

EOQ-Based Raw Material Inventory Control at Mie Jebew Using POM-QM

Anisa Fitriani¹, Hanifah², Hendrianto Sitorus³, Ahmad Albar Tanjung⁴

Program Studi Manajemen, Sekolah Tinggi Ilmu Manajemen Sukma, Medan Indonesia

Author Email: ajanisaa269@gmail.com¹, hanifanifaa573@gmail.com², hendrisitorus2345@gmail.com³, alb4rt4anjung@gmail.com⁴

Abstract. This study aims to analyze raw material inventory control at Mie Jebew and determine the most economical order quantity to minimize inventory costs. The research problem arises because raw material procurement is still based on the owner's estimation, potentially resulting in overstocking or stock shortages. This research employed a descriptive quantitative approach using primary data collected through direct interviews with the business owner. Data were analyzed using the Economic Order Quantity (EOQ) and Reorder Point (ROP) methods with the assistance of POM-QM for Windows software. The findings indicate that the implementation of the EOQ method determines the optimal order quantity, reduces the ordering frequency from 52 times to approximately 4–15 times per year depending on the characteristics of each raw material, and produces more economical inventory costs. In addition, the EOQ method balances ordering and holding costs, ensuring the availability of raw materials without creating excessive inventory. The results imply that the implementation of EOQ improves inventory control efficiency, supports production continuity, and provides a reliable basis for procurement decision-making. Furthermore, the Reorder Point (ROP) calculation identifies the appropriate time for reordering, thereby minimizing the risk of stockouts and maintaining raw material availability throughout the production process. This study provides practical implications that the implementation of EOQ and ROP can enhance inventory management efficiency, support production continuity, and improve operational decision-making for micro, small, and medium enterprises (MSMEs).

Keywords: Raw Material Inventory, Economic Order Quantity (EOQ), Reorder Point (ROP), POM-QM for Windows, Mie Jebew.

1. INTRODUCTION

Raw material inventory is one of the most critical aspects of operations management, as it directly affects production continuity and the ability of a business to meet consumer demand. Improper inventory management may lead to overstocking or stockouts, ultimately increasing operational costs and reducing business efficiency [1]. For micro, small, and medium enterprises (MSMEs), inventory control remains a significant challenge, as most businesses still purchase raw materials based on experience or estimation without systematic calculation methods. This condition often results in inventory levels that do not align with production requirements, potentially causing waste in holding costs or production delays [2].

Mie Jebew Business is one of the MSMEs operating in the culinary sector that produces spicy noodles with an average daily sales volume of 30 servings. In its operations, the business uses several primary raw materials, including egg noodles, chili, fish balls, beef balls, and fish cake. To date, raw material procurement is conducted once weekly based on the owner's estimates without calculating economical order quantities. This practice carries the potential for inefficient purchasing and higher total inventory costs. One established method for inventory control is the Economic Order Quantity (EOQ). The EOQ method is designed to determine the most economical order quantity by balancing ordering costs and holding costs, thereby minimizing total inventory costs [3].

In addition to establishing optimal order quantities, effective inventory management requires determining the appropriate reorder point (ROP). The ROP method assists businesses in identifying when to place replenishment orders so that production continues uninterrupted without material shortages [4].

Previous studies have demonstrated that the implementation of the EOQ method improves inventory control efficiency. This study aims to analyze raw material inventory control at Mie Jebew Business using the Economic Order Quantity (EOQ) method supported by POM-QM for Windows software. The findings are expected to provide a foundation for developing more effective, efficient, and economical raw material procurement policies, supporting smooth production processes and enhancing business competitiveness.

2. METHODOLOGY

This study employs a descriptive quantitative method, which aims to describe the state of the research object based on collected data analyzed using specific calculation techniques. This approach is selected because the research focuses on analyzing raw material inventory control through the application of the Economic Order Quantity (EOQ) method to determine the most economical order quantities.

