OPTIMIZATION OF INVENTORY MANAGEMENT
EOQ (Economic Order Quantity)

- ***Objectives***

1. Able to estimate the Economic Order Quantity (EOQ) and to determine when it is appropriate to use.
2. Understand strengths (robust, simple) and weaknesses (strong assumptions) of EOQ model .
3. Able to estimate sensitivity of EOQ to underlying changes in the input data and understanding of its underlying robustness.

- ***Prerequisites:***

1. Stock valuation principles: average cost,
2. Inventory management in quantity and value.

OPTIMIZATION OF INVENTORY MANAGEMENT

Given the down payment required to acquire them, inventories constitute often one of

the most expensive items on a balance sheet for a company. Therefore, the inventory has a significant impact on working capital. Know how to keep enough stocks to meet demand, while ensuring that they do not hold too much to avoid a The effect on cash flows requires a delicate balance to be created.

A company must balance the needs of its customers with its own objectives as part of an integrated inventory management model that ensures the right inventory at the right place, at the right time. It's about putting in place a disciplined process through which

The level of investment made in stocks is considered to be the ideal level or the best customer service we can offer.

Cost of inventory

1. Capital locked in a dinar stored during a TERM = a dinar that could have been used to generate profit: return on investment
2. Storage and handling

- Rents,
- Wages,
- Insurance

3. Impairment Loss of value of what is stored:
   - Perishable products,

- Stale,
- Products those are retro...

4. Cost in general proportional to the quantity stored and the duration: h = I.c, with interest rate.

5. Other costs to consider in inventory management:

- Penalties related to stock-outs:
- Dissatisfied customers, lost sales, late payments...
- Order, launch costs: Fixed K and variable part c

Wilson's method or EOQ system, what is it and when did it appears?

This model was popularized in 1934 with the publication of an article by R.H. Wilson, who gave its name to the model, but it was first developed by engineer Ford Whitman Harris when he worked at the company Westinghouse Corporation.

Ford Whitman Harris
R. H. Wilson

The method was born with a clear objective: to systematize the goods that are kept in the warehouse periodically, in order to define the date on which orders will be placed to suppliers for re-supply and in what quantity.
Although this system is commonly used to systematize raw material purchases, it is also applicable to the optimization of purchases of any product needed by the company provided that one can determine the purchase costs in terms of order and storage
The method is simple and based on a formula that allows to determine when and in what quantities to place orders of the company, taking into account the demand and the minimum safety stock of the company.

Basic assumptions of the EOQ model

In order to develop the EOQ method, the following basic conditions or assumptions

must be met in the firm; otherwise the calculations cannot be carried out precisely:

a. The assumption is that the firm's demand is known, independent and not subject to major fluctuations throughout the year, so constant.

b. The unit cost of each product, of each purchase, must also meet these conditions and it must be known and fixed throughout the year. This is not valid for seasonal products.

c. Storage costs are also known and depend on the level of stocks.

d. Any discounts or discounts for purchase volume or order are not taken into account.

e. The supplier's supply and discharge times are also considered constant and known.

f. It is assumed that there are no stock shortages and that the supplier can be asked for the quantity of product at any time.

https://www.geeksforgeeks.org/economic-order-quantity-eoq-meaning-working-calculation-importance-

Geeky Takeaways:

Points à retenir :

- *EOQ helps in finding the balance between holding costs and ordering costs.*
- *The model takes into account factors such as carrying costs per unit, demand rate, and ordering costs.*
- *Implementing EOQ principles can lead to improved efficiency, cost savings, and better customer service by ensuring that businesses maintain optimal inventory levels.*

Formula for Calculating Economic Order Quantity

Here,

- D is the demand for the product (in units) over a given period.
- S is the ordering cost per order.
- H is the holding cost per unit per year.

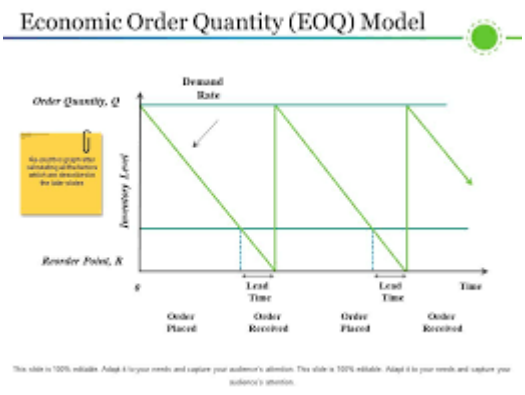
$$EOQ = \sqrt{\frac{2 * F * D}{I * C}} = \sqrt{\frac{2 * F * D}{H}}$$

$$EOQ = \sqrt{\frac{2 * \text{Fixed Cost to Purchase} * \text{Demand Per Time}}{\text{Inventory Carrying Cost Per Unit Per Time}}}$$

Usually the 'Unit of Time' is ANNUALLY, therefore

$$EOQ = \sqrt{\frac{2 * \text{Fixed Cost to Purchase} * \text{Annual Demand}}{\text{Annual Inventory Carrying Cost Per Unit}}}$$

