

Increasing Operational Efficiency Through the Economic Order Quantity (EOQ) Method in the Online Market



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ABSTRACT: This research aims to analyze and develop strategies to increase operational efficiency in the Inari Tara business. In the current era of globalization and digitalization, MSMEs face significant challenges in increasing their competitiveness. Operational efficiency is one of the key factors that can support business sustainability and growth. Through a case study approach, this research explores various methods and tools that Inari Tara can use to improve their operational efficiency. The research results show that the application of digital technology, improved supply chain management, and human resource development play an important role in achieving higher operational efficiency. This research provides practical recommendations for Inari Tara to adopt these strategies to increase the competitiveness and sustainability of their business.

KEYWORDS: Inari Tara, EOQ, MSMEs, Operational Efficiency, Online Market

I. INTRODUCTION

Increasing operational efficiency is highly desirable for Micro, Small and Medium Enterprises (MSMEs) in the culinary sector that operate in a competitive and dynamic business environment. To remain competitive, MSMEs need to adopt effective inventory management strategies. One approach that can help in achieving this goal is the concept of Economic Order Quantity (EOQ). EOQ is a mathematical model used to determine the optimal number of orders for goods so that total inventory costs can be minimized [1, 2]

Efficient inventory management is crucial for businesses in the culinary sector to maintain product quality, meet market demand in a timely manner, and manage cash flow well. EOQ allows small companies to optimize the use of their limited resources, such as raw materials and auxiliary materials, by reducing unnecessary inventory costs and avoiding the risk of stock shortages which can be detrimental, therefore companies are obliged to implement these policies and strategies [1, 3, 4, 5].

Research by [1] shows that EOQ makes a significant contribution to increasing the operational efficiency of culinary businesses. By implementing EOQ, MSMEs can plan raw material orders more effectively, optimize production processes, and reduce overall costs related to inventory [6]. This not only helps in maintaining operational sustainability, but also strengthens its competitiveness in an increasingly tough market.

The use of EOQ in inventory management for MSMEs in the culinary and other industrial sectors not only provides direct economic benefits in the form of reducing inventory costs, but also increases overall operational efficiency [7]. With a deep understanding of how EOQ can be implemented appropriately, MSMEs can maximize their potential to grow and develop amidst fierce competition in the food and beverage industry.

One of the MSMEs discussed is Inari Tara. Inari Tara is a micro, small and medium business in the culinary sector. This company will be running in mid-2023 and was founded by several people who control the business. Inari Tara runs in the culinary sector with unique innovation, this makes Inari Tara able to compete freely in the culinary field which combines typical Japanese food (Inari) with a mixture of local foods. Apart from the uniqueness of mixing flavors, Inari Tara also plays in the online market sector where they use a pre-order system. This can help the development of small businesses to remain stable by storing stock and buyers who can be handled well and efficiently. One of the food products sold by Inari Tara is Inari Tara Rendang, this food combines the essence of Japanese and Indonesian food which can be enjoyed by people in Indonesia.

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Formulation Of the Problem

There are three problems that arise in this research, including, 1) is it necessary for the Inari Tara company to implement the EOQ method, 2) the strategy implemented by Ini Tara in overcoming obstacles in implementing the EOQ method and 3) if the EOQ method is implemented, will it actually be will improve stock management and availability of raw materials.

Research Purposes

One method used to understand MSME inventory management is to use EOQ calculations. To achieve the research objectives, several research questions need to be studied as follows, explaining the importance of using the Economic Order Quantity concept for Inari Tara, identifying strategies that Inari Tara can implement to overcome challenges in implementing EOQ and analyzing how EOQ can be implemented effectively by Inari Tara to improving stock management and availability of raw materials, as well as identifying key factors that support successful implementation.

II. THEORETICAL BASIS

A. Basic Concepts of Inventory Management

The basic concept of inventory management is a system designed to supervise, manage and monitor stock of goods within a business scope [8]. In a business context, inventory management has a central role in maintaining smooth operations, reducing costs, and meeting customer needs [9]. Inventory management can be interpreted as a way to determine the optimal amount of inventory with minimal total costs, because too much inventory can result in the company bearing the risk of damage and high storage costs [10].

According to [11], the goal of efficient inventory management is to provide the best service for consumers, streamline the production process, ensure the right products are available at the right time, prevent excesses and stock outs. In its implementation, inventory management can be carried out using various methods, such as a manual approach, computer-based implementation, and the use of RFID (Radio Frequency Identification) technology.

B. Economic Order Quantity (EOQ)

Economic Order Quantity is an inventory management system that is important in optimizing inventory costs and shipping costs. The definition of EOQ is a method for determining the right quantity to purchase a product, with the aim of reducing the costs to be incurred [12, 13]. The main objective of EOQ is to optimize inventory and delivery costs, as well as reduce total incremental costs (TIC) that occur due to inventory and delivery [14]. In calculating EOQ, the two main costs that need to be considered are Ordering Cost and Handling Cost [15].

