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EOQ as a Profit Maximised & Customer Satisfied Tool for Agro Industry Inventory Management

Anasuya Swain[1], Debasmita Samal [2], Abdul Kalam[3]
[1, 2]*Asst. Professor, COEB, Patia, Bhubaneswar -751024*
[3]*Professor, MIT, BBSR*

Abstract: Inventories are the ready products/ services for sale. Inventory management of agro-based industry is a challenging tax because due to its perishable nature.EOQ model has its importance & role for proper management of this category of Inventory. This paper analyses possible parameters of existing literature, concentration, description of characteristics and of EOQ inventory control model that have been developed and can solve the Problem in this field & will provide the customer satisfaction with profit maximization.
Keywords: Agricultural products, Inventory management, EOQ, Operation Management, Ordering cost

I. INTRODUCTION

India as an agriculture base economy has its requirement for agriculture growth through the establishment & development of agro-based industry which can be held & possible through successful business of agricultural products where as success of any business is related to their ability to provide the satisfaction towards the customers and maximum selling of its product, has the required goods and services in the right place & time or proper/effective inventory management.

An effective inventory management should maintain sufficient finished goods inventory for smooth sales operation, efficient customer services, minimization of the carrying cost and time, control investment in inventories, keep it at an optimum level, permits a better utilization for available stocks by facilitating interdepartmental transfers with a company.

Effective inventory management for manufactured products is with the application of various models where as Agriculture products with its inventory is big issue today need more attention because, it is difficult task to manage the agriculture products and its inventory due to their unique features such as the perishable nature, limited and unpredictable supply, prices and decision of how much to sell. This is the real case in the Odisha market , whereas the problem arises in the

Tomato and potato inventory management with its reflection in the form of sometimes the scarcity of these products with its rising price & falling price with its maximum supply to the market results a major challenge today, i.e. the farmer's suicide & de-motivation towards farming creates the inspiration among the authors to implement a proposed model for storable agricultural product with random supply and fixed price.

In this case characterization of the optimal inventory (selling) policies has to be developed for variety of cost functions , Here the author has taken the linear cost which may be functioned & if will be relevant in practice, can derive closed form expressions for the optimal policies and the optimal discount profits with the help of EOQ model as a tool for its implementation and effective inventory management .

Here the available data is taken for the analysis with the development of calculated cost, estimates to compare business and the recommended EOQ model to the business to implement & increase stocks and reduce reorder. Regardless of all other theory , Applying this ,EOQ theory to practice, it is possible to make selling decisions judiciously & can significantly make outer form of the prevailing practice of selling.EOQ is an inventory model which is for the fixed order size inventory and is a formula for determining the optimal order size that minimizes the sum of carrying costs and ordering cost which has the requirement of the demand forecasting of the particular region or by taking the usage of a particular product and its past data available where as the demand derived under a set of restrictive assumptions has to be held as follows:

A. Demand is known with certainty and is constant over time.
B. No shortage are allowed
C. Lead time of orders is constants
D. The order quantity is reconceived all at once

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II. LITERATURE REVIEW

Organization's inventory is an important component and its management is vital to the success and cost reduction of the firm's expenditure. In this field of effective inventory management, a number of scholars have done the research and with their suggestions & findings.

L. Bournee & D.H.T walker(1977) Company performance depend upon many variables, either depends on sales marketing good human resource or the less production cost.

Wee H M. (1999)," Domestic and international research shows that the agricultural products are perishable products, and their inventory model is based on the study of perishable products. And the core elements in the perishable products are: 1) demand, 2) freshness, 3) loss rate"

J. W Toomy(2000), "The role of inventory management is to maintain a desired stock level for every specific product items, where the systems that plan and control inventory must be based in the product, customer and the process of product that available in the inventory.

Prasad & TATA (2000) Batching of inventory helps NGOS to save on their transport cost which will eventually save on their total supply chain with total cost.

Wild(2002) recommends , proper warehousing of inventory so that when goods are ordered , they are held at the warehouse or the least item possible minimizing holding cost of inventory. .

Kavalya (2004) Total cost model needs to be balanced by ensuring purchase costs, ordering cost and holding costs are minimized so that the firm can reap good profits and maintains its budgetary allocation for nongovernmental organization .

Beamon and Kotleba (2006) explain that reorder level (ROL) is critical for human terrain organizations to achieve optimal efficiency and to be effective. They need to have two reorder levels one that is normal where as a second one that is for emergency cases in case of disaster. This improves performance and customer satisfaction.

Lai & Chang (2009) it was found out that keeping moderate inventory is good and it enables an organization operate minimal expenses of holding and setup costs; eliminate unwanted lead time produce goods as per customer order. This enables and organization achieve total quality control as efficient and effective supply chain management are implemented in a firm's value chain.

T. Lwiki & P. B Ojera (2013), Inventory management is a crucial part of a firm because mismanagement of inventory threatens a firm's viability such as too much inventory consumes physical space, creates financial burden and increases the possibilities of damage, spoilage, and loss.

III. OBJECTIVE OF THE STUDY

A. To find out the economic order Quantity for the various agricultural product's demand forecasting of various regions.

B. To find out ideas to manage the inventory level of the organization.

IV. METHODOLOGY

Here the data, model and theory are collected, discussed and interpreted for its implementation and the solution towards the issue in the field of agriculture product & its inventory management with the help of EOQ.

V. DISCUSSION AND INTERPRETATION

Here, the author is with the assumption that, EOQ model development as the strategy, by which the retailer must pay for the items as soon as he receives the items from the supplier / farmer. This EOQ model has to satisfy the farmer\supplier and customer by which the retailer can do the effective business and make profit maximization. But the retailer in this situation are with the challenge with the supply of the perishable products like potato and Tomato, because the farmers are not efficient and effective in their judgement for the production of these products according to the demand of the market and sometimes make a huge production and sometimes very less or it may be zero, determines the fluctuated price, huge loss and de-motivated farmer, needs an effective management is a formidable task for the retailers to estimate the demand of the market for one category of product of a particular horizon by taking the past data availability with the inventory size fixation, accordingly in a significant rate to avoid the loss due to the deterioration of these perishable product. Customer satisfaction is also important factor in business, need a fixed price all over the year will lead to the constant demand for the product throughout the year .To develop a solution towards this problem, the authors has taken the help of Ghare & sehradar, who had developed an EOQ model for items with a variable rate of deterioration, is

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developed by the demand rate and inventory cost namely holding cost, ordering cost with flexible purchase cost & constant selling price.

Here, the authors has developed an EOQ based inventory model for deteriorating items to determine the optimal ordering policies of a retailer where the demand rate, holding cost, ordering cost, purchasing cost and selling cost and selling price, has to be determined and fixed . Though the demand is the function of selling price, quality, supply, availability and time can be determined with the assumption that, it will be remaining as constant. The selling price has to be determined which has to be remain as constant throughout the year to keep the customer demand constant and provides the satisfaction to them. Acknowledgement of the demand for the product and life time of the product like Potato and Tomato will help the retailer to estimate the economic order quantity for the purchase and storage and supply for the sell. As a result, all the produced product will not come to the direct market will not come and also will not hamper the market price of the product, According to the demand for the year, Products has to be stored in the cold store and according to the requirement the retailer will take from the cold store which will decrease the fearing of deterioration and wastage of the product, after all surplus calculation can be held which will be exported towards the other state/ country. The ideas can be calculated through the help of James A. Cargal's EOQ formula, which may be a demo for the implementation and accessibility of its use. EOQ formula is-

EOQ= $\sqrt{2.A.Cp/C.Ch}$

Q= The EOQ order quantity .this is the variable we want to optimize. All the other variables are fixed quantities.

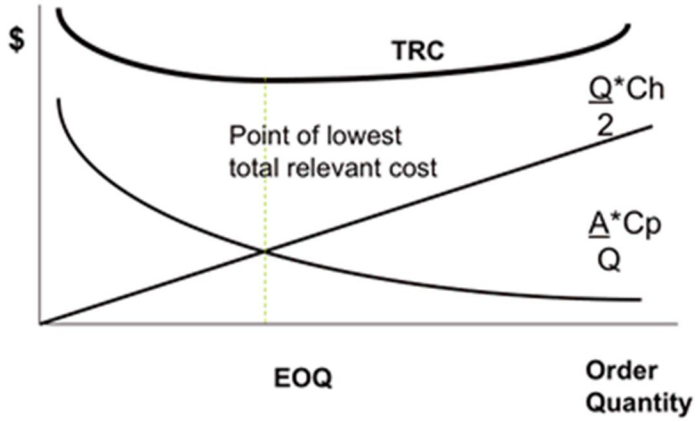
A = the annual demand of product in quantity /unit time.

This can also know a rate –

Cp = the product order cost. This is the flat fee charged for making any order is independent of Q.

C= Unit cost

Ch = Holding cost/ Unit as fraction of product cost



A = Demand for the year

Cp = Cost to place a single order

Ch = Cost to hold one unit inventory for a year

A. Assumptions of the EOQ

EOQ model assumes that demand is constant and that poor inventory at a fixed rate until it reaches zero.

1) The firm knows with certainty how much items of particular inventories will be used /demanded for within a specific period of time.

2) The use of inventories / sales made by the firm remains constant/ unchanged throughout the period.

3) The moment inventories reach to the zero level, the order of the replenishment of inventory is placed without delay.

B. Calculation of EOQ

It determines the optimal amount of those cost that affected both by the amount of inventories held and the number of orders made. Ordering in bulk at the same time will increase the costs of maintaining a small business, because that will increase the number of stocks in the warehouse , while ordering costs will be lowered . Increasing the number of orders reduces holding costs but increases

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the costs of ordering .EOQ model minimizes the amount of these costs, which found a formula that shows the connections between the costs of maintaining and ordering and annual demand for the material . Here the authors have taken the ABC retail shops data. Significant costs affecting the determination of the optimal inventory levels are holding costs and ordering costs. Significant holding costs are only those that differ with respect to inventory levels. This includes the opportunity cost of the holding funds, Invested in stocks, which is reflected by the cost of wanted return from investing in stocks compared with any other investment alternative. For the firm the required return is 25%. In other holding costs, it is included storage and security and electricity and the cost of electricity goes to 12000 for 12 months.

In ordering costs there are included costs for transportation which relate to the number of units ordered. Society makes a supply once in every week and the charge is 10000.

C. Determination of EOQ

Economic order Quantity (EOQ) can be determined by reflecting the total costs for different amounts of orders through the formula. For the EOQ'S determination, we need the annual demand data, the cost of ordering and cost of holding. In this paper for experiment we supposed to calculate EOQ for the potato which is sold.

The ABC retail shop calculates demand for potato based on average monthly turnover. It works 365 days a year. So the annual demand for the potato is –

D= 100 quintals/one month ×12 = 1200 quintals The purchase price for one unit is Rs 800/ packet of potato

Ordering cost It includes the cost of transport cost, it orders once in a week a truck of potato packet charge Rs10, 000. According to the retail shop truck carriages 100 bags of potato cost Rs 10,000, means each bag ordering cost is Rs 100

Ordering cost= transportation cost

Transportation cost = $\frac{10000\times.12\times12}{100}$ =18

EOQ= $\sqrt{\frac{2\times1200\times18}{800}}$ =7.07 quintals

So the economic order for the potatoes is approximately 7.07 quintals per order to minimize the cost.

VI. CONCLUSION

Economic order quantity (EOQ) inventory model is effective in inventory management by the reduction of ordering, carrying and total cost, is considered as promotional effort for customer satisfaction and developmental pricing strategy for maximization of the profit for both the retailer and farmer. Here demand is estimated by taking the previous data available and price fixation for a particular product throughout the year, will help the farmer to produce the product according to the demand of the market and also help the retailer sell the product according to their estimation though production is constant .Inventory order calculation and implication helps to reduce both the risk of the farmer and retailer ,farmer will take the price of their production, though it is previously ordered an retailer will get the fixed price from the customer, though it is constant throughout the year . By this effective inventory management a seller or retailer can not only give the customer satisfaction, profit maximization but also can do the responsibility towards society and reduce the risks & challenges of the government that is scarcity selling and farmer suicide.

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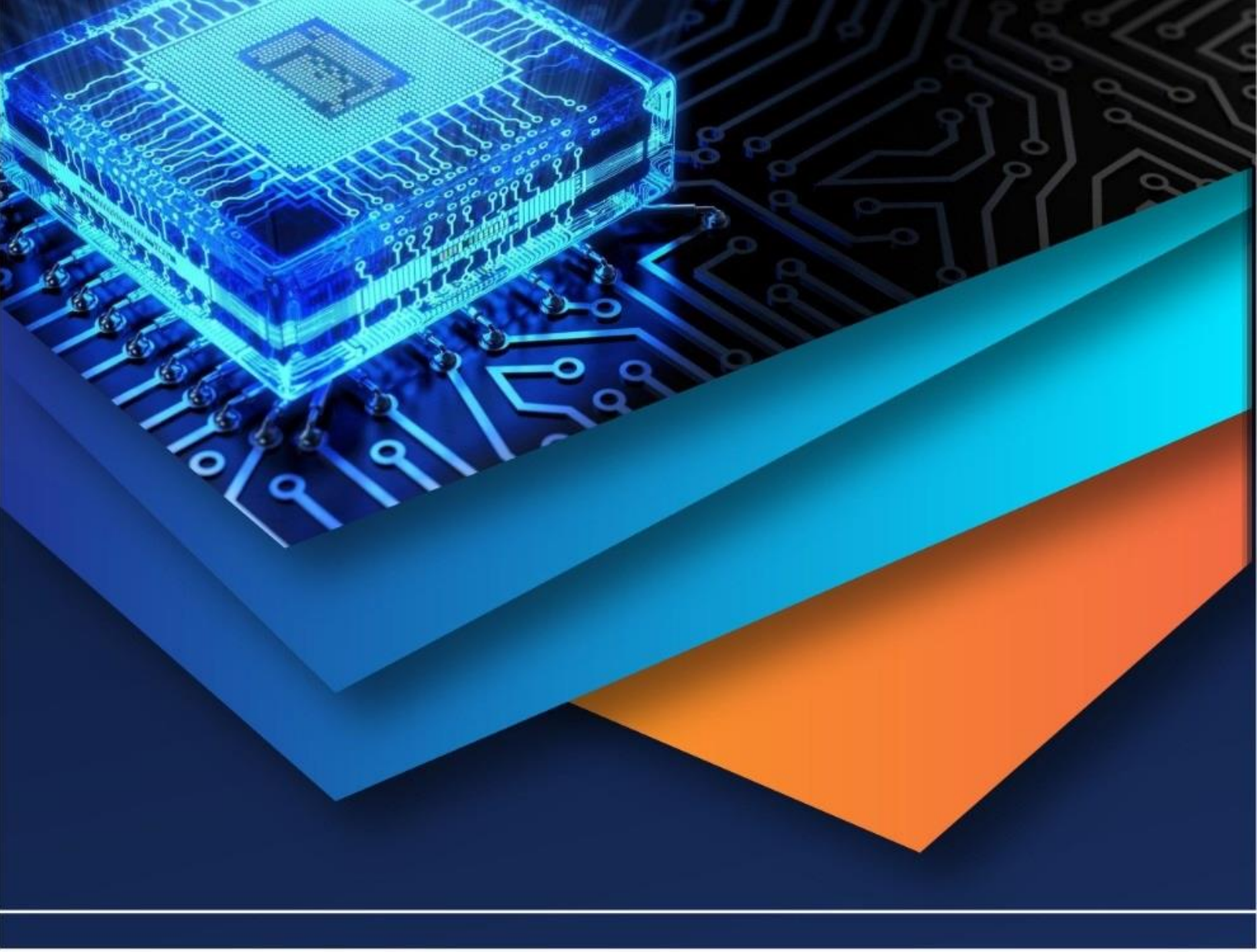

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