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Analyzing the Impact of Economic Order Quality Model on Inventory Management

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Abstract – In today's global market, companies are looking for growth and opportunities to reduce their total cost and management of companies would like to increase quality, efficiency and capability without increasing their investment. The success of many businesses is related to their ability to provide goods and services at right time and in right place. Different organization adopts different inventory control methods to manage their inventory to avoid stock-out and overstock. In this paper a case study of a company in Haryana is considered. For this study the EOQ (Economic Order Quantity) technique of inventory management is considered. In this company inventory management is not proper which causes overstock and sometimes stock-out. In this paper inventory management technique is considered and costs are calculated to compare two methods, one is used by this company and other is recommended model.

Keywords: Inventory, EOQ, Ordering Cost, Holding Cost.

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1. INTRODUCTION

Inventory management is a standout amongst the most significant factors in association and the extent of inventories to add up to asset by and large changes between 15 to 25%. Inventory management framework has essentially two concerns, one is dimension of customer administration for example to have right goods, in opportune spot and at correct time and other is cost of ordering and carrying inventories. Inventory management isn't legitimate in this company which is arranged in Vasai. In this paper it is named as company XYZ in light of the fact that the personality of this company is secured. The management of this company is confronting numerous issues when overstock or stock out happens in the warehouse. So to conquer these issues different techniques can be utilized like JIT (Just in Time), Value stream mapping, EOQ and ROP and so forth. In this paper an EOQ strategy is chosen for research work.

2. ECONOMIC ORDER QUANTITY (EOQ) FORMULA

Individuals in manufacturing industry businesses don't have the foggiest idea or don't comprehend what EOQ means and how to utilize this procedure? In this article, "The EOQ Inventory Formula" composed by James A. Cargal clears up the crucial hypothesis of the Economic Order Quantity. Cargal distributed this article from Troy State University Montgomery. The article is straight forward and straightforward. Cargal works superbly clarifying every factor and how it's utilized in like manner. The recipe is composed as represented in condition and depicted as the accompanying,

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

Q = the EOQ order quantity. This is the variable we need to optimize. All the other variables are fixed quantities.

D = the annual demand of product in quantity per unit time. This can likewise be known as a rate.

S = the product order cost. This is the level expense charged for making any order and is independent of Q.

C = unit cost.

H = holding cost per unit as a fraction of item cost.

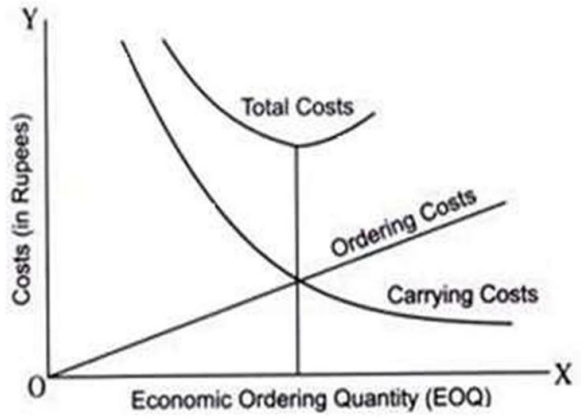


Fig. 1: Economic Order Quantity Graph

2.1 Economic Order Quantity Assumption

A. EOQ model assumes that demand is known and is constant over time.

B. No shortages are allowed.

C. Lead time for the receipt of orders is constant.

D. The order quantity is received all at once.

E. The purchase price of item is constant.

3. LITERATURE REVIEW

Bill Roach 2005, clears up how the beginning of the Economic Order Quantity started in his article, "Root of the Economic Order Quantity Formula; translation or change?" dispersed in 2005. Bug clears up that the Economic Order Quantity (EOQ) has been an exceptional equation that finds the ideal economic order amount. He in like way decides how Ford W. Harris feeling of obligation with respect to the EOQ equation was essential. Harris was continually a self-arranged person that singular got formal coaching that associated all through helper school. He comprehends how to make and pass on the economic order amount equation in 1915 as an understudy.

Nanaware et al, 2017 in this paper, it is talked about that inventory management should be possible adequately by utilizing ABC examination and EOQ. The usage of ABC examination gives the circulation of A, B, C type materials. This dispersion of materials gives the economic significance of materials. EOQ gives the aftereffects of right amount of orders at opportune time. It stays away from the deferrals in material supply and furthermore maintains a strategic distance from wastage of materials. Inventory control framework limits the wastage of materials which at last spares the expense of a task.

Shim, Siegel 2008, as compelling stock organization points of confinement stock, cuts down expense and improves productivity, executives should assess the adequacy of stock dimensions, which depend upon various components, including sales, liquidity, open inventory financing, production, supplier unwavering quality, delay in getting new demands, and normality. A development in stock cuts down the probability of lost arrangements from stock outs and the production log jam brought about by inadequate stock. Stock dimensions are furthermore affected by transient loan fees. As there is addition in transient loan fees, the perfect dimension of holding stock is diminished.