C. Inventory Costs

Inventory costs are an important cost in company operations, especially in the manufacturing and trading industries. Inventory costs can be defined as costs associated with storing and managing raw materials, finished goods and spare parts used in the company's production and operational processes. The main goal in managing inventory costs is to minimize total inventory costs and optimize available inventory levels [16].

D. Ordering Costs

According to [17] Ordering costs are an important cost in company operations, especially in the manufacturing and trading industries. Ordering costs can be defined as costs associated with shipping raw materials, finished goods, and spare parts used in a company's production and operational processes. According to [16], ordering costs are the costs incurred by a company to purchase raw materials and finished goods used in the production process.

The main goal in managing ordering costs is to minimize total inventory costs and optimize available inventory levels. According to [18], ordering costs can be reduced by using the Economic Order Quantity (EOQ) method which can save on ordering costs. In addition, ordering costs can also be reduced by using other strategies such as backorders and more accurate demand forecasting.

E. Carrying Cost

Storage costs/holding cost/carrying cost are costs that must be borne by the company in connection with raw materials stored within the company [19]. These carrying costs include the costs of storage facilities, such as lighting, heating or cooling, as well as fees others such as purchase transportation costs and other costs related to storing raw materials.

The goal of carrying cost is to minimize storage costs and optimize the use of storage facilities. According to [20], carrying costs must be considered in inventory control so that they are not too large or too small, so that they can affect the company's operational efficiency.

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F. Operational Efficiency

Operational efficiency is the key to increasing productivity and reducing costs in an organization. In a business context, operational efficiency can be achieved by optimizing the use of resources, reducing operational costs, and improving the quality of products or services. According to [21], operational efficiency can be increased by using effective and efficient information technology. They also emphasize the importance of cost analysis and performance analysis to identify areas for improvement. Apart from that, operational efficiency can also be increased by optimizing business processes, reducing overhead costs, and improving product or service quality.

G. Reducing the Risk of Obsolescence

Obsolescence risk occurs when inventory stock is insufficient for customer demand or production needs, which can result in disruptions in the supply chain and potential financial losses. According to [22], the risk of obsolescence can be overcome by considering factors that influence lead time, demand variability, and the desired level of service. In this context, inventory management strategies such as good planning, use of appropriate reorder point models, and supplier diversification can help reduce the impact of obsolescence risk in business operations.

H. Online Market

Online markets have become an integral part of everyday life, especially for the millennial generation. According to [23], online business is a business that is run online using the internet network, while the information to be conveyed or sold usually uses websites, social networks and buying and selling forums. Online business can be interpreted as a place to share information where individuals can contribute their abilities to create a community. solid via the internet. Online sales have a role that is more effective, efficient and cheaper than offline sales [24].

The use of e-commerce technology has experienced extraordinary development, especially in large-scale companies. In analyzing online business barriers, the theory used is the Uses and Gratifications Theory, which focuses on how online business can play a role in increasing consumer satisfaction.

III. METHOD

A. Types of Research

The research method used in this research is a qualitative approach, focusing on case studies in Inari Tara. Through interviews and participant observation with the owner. This research aims to explore their direct experiences in implementing EOQ in daily practice [25]. This approach allows researchers to understand in depth the factors that influence the success or challenges in implementing EOQ in a specific business environment such as Inari Tara.

The research results show that more than 80% of MSMEs are believed to fail in their first four years of existence. This can occur as a result of ineffective inventory management, which obviously affects operations, production, customer relationships and profitability, among other areas [26].

B. Data Collection

Data collection techniques were carried out through interviews and participant observation with the owner of Inari Tara, a company operating in the food and beverage services industry. This approach was chosen to answer the problem formulation that identifies the application of Economic Order Quantity (EOQ) as a strategy to improve company operational efficiency, but it cannot be guaranteed that the inventory management system and inventory management strategy that will be implemented by manufacturing SMEs guarantees increased business operations, profitability and liquidity. Later, further research is still needed [27].

Participatory observation was carried out to observe the decision-making process regarding inventory and the implementation of EOQ policies in real situations. This approach provides a detailed explanation of a company's operational dynamics, which is an important element in understanding EOQ implementation and its impact on overall operational efficiency [26].

By integrating data from interviews and participant observation, this research aims to provide a comprehensive understanding of how EOQ can be optimized in inventory management in the food and beverage services industry. It is hoped that this thorough data analysis can make a significant contribution to the development of inventory management strategies that are more effective and responsive to market changes for companies like Inari Tara.

C. Data Analysis

After collecting data through interviews and participant observation with the owner Inari Tara, qualitative data analysis was carried out to understand the implementation of Economic Order Quantity (EOQ) in the context of this company. The qualitative analysis approach allows researchers to explore the perspectives, experiences and points of view of individuals directly involved in inventory management. Thematic analysis was used to identify key patterns and themes that emerged from the data collected [28].

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Thematic analysis is an approach used in qualitative research to identify patterns and main themes that emerge from the data collected. This approach allows researchers to organize and group data based on the significance or similarity of themes, not just the frequency of occurrence of words or phrases [28]. The analysis process begins with familiarization with the data through transcription of interviews and recording field notes, followed by a search for general patterns or main ideas formed from participant narratives.

Thematic analysis involves coding data to identify relevant units of information, which are then grouped into broader themes that reflect interrelated experiences or perspectives [28]. The advantage of this approach is its flexibility in capturing the complexity of qualitative data, allowing researchers to explore multiple dimensions of complex and contextual human experience. By using thematic analysis, researchers can explore the hidden meanings behind words and explain the diversity of experiences experienced by respondents.

The use of thematic analysis not only facilitates in-depth interpretation of data, but also allows researchers to explore complex and dynamic issues within a particular research context. This is important in building a comprehensive understanding of the phenomenon being researched, such as the implementation of EOQ in inventory management at Inari Tara, with the potential to produce in-depth insights for the development of best practices in company operational management [28].

IV. RESULTS AND DISCUSSION

A. Use of the EOQ Concept Inari Tara

Inari Tara is a business in the culinary sector that utilizes the EOQ concept to improve their operational efficiency and inventory management. As an MSME in the culinary sector, Inari Tara faces challenges in managing raw materials so that they remain fresh and available as needed, without experiencing excess or shortage of stock.

By implementing EOQ, Inari Tara is able to determine the optimal order quantity that minimizes ordering and carrying costs. For example, they calculate EOQ for ingredients such as chicken, coconut, and spices used in everyday menus. From the research results, the frequency of purchasing raw materials when using the EOQ method is 3 times the purchase of raw materials in one year, whereas if based on company policy, the frequency of ordering raw materials is 12 times in one year, so it can be seen that there is efficiency in purchasing raw materials [29].

EOQ helps Inari Tara support business sustainability by reducing raw material waste. With more accurate inventory management, it is hoped that Inari Tara will be able to minimize waste of raw materials. This is not only profitable from an economic perspective, but also helps them run a more environmentally friendly business.

Table 1. Inari Rendang Ingredients Supplies

No	Material Type	Average requirement month (grs)	Average requirement Year (grs)	Price per unit (IDR)	Order Per-order (IDR)	Fee	Per-unit Carrying Cost (IDR)	Number of Orders/Year
1	Inari (Tofu Skin)	3,250	39,000	122,000	10,000		5,000	150 Packs
2	Rice	20,000	240,000	72,000	10,000		5,000	240 Kgs
3	Rendang Seasoning	1,500	18,000	10,000	5,000		5,000	72 pieces
4	Garlic and shallots	5,000	60,000	10,000	5,000		5,000	60 Kgs
5	Santan	1,000	12,000	10,000	5,000		5,000	48 pieces
6	Chicken	6,000	72,000	55,000	5,000		5,000	72 pieces
7	Grated Coconut	1,000	48,000	10,000	5,000		5,000	48 pieces

From this table, it can be seen that the average number of units of each material needed in one year, the average number of units in one month, the price of each material per unit, the order cost per order for each order and carrying costs per unit. Calculation of optimum costs using a formula [30, 31].

1. EOQ (Economic Order Quantity)

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

- **D** is annual demand (number of units needed per-year)
- **S** is the message Cost per-order

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- **H** is the holding cost/carrying cost per-unit
- 2. Number of Orders/Year $= \frac{D}{EOQ}$
- 3. Ordering Cost/Year $= \frac{EOQ}{S}$
- 4. Carrying Cost/Year $= (\text{Number of Orders per-year}) (S)$
- 5. Optimum Total Cost/Year $\equiv \frac{EOQ}{2} \left(\frac{H}{S} + \right) \text{Carrying Cost}$

Calculation Details

1. Inari (Tofu Skin)

- $D = 39,000$ grams
- $S = \text{IDR } 10,000$
- $H = \text{IDR } 5,000$

$$EOQ = \sqrt{\frac{(2)(39,000)(10,000)}{5,000}} = 150 \text{ Packs/Year}$$

$$\text{Number of Orders/Year} = \frac{39,000}{150} = 260 \text{ packs}$$

$$\text{Ordering Cost/Year} = \frac{39,000}{150} = (150)(10,000) = \text{IDR } 150,000$$

$$\text{Carrying Cost/Year} = \frac{150}{2} \left(5,000 \right) = \text{IDR } 375,000$$

$$\text{Optimum Total Cost/Year} = 150,000 + 750,000 = \text{IDR } 900,000$$

Table 2. Raw material inventory data

No	Material Type	D (grams)	S (IDR)	H (IDR)
2	Rice	240,000	10,000	5,000
3	Rendang Seasoning	18,000	5,000	5,000
4	Garlic and shallots	60,000	5,000	5,000
5	Santan	12,000	5,000	5,000
6	Chicken	72,000	5,000	5,000
7	Grated Coconut	1,000	5,000	5,000

