and discussion conducted at PT Indomarco Prismatama, Indomaret Abdul Muis Branch, regarding the implementation of inventory control to reduce product damage, several conclusions can be drawn as follows:

1. The inventory control system currently applied by the company is one of the root causes of problems. With an excessively frequent delivery system (180 times per year) and a total of 215,600 units delivered annually, the risk of product damage and overstocking is significantly high.

2. The application of the Periodic Order Quantity (POQ) method proves to be more effective, as the calculation results indicate 24 deliveries per year with a total of 163,427 units, resulting in more controlled inventory levels.
3. The efficiency of inventory costs under the POQ method is much higher compared to the current company system. With 24 deliveries per year, the total inventory cost amounts to only IDR 2,585,625, while under the company's current policy with 180 deliveries per year, the cost reaches IDR 43,150,000.
4. The POQ method balances cost efficiency and operational continuity. A fixed delivery schedule every two weeks ensures product availability while simultaneously reducing the risk of overstocking, which has been the primary cause of product damage and financial losses.

Suggestions

1. Implementation of the POQ Method

The store is advised to implement the POQ method with a planned delivery frequency of 24 times per year. This method can reduce the annual total inventory cost to IDR 2,585,625 and minimize product damage caused by overstocking.

2. Granting Authority to Store Managers or Field Supervisors

The company should grant authority to the store manager or field supervisor to regulate the quantity of deliveries. Currently, only the warehouse has authority over shipments, which reduces the effectiveness of stock control at the store level. Improved coordination is therefore required.

3. Suggestions for Future Researchers

Future researchers are encouraged to explore additional variables influencing inventory control, such as determining the optimal safety stock level. Further studies are expected to provide new insights and more comprehensive recommendations for inventory management in retail companies.

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