Economic Order Quantity – EOQ

Economic Order Amount (EOQ) is the ideal order quantity that a company must purchase to reduce inventory costs such as acquisition costs, shortages, and order costs. This production scheduling model was developed in 1913 by Ford W. Harris and was improved over time. The formula assumes that all costs of demand, ordering and holding cost remain constant.

The EOQ is used as part of a continuous review inventory system in which the level of inventory is monitored at all times and a fixed quantity is ordered each time the inventory level reaches a specific reorder point. The EOQ provides a model for calculating the appropriate reorder point and the optimal reorder quantity to ensure the instantaneous replenishment of inventory with no shortages. It can be a valuable tool for small business owners who need to make decisions about how much inventory to keep on hand, how many items to order each time, and how often to reorder to incur the lowest possible costs.

The EOQ model assumes that demand is constant, and that inventory is depleted at a fixed rate until it reaches zero. At that point, a specific number of items arrive to return the inventory to its beginning level. Since the model assumes instantaneous replenishment, there are no inventory shortages or associated costs. Therefore, the cost of inventory under the EOQ model involves a tradeoff between inventory holding costs (the cost of storage, as well as the cost of tying up capital in inventory rather than investing it or using it for other purposes) and order costs (any fees associated with placing orders, such as delivery charges).

Ordering a large amount at one time will increase a small business's holding costs, while making more frequent orders of fewer items will reduce holding costs but increase order costs. The EOQ model finds the quantity that minimizes the sum of these costs.

Formula and Calculation of Economic Order Quantity (EOQ)

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

where:

- Q = EOQ units
- D = Demand in units (typically on an annual basis)
- S = Order cost (per purchase order)
- H = Holding costs (per unit, per year)

The ordering and holding costs

The two significant factors that are considered while determining the economic order quantity (EOQ) for any business are the ordering costs and the holding costs.

Ordering costs

The ordering costs are the costs that are incurred every time an order for inventory is placed with the supplier. Examples of these costs include telephone charges, delivery charges, invoice verification expenses and payment processing expenses etc. The total ordering cost usually varies according to the frequency of placing orders. Mostly, it is directly proportional to the number of orders placed during the year which means If the number of orders placed during the year increases, the annual ordering cost will also increase and if, on the other hand, the number of orders placed during the year decreases, the annual ordering cost will also decrease.

Holding costs

The holding costs (also known as carrying costs) are the costs that are incurred to hold the inventory in a store or warehouse. Examples of costs associated with holding of inventory include occupancy of storage space, rent, shrinkage, deterioration, obsolescence, insurance and property tax etc. The total holding cost usually depends upon the size of the order placed for inventory. Mostly, the larger the order size, the higher the annual holding cost and vice versa. The total holding cost is some time expressed as a percentage of total investment in inventory.

Example of How to Use EOQ

EOQ takes into account the timing of the re-order, the cost incurred to place the order, and the cost of storing the goods. If the company is constantly placing small orders to maintain a certain stock level, the order costs are higher, and additional storage space is needed.

Suppose, for example, that a clothing retailer holds a streak of men's jeans, and the store sells 1,000 pairs of jeans every year. The company costs $ 5 a year to keep jeans in stock, and the fixed cost for ordering is $ 2.

The EOQ formula is the square root of (2 x 1000 pairs x $ 2 order cost) / (retention cost of $ 5) or 28.3 rounding. The ideal order size to reduce costs and meet customer demand is just over 28 pairs of jeans. The most sophisticated part of the EOQ formula provides a re-order point.

Advantages of EOQ

The EOQ has been used successfully for decades by companies of all kinds, so it definitely has few advantages.

Here are some of them:

1. Helps reduce inventory costs

The primary purpose of EOQ is to help keep inventory carrying costs as low as possible. The more inventories you have, the more you will have to pay for insurance, taxes, security, etc.

Accurately calculating the inventory you need will help you maintain the budget you can afford.

2. It makes restocking easy

The amount of economic demand can help you understand how often you order. You may discover that ordering smaller quantities is often better for your end result or vice versa.

By calculating the amount you need in proportion to the quantity you sell during a certain time period, you can make sure that you always have enough stock to satisfy your customers.

3. Helps you find the best deal

Many sellers advertise deals throughout the year to entice you to buy more of their inventory that usually ends up in increasing inventory cost even if you get a reduced price. The EOQ model only helps you buy what you'll use. It will help you take advantage of the supplier's deal if you discover, after delivering the numbers in EOQ format, that you are not over-buying but getting the right amount at a lower price.

4. Better inventory management

Another benefit of EOQ is that it is key to improving inventory management and when a company is able to manage its inventory in a more effective way than it can reduce significant operating costs which in turn will lead to more profit for the company. In simple words, EOQ indirectly assists the company in earning profits by reducing operational costs associated with inventory management.

5. Reducing ordering costs

In the case of EOQ while merchandise companies request to order merchandise on a specific date it may be every two weeks or monthly which leads to a decrease in order costs because if the company requests 10 times in one month from the company you will have to pay transportation costs, packing costs and other costs 10 times but if the company requests Merchandise is only once a month, you will bear all costs only once, not 10 times.

6. Reduced holding costs

The biggest advantage of EOQ is that it helps the company reduce the cost of possession of inventory because when the company has an EOQ system in place it does not need to have a large warehouse to store the goods as the company requests the goods in limited quantities so that the production of the goods does not stop. In simple words, if the company does not follow this method, then it must purchase a warehouse or take a warehouse for rent in addition to that it will need employees for this warehouse which involves expenses again but because of this system, a company can save all the costs of possession related to the stock.

Disadvantages of Economic Order Quantity

1. An accurate order forecast is not possible

The biggest disadvantage to the amount of economic demand is that it is based on the assumption that the demand for the company's products is precisely predictable and is not possible in real life because the demand for the company's products is never constant but rather continues to change and if the demand for the product produced by the company rises Or it is greatly reduced by the lack of a company EOQ system.

2. Immediate availability of products with suppliers

Another problem with EOQ is that it may be possible that the supplier does not have raw materials and if the company needs immediate raw materials to meet the unexpected demand which can lead to problems as the EOQ system depends on the assumption that the request will be stable which can be accurately forecast. In simple words, if the company has good relationships with multiple suppliers more than it is not a big problem, however, if the company relies on only one or two suppliers for its raw materials then the company may face problems using the EOQ method.

3. Requires constant monitoring

Companies in the case of the economic demand quantity must constantly monitor the levels of re-demand as the level of raw materials immediately reaches the level of re-demand, and the company must request goods from suppliers, and this is the place where the company will need to employ employees in order to monitor inventory levels which is once Others are time consuming and expensive as well.

One can also see from the above that the amount of economic demand has pros and cons and this is the reason that any company thinking in making a decision to implement the system of economic demand quantity must carefully read the points above and then decide whether to implement this system or not.