



## Review Presentation of Different Economic Order Quantity (EOQ) Models and Their Application

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Article History	Abstract:
Received: 23 July 2023 Revised: 10 Sept 2023 Accepted: 24 Oct 2023	<i>In the context of inventory management, this review presentation offers a thorough overview of several Economic Order Quantity (EOQ) models and their real-world uses. It explores the fundamental EOQ model and broadens to incorporate models that account for perishable items, quantity discounts, and scarcity prices. The talk also looks at the many sectors in which these models are used to optimize order amounts, save costs, and improve operational efficiency. Businesses may improve their inventory control strategies, realize considerable cost savings, and increase performance by making educated decisions based on a thorough grasp of the various EOQ models and their practical implementations.</i>
CC License CC-BY-NC-SA 4.0	Keywords: Economic Order Quantity (EOQ), models, quantity discounts

### 1. Introduction

The Economic Order Quantity (EOQ) models are essential tools for inventory management that aim to balance ordering and holding expenses as efficiently as possible. In this review, the researcher examines various EOQ models and their real-world uses. As companies look to simplify their inventory procedures, cut expenses, and boost overall operational effectiveness, these models are essential. The fundamental idea is the traditional EOQ model, which offers a formula to reduce overall inventory costs. It presupposes a constant ordering fee and demand rate. The EOQ model with shortfall costs also acknowledges the cost of stockouts and aids in determining the ideal order amount to reduce the total cost of ordering, holding, and shortages.

### 2. Materials and Methods

Interviews are the main “primary qualitative approach” for gathering data for the EOQ model. Interviewing 3 financial advisers is the main qualitative approach used in this context to gather data in order to obtain insight into their opinions and experiences with the EOQ Model. Financial advisers can discuss the EOQ model in-depth during interviews and can offer their perspectives and practical experience in doing so [1].

They may be encouraged to share rich narratives about how they have used the EOQ model, any difficulties they have run into, and the financial repercussions of using it for inventory management. After the interviews have been conducted, a narrative analysis can be used to glean insightful qualitative information.

Examining the financial advisers' common experiences, tales, and points of view is part of narrative analysis. It makes it easier to spot recurrent themes, patterns, and original discoveries in their storytelling [2]. In general, narrative analysis and interviews may offer a qualitative perspective into the EOQ model's financial components, illuminating how it affects working capital management, financial performance overall, and financial decision-making in diverse company situations.

### 3. Results and Discussion

#### *Different types of EOQ model*

Inventory management methods like EOQ models are crucial for helping businesses reduce their ordering and holding expenses. Here, are some EOQ models, their equations, related graphs, and theoretical ideas below:

#### **Classical EOQ Model:**

##### **Mathematical Equation:**

$$EDQ = \sqrt{2DS/H}$$

Where:

EOQ= Economic Order Quantity

D = Demand rate

S= ordering cost

H= Holding cost per unit per year

##### **Theoretical Concepts:**

Reduces the overall cost of inventory while taking both purchasing and keeping expenses into account.

Anticipates an identical purchasing cost and consumption rate [3].

Demonstrates a trade-off between placing orders more often (which lowers holding costs) and placing orders in greater amounts (which lowers ordering costs).

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<b>Question 1:</b>	<b>How might the EOQ model improve how you manage your inventory?</b>
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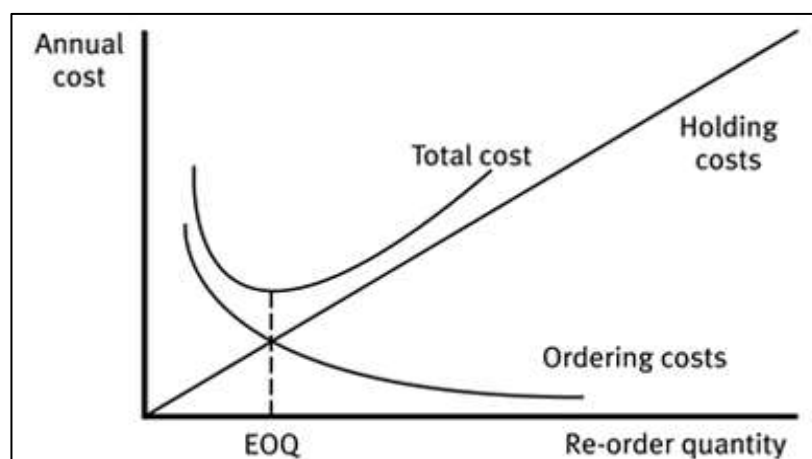
<i>Financial advisors 1:</i>	By identifying the optimal order quantity that reduces the overall costs of ordering and maintaining inventory, the EOQ model may optimize our inventory.
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<i>Financial advisors 2:</i>	I may prevent overstocking and stockouts by using the EOQ model
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<i>Financial advisors 3:</i>	The EOQ allowing I use that money for other investments.
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Based on the interview's 1st questions, Financial Advisor 1 says that the EOQ model may optimise their inventory by determining the appropriate order quantity that lowers the total expenses of ordering and keeping inventory. Financial Advisor 2 says that by utilising the EOQ model, he could stop overstocking and Financial Advisor 3 says that the EOQ model permits him to spend that money for other investments.



**Figure no. 1:** Classical EOQ Model

#### **EOQ Model with Shortage Costs:**

##### **Mathematical Equation:**

$$EOQ = \sqrt{2DS/H + C_s}$$

Where:

EOQ= Economic Order Quantity

D = Demand rate

S= ordering cost

H= Holding cost per unit per year  
Cs= Shortage cost per unit per year

### Theoretical concepts:

Consider the price of shortages, which can happen if the levels of stock are too low [4].

Determines the amount of orders that might be placed in order to reduce the total cost of placing an order, holding, and shortages. According to the 2nd question of the interview, financial advisors stated that the EOQ model is crucial for inventory management, affecting cash flow, working capital, ordering expenses, holding costs and aiding in risk reduction strategies.

Question 2:	What elements must you consider when integrating the EOQ model into your inventory management strategy?
<i>Financial advisors 1:</i>	The EOQ Model influence the flow of our cash and working capital of the economic order quantity.
<i>Financial advisors 2:</i>	Ordering costs, holding costs, yearly demand, lead periods, and any quantity discounts provided by suppliers are important consideration for our company
<i>Financial advisors 3:</i>	The EOQ model is crucial to identify and develop ways to reduce the risks.

### Examples of the EOQ model

A business needs 10,000 units of a product per year. The cost of storing for each unit per year is \$2, while the ordering fee is \$10 for each order. Here is the way the EOQ is determined:

Given:

Annual Demand (D) = 10,000 units

Ordering Cost per Order (S) = \$10

Holding Cost per Unit per Year (H) = \$2

The EOQ formula is:

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

Plugging in the values:

$$EOQ = \sqrt{2 \cdot 10,000 \cdot 10 / 2}$$

Now, calculate the square root:

$$EOQ = \sqrt{100,000} = 316.23$$

The EOQ for this firm is roughly 316 units, rounded to a useful figure. This indicates that 316 units is the approximate number of units to order in order to minimise the overall cost of inventory. In addition to meeting the yearly need of 10,000 units, purchasing this number will assist in balancing the expenses of ordering and holding. To accomplish affordable stock control and lower overall inventory expenses, the organisation should think about placing orders for 316 units.

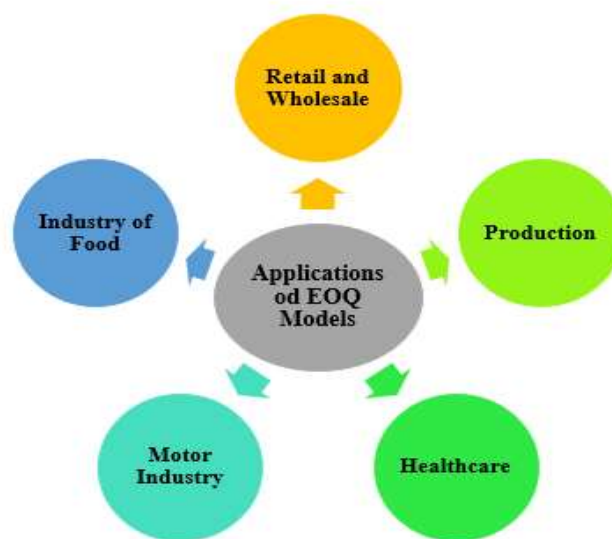
Based on interview question 3, the 3 financial advisors stated that the EOQ model positively impacts cash flow and working capital to better cash flow management.

Question 3:	Does the EOQ model have impact on cash flow and working capital?
<i>Financial advisors 1:</i>	Yes, the EOQ model have impact on cash flow and working capital
<i>Financial advisors 2:</i>	Yes, of course
<i>Financial advisors 3:</i>	Yes, the EOQ model can lead to better cash flow management.

### Applications of the EOQ Models

A flexible inventory management method with several applications in a variety of sectors is the EOQ model. Finding the ideal order amount that balances ordering and holding expenses while minimising overall inventory costs is its main goal.

1. **Retail and Wholesale:** To ensure they maintain sufficient stock levels while minimising holding costs, retailers and wholesalers utilise the EOQ model to establish the appropriate order quantities for their items [5]. It is especially useful for handling quickly moving consumer products.
2. **Production:** The EOQ model is used by manufacturers to optimise the acquisition of components and raw materials, lowering the expenses associated with keeping too much inventory on hand or placing frequent orders. This guarantees an efficient production process.
3. **Healthcare:** To efficiently handle their medical supply inventories, hospitals, clinics, and other healthcare providers employ the EOQ approach [6]. It lowers waste and expenses while assisting them in maintaining key medical supplies and equipment.
4. **Motor Industry:** To ensure a smooth production process and save lead times, auto manufacturers and suppliers use the EOQ model for handling their stock of parts and components.
5. **Industry of Food:** The EOQ model is employed in the industry of food, particularly for perishable items. It assists in controlling stock levels to reduce waste from rotting or expiry and ensure that consumers may purchase fresh goods.



**Figure no 3:** Applications EOQ Models

The continuous demand assumption made by the EOQ model might not hold true in actual circumstances, Suboptimal order amounts may result from variations in demand. The fundamental EOQ model does not consider supplier quantity discounts. It is a supplier that offers discounts for larger purchases, not taking these savings into account might lead to greater expenses. The fundamental EOQ model has the unrealistic assumption that shortages are forbidden, which may not be true for sectors [7]. Stockouts may cause major expenses or unhappy customers. Lead times, which might affect the timing of orders, are not considered in the EOQ model. The EOQ model's implementation has a favourable effect on working capital and cash flow.

#### 4. Conclusions

With its core concepts of optimising order quantities, the EOQ model has a lot to offer companies looking to improve their inventory management techniques. The strategy can result in financial gains and operational savings by reducing the expenses related to ordering and keeping inventory. The EOQ approach does, however, have certain drawbacks. It ignores quantity discounts, assumes steady demand, and does not take lead periods or potential shortages into consideration. Therefore, when it is implemented, a complete knowledge of these constraints must accompany along with it, and as necessary, additional inventory management techniques might be added.

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