Kisaka, 2006, investigated the job of Economic Order Quantity model in decreasing the expense of raw material inventory at a dairy homestead venture. He thought about all out expense of raw material inventory brought about through the undertaking utilized technique with the complete expense of raw material inventory which could have been caused under the EOQ application. Kisaka found that there was cost sparing which could have been seen through utilizing the EOQ model.

Wisner et al., 2014, Inventory organization incorporates change between customer administration, or thing openness, and cost of stock. There are different factors that impact inventory basic leadership. In this paper, only two will be seen as: the cost factor and the vulnerability factor, which fuses request vulnerability and time vulnerability.

Dr. Rakesh Kumar, 2016, in this paper it is talked about that, the Economic Order Quantity is extremely helpful instrument for inventory control. It might be connected to complete goods inventories, work-in-advance inventories and raw material inventories. It control purchase and capacity of inventory so as to keep up an even progression of production in the meantime staying away from excessive interest in inventories.

Chambers, Lacey 2011, this paper says that inventory management includes an exchange off between the expenses related with keeping inventory versus the advantages of holding inventory. The advantage of an inventory is to guarantee that goods will be accessible as required. The essential expenses of an inventory are the open door cost of the capital used to back the inventory, ordering expenses, and capacity costs. Inventory management tries to boost the net advantage, the advantages short expenses of the inventory.

4. OBJECTIVE OF THE STUDY

The main Objective of Inventory Control Are

- To develop an effective inventory management system.
- To maintain optimum level of inventory.
- To minimize carrying cost and time.
- To find optimal reorder level to make decision when to order.
- To compare existing inventory with expected inventory for proposed model.

5. CASE STUDY

This contextual analysis is done in company called as XYZ. This company was built up in the year 2008, the company production and supplies various kinds of blowers. The Company has provided their products to numerous customers in India. The Company has office in Nallasopara (E.), Maharashtra for marketing reason. Raw material required for manufacturing blowers are H.R. Sheet, Motors of various H.P., C-channel, L-edge, nut-screw and paint. The Main issue of this industry is inventory control for ordering raw material and supply of blowers to customers. To oversee inventory of raw materials a contextual investigation is done and EOQ technique for inventory management has been received. To do the contextual investigation on inventory management company XYZ was drawn closer.

- **The Problem**

Current forecasting strategy utilized by this firm has brought some issue because of off base forecasting. Forecasting strategy utilized is the basic normal dependent on the normal verifiable interest, yet this has prompted off base expectation.

The reason for this study is to prescribe choices approaches to assist the company with reducing the stock and cost by utilizing progressively compelling expectation EOQ and ROP. For this reason, investigation of a product of the company is done, utilizing information of the most recent one year. At long last expense is evaluated to see the significance and the thing that matters is contrasted and the current and proposed model.

- **Determination of EOQ**

To figure EOQ, the yearly interest of the firm, cost of ordering and holding cost is required. In this paper EOQ of H.R. sheet is talked about in light of the fact that in this industry inventory management of this product is troublesome. In this paper absolute expense of ordering, holding cost is additionally determined

- **Annual Demand**

Annual demand for lug is calculated based on average monthly turnover in this firm.

The demand for H.R. Sheet is 3000 kg per month

D = 3000 kg per month x 12

= 36000 kg per year Unit Cost:

Cost of one unit is Rs.60 per kg.

Therefore, *C* = Rs.60/kg Ordering Cost:

According to Company's current forecasting model, company makes order one time in a month and the total charge is Rs.200000/-According to company's data cost of ordering is 10% of Rs.200000/-

So, ordering cost per order = Rs.20000/-

Therefore, cost of H.R. Sheet = Rs.200000 – Rs.20000 = Rs180000/-

Therefore no. of kg of H.R

$$\text{Sheet purchased} = \frac{cost\ of\ \text{H.R.Sheet}}{unit\ cost\ of\ \text{H.R.Sheet}} = \frac{180000}{60} = 3000\ \text{kg}$$

Company makes 1 order in a month, so number of orders = 12 orders in a year.

$$\text{Ordering cost per kg} = \frac{20000*12}{3000} = \text{Rs80 per kg}$$

After calculating costs we can estimate EOQ:

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

$$EOQ = \sqrt{\frac{2*36000*80}{0.03*60}}$$

Therefore, the EOQ for H.R. sheet is approximately 1789 kg. Since the firm currently orders 3000 kg, it should decrease the amount of orders to 1789 kg in order to minimize cost.

