APPLICATION OF OPERATION RESEARCH IN REAL LIFE CONCEPTS

[1]A.Sasikala, [2]Dr.M.Kavitha,

[1]Research Scholar, Department of Mathematics, St. Peter's Institute of Higher Education and Research, Avadi, Ch-54

[2]Associate Professor, Department of Mathematics, St. Peter's Institute of Higher Education and Research, Avadi, Ch-54.

ABSTRACT : This project is primarily concerned with the application of inventory control and management in the real life situation. Most of the industries and firms which are manufacturing or purchasing goods face the great challenge in managing inventories. The poor inventory management results in under or over stocking as well as high inventory cost. This paper investigates mainly the application of inventory model in determining stock control in an organization. In this investigation, at various time intervals, the combination of orders were taken because the EOQ may change according to that. This model helps the company to know when to place the new orders for each raw material and exact amount of raw materials that is in the company.

INTRODUCTION

Operational research is the study of optimizing techniques. It is mainly applied in Decision Theory. Inventory management and Inventory control are important topics in OR. This also plays an important role in control of material and goods which has been used later in the case of production or later exchange in the case of service activities.

OBJECTIVES OF THE STUDY

- To develop the inventory control management
- To find the optimal reorder quantity which helps to decide when the items should be reordered
- To compare the existing inventory with expected inventory for the proposed model
- To maintain the sufficient stocks of raw materials during the period of shot supply and price change anticipation
- To minimize the carrying cost and time

DEFINITIONS

INVENTORY CONTROL

Inventory control is defined as the method of controlling all stocks of goods which are properly and promptly issued, accounted and preserved in the suitable and best interest of an entity that handles its inventory.

ECONOMIC ORDER QUANTITY

It is defined as the formula for production which is used to determine the most efficient amount of goods that should be purchased based on ordering and carrying costs. This helps to minimize the inventory costs and makes the effective ordering and holding inventory.

PURCHASING COST

Purchasing cost is based on the price per unit of the item. It may be constant or it may be offered at a discount that depends on the size of the order.

SETUP COST

Setup cost is the fixed charge which involved when an order is placed. This cost is independent of the size of the order.

HOLDING COST

Holding cost represents the maintaining the cost of inventory in stock. It includes the interest on capital as well as the cost of storage, maintenance and handling.

SHORTAGE COST

Shortage cost is the penalty incurred when we run out of stock. It includes potential loss of income as well as the more subjective cost of loss in customer's goodwill.

INVENTORY POSITION AT TEXTILE INDUSTRY

Kavery Textiles is the largest textile industry in the Manali area. In this industry, raw materials are ordered through experience or when inventory levels become low in the warehouse. Sometimes, the raw materials are ordered as the result of visual check by the workers working in that industry.

This shows that there is no proper way that the company employs to manage its inventory. Due to this improper way, over stocking and under stocking has happened. That is the unnecessary inventory accumulates that is kept in the warehouse at high cost or not enough materials in stock, causes delay in production. Hence to formalized and standardized inventory control system should be established to solve these problems and way of solving these problems is to determine the EOQ which minimize the total cost of inventory.

FORMULAE

No .of. Orders $= \frac{D}{Q}$

Annual ordering cost $= [\ \frac{D}{Q}\ ] \times S$

Holding cost $= IC$

Annual holding cost $= [\frac{Q}{2}] \times H$

Annual Total cost (TC) $= \{\ [\frac{D}{Q}]\ \times S\ \} + \{\ [\frac{Q}{2}]\ \times H\ \}$

Hence, $EOQ = \frac{dTC}{dQ} = \sqrt{\frac{2SD}{H}}$

COMPONENTS	EXPANSIONS
D	Annual quantity demanded
Q	Volume per order
S	Ordering cost (Fixed cost)
C	Unit cost (Variable cost)
H	Holding cost (Variable cost)
I	Carrying cost (Interest Rate)

PRACTICAL APPLICATION

The Kavery textile Industry, faces an annual demand of 24000 units. Hence its monthly demand is 2000 units. It costs the industry Rs.100 for every order placed and Rs.25 per unit of the product. It has a carrying cost of 10% of a unit cost. In this situation, we have to determine the Annual demand, ordering quantity, number of orders, holding cost, ordering cost with respect to the EOQ value and the company's current technique of ordering raw materials for the firm. Based on this result, the difference between the total cost is determined. The value that is obtained by this difference suggests that which helps to reduce the holding inventory. Then the optimal order quantity is obtained. This results helps the company to take the right decisions at the right time which incurred the stability of the firm or an industry.

Variable	Value
D	24000
Q	Q
S	Rs.100
C	Rs.25
H	Rs.2.5
I	10%

$$EOQ = \sqrt{\frac{2 \times 100 \times 24000}{2.5}}$$

Therefore,   **EOQ = 1385.64 units**

The EOQ of the material required is approximately 1386 units. But the industry currently orders the material of amount 2000 units per month. Hence it should decrease the ordering amount to 1386 units instead of 2000 units.

TERMS	RESULTS BASED ON EOQ	RESULTS BASED ON COMPANY'S CURRENT TECHNIQUE
ANNUAL DEMAND	24000	24000
ORDERING QUANTITY IN UNITS	1386	2000
NUMBER OF ORDERS	17	12
HOLDING COST	1732	2500
ORDERING COST	1732	1200
TOTAL COST	3464	3700

The difference between the total cost of EOQ and Company's current technique is 3700 – 3464 = Rs.236/-

Hence the optimal order quantity is Q = 1386 (approximately) which minimizes the holding inventory cost.

CONCLUSION

It is concluded that, to minimize the operational cost, the Kavery Textile Industry should use the formalized inventory management and control system. By applying this EOQ model for this Textile Industry along with the decision of the management, the holding cost and the ordering cost can be minimized effectively. By this EOQ model, the Industry can estimate that how much raw materials of exact amount to be ordered and when to place new orders for each raw material.

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