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Optimality Option Analysis of Raw Material Inventory Control Methods at Bandung Donut Pops MSMEs

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Abstract

This study aims to analyze the optimality of inventory control methods for raw materials at Donat Pops MSME in Bandung using the Economic Order Quantity (EOQ), Reorder Point (ROP), and Safety Stock approaches. The research is motivated by inefficiencies in conventional inventory management practices, which lead to high ordering costs, unstable stock levels, and production disruptions. A quantitative descriptive method with a case study approach was employed using operational data from 2025. The analysis was conducted by calculating EOQ to determine optimal order quantity, ROP to define the reorder threshold, and safety stock to mitigate demand and lead time uncertainty.The results show that the EOQ model produces an optimal order quantity of 1,341 kg, reducing ordering frequency from approximately 70 times to 27 times per year. The Reorder Point of 450 kg ensures production continuity, while the Safety Stock of 90 kg acts as a buffer against stockout risks. Overall, the implementation of EOQ, ROP, and Safety Stock achieves a 37.4% reduction in total inventory costs compared to the existing system. These findings indicate that quantitative inventory management not only improves MSME operational efficiency but also aligns with Islamic economic principles such as avoiding waste (israf), optimizing resource utilization, and achieving maslahah (public benefit).

Keywords Economic Order Quantity; Reorder Point; Safety Stock; MSMEs; Inventory Management; Islamic Economics

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1. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play an important role in supporting economic growth, employment creation, and local production systems (Anatan & Nur, 2023). However, many MSMEs still face operational challenges, particularly in managing raw material availability, production continuity, and cost efficiency. Inventory management becomes a strategic aspect because excessive inventory increases storage costs and the risk of material deterioration, while insufficient inventory may disrupt production activities and reduce customer satisfaction (Teerasoponpong & Sopadang, 2022).

In the food processing sector, raw material inventory control has more complex characteristics because materials are influenced by demand fluctuations, supplier reliability, storage capacity, and

product freshness requirements (Bendoly, 2022). MSMEs producing food products must maintain an appropriate balance between inventory availability and operational efficiency. Poor inventory decisions may create two major problems: overstock conditions that increase unnecessary costs and stock shortages that interrupt production processes (Maheshwari et al., 2021). Therefore, selecting an appropriate inventory control method is essential to ensure that production activities operate efficiently and sustainably.

One of the classical approaches widely applied in inventory management is the Economic Order Quantity (EOQ) model. EOQ determines the optimal ordering quantity by balancing ordering costs and holding costs. The model aims to minimize total inventory costs while maintaining sufficient material availability. However, the EOQ model generally assumes relatively stable demand and predictable inventory conditions. In practical MSME environments, demand uncertainty and supply fluctuations require alternative approaches that are more adaptive, such as the Periodic Review System (PRS), where inventory levels are reviewed periodically and order quantities are adjusted according to actual inventory conditions (van Donselaar et al., 2021).

The Periodic Review System provides an advantage for MSMEs because it allows decision makers to evaluate inventory positions at predetermined intervals rather than relying only on fixed order quantities. This approach is suitable for businesses with variable demand patterns because the quantity ordered can change according to inventory depletion, expected demand, and safety stock requirements. Previous studies indicate that periodic review inventory models can improve inventory efficiency by reducing holding costs while maintaining service levels (van Donselaar et al., 2021).

This research focuses on Bandung Donat Pops MSMEs, which currently implement a conventional raw material ordering strategy with quantities ranging from 300–500 kg per order. This purchasing practice has not yet been determined based on quantitative inventory analysis, resulting in uncertainty regarding whether the existing order quantity represents an efficient decision. The fluctuation of ordering quantities indicates that inventory decisions are still based on experience rather than systematic calculation. Therefore, this study analyzes the optimality of raw material inventory control methods by comparing EOQ and Periodic Review System approaches to identify the most appropriate inventory policy for Donat Pops MSMEs (Radicic & Petković, 2023).