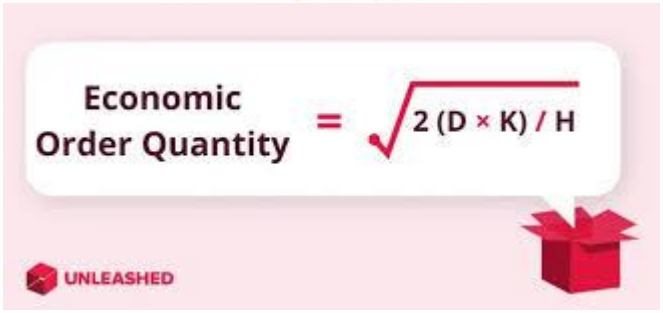
six-sigma-material.com

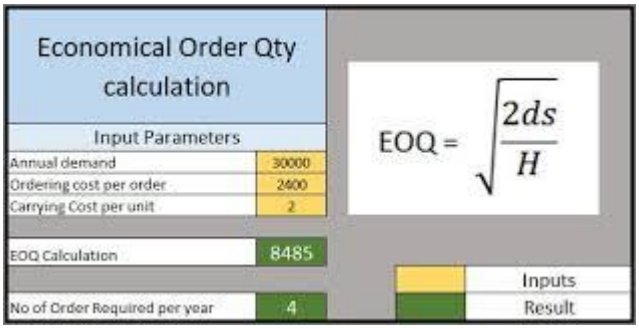


Economic Order Quantity

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

D = Annual demand (units)
S = Cost per order ($)
C = Cost per unit ($)
I = Holding cost (%)
H = Holding cost ($) = I x C



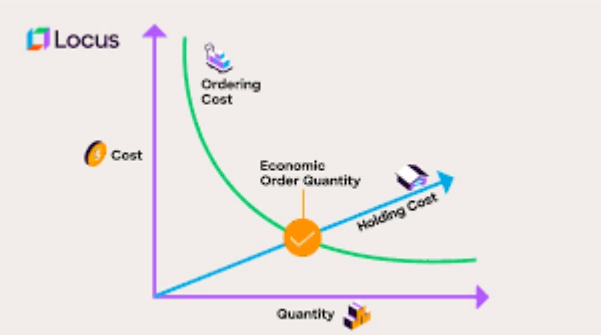


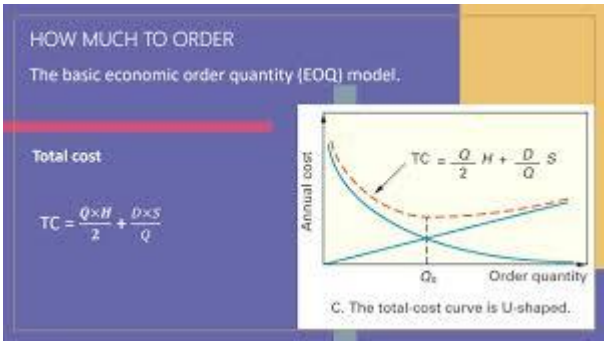
$$EOQ = \sqrt{\frac{2 * D * S}{H}}$$

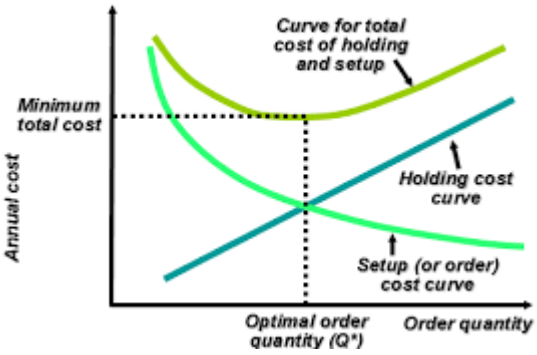
Where:
EOQ = Economic Order Quantity
D = Annual demand quantity (number of units)
S = Ordering cost per order
H = Holding cost per unit per year

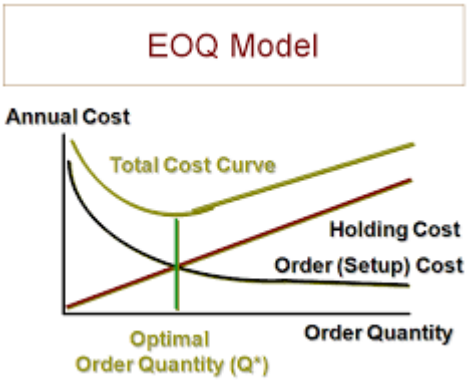
The Wilson EOQ Formula

$$\text{Economic Order Quantity:} \frac{\sqrt{(2 \times \text{Yearly Consumption}) \times (\text{Cost to Purchase})}}{[(\text{Price}) \times (\text{Inventory Holding Cost \%})]}$$









Application

file:///C:/Users/windows/Desktop/hp/control%20de%20gestion%20hp/ING/batchesEx.pdf

[Spring Water] The demand for spring water at the Plano WalMart is 600 litres per week. The setup cost for placing an order to replenish inventory is $25. The order is delivered by the supplier which charges WalMart $0.10/liter for the cost of transportation from the Ozark mountains to Plano. This transportation cost increases the cost of water to $1.25/liter. The water loses its freshness while stored at the Plano WalMart. To account for this, the WalMart charges an annual holding cost of $2.6/liter. Determine how often the WalMart should order for water and what size each order should be.

Solutions

From the question, we deduce that D= 25, h = 2.6/52 = 0.05 per week, S = 600 per week. Note that the transportation cost and the the cost of water are irrelevant for our analysis. Then the optimal order quantity is :

The Wilson EOQ Formula

Economic Order Quantity: $\frac{\sqrt{(2 \text{ x Yearly Consumption}) \text{ X (Cost to Purchase)}}}{[(\text{Price}) \text{ X (Inventory Holding Cost \%)}]}$

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

Where:
EOQ = Economic Order Quantity
D = Annual demand quantity (number of units)
S = Ordering cost per order
H = Holding cost per unit per year

$$Q = \sqrt{\frac{2*25*600}{0.05}} = 774.6 \; Liters$$

The WalMart places an order of size 774.6 liters in each order cycle. Length of such a cycle is

$$\frac{Q}{S} = \frac{774.6}{600} = 1.29 \; WEEKS \cong 9 \; days$$

Every 9 days, the WalMart should order for 774.6 liters of spring water.