The research object is Mie Jebew Business, a culinary enterprise that uses five primary raw materials: egg noodles, chili, fish balls, beef balls, and fish cake. The study analyzes annual raw material requirements to identify optimal order quantities that minimize total inventory costs. Data sources include primary and secondary data. Primary data are obtained through direct interviews with the owner of Mie Jebew Business regarding annual raw material requirements, purchasing frequency, ordering costs, holding costs, and current procurement practices. Secondary data are derived from scientific journals and prior research related to inventory control using the EOQ method.

2.1 Raw Material Inventory

Raw material inventory refers to the quantity of materials held by a business for use in production over a specific period. Effective inventory management aims to ensure production continuity, prevent stockouts, mitigate the risk of supply delays, and minimize holding costs [5].

Objectives of Raw Material Inventory:

- a. Ensure production continuity (avoid material shortages)
- b. Anticipate demand uncertainty
- c. Prevent supplier delivery delays
- d. Optimize total inventory costs

Problems Arising from Poor Management:

- a. Excess inventory leading to high holding costs
- b. Insufficient inventory causing production halts and customer dissatisfaction
- c. Unplanned ordering leading to excessive ordering costs

2.2 Economic Order Quantity Method

The Economic Order Quantity (EOQ) method is an inventory control technique used to determine the most economical order quantity that minimizes total inventory costs by balancing ordering costs and holding costs [3].

Cost Components Considered:

- a. Ordering Costs: Expenses incurred for each order, including administrative fees and transportation costs
- b. Holding Costs: Expenses related to storing inventory, such as electricity, rent, and material spoilage

The EOQ formula is expressed as:

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

Where:

- a. D = Annual demand for raw material
- b. S = Cost per order
- c. H = Holding cost per unit per period

Benefits of the EOQ Method:

- a. Determine the most efficient purchase quantity
- b. Reduce total inventory cost
- c. Support evidence based procurement decision making

According to Arely et al. [6], the EOQ method assists businesses in identifying the most efficient purchase quantity to lower total inventory costs. Furthermore, it reduces unnecessary ordering frequency and improves inventory management effectiveness.

2.3 Reorder Point Method

The Reorder Point (ROP) method determines the appropriate time to place a replenishment order before inventory is depleted. Establishing a reorder point is essential to maintain uninterrupted production [4].

The ROP formula is expressed as:

$$ROP = d \times L$$

Where:

d = Average daily raw material requirement

L = Lead time (delivery waiting period)

The ROP method allows businesses to schedule replenishment orders to minimize the risk of stockouts.

2.4 POM-QM for Windows

POM-QM for Windows is decision-support software designed for operations management. One of its available modules is the Inventory module, which automatically calculates EOQ, ROP, safety stock, and total inventory costs [7]. Users input parameters including demand volume, ordering costs, holding costs, lead time, and service level, and the system generates optimal order quantity recommendations and other inventory control indicators.

The use of POM-QM for Windows offers several advantages, including accelerated calculations, reduced manual calculation errors, and presentation of analysis results in tables and graphs to facilitate interpretation [7]. This software also enhances analytical efficiency by integrating calculations based on established quantitative models. In academic research and business practice, POM-QM for Windows is widely used as an analytical tool due to its simple and user-friendly interface.

Users are not required to perform complex manual calculations, allowing greater focus on analysis and decision-making. Consequently, the software is highly suitable for academics, students, and practitioners addressing operations management issues, particularly those related to inventory control. Its application is expected to generate more accurate decisions, optimize inventory costs, and support improved operational efficiency.

3 RESULTS AND DISCUSSION

Based on interviews with the owner of Mie Jebew Business, raw material procurement is currently conducted conventionally, with purchases made once weekly without systematic inventory calculation. This practice carries the potential for waste in ordering and holding costs, as purchase quantities are determined solely by estimation.

In this study, all interview data are processed using the Economic Order Quantity method with POM-QM for Windows software. The analysis covers five primary raw materials: egg noodles, chili, fish balls, beef balls, and fish cake.

Prior to calculation, annual requirements for each raw material are determined as follows:

Table 1. Annual Raw Material Requirements of Mie Jebew Business

Raw Mateial	Weekly Requirement	Annual Requirement (D)	Unit Price
Egg Noodles	104 Packs	7,280 Packs	IDR 6,000/Pack
Chili	2 Kg	104 Kg	IDR 30,000/Kg
Fish Balls	3 Kg	156 Kg	IDR 35,000/Kg
Beef Balls	2 Kg	104 Kg	IDR 30,000/Kg
Fish Cake	2 Kg	104 Kg	IDR 30,000/Kg

3.1 Inventory Analysis of Egg Noodles

Data processing using POM-QM for Windows yields an optimal Economic Order Quantity (EOQ) of 492.61 packs, rounded to 493 packs per order. This value represents the most economical purchase quantity to minimize total inventory costs.

The analysis also shows a maximum inventory level of 492.61 packs and an average inventory level of 246.31 packs. Order frequency, previously performed weekly, can be reduced to approximately 14.78 orders per year. Annual ordering costs amount to IDR 221,675.40, which is equivalent to annual holding costs of IDR 221,675.40. The balance between these costs results in a total inventory cost of IDR 443,350.90. Total annual purchase costs for egg noodles amount to IDR 43,680,000, bringing the total overall cost including purchase costs to IDR 44,123,350.

These findings indicate that the application of the EOQ method for egg noodles delivers significant benefits to Mie Jebew Business. Beyond determining optimal purchase quantities, the method enhances operational efficiency, reduces order frequency, lowers inventory costs, and supports more planned procurement decision-making. Improved inventory management minimizes the risk of stockouts or overstocking, ensuring sustainable production continuity.

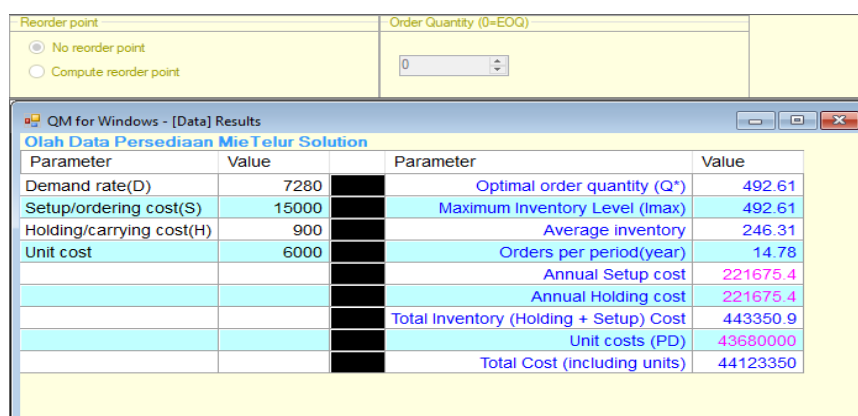


Figure 1. Visualization of Egg Noodle Inventory Parameter Input Process
Source: POM-QM for Windows 2026 Output

3.2 Inventory Analysis of Chili

Based on calculations using the Economic Order Quantity method supported by POM-QM for Windows, the optimal order quantity for chili is 26.33 kg per order. This quantity minimizes total inventory costs by balancing ordering and holding costs. Prior to EOQ implementation, chili was purchased 52 times per year or once weekly. Following analysis, order frequency can be reduced to approximately 3.95 orders per year. This reduction demonstrates that the business can purchase in larger quantities at longer intervals.

Maximum inventory for chili is 26.33 kg, with an average inventory of 13.17 kg, indicating sufficient stock to meet production requirements without excess accumulation. Annual ordering costs and annual holding costs both amount to IDR 59,245.25, resulting in a total inventory cost of IDR 118,490.50. Total annual purchase costs for chili amount to IDR 3,120,000.

It can be concluded that the application of the EOQ method for chili provides substantial benefits to Mie Jebew Business. In addition to determining the most economical purchase quantity, the method reduces operational costs, improves procurement efficiency, and maintains chili availability to support uninterrupted production. Thus, the EOQ method can serve as a basis for more effective and sustainable inventory management decision-making.

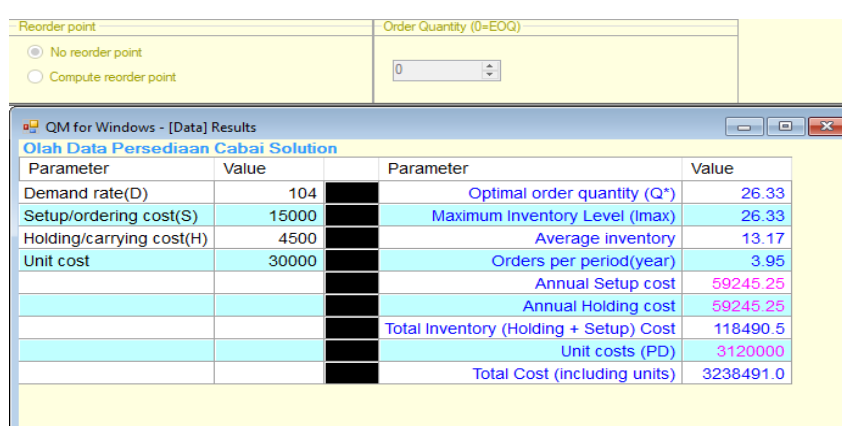


Figure 2. Visualization of Chili Inventory Parameter Input Process
Source: POM-QM for Windows 2026 Output

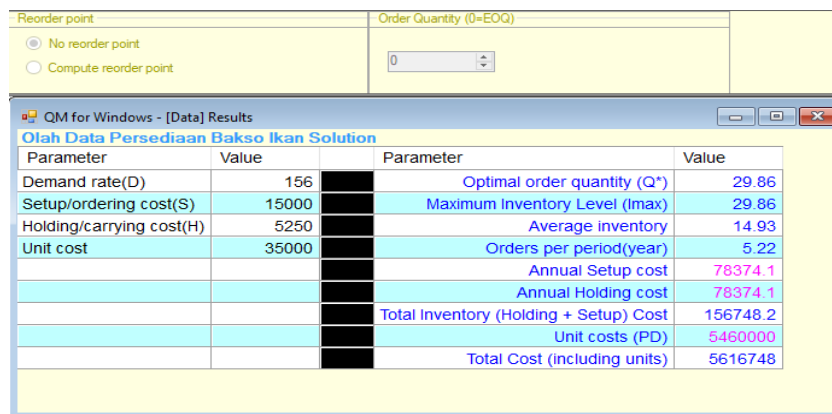
3.2 Inventory Analysis of Fish Balls

Data processing using the Economic Order Quantity method with POM-QM for Windows yields an optimal order quantity of 29.86 kg per order for fish balls. This quantity represents the most economical purchase volume, balancing ordering costs and holding costs. Previously, Mie Jebew Business purchased fish balls 52 times per year or once weekly.

Following analysis, order frequency can be reduced to approximately 5.22 orders per year. This reduction indicates that the business can purchase in larger quantities per transaction, improving procurement efficiency. Maximum inventory for fish balls is 29.86 kg, with an average inventory of 14.93 kg—sufficient to meet production requirements without excess accumulation. As fish balls are a primary raw material used in every production batch, optimal inventory management is critical. Annual ordering costs and annual holding costs both amount to IDR 78,374.10, confirming alignment with the core principle of the EOQ method.

Total inventory costs amount to IDR 156,748.20, while total annual purchase costs for fish balls reach IDR 5,460,000. Although purchase costs constitute the largest cost component, EOQ implementation delivers benefits through reduced ordering and holding costs. Beyond cost efficiency, EOQ application for fish balls improves operational management quality. A structured purchasing schedule facilitates requirement planning, expenditure control, and better mitigation of supply delays. Improved inventory systems support continuous production and consistent service quality for customers.