The change in recommended ordering quantity from approximately 300–500 kg to 1,341 kg is theoretically and practically feasible because the EOQ calculation does not simply increase inventory volume but determines the most economical ordering size based on the relationship between annual demand, ordering cost, and holding cost. A larger order quantity can be justified when ordering frequency costs are relatively high compared with storage costs, supplier delivery patterns support bulk purchasing, and production demand is relatively stable. In the context of Donat Pops, increasing the

order quantity allows the company to reduce repeated purchasing activities, improve production planning, and obtain a more efficient balance between ordering costs and inventory holding costs. Similar inventory optimization studies demonstrate that data-based ordering decisions can generate operational savings and improve supply chain performance in MSMEs (Teerasoponpong & Sopadang, 2022).

From an Islamic perspective, inventory efficiency is not merely a financial strategy but also reflects ethical responsibility in managing resources. Islam emphasizes that economic activities should avoid excessive consumption and unnecessary waste (israf). Resource utilization must consider balance, responsibility, and benefit for human welfare. In this perspective, effective inventory management represents an effort to prevent material waste, reduce unnecessary costs, and protect business assets as part of the principle of hifz al-mal (protection of wealth) within maqashid al-shariah. The principle of avoiding waste encourages organizations to manage resources proportionally and responsibly rather than accumulating materials without productive purposes (Durmuş, 2022).

Therefore, inventory optimization in Islamic business ethics integrates economic rationality with moral responsibility. A business is encouraged to achieve efficiency while ensuring that resources are utilized appropriately and sustainably. The implementation of EOQ and Periodic Review System in Donat Pops MSMEs can be understood not only as a cost-minimization technique but also as a managerial effort to maintain accountability in resource utilization.

Several previous studies have investigated EOQ implementation and inventory optimization in manufacturing and MSME contexts. However, limited research has examined comparative analysis between EOQ and Periodic Review System specifically in food-based MSMEs while integrating operational efficiency with Islamic resource management principles. This study contributes a new perspective by combining quantitative inventory optimization methods with Islamic ethical considerations in MSME operational management (Purnamasari et al., 2023).

The novelty of this research lies in three aspects. First, this study provides an empirical comparison between EOQ and Periodic Review System models in determining optimal raw material inventory decisions for Donat Pops MSMEs. Second, this research explains the managerial feasibility of changing ordering practices from experience-based decisions toward data-driven inventory policies. Third, this study introduces an Islamic perspective that positions inventory efficiency as part of responsible resource management, avoiding waste (israf) and protecting business assets (hifz al-mal). Based on these considerations, this study aims to analyze the optimal raw material inventory control method for Bandung Donat Pops MSMEs by comparing EOQ and Periodic Review System approaches. The findings are expected to provide practical recommendations for MSMEs in developing efficient, sustainable, and ethically responsible inventory management strategies.

2. METHODS

2.1 Research Design

This study employed a descriptive quantitative approach with a case study design to analyze raw material inventory optimization at Bandung Donat Pops MSME. A quantitative approach was selected because this research focuses on measuring inventory efficiency through numerical variables, including annual raw material demand, ordering costs, holding costs, lead time, and safety stock levels. A case study design was applied to provide an in-depth understanding of inventory management practices within a specific MSME operational context (Amelia et al., 2025).

The inventory optimization analysis was conducted using the Economic Order Quantity (EOQ), Reorder Point (ROP), Safety Stock, and Periodic Review System (PRS) models. The EOQ model was used to determine the optimal order quantity by balancing ordering and holding costs. Meanwhile, ROP and Safety Stock were applied to determine the appropriate replenishment timing and minimum inventory level required to reduce the risk of raw material shortages (Darmawan et al., 2025).

The selection of these models was based on the characteristics of MSME inventory systems, where purchasing decisions are frequently determined through managerial experience rather than systematic quantitative calculations. Therefore, the application of mathematical inventory models provides a more objective basis for improving procurement efficiency and operational stability (Anatan & Nur, 2023).

2.2 Data Sources and Data Collection

This study utilized both primary and secondary data sources. Primary data were obtained through direct observation, interviews with the Donat Pops MSME owner, and documentation of raw material procurement activities. The collected operational data included annual flour demand, purchasing frequency, ordering quantity, ordering costs, storage costs, supplier lead time, and inventory conditions (Baldea, 2022).

