

ANALYSIS OF ECONOMIC ORDER QUANTITY AT “AWUD SELERAKU” NOODLE CRACKERS MSME IN PAGOJENGAN VILLAGE, PAGUYANGAN DISTRICT, BREBES REGENCY

Wahyu Lintang Fajriyah^{1*}, Fathmi Aqinna Rifqia², Intan Kirana³

^{1,2,3} Study Program of Agribusiness, Faculty of Science dan Technology,
Universitas Peradaban

E-mail: lintangfajriah@gmail.com¹, fathmiaqinnarifqia@peradaban.ac.id²,
intanxkirana@gmail.com³

Copyright © 2026 The Author



This is an open access article

Under the Creative Commons Attribution Share Alike 4.0 International License

Abstract:

This study aimed to analyze the implementation and calculate the Economic Order Quantity (EOQ), Reorder Point (ROP), and Safety Stock (SS) at the “Awud Seleraku” Noodle Cracker MSME in Brebes Regency, Central Java. MSMEs play a strategic role, yet they frequently face challenges in inventory management. The MSMEs commonly find it difficult to predict the exact stock quantity required during order leading times. Stockouts lead to unfulfilled consumer demand, which diminishes trust and risks losing customers to competitors. On the other hand, excess stock increases operational costs, particularly for holding cost. This study calculated EOQ, ROP, and SS of the main raw materials including tapioca flour, salt, and food coloring over a one-year period (December 2024–November 2025). The implementation of EOQ, ROP, and Safety Stock concepts is expected to provide optimum quantity and timing recommendations for orders to minimize inventory costs, maintain smooth production, and enhance business efficiency and competitiveness of “Awud Seleraku” Noodle Cracker MSME.

Keywords: MSME; Inventory; Economic Order Quantity

Abstrak:

Penelitian ini bertujuan menganalisis penerapan dan menghitung kuantitas pesanan ekonomis atau Economic Order Quantity (EOQ), titik pemesanan kembali atau Reorder Point (ROP), dan persediaan pengaman atau Safety Stock (SS) pada UMKM Kerupuk Mie “Awud Seleraku” di Kabupaten Brebes, Jawa Tengah. UMKM memiliki peran strategis, namun sering waktu menghadapi tantangan dalam manajemen persediaan. UMKM pada umumnya kesulitan dalam memprediksi jumlah stok yang harus tersedia selama waktu tunggu pemesanan barang. Kekurangan stok menyebabkan tidak terpenuhinya permintaan konsumen yang berdampak pada penurunan kepercayaan dan berpotensi berpindah pada kompetitor. Di sisi lain, kelebihan stok berdampak terhadap meningkatnya biaya operasional, khususnya penyimpanan barang. Penelitian ini menghitung EOQ, ROP, dan SS bahan baku utama berupa tepung tapioka, garam, dan pewarna selama satu tahun (Desember 2024–November 2025). Penerapan konsep EOQ, ROP, dan SS diharapkan dapat memberikan rekomendasi kuantitas dan waktu pemesanan yang optimal untuk meminimalisasi biaya persediaan, menjaga kelancaran produksi, serta meningkatkan efisiensi dan daya saing usaha dari UMK Kerupuk MIE “Awud Seleraku”.

Kata Kunci: UMKM; Persediaan; Economic Order Quantity

1. Introduction

Micro, Small, and Medium Enterprises (MSMEs) represent an economic sector with a strategic role in the economy, particularly in developing countries like Indonesia. MSMEs are widely recognized as the backbone of the economy due to their contribution to job creation, poverty reduction, and economic growth. Generally, MSMEs are defined based on specific criteria, such as the number of employees, annual turnover, and business of both assets and revenue, yet they are highly flexible in adapting to market demands. Pursuant to Act Number 20 of 2008, micro enterprises are defined as business with an annual revenue of less than IDR 300 million; small enterprises have an annual revenue between IDR 300 million and IDR 2,5 billion; and medium enterprises have an annual revenue between Rp2,5 billion and Rp50 billion. Undoubtedly, the contribution of MSMEs to the national economy is immense.

Furthermore, MSMEs demonstrate resilience against global economic recessions because they are not highly exposed to the global economy, they produce daily necessities rather than luxury goods; and they are generally more adaptive and unburdened by costly administration (Hill 2001, Manikmas 2003). MSMEs serve as a primary driver of the local economy, supporting the diversity of products and services while utilizing local resources. Nonetheless, MSMEs frequently face various challenges, such as limited access to financing, low managerial capacity, and technological constraints. Therefore, effective management, including production cost aspects, is crucial to ensuring the sustainability and competitiveness of MSMEs.

According to Hanggana (2006:11), “raw materials are elements used to manufacture finished goods, which inherently integrate into the final product.” According to Sofjan Assauri (2008:176), “raw material inventory control involves activities to determine the level and composition of raw material and finished product inventories, so that companies can protect the continuity of production effectively and efficiently.” According to M. Nafarin (2004 in Kamarudin, 2014:31), “Economic Order Quantity (EOQ) is the quantity of goods that can be acquired at minimal cost, often referred to as the optimal purchase volume.” According to Assauri (2008:256), “safety stock is an inventory reserved as a safeguard for the continuity of the company’s production process to prevent stock shortages.” According to Awat (1999 in Karumarudin, 2015:34), “the reorder point indicates the specific inventory level remaining in the warehouse at which a new order must be placed.” Total Inventory Cost (TIC) is the sum of Total Ordering Cost (TOC) and Total Carrying Cost (TCC). The minimum or most economical total inventory cost is achieved when the ordering cost equals the holding cost.

“Awud Seleraku” Noodle Cracker is a food product made from tapioca flour. The “Awud Seleraku” Noodle Cracker business is located in Pagojengan Village, Brebes Regency, Central Java. It capitalizes on its potential by producing noodle crackers. However, to compete in an increasingly competitive food market, it is important to understand production costs, marketing, and business efficiency aspects to ensure long-term business sustainability. The purpose of calculating the EOQ, ROP, and SS for this business is to optimize inventory levels in order to minimize total costs while preventing stockouts.

2. Literature Review

Chase and Jacob (2014) defines inventory as all required demands within a company, whether in the form of resources or goods. Siregar (2014) states that inventory control is a role that establishes plans in the form of management, as well as handling and directing execution through manuals, criteria, standards, or procedures using actions that make it possible to optimize and implement programs based on their elements and units.

Heizer and Render (2010) mention that the Economic Order Quantity (EOQ) method is one of the most well known and long standing inventory control techniques. This inventory control technique can determine when to reorder and the quantity to order. The reorder point is the time or point at which goods in the warehouse must be added before a stockout occurs. Ristono (2009) states that safety stock is inventory kept to anticipate uncertain demand. If safety stock is not properly calculated, inventory will run out.

3. Research Methods

3.1. Object, time and Place

This study was conducted in December 2025 at the “Awud Seleraku” Noodle Cracker business in Pagojengan Village, Brebes Regency, Central Java Province. The research object was selected purposively due to the MSME owner has been operating the business for a long time, which is more than 50 years.

3.2. Data Collection Techniques

The types and sources of data collected in this study include primary data and secondary data. Primary data refers to data obtained directly through interviews guided by a pre-prepared questionnaire. Primary data in this study included raw materials and additional materials demand per period, ordering cost per order, holding cost per unit, and so on. Secondary data refers to data obtained from relevant institutions, literature, journals, books, and other relevant and factual library materials.

Data collection techniques in this study were observations and interviews. For observation, data collection is carried out by making direct observations of the test objects in the field (Herdayanti & Syahril, 2019). An interview is a data collection method conducted by meeting directly and conducting a question and answer session with the respondents (Sugiyono, 2013).

3.3. Data Analysis Techniques

The economic order quantity for each raw material can be calculated using the following formula:

$$EOQ = \sqrt{\frac{2 \times D \times S}{H}}$$

Where:

D = Raw material demand per period

S = Ordering cost per order

H = Holding cost per unit per order

Safety stock is an amount of inventory that must be reserved to secure the production process and prevent raw materials shortages. Statistical method can be used to calculate safety stock by comparing actual raw material demand with average raw material demand for each period, and then determining the deviation. Standar deviation formula as follows can be applied to make the comparison:

$$SD = \sqrt{\Sigma \left(\frac{x - \bar{x}}{n} \right)^2}$$

Where:

x = Actual raw material demand

\bar{x} = Average raw material demand

n = Number of periods

Once the standar deviation is determined, the Safety Stock can be calculated using the following formula:

$$\begin{aligned} \text{Safety Stock} &= \text{Standard Deviation} \times Z \\ &= \sigma_d \cdot Z \end{aligned}$$

Where:

Z = Safety factor

The Reorder Point (ROP) indicates the remaining quantity at which the company must place a new order. First, the average daily raw material requirement must be determined. This is obtained by dividing the total raw material demand by the number of working days in a year (360 days). The average daily raw material requirement is then multiplied by the lead time and added to the safety stock.

4. Results and Discussion

The results and discussion sections should be presented systematically to explain the research findings and their meaning. Here is a general structure that can be used:

4.1. Research Results

The “Awud Seleraku” noodle cracker Business, owned by Mr. Darso, was established in 1970s in Pagojengan Village and has been passed down through generations. This business has already obtained Halal certification. “Awud Seleraku” Noodle Cracker is a snack product made from tapioca flour. The business capitalizes on its potential to produce noodle crackers with the price Rp15.000 for a 1,8kg package.

Raw materials are elements used to manufacture goods or the essential components for a production process, which are processed into finished goods and subsequently bought and sold on commodity exchanges worldwide. According to Supriyono (2018), production costs are the expense incurred to process raw materials into finished products that are ready for sale. This study identified tapioca flour as the primary raw material, while salt and coloring food as additional materials. The total cost of raw materials required to produce 5.475 sacks of “Awud Seleraku” noodle crackers per year was IDR 82,125,000. The following is the detailed breakdown of the noodle cracker raw material and additional materials costs:

Tabel 1. Total raw material and additional materials requirements of “Awud Seleraku” Noodle Cracker in December 2024 to November 2025

Month	Year	Tapioca flour (kg)	Salt (kg)	Coloring food (kg)
Dec'	2024	930	62	3,1
Jan'	2025	900	60	3
Feb'	2025	840	56	2,8

Mar'	2025	930	62	3,1
Apr'	2025	900	60	3
May	2025	930	62	3,1
Jun'	2025	900	60	3
Jul'	2025	930	62	3,1
Aug'	2025	930	62	3,1
Sept'	2025	900	60	3
Oct'	2025	930	62	3,1
Nov'	2025	930	62	3,1
Total		10.950	730	36,5
Average		912,5	60,83	3,04

Sources: Data processed, 2025

Tabel 1 above shows the total raw material and additional materials requirements for “Awud Seleraku” noodle cracker over a one-year period. The following table presents the total inventory or each material over a one-year period.

Tabel 2. Total inventory costs for raw material and additional materials of “Awud Seleraku” Noodle Cracker in December 2024 to November 2025

Month	Tapioca flour (Rp/kg)	Salt (Rp/kg)	Coloring food (Rp/kg)
Dec'	6.975.000	248.000	620.000
Jan'	6.750.000	240.000	600.000
Feb'	6.300.000	224.000	560.000
Mar'	6.975.000	248.000	620.000
Apr'	6.750.000	240.000	600.000
May	6.975.000	248.000	620.000
Jun'	6.750.000	240.000	600.000
Jul'	6.975.000	248.000	620.000
Aug'	6.975.000	248.000	620.000
Sept'	6.750.000	240.000	600.000
Oct'	6.975.000	248.000	620.000
Nov'	6.975.000	248.000	620.000
Total	82.125.000	2.920.000	7.300.000
Average	6.843.750	243.333	608.333

Sources: Data processed, 2025

Ordering cost refers to all epenses incurred each time a company or business places an order for goods or raw materials from a supplier. This cost is not calculated based on quantity of items ordered, but rather on the frequency of purchases or the ordering processes conducted. Below is the ordering cost table for “Awud Seleraku” noodle cracker.

Tabel 3. Type of monthly ordering cost

Type of ordering cost	Ordering frequency	Amount (Rp)
Telephone cost	30 days	50.000
Delivery cost	30 days	450.000
Total		500.000

Sources: Data processed, 2025

Ordering costs are expenses as a result of making purchases from a supplier, spanning from the initial order placement until the goods arrive. At the “Awud Seleraku” noodle crackers business, ordering costs consist of a delivery fee of Rp15.000 per order from each supplier and telephone costs of Rp1.666 per order. The total ordering costs incurred by “Awud Seleraku” noodle crackers over a one-year period amount to Rp6.083.090.

Holding costs are expenses that arise from storing materials in the warehouse for a certain period. The holdin costs at “Awud Seleraku” noodle crackers consist of labor osts and electricity expenses. Labor costs refer to the wages of three warehouse employees who manage the raw materal and the additional

materials, as well as maintain warehouse cleanliness. Meanwhile, electricity costs arise from the power consumed within the warehouse. The total labor cost for the 3 employees was Rp10.000 every 20 days, resulting in an annual payable amount of Rp7.200.000. Additionally, the total monthly cost for the electricity and water was Rp300.000, which amounts to Rp3.600.000 over one year. Consequently, the total annual holding cost incurred by “Awud Seleraku” noodle crackers was Rp10.800.00.

The economic order quantity or tapioca flour was calculated as follows:

$$\begin{aligned} EOQ (\text{tapioca flour}) &= \sqrt{\frac{2 \times D \times S}{H}} \\ &= \sqrt{\frac{2 \times 10950 \times 1666}{65,7}} \\ &= \sqrt{555.333} \\ &= 745,2 \end{aligned}$$

Based on the calculation results above, therefore the economic order quantity for tapioca flour was 745,2kg. The economic order quantity for salt was calculated as follows:

$$\begin{aligned} EOQ (\text{salt}) &= \sqrt{\frac{2 \times D \times S}{H}} \\ &= \sqrt{\frac{2 \times 730 \times 1666}{65,7}} \\ &= 192,4 \end{aligned}$$

Based on the calculation results above, therefore the economic order quantity for salt was 192,42kg per order. The economic order quantity for food coloring was calculated as follows:

$$\begin{aligned} EOQ(\text{foodcoloring}) &= \sqrt{\frac{2 \times D \times S}{H}} \\ &= \sqrt{\frac{2 \times 36,5 \times 1666}{65,7}} \\ &= 43 \end{aligned}$$

Based on the calculation results above, therefore the economic order quantity for food coloring was 43kg per order. Safety Stock for each raw material and additional material later was calculated. Safety Stock for tapioca flour was calculated using the formula:

$$\begin{aligned} SS (\text{tapioca flour}) &= z \cdot \sigma_d \\ &= 1,65 \times 25,86 \\ &= 42,7 \text{ Kg} \end{aligned}$$

Based on the calculation results above, therefore Safety Stock for tapioca flour was 42,7kg per order. This indicated that the inventory level for tapioca flour in the warehouse must not fall below 42,7kg. Safety stock for salt was calculated using the formula:

$$\begin{aligned} SS (\text{salt}) &= z \cdot \sigma_d \\ &= 1,65 \times 1,72 \\ &= 2,8 \text{ kg} \end{aligned}$$

Based on the calculation results above, therefore Safety Stock for salt was 2,8kg per order. This indicated that the inventory level for salt in the warehouse must not fall below 2,8kg. Safety stock for food coloring was calculated using the formula:

$$\begin{aligned} SS (\text{food coloring}) &= z \cdot \sigma_d \\ &= 1,65 \times 0,086 \\ &= 0,14 \text{ kg} \end{aligned}$$

Based on the calculation results above, therefore Safety Stock for food coloring 0,14 kg per order. This indicated that the inventory level for food coloring in the warehouse must not fall below 0,14kg.

The Reorder Point (ROP) indicates the remaining inventory quantity at which the company must place a new order. First, the average daily raw material requirement must be determined. This is obtained by dividing the total raw material demand by the number of working days in a year (360 days). The average daily raw material and additional material requirements are then multiplied by the lead time and

added to the safety stock. There was no waiting period or lead time in the raw material and additional materials purchasing process as they were acquired on the same day as they were ordered. Consequently, the reorder point occurred when the materials stock reached the safety stock level.

5. Conclusion

This study aimed to analyze the application and calculate EOQ, SS, and ROP for the “Awud Seleraku” noodle crackers MSME in Brebes, Central Java. By implementing the concepts, it is expected that MSME will receive optimal recommendations regarding order quantities and timing. This will help minimize inventory costs, ensure smooth production flow, and enhance business efficiency and competitiveness.

Based on the calculations, EOQ was 754kg per order for tapioca flour, 192kg per order for salt, and 43kg per order for food coloring. Meanwhile, the calculated SS was 42,7kg for tapioca flour, 2,8kg for salt, and 0,14kg for food coloring. However, the ROP calculation results showed that the ROP value was equal to the SS because there was no lead time involved in the ordering process.

Bibliography

- Gani Maesti, I., & Saputri Eka, H. (2018). Analisis Peramalan dan Pengendalian Persediaan Bahan Baku Dengan Metode EOQ Pada Optimalisasi Kayu Di Perusahaan Purezento.
- Heizer, J., & Render, B. (2010). Manajemen Operasi (Buku 2, Edisi 9). Jakarta: Salemba Empat.
- Herdayati, & Syahril. (2019). Desain Penelitian dan Teknik Pengumpulan Data dalam Penelitian. Jurnal Online Internasional Nasional, 7(1), 1–11.
- Jacobs R. and Chase, R. B.. (2014). Manajemen Operasi dan Rantai Pasokan, Edisi 14 |. Jl. Raya Lenteng Agung No.101, Jagakarsa, Jakarta Selatan: McGraw - Hill Education and Salemba Empat,
- Laoli, S., Zai, K. S., & Lase, N. K. (2022). Penerapan Metode *Economic Order Quantity* (EOQ), *Reorder Point* (ROP), dan *Safety Stock* (SS) dalam Mengelola Manajemen Persediaan di Grand Kartika GunungSitoli.
- Mubasysyir, M. H., Supian, S., & Hertini, E. (2024). Multi-Item Inventory Control Using *Economic Order Quantity* (EOQ) *Model with Safety Stock, Reorder Point, and Maximum Capacity in Retail Business*.
- Palupi, P. M., Korawijayanti, L., & Handoyono, R. (2018). Penerapan Metode *Economic Order Quantity* (EOQ) Untuk Meningkatkan Efisiensi Biaya Persediaan Bahan Baku (Studi Kasus pada PT Nusamulti Centralestari).
- Rindawati, M. S., & Andriani, H. (2022). Analisis Pengendalian Persediaan Obat Menggunakan Metode ABC, *Safety Stock*, EOQ, dan Rop di Instalasi Farmasi Rumah Sakit Pemerintah di Jakarta.
- Ristono, A. (2009). Manajemen Persediaan (Edisi 1). Yogyakarta: Graha Ilmu.
- Sugiyono. (2013). Metode Penelitian Kuantitatif Kualitatif dan R&D. Alfabeta.