Table 3. Recapitulation results of EOQ calculations

No	Material Type	EOQ (units)	Number of Orders/Year (grs)	Order Cost/Year (IDR)	Carrying Cost/Year (IDR)	Optimum Cost/Year (IDR)	Total Cost/Year (IDR)
2	Rice	240	1,000	240,000	60,000	300,000	
3	Rendang Seasoning	18	1,000	390,000	45,000	435,000	
4	Garlic and shallots	11	5,454	55,000	27,500	82,500	
5	Santan	12	1,000	60,000	30,000	90,000	
6	Chicken	13	5,765.23	65,000	32,500	97,500	
7	Grated Coconut	3,2 ~ 3	666.66	15,000	7,500	22,500	

Table 4. Optimum Cost Calculation

Raw material	Annual Demand (D) Grams	Order Fee (S) IDR	Storage Fee (H) IDR	EOQ (Grams)
Inari (Tofu Skin)	39,000	10,000	10,000	13,180
Rice	2,520,000	10,000	10,000	1,318
Rendang Seasoning	18,000	5,000	5,000	3,162
Garlic and shallots	60,000	5,000	5,000	7,071

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Santan	12,000	5,000	5,000	2,197
Chicken	72,000	10,000	10,000	9,090
Grated Coconut	12,000	5,000	5,000	2,197

Based on the optimum cost calculation table data for Inari raw materials, there is a significant comparison between initial costs and optimum costs. Initially, without using the Economic Order Quantity (EOQ) method, ordering costs and carrying costs may not be optimal, which could lead to higher annual inventory costs. For example, with annual demand of 39,000 grams and ordering costs of IDR 10,000 per-order, suboptimal ordering frequency can increase total ordering costs. In addition, without EOQ calculations, the amount of raw materials stored may be inefficient, so annual storage costs can be higher.

By implementing EOQ, which for Inari is calculated at 13,180 grams per order, the company can reduce the order frequency to around 3 times per year. This significantly lowers the total annual ordering costs. In addition, this optimal order quantity also helps reduce annual storage costs because the company does not need to store excessive amounts of raw materials. Therefore, the use of EOQ results in lower and more efficient inventory costs, compared to non-optimized initial costs. Implementing this EOQ helps companies reduce total inventory costs, increase operational efficiency, and maximize profitability.

B. Inari Tara's strategy for overcoming challenges in implementing EOQ

Inari Tara Company overcomes challenges by analyzing accurate data, where sales and raw material usage data are accurately collected and analyzed. Accurate historical data helps in EOQ calculations that are more precise and relevant to market conditions. In addition to technology integration, EOQ calculations are aided by sophisticated inventory management software. This system can automate calculations and provide order recommendations based on Inari Tara's real-time data. Furthermore, Inari Tara collaborates with suppliers, building strong relationships with suppliers to ensure flexibility in ordering and reliability of delivery. Good communication with suppliers can help overcome differences in delivery times and demand.

C. Implementation of EOQ to Improve Stock Management and Availability of Raw Materials

As an MSME in the culinary sector, Inari Tara faces challenges in maintaining a balance between overstocking and understocking. By adopting EOQ, they can order raw materials in optimal quantities at the right time, avoiding the risk of raw materials expiring or stock shortages when demand increases.

In its implementation, Inari Tara pays attention to key factors such as ordering costs, storage costs, and raw material demand levels. Using historical data on demand patterns and associated costs, they calculate EOQs for the various raw materials they require. For example, the number of orders for chicken and spices used in the daily menu is calculated using the classic EOQ formula. This allows Inari Tara to determine the optimal order frequency and quantity, so that total inventory costs can be minimized.

Additionally, Inari Tara uses a software-based inventory management system to monitor stock in real-time and automate the ordering process based on EOQ calculations. This technology helps them track inventory accurately and ensure that the data used is always up-to-date.

V. CONCLUSION

This research shows that the application of Economic Order Quantity (EOQ) to Inari Tara MSMEs can significantly increase operational efficiency. Through the implementation of EOQ, this MSME has succeeded in reducing inventory costs and minimizing waste of raw materials, so that operations become more efficient. EOQ proved effective in determining optimal order quantities, which helped Inari Tara manage stock better. With better stock management, Inari Tara can ensure smooth production and distribution, as well as support the sustainability and growth of their business in the future.

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