The use of actual operational data is important because inventory decisions based only on intuition may lead to excessive inventory accumulation (*overstock*) or insufficient inventory availability (*stockout*), which can increase operational costs and disrupt production continuity (Wardana et al., 2025b).

Secondary data were collected from scientific publications related to inventory management, EOQ models, probabilistic inventory systems, Periodic Review Systems, and Islamic economic principles in resource utilization. Literature analysis was conducted to strengthen the theoretical foundation and compare the findings with previous inventory optimization studies (Bendoly, 2022).

2.3 Inventory Cost Measurement

Ordering Cost (S)

Ordering cost represents all expenses incurred whenever a company performs a raw material procurement activity. In this study, ordering cost was not limited to transaction expenses but included several supporting components:

1. Transportation or delivery costs.
2. Communication costs with suppliers.
3. Administrative costs related to purchasing activities.
4. Coordination costs involved in the procurement process.

The total ordering cost was calculated based on the average expenditure required for one procurement activity. This approach was adopted because ordering cost is one of the main components in EOQ analysis, and inaccurate estimation of ordering costs may produce inappropriate inventory decisions (Gurtu, 2021).

2.4 Holding Cost (H)

Holding cost refers to the expenses associated with maintaining inventory over a specific period. In this study, holding cost consisted of several components:

1. Warehouse utilization costs.
2. Electricity and storage facility costs.
3. Risk of raw material damage or quality deterioration.
4. Potential economic losses due to excessive inventory accumulation.

The calculation of holding cost is particularly important in food-based MSMEs because raw materials are vulnerable to quality degradation when stored excessively. Therefore, holding cost reflects not only physical storage expenses but also economic risks associated with inventory ownership (Gurtu, 2021).

2.5 Mathematical Formulation

The EOQ model was applied to determine the optimal purchasing quantity by balancing ordering and holding costs. The EOQ formula used in this study is:

$$\text{EQH} = \sqrt{\frac{2DS}{H}}$$

Where:

a. (EOQ) = Economic Order Quantity (kg)

b. (D) = Annual demand (kg/year)

c. (S) = Ordering cost per order (IDR/order)

d. (H) = Holding cost per kg per year (IDR/kg/year)

The EOQ model remains widely applied in inventory management research because it provides a mathematical approach for minimizing total inventory costs by achieving a balance between ordering frequency and inventory storage costs (Alnahhal, 2024). The Reorder Point (ROP) model was used to determine the inventory level at which a new order should be placed to prevent production disruption. The formula is expressed as:

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

Where:

a. (ROP) = Reorder Point (kg)

b. (d) = Average daily demand (kg/day)

c. (L) = Lead time (day)

d. (SS) = Safety Stock (kg)

ROP functions as an inventory control mechanism that ensures replenishment decisions are made before inventory reaches a critical level that may interrupt production activities (Arani et al., 2021). Safety Stock was calculated to anticipate uncertainty in demand fluctuations and supplier delivery delays using the following formula:

$$SS = (d_{\max - d_{avg}}) \times L$$

Where:

a. (SS) = Safety Stock (kg)

b. (d_{max}) = Maximum daily demand (kg/day)

c. (d_{avg}) = Average daily demand (kg/day)

d. (L) = Lead time (day)

Safety stock is required because variations in demand and supply uncertainty may increase the risk of production interruption when companies do not maintain sufficient inventory buffers (Agbenyega & Quick, 2025).

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

Where:

a. (TIC) = Total Inventory Cost (IDR/year)

b. (Q) = Order quantity (kg)

The TIC calculation was used to compare the existing inventory system of Donat Pops MSME with the optimized inventory policy generated from the EOQ model.

2.6 Periodic Review System (PRS)

In addition to EOQ, this study applied the Periodic Review System (PRS) as an alternative inventory control approach. PRS evaluates inventory levels at predetermined review intervals and determines order quantities based on current inventory positions, expected demand, and required safety stock levels (van Donselaar et al., 2021). The PRS approach is suitable for food-based MSMEs because these businesses frequently experience demand fluctuations and supply uncertainty.

Through periodic evaluation, companies can adjust purchasing decisions according to actual inventory conditions, thereby reducing the possibility of excessive stock or raw material shortages (van Donselaar et al., 2021). The PRS analysis involved identifying review periods, inventory positions, demand variability, and safety stock requirements. The results were compared with the EOQ model to determine the most appropriate inventory strategy for Donat Pops MSME.

2.7 Operationalization of Islamic Economic Perspective

The Islamic economic perspective in this study was analyzed using a qualitative descriptive approach. This approach was applied to interpret quantitative inventory optimization results based on Islamic economic indicators, particularly hifz al-mal (*protection of wealth*), avoidance of israf (wastefulness), and achievement of maslahah (*public benefit*). The Islamic economic perspective was not positioned as a statistical variable but as an interpretative framework to evaluate whether inventory management decisions reflected responsible resource utilization.

The implementation of EOQ, ROP, and Safety Stock represents an effort to protect business assets by reducing unnecessary procurement costs, minimizing raw material waste, and improving resource efficiency. The concept of *hifz al-mal* emphasizes the importance of preserving economic assets and ensuring that resources generate sustainable benefits (Sari et al., 2025). Furthermore, reducing inefficient purchasing activities and controlling inventory levels according to production requirements represent efforts to prevent *israf* or excessive resource utilization.

In Islamic economic principles, efficiency is not only related to financial performance but also reflects ethical responsibility in managing resources (Budiman, 2025). Therefore, the integration of inventory optimization models with Islamic economic principles provides a comprehensive analytical framework, where operational efficiency is achieved together with responsible and sustainable resource management.

3 FINDINGS AND DISCUSSION

3.1. EOQ Efficiency in MSMEs

The results of this study indicate that the application of the Economic Order Quantity (EOQ) model to the Bandung Donat Pops MSME resulted in an optimal order quantity for the main raw material, namely wheat flour, of 1,341 kg per order. This value was obtained from operational data for 2025, with an annual demand of 36,000 kg, an ordering cost of IDR 50,000 per order, and a holding cost of IDR 2,000 per kg per year. These calculations demonstrate that the EOQ model is capable of determining the optimal ordering point that balances ordering and holding costs in the inventory system.

With the calculation, namely:

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

So that :

$$EOQ = \sqrt{\frac{2 \times 36.000 \times 50.000}{2.000}} = \sqrt{1.800.000} \approx 1.341{,}64 \text{ kg}$$

The results indicate that the optimal order quantity for flour is approximately 1,341 kg per order. In comparison, Donat Pops MSME currently places orders in quantities of 300–500 kg per order with a frequency of about 60–80 orders per year. This condition reflects inefficiency in inventory management, as the high ordering frequency increases operational costs and leads to inefficient time allocation in procurement activities. In addition, the unstructured ordering pattern still poses a risk of stockouts during periods of high demand. This phenomenon is consistent with findings that many MSMEs still rely on intuitive inventory practices, which contribute to operational cost inefficiency (Saputra, 2024).

After implementing the EOQ model, the optimal order quantity of 1,341 kg reduces the ordering frequency significantly to approximately 27 times per year. This reduction demonstrates improved efficiency in the ordering system, as the MSME no longer needs to place frequent small scale purchases. Consequently, EOQ directly contributes to reducing unnecessary procurement activities. From a cost perspective, the analysis shows that under current conditions, total inventory cost consists of ordering costs of IDR 3,500,000 per year and holding costs of IDR 800,000 per year, resulting in a total inventory cost of IDR 4,300,000. After EOQ implementation, ordering costs decrease to IDR 1,350,000 per year, while holding costs increase to IDR 1,341,000 due to higher average inventory levels. As a result, the total inventory cost becomes IDR 2,691,000. This comparison indicates a cost saving of IDR 1,609,000 per year.

In percentage terms, the achieved efficiency reaches 37.4 percent, demonstrating that EOQ implementation significantly improves inventory management efficiency. These findings indicate that

the EOQ model not only reduces costs but also enhances the overall operational effectiveness of MSMEs. From a theoretical perspective, these results support the view that EOQ is an effective model for optimizing inventory because it balances ordering and holding costs under relatively stable demand conditions (Alnahhal, 2024). Furthermore, EOQ has been proven to provide consistent mathematical solutions for inventory systems in the food industry with stable daily demand patterns (Maitra, 2024).

Although the EOQ model provides an economically optimal ordering policy, the decision to maintain a larger inventory level requires additional consideration regarding raw material quality control, particularly for wheat flour used in donut production. The storage of approximately 1,341 kg of wheat flour, which represents around eleven days of production requirements, should not only be evaluated from a cost perspective but also from the perspective of product quality preservation. In food-based MSMEs, inventory optimization must consider both economic efficiency and the ability to maintain raw material characteristics throughout the storage period (Maheshwari et al., 2021).

Wheat flour is a relatively stable dry ingredient; however, inappropriate storage conditions may lead to quality degradation caused by moisture absorption, insect infestation, microbial contamination, and changes in physicochemical properties. Excessive humidity can increase water activity in flour, creating favorable conditions for mold growth and reducing flour quality. Therefore, maintaining controlled storage conditions is essential to ensure that inventory accumulation does not negatively affect production performance (Mishra et al., 2022).

From a quality management perspective, the implementation of EOQ should be accompanied by proper warehouse management practices. The stored flour should be placed in a dry, clean, and well-ventilated area, protected from direct contact with the floor and walls, and monitored regularly for moisture conditions and pest contamination. The application of the First-In First-Out (FIFO) principle is also important to ensure that older stock is used before newly purchased materials, thereby reducing the possibility of quality deterioration during storage (Nagy et al., 2023).

Furthermore, the suitability of the EOQ quantity depends on the relationship between inventory volume and shelf-life characteristics. Although wheat flour generally has a longer shelf-life compared with fresh food ingredients, storage duration, packaging quality, and environmental conditions remain critical factors influencing its usability. Therefore, the EOQ recommendation should be interpreted together with operational quality control practices rather than applied solely as a mathematical cost-minimization decision (Sipos et al., 2021).

In the context of Donat Pops MSME, the EOQ-based inventory policy can be considered feasible because the calculated quantity remains within a relatively short consumption cycle. However, continuous monitoring of warehouse conditions is necessary to ensure that cost efficiency does not compromise raw material quality. This finding highlights that effective inventory management in food

MSMEs requires integration between quantitative optimization models and preventive quality assurance practices.

From an operational perspective, EOQ implementation also improves production stability. The MSME no longer places frequent small orders but instead orders in optimal quantities, which are more efficient. This reinforces findings that EOQ can enhance business profitability through more precise inventory control and reduced disruptions in production processes (Ardianto et al., 2025). In the MSME context, EOQ implementation provides several important benefits, including reduced operational costs, improved time efficiency in management, and better control of stockout risks. However, the EOQ model has limitations because it assumes constant demand and stable costs; therefore, practical adjustments are still required based on real world conditions (Wardana et al., 2025a).

From a managerial perspective, the findings show that Donat Pops MSME can improve financial efficiency by applying a simple EOQ model that can be implemented using spreadsheet tools without requiring complex technological systems. This system directly contributes to cost savings while improving operational efficiency. The novelty of this study lies in the application of EOQ based on daily production data in a culinary MSME, the simulation of multi-raw material inventory within a single control system, and a cost-efficiency analysis comparing actual and optimal conditions. Thus, this research provides empirical evidence strengthening the relevance of EOQ in modern MSMEs characterized by dynamic daily demand patterns.

The implementation of the Economic Order Quantity (EOQ) model at Donat Pops MSME demonstrates a transition from experience-based purchasing decisions toward a more systematic and cost-oriented inventory management approach. Previously, raw material procurement decisions were primarily determined by managerial estimation and production needs, which resulted in frequent ordering activities and less structured cost control. Such conditions are commonly found among MSMEs, where inventory decisions are often based on practical experience rather than quantitative analysis (Teerasoponpong & Sopadang, 2022).

The EOQ model provides a structured mechanism for determining an economically optimal ordering policy by balancing ordering costs and inventory holding costs. The main contribution of EOQ implementation in this study is not merely the determination of order quantity but the improvement of procurement efficiency through the reduction of unnecessary ordering activities. By optimizing purchasing decisions, MSMEs can minimize repeated transaction costs, improve procurement planning, and allocate managerial resources more effectively (Alnahhal, 2024).