Total Cost calculation:

For EOQ = 1789 kg

$$\text{Holding cost} = \frac{Q}{2} \times H$$
$$= \frac{1789}{2} \times 1.8$$
$$= \text{Rs.}1610.1$$

$$\text{Ordering cost} = \text{No. of order} * \text{cost of order per kg}$$
$$= \frac{36000}{1789} \times 80$$
$$= \text{Rs.}1609.84$$

$$\text{Total cost} = \text{Holding cost} + \text{Ordering cost}$$
$$= 1610.1 + 1609.84$$
$$= \text{Rs.}3219.94$$

From Company's data (Q = 3000 kg)

$$\text{Holding cost} = \frac{Q}{2} \times H$$
$$= \frac{3000}{2} \times 1.8$$
$$= \text{Rs.}2700$$

$$\text{Ordering cost} = \text{No. of order} * \text{cost of order per kg}$$
$$= \frac{36000}{3000} \times 80$$
$$= \text{Rs.}960$$

Total cost = Holding cost + Ordering cost

= 2700 + 960

= Rs.3660

The difference between total cost for Q = 3000 kg and for EOQ = 1789 kg

= (3660 – 3219.94) = Rs.440.06 which is greater than EOQ quantity.

The result is summarized as

Table: 1.1 Summarization of result

Term	EOQ Technique	Company's current technique
Annual Demand (kg)	38000	38000
Order Quantity (kg)	1989	3200
No. of Order	23	14
Holding Cost (Rs.)	1810.10	2900
Ordering Cost (Rs.)	1809.84	1160
Total Cost (Rs.)	3419.94	3860

So optimal order quantity Q= 1789 kg is appropriate, which minimizes total cost for holding inventory.

- **Reorder Point**

(How much to Order)

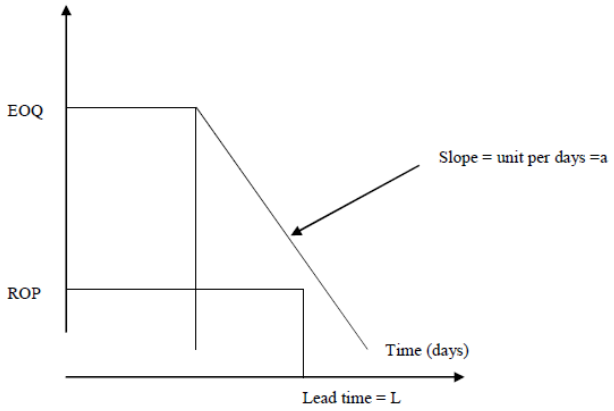
The simple EOQ model assumes that receipt of an order is instantaneous i.e. it is assumed:

1) A firm will place an order when the inventory level for that particular product reaches to zero.

2) It will receive the ordered product immediately.

The time between placing an order and reception of an order called lead time can be as sort as a few hours or as long as months. The reorder point is given as,

ROP = (Demand per day) * (Lead time for a new order in days) = D * L This equation for ROP assumes that demand during lead time and lead time itself is constant. The Demand per day is found by dividing the annual demand D by the number of working days in a year.



Since most significant interval is 10 days then the firm should make order when stock level is at 986.30 kg.

6. RESULT AND CONCLUSION

The EOQ strategy of inventory management results in decrease in holding and ordering cost. Along these lines this diminishes the absolute expense of the company. In this exploration paper all out expense of inventory is decreased by around 10%.

From the above study it is discovered that in the greater part of the cases industry does not pursue the advanced inventory management framework. Here materials are ordered through understanding or when inventory levels become low. They keep one month stock of the raw materials and after that spot order for the following parcel. Therefore the company faces the issue of overstocking or understocking.

Along these lines, the company needs an honorable inventory framework to limit operational expenses. In the event that the Economic Order Quantity model is utilized with appropriate

judgment by the management at that point holding expenses and cost of ordering can be diminished to a more noteworthy greatness. By utilizing this model the company can think about the careful measure of materials to order and when to put in new requests for every material. From reorder point figuring it very well may be resolved when next order is to be set.

Since there is no formal inventory control framework utilized by this company to oversee inventories for its raw materials, a few angles should be improved so as to limit the raw materials inventory costs. Coming up next are suggested:

A. Company ought to improve their methods for keeping records about buying. In the event that conceivable, the company ought to mechanize these systems.

B. Lack of care on the quantitative techniques of inventory organization demonstrates that vendors and supplies staff are lacking in organization of business capacities, along these lines these staff should be given a work getting ready about stores and supplies organization to improve their understanding and ability in the field.

C. It is similarly suggested that infrequent review where inventory are studied in a typical between time may be the reasonable methodology for the association to comprehend the 'when to order' issue.

7. LIMITATION OF THE STUDY

Because of confinement according to company arrangement required information gathering is unimaginable. Additionally it was so hard to gather information from all accessible division. Economic order amount figuring depends on some supposition. Here demand is thought to be consistent over the period. In any case, by and by demand is variable amid the period.

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