These findings confirm that the application of the Economic Order Quantity method for fish balls improves inventory control efficiency at Mie Jebew Business. The method not only determines the most economical purchase quantity but also reduces order frequency, lowers total inventory costs, and supports production continuity. Accordingly, the EOQ method can be adopted as a basis for more effective and sustainable raw material inventory management.



Parameter	Value	Parameter	Value
Demand rate(D)	156	Optimal order quantity (Q*)	29.86
Setup/ordering cost(S)	15000	Maximum Inventory Level (Imax)	29.86
Holding/carrying cost(H)	5250	Average inventory	14.93
Unit cost	35000	Orders per period(year)	5.22
		Annual Setup cost	78374.1
		Annual Holding cost	78374.1
		Total Inventory (Holding + Setup) Cost	156748.2
		Unit costs (PD)	5460000
		Total Cost (including units)	5616748

Figure 3. Visualization of Fish Balls Inventory Parameter Input Process
Source: POM-QM for Windows 2026 Output

3.3 Inventory Analysis of Beef Balls

Data processing using the Economic Order Quantity method with POM-QM for Windows yields an optimal order quantity of 26.33 kg per order for beef balls. This quantity minimizes total inventory costs by balancing ordering and holding costs. Prior to EOQ implementation, beef balls were purchased 52 times per year or once weekly. This practice resulted in excessive ordering activity, increasing transportation costs, administrative fees, and time dedicated to procurement. Following analysis, order frequency can be reduced to approximately 3.95 orders per year.

Maximum inventory for beef balls is 26.33 kg, with an average inventory of 13.17 kg—sufficient to meet production requirements without excess stock that would increase holding costs. Annual ordering costs and annual holding costs both amount to IDR 59,245.25, confirming alignment with the core principle of the EOQ method.

Total inventory costs amount to IDR 118,490.50, while total annual purchase costs for beef balls reach IDR 3,120,000. Although purchase costs constitute the largest cost component, EOQ implementation delivers benefits through reduced ordering and holding costs. Beyond cost efficiency, EOQ application improves operational management quality. A more structured purchasing schedule facilitates inventory control, cash flow management, and mitigation of supply delays. Consequently, production continues uninterrupted, maintaining service quality for customers.

These findings confirm that the application of the Economic Order Quantity method for beef balls improves inventory control efficiency at Mie Jebew Business. The method determines optimal purchase quantities, reduces order frequency, lowers inventory costs, and supports more effective and efficient production continuity.

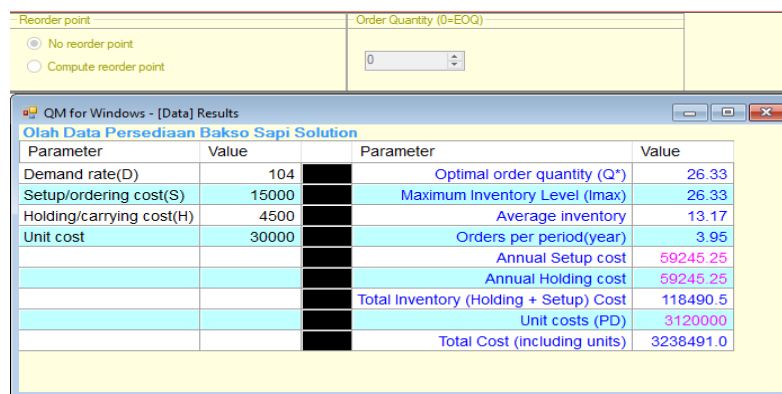


Figure 4. Visualization of Beef Balls Inventory Parameter Input Process
Source: POM-QM for Windows 2026 Output

3.4 Inventory Analysis of Fish Cake

Data processing using the Economic Order Quantity method with POM-QM for Windows yields an optimal order quantity of 26.33 kg per order for fish cake. This quantity minimizes total inventory costs by balancing ordering costs and holding costs. Prior to EOQ implementation, fish cake was purchased 52 times per year or once weekly. This practice resulted in excessive ordering activity, increasing ordering costs such as transportation and administrative fees. Following analysis, order frequency can be reduced to approximately 3.95 orders per year.

Maximum inventory for fish cake is 26.33 kg, with an average inventory of 13.17 kg—sufficient to meet production requirements without excess accumulation. Effective inventory management is particularly important for fish cake, which is a perishable raw material that degrades in quality if stored for extended periods. Annual ordering costs and annual holding costs both amount to IDR 59,245.25, confirming alignment with the core principle of the EOQ method.

Total inventory costs amount to IDR 118,490.50, while total annual purchase costs for fish cake reach IDR 3,120,000. EOQ implementation delivers benefits through reduced inventory costs via lower order frequency without compromising the total raw material requirements for production.

From an operational perspective, EOQ application delivers substantial benefits to Mie Jebew Business. Reduced purchasing frequency allows the owner to save time, lower transportation costs, and better control business expenditures. Additionally, a structured purchasing schedule helps avoid stockouts or excess inventory that could cause losses due to quality degradation.

These findings confirm that the application of the Economic Order Quantity method for fish cake improves the effectiveness of inventory control systems at Mie Jebew Business. The method not only determines the most economical purchase quantity but also reduces inventory costs, improves operational efficiency, and supports sustainable production continuity.

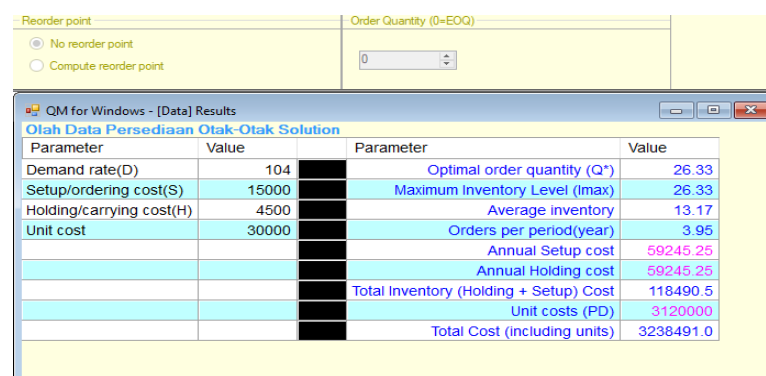


Figure 4. Visualization of Fish Cake Inventory Parameter Input Process
Source: POM-QM for Windows 2026 Output

4 CONCLUSION

Based on the findings of this study regarding the application of the Economic Order Quantity method for raw material inventory control at Mie Jebew Business, it can be concluded that the method effectively determines the most economical order quantities to improve inventory management effectiveness and efficiency. Data processing using POM-QM for Windows software yields an optimal order quantity of 492.61 packs for egg noodles with an order frequency of approximately 14.78 times per year. For chili, beef balls, and fish cake, the optimal order quantity is 26.33 kg with an order frequency of approximately 3.95 times per year, while fish balls have an optimal order quantity of 29.86 kg with an order frequency of approximately 5.22 times per year.

The application of the Economic Order Quantity method also balances ordering costs and holding costs to generate more economical total inventory costs. Total inventory costs amount to IDR 443,350.90 for egg noodles, IDR 118,490.50 for chili, IDR 156,748.20 for fish balls, IDR 118,490.50 for beef balls, and IDR 118,490.50 for fish cake. These results confirm that the Economic Order Quantity method minimizes total inventory costs without compromising the raw material requirements for production.

Accordingly, the Economic Order Quantity method can be adopted as a basis for raw material procurement decision-making at Mie Jebew Business. The method not only determines optimal order quantities but also improves operational efficiency, reduces excessive purchasing frequency, and supports production continuity through more planned and economical inventory management.

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