The comparison between the existing inventory practice and the EOQ-based system indicates that inventory efficiency depends on achieving an appropriate balance between procurement frequency and storage requirements. Excessive ordering frequency increases administrative and transportation costs,

while excessive inventory accumulation increases holding costs and potential material losses. Therefore, EOQ functions as a decision-support model that helps MSMEs determine a more economical inventory policy based on operational conditions and cost structures (Gurtu, 2021).

These findings support previous research demonstrating that EOQ remains relevant for small-scale food businesses because it provides a simple but effective analytical framework for improving inventory decisions. Although the classical EOQ model assumes relatively stable demand and cost conditions, its application can still provide valuable guidance when adjusted to the characteristics of MSME operations (Alnahhal, 2024). Thus, EOQ implementation strengthens financial efficiency and encourages a more disciplined approach to raw material procurement management.

3.2 Operational Implications

The implementation of quantitative inventory control provides important operational implications for improving supply chain reliability at Donat Pops MSME. Before adopting an analytical inventory system, procurement decisions were mainly based on physical stock observation and managerial experience. This approach created uncertainty because purchasing decisions could occur either too early, resulting in unnecessary inventory accumulation, or too late, causing potential production interruptions.

The application of the Reorder Point (ROP) concept provides a more systematic mechanism for determining when replenishment should be initiated. ROP functions as an operational control indicator that integrates demand patterns, lead time, and inventory availability to prevent material shortages. Previous studies emphasize that accurate reorder decisions are essential for maintaining production continuity, particularly in environments characterized by demand variability and uncertain supply conditions (Arani et al., 2021).

Furthermore, safety stock plays an important role in strengthening supply chain resilience. In food-based MSMEs, uncertainty may arise from supplier delays, market fluctuations, and changes in customer demand. Maintaining an appropriate buffer inventory enables businesses to absorb short-term disruptions without significantly affecting production activities. Therefore, safety stock is not simply additional inventory but a strategic mechanism for reducing operational risks (Agbenyega & Quick, 2025).

From a managerial perspective, the integration of EOQ, ROP, and safety stock transforms inventory management from a reactive system into a preventive control mechanism. The business owner no longer relies solely on subjective estimation but can make procurement decisions based on measurable indicators. This approach enhances production stability, improves supplier coordination, and supports consistent customer service performance (Maheshwari et al., 2021).

Therefore, the operational significance of this research lies in demonstrating how simple inventory models can strengthen supply chain reliability among MSMEs. The adoption of structured inventory practices enables small businesses to reduce stockout risks while maintaining production continuity under uncertain operating conditions.

3.3 Theoretical Implications

This study contributes to inventory management theory by providing empirical evidence regarding the applicability of continuous review inventory systems within the context of food-based MSMEs. Classical inventory theory explains that effective inventory management requires an optimal balance between ordering costs, holding costs, and shortage risks. The integration of EOQ, ROP, and safety stock in this research demonstrates how these theoretical principles can be adapted to small business environments.

The continuous review inventory system emphasizes continuous monitoring of inventory conditions and timely replenishment decisions when stock reaches a predetermined threshold. This principle differs from traditional MSME practices that frequently depend on personal judgment and informal experience. The findings indicate that quantitative inventory models can improve decision accuracy and provide a more rational foundation for procurement management.

The application of EOQ, ROP, and safety stock in Donat Pops MSME also confirms that classical inventory models remain relevant beyond large manufacturing organizations. Although MSMEs generally operate with limited resources and simpler management structures, they still face similar inventory challenges, including cost inefficiency, demand uncertainty, and supply disruption risks. Therefore, this research extends the application of inventory management theory into a micro-enterprise context.

Previous studies have highlighted that inventory optimization models remain important in modern supply chains because they support cost reduction and operational stability under uncertain conditions (Zhou et al., 2023). This study strengthens that argument by showing that continuous review inventory principles can be practically implemented in small-scale food businesses without requiring complex technological infrastructure.

The theoretical contribution of this research is the empirical validation that continuous review inventory approaches can support both economic efficiency and operational reliability in MSMEs. The findings enrich inventory management literature by demonstrating the adaptability of established theories within dynamic and resource-constrained business environments.

3.4. Implications for Islamic Economics

This finding not only demonstrates increased operational efficiency but also strongly aligns with Islamic economic principles, which emphasize the balance between efficiency, fairness, and sustainability in economic activity. Based on operational data, namely:

Average daily demand (d) = 129 kg

Lead time (L) = 3 days

Safety stock (SS) = 90 kg

So it is formulated:

$$ROP = (d\ x\ L) + SS$$

$$ROP = (120 \times 3) + 90 = 450 \text{ kg}$$

The ROP value of 450 kg indicates that raw material ordering should be initiated when inventory falls to 450 kg. If this system is not implemented, the MSME faces a high risk of stockouts before new raw materials arrive. Operationally, ROP functions as an early warning system that directs purchasing decisions at the correct time rather than relying on subjective estimation (Nagy et al., 2023).

From an Islamic economic perspective, efficient resource management is part of the implementation of maqasid al-shariah, particularly in the protection of wealth (hifz al-mal). Optimal inventory management reflects efforts to preserve business assets by avoiding waste and economic value loss. Chapra (2021) emphasizes that economic activities in Islam must ensure the optimal use of resources without causing harm or waste. Therefore, the EOQ implementation in Donat Pops MSME can be viewed as a form of efficiency aligned with Islamic values (Sipos et al., 2021).

In addition, the findings show that the previous conventional system resulted in a high ordering frequency of around 70 times per year, which potentially created unnecessary operational costs. After implementing EOQ, the ordering frequency decreased to 27 times per year. This shift reflects a transition from inefficient practices toward a more structured and rational system. In Islamic economics, wasteful behavior (israf) is prohibited as it contradicts the principle of balance in resource utilization (Al Firdausi & Suprayitno, 2023). Thus, EOQ implementation indirectly supports the avoidance of israf in economic activities (Ardianto et al., 2025).

Furthermore, the application of a Reorder Point (ROP) of 450 kg demonstrates a more structured inventory control system. ROP serves as the minimum stock level that signals when replenishment should be made. In the context of Islamic economics, this arrangement reflects the principle of justice (‘adl) in resource distribution, ensuring that production needs are met proportionally without causing excess or shortages that may harm others (Achkar et al., 2023). Saputra (2024) states that justice in an Islamic economic system is reflected in the ability of the system to maintain a balance between resource availability and demand (Saputra, 2024).

In addition, the safety stock of 90 kg used as inventory buffer indicates an effort to mitigate risks related to demand uncertainty and supply delays. Mathematically, this can be expressed as:

$$SS = d_{\max - d_{avg}} \text{ x L}$$

$$SS = (150 - 120) \times 3 = 90 \text{ kg}$$

A safety stock of 90 kg indicates that the MSME must always maintain additional inventory beyond normal production requirements. Without safety stock, any delay from suppliers would immediately halt production activities. This finding is consistent with studies stating that safety stock is an essential element in maintaining operational continuity and customer satisfaction (Muksin, 2023).

From an Islamic economic perspective, this practice aligns with the concept of maslahah, which emphasizes the realization of benefits and the prevention of harm in economic activities. Agbenyega and Quick (2025) explain that data-driven safety stock implementation can enhance supply chain resilience without causing excessive waste. In the context of Donat Pops MSME, safety stock functions as an instrument to ensure continuous production and sustainable customer service (Agbenyega & Quick, 2025).

Furthermore, the integration of EOQ, ROP, and safety stock within the inventory control system demonstrates that operational efficiency can be achieved without neglecting ethical values in Islamic economics. This system reflects the principles of efficiency (iqtisad), balance (tawazun), and sustainability *(istimrar*) (Romariardi et al., 2022). Jin et al. (2025) emphasize that mathematical inventory optimization can improve cost efficiency while maintaining long-term production system stability (Jin et al., 2025). Thus, the findings of this study indicate that the application of EOQ, ROP, and safety stock not only improves cost efficiency in Donat Pops MSME but also aligns with Islamic economic principles that emphasize balance, justice, and sustainability in economic activities (Gorondutse et al., 2016).

From an Islamic economic perspective, inventory management is not only related to financial efficiency but also reflects ethical responsibility in managing resources. Islam encourages balanced economic behavior and discourages excessive consumption or unnecessary waste. The concept of israf emphasizes that resources should not be used beyond reasonable needs because excessive utilization may reduce economic benefits and create inefficiency (Durmuş, 2022).

In the context of MSME inventory management, inefficient procurement practices may lead to unnecessary costs, resource waste, and potential loss of economic value. Excessive accumulation of raw materials without productive purposes may increase storage burdens and create risks of material deterioration. Therefore, optimizing inventory levels represents an effort to avoid wasteful practices and promote responsible resource utilization (Heizer et al., 2020).

The principle of hifz al-mal within maqasid al-shariah highlights the importance of protecting wealth and ensuring that economic resources generate sustainable benefits. Effective inventory management reflects this principle because it preserves business assets through careful planning, cost control, and prevention of unnecessary losses (Sari et al., 2025). Furthermore, inventory optimization supports the achievement of maslahah by maintaining business continuity and ensuring that production activities can serve customer needs effectively. In this sense, operational efficiency is not merely a pursuit of profit maximization but also a form of accountability in managing resources entrusted to economic actors (Otuya & Joseph, 2017).

Therefore, the application of inventory control methods in Donat Pops MSME can be interpreted as a practice aligned with Islamic economic values. The integration of quantitative management approaches with ethical principles demonstrates that efficiency and religious responsibility can operate together in sustainable business management.

4. CONCLUSION

This study examined raw material inventory optimization at Donat Pops MSME in Bandung through the application of Economic Order Quantity (EOQ), Reorder Point (ROP), and Safety Stock models. The findings demonstrate that quantitative inventory management provides a more systematic alternative to the previous experience-based procurement approach. The implementation of inventory optimization enables the MSME to improve purchasing decisions, strengthen operational planning, and establish a more measurable inventory control system.

The results indicate that the EOQ-based policy provides a more efficient procurement structure by balancing ordering activities and inventory holding requirements. Meanwhile, the integration of ROP and safety stock strengthens operational reliability by providing a preventive mechanism against raw material shortages and supply uncertainty. These findings confirm that inventory optimization in MSMEs should not only focus on cost reduction but also consider production continuity, supply chain stability, and quality preservation of raw materials.

For practical implementation, Donat Pops MSME should adopt a gradual transition strategy rather than immediately changing the existing purchasing system. The first step is to conduct coordination and renegotiation with wheat flour suppliers regarding delivery schedules, order quantities, payment arrangements, and storage capacity to support larger but more efficient procurement cycles. The second step is to improve warehouse management by preparing appropriate pallet arrangements, maintaining ventilation, preventing direct contact between flour packaging and damp surfaces, and implementing the First-In First-Out (FIFO) system to maintain flour quality. The third step is to conduct periodic evaluation of inventory performance by comparing actual consumption patterns, supplier reliability,

and storage conditions before fully adopting the EOQ-based policy as a permanent procurement standard.

From the perspective of Islamic economics, inventory optimization reflects responsible resource management by reducing unnecessary waste (israf), protecting business assets (hifz al-mal), and supporting sustainable economic activity. Efficient inventory control is therefore not only a managerial decision but also an ethical practice that encourages balanced and accountable utilization of resources.

However, this study has several methodological limitations. First, the EOQ analysis applies a deterministic assumption of relatively constant demand, whereas actual donut demand in MSME environments may fluctuate statistically due to seasonal changes, market dynamics, and consumer preferences. Therefore, future studies should consider probabilistic inventory models or stochastic approaches to capture demand uncertainty more accurately. Second, the quantitative analysis in this study focuses primarily on the main raw material, namely wheat flour, while other supporting ingredients such as sugar, oil, eggs, and packaging materials were not included in the optimization model. Future research should expand the analysis to multiple raw materials to develop a more comprehensive inventory management framework for food-based MSMEs.

Overall, this research provides empirical evidence that integrating inventory optimization models with operational quality control and ethical resource management principles can support MSMEs in developing more efficient, resilient, and sustainable business practices.

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