# A study on the effectiveness of inventory management and control system in a milk producer organisation

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**Abstract:** Inventory management is mainly concerned about identifying the amount and the position of the goods that a firm has in their inventory. Inventory management is imperative as it helps to defend the intended course of production against the chance of running out of important materials or goods. Inventory management also includes making essential connections between the replenishment lead time of goods, asset management, and the carrying costs of inventory, future inventory price forecasting, physical inventory, and available space for inventory, demand forecasting and much more. The major objective of the study is to examine to the techniques used by the company to control the inventory. It also includes studying the effectiveness of the technique adopted. In this report we can come to know the background information and the objective of the industry as a whole and also develop the project procedures and various method performed in order to get a detailed report on the industry.

**Keywords:** EOQ; ABC; inventory; carrying costs; milk producer.

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## 1 Objective of the study

- To outline the performance of the company in terms of inventory.
- To identify the inventory management practices in milk producers.
- To reconstruct the EOQ of the product.

### *1.1 Scope of the study*

The present study has been carried out on a single milk producer's. inventory management is built to act as a cushion between supply and demand so all the firms' gives special important for inventory management. The study is restricted only to inventory management of the company and within the limit of Mangalore region.

## 2 Current operations of the milk producer organisation

1 Purchase the required material as purchase indents.

2 Verification and processing of supply files.

3 Maintenance of approved vendor list.

4 Coordination of departmental quality records

### *2.1 Receipt section*

This section will be responsible for

1 receiving correct quantities are consigned in the supplier delivery Challan

2 arrange for inspection of material through inspection department

3 raise 'goods receipt note' (GRN)

4 sending the accepted with GRN to the stores department

5 keeping in custody the rejected supplier and intimate purchase department for necessary action in case of rejection/shortage/excess daily receipt voucher is prepared whenever the material received in this section.

### *2.2 Stores department*

Stores department required greater importance in today's business organisation store keeper refers to the safe custody of all material stocked in store. It is located near production department.

Stores manager heads the stores department. He has overall responsibility towards stores function. Officer and office assistant for the purpose of storing material rack and cup-board provided. As store department is situated in the same building at the factories, the transportation charges are minimum.

Raw materials which are checked by the quality control department are brought to the stores department for storage. The store's manager maintains stores record here they maintain record of list of material in hand, material consumed etc.

### *2.3 Main function of stores department*

1 Indenting material with the purchase department.

2 Receiving the material and arranging for inspection.

3 Verification of specific item whenever applicable.

4 Issuing of the material as per issue indents to the user.

5 Disposal of rejected material.

6 Ensuring the test result of the material.

7 Maintains and departments quality record.

### *2.4 Process management – stores management*

The scope of the system includes indenting, receiving, storing, indemnification, issuing stock keeping and coordinating with the indenting department and the purchase department.

The manufacture of standard products as compared to custom-made items still influence inventories as materials needed to manufacture a standard product is easy to obtain and a close control on the stock is not necessary whereas materials required to produce made-to-order items need strict control to ensure that no item is lost in the process of manufacture. Such materials and tools are of special and expensive nature and loss of any small part will hold up the production.

#### *2.4.1 Type of manufacture:*

Besides type of product, 'type of manufacture' also influences inventory management and control where, continuous manufacture employed (Davis, 1975) at the rate of production is the key factor. Here inventory control is of major importance and in reality controls the production of the product. The economic advantage in this type of manufacture is the uninterrupted operation of the machines and assembly lines in the plant. Intermittent manufacture on the other hand permits greater flexibility in the control of the material.

#### *2.4.2 The other factors are:*

- The capability of present and future data processing equipment.
- The potential savings that might be anticipated from improved conversion of inventories.
- The present method for controlling inventories and for making inventory decisions.

- The degree of commitment by management personnel for the development of more effective inventory management and results anticipated from such a system.

### *2.4.3 Factors determining the level of inventory*

Factors influencing the decision of investment in inventories can be divided into two parts:

a General factors:

These factors include common factors that are considered in taking decision of all types of assets fixed and current, such as type and nature of business, volume of sales operational level etc.

b Specific factors:

The specific factors are:

- seasonal nature of raw material
- term of purchase – long credit supply terms, rebate or concessions etc.
- price level variation
- loan facility
- length and technical nature of production process
- supply conditions – certainty and regularity in supply of raw material requires less investment
- time factor: indenting and availability of materials
- management policies
- other factors like threat of strike, proposed control of raw material, rationing etc.

## 3 Review of literature and research methodology

Babayemi et al. (2016) opined that inventory management is an extremely important function to any business, since inadequacies in control can result in serious problems. If inventories are managed in an inefficient manner, it is likely that delays in production, dissatisfied customers, or curtailment of working capital will result.

### *3.1 Process of inventory management and control*

As mentioned earlier, inventory management and control refers to the planning for optimum quantities of materials at all stages in the production cycle and evoking technique, which would ensure the availability of planned inventories (Chung, 1989).

Four steps are involved in the process. They are: determination of optimum inventory levels and procedures of this review and adjustments, determination of degree of control that is required for the best results, planning and design of the inventory control system and planning of the inventory control organisation.

1 *Optimum inventory levels:* determination of inventory that an organisation should hold is a, significant but difficult task. Too much of inventory results in locking up of working capital accompanied by increased carrying costs. Excess inventories however, guarantee uninterrupted supply of materials and components, to meet customers' demand (Rafiei et al., 2016).

2 *Degree of control:* the second aspect of inventory management is to decide just how much control is needed to realise the objectives of inventory management. The difficulty is best overcome by classification of inventory on the bases of value popularly called ABC, VED, FSN analysis and other methods are useful in deciding the degree of control. More impor tance should be given also for items of high consumption.

3 *Planning and design of the inventory system:* inventory system provides the organisational structure and the operating policies for maintaining and controlling goods to be inventoried. The system is responsible for ordering and receipt of goods ,tinning the order placement and keeping track of what has been ordered, how much and from whom, further the system must provide follow up to enable the system of answering of question as, has the vendor received the order? Has it been shipped? Are the hems correct? Are the procedures established for re-ordering or returning undesirable merchandise?

4 *Organisational arrangement:* the last aspect of inventory management and control is to determine an organisation structure to handle inventory. Organisationally speaking inventory control function is assigned to materials management or production planning and control. Attaching inventory control to material management activity is feasible in organisations wer e integrated material management is in practice.

Lean management is getting more and more attention in today's highly competitive environment. In this context, the aim of their study was to test the hypothesis that efficient (lean) inventory management leads to an improvement in a firm's financial performance.

## 4 Inventory control tools and techniques

Inventory control is concerned with the acquisition, storage, handling and use of inventories so as to ensure the availability of inventory whenever needed, providing adequate provision for contingencies, deriving maximum economy and minimising wastage and losses (Kienholz et al., 2015; Lee et al., 2015; Lutz et al., 2003; Roy et al., 2008; Tauber, 1975).

The important factors to be considered while setting or selecting of an inventory management system:

- the type of control required over inventory items
- how much should be ordered
- when it should be ordered.

The different techniques of inventory management are as follows:

1 ABC analysis: the first stop in the inventory control process is classification of different types of inventories to determine the type and degree of control required for each. The ABC system is a widely used classification technique to identify various items of inventories for purposes of inventory control shown in Table 1.

2 Economic order quantity: EOQ is an important factor in controlling, which can be reasonable to order economically at a time. It is also known as 'standard order quantity', 'economic lot size' or 'economic ordering quantity'. In determining this point, ordering costs and carrying costs are taken into consideration.

**Table 1** Table showing features of ABC analysis

| *Nature* | *A (high consumption value)* | *B (moderate consumption value* | *C (low consumption value)* |
|---|---|---|---|
| Extent of control | Very strict | Moderate control | Loose control |
| Safety of stock | No safety stocks | Low safety stocks | High safety stocks |
| Frequency orders | Frequency ordering | Once in three months | Bulk ordering in six months |
| Control statements | Weekly statements | Monthly report | Quarterly reports |
| Follow up | Maximum | Periodic | Follow up only in exceptional case |
| Type of analysis | Regards value analysis | Moderate value analysis | Minimum value analysis |
| Forecasting | Accurate forecasting in material planning | Estimates based on past data and present plans | Rough estimates for planning |
| Period of review | Minimisation of waste, obsolete and surplus | Quarterly control over surplus and obsolete items | Annual review over surplus and obsolete material |
| Centralisation | Centralised purchasing and storage | Combination purchasing | Decentralised purchasing |
| Level of management | Must be handled by senior officers | Can be handled by middle management | Can be fully delegated |
| Sources of supplies | As many sources as possible for each item | Two more reliable source | Two reliable source for each item |
| Posting ledger | Individual posting | Small group posting | Group posting |
| Lead time | Maximum efforts to reduce lead time | Moderate | Minimum clerical efforts |

Ordering costs is used in case of raw-materials and includes the entire cost of acquiring raw materials (Wu et al., 2016; Xing et al., 2008). They include costs incurred in the following activities, requisitioning, purchase ordering, transporting, receiving, inspecting and storing, carrying costs are the costs incurred for maintaining a given level of inventory. It includes storage, insurance, taxes deterioration and obsolescence.

Either of these two costs affects the profits of the firm adversely and management tries to balance these two costs. The balancing or reconciliation point is known as 'economic order quantity'. The quantity may be calculated with the help of the following formula

$$\text{EOQ} = \sqrt{2\text{AO}/\text{C}}$$

Here

EOQ economic order quantity

A annual quantity used

O cost of placing an order

C carrying cost.

Inventory can best be monitored and measured in the warehouse. Their study included finding out what has to be monitored and measured; a closer look at stock counting; discussing how information is gathered; asking what makes a good warehouse management system and what the benefits are of using inventory control and warehouse management together and looking at working with limited systems.

In literature inventory management refers to all the activities involve in developing and managing the inventory levels of raw materials, semi-finished materials (work-in-progress) and finished good so that adequate supplies are available and the costs of over or under stocks are low. Rosenblatt (1977) says: 'The cost of maintaining inventory is included in the final price paid by the consumer. Good in inventory represents a cost to their owner. The manufacturer has the expense of materials and labour. The wholesaler also has funds tied up'.

Rao K.V.'s, article 'Techniques of inventory management' in The Economic Times considered four costs viz., replenishment cost, inventory carrying cost, under-stocking cost and overstocking cost in developing an inventory system.

## 5 Data analysis and interpretation

The study attempted to evaluate the efficiency of inventory management. Various techniques were employed to meet the objectives of the study. Include tools such as ABC analysis, EOQ model etc. were also employed.

The data has been analyses as below in the given Table 2

### *5.1 Key ratios*

Current ratio

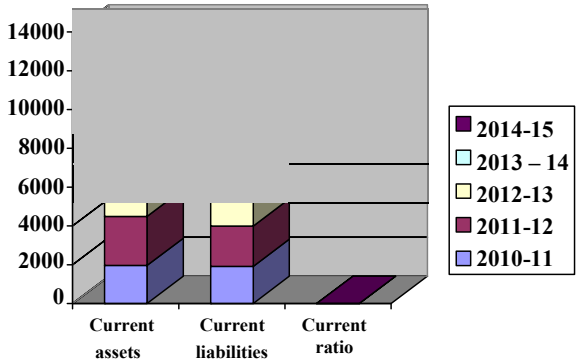
$$\text{Current Ratio} = \text{Current Assets}/\text{Current Liabilities}.$$

Current ratio for five year (amt. in Lakhs).

**Table 2** Ratio analysis 2010–2015

| *Year* | *2010–11* | *2011–12* | *2012–13* | *2013–14* | *2014–15* |
|---|---|---|---|---|---|
| Current assets | 1,956.11 | 2,531.95 | 2,127.19 | 2,331.67 | 3,293.66 |
| Current liabilities | 1,908.63 | 2,078.81 | 1,944.86 | 2,417.41 | 3,518.35 |
| Current ratio | 1.02 | 1.22 | 1.09 | 0.96 | 0.94 |

**Figure 1** Ratio analysis 2010–2015 (see online version for colours)




### *5.1.1 Interpretation*

The current ratio of a firm measures its short term solvency, that is, its ability to meet short-term obligations. The company has to maintain 2:1 ratio in order to maintain favourable current ratio. The company capacity to pay its current liabilities or short term borrowings out of current assets is decreasing. The company is not having current assets to clear its current liabilities it should go for outside sources to clear its short term obligation.

### *ABC Analysis*

*Grade A:* characteristics of 'A' type product:

- very strict control
- very low safety stock
- frequent ordering
- maximum follow up
- weekly control statement
- as many sources as possible
- centralised purchasing.

**Table 3** Showing items with grade 'A' for milk producer organisation (MPO) and their milk products

| *Name of the raw materials* | *Quantity* | *Rate* | *Value* | *Percentage* | *Cumulative percentage* | *Grade* |
|---|---|---|---|---|---|---|
| Curds 200 gm | 6,684.000 | 39.10 | 261,344.40 | 20.58 | 20.58 | A |
| Sweet Lassi 200 ML | 6,624.000 | 33.41 | 22,182.10 | 17.42 | 38.00 | A |
| Good life 500 ML | 3,802.500 | 33.61 | 127,802.03 | 10.06 | 48.06 | A |
| Paneer 1 kg | 619.000 | 174.34 | 107,917.22 | 8.50 | 56.56 | A |
| Curds | 2,838.000 | 32.20 | 91,383.60 | 7.19 | 63.75 | A |
| Butter milk 200 ML | 3,540.000 | 21.25 | 75,225.00 | 5.92 | 69.67 | A |
| Mango Lassi | 1,020.000 | 44.54 | 45,432.31 | 3.58 | 73.25 | A |
| Butter milk (unsalted) | 204.500 | 210.92 | 43,133.14 | 3.40 | 76.65 | A |
| Flavoured milk (200 ML) | 31.00 | 10.82 | 33,542.00 | 2.64 | 79.29 | A |

*Grade B:* characteristics of 'B' type product:

- moderate control
- high safety stock
- once in two or three months ordering
- periodical follow up
- quality control
- two or more sources of supply
- combined purchasing.

**Table 4** Showing items with grade 'B' for MPO and their milk products

| *Name of the raw materials* | *Quantity* | *Rate* | *Value* | *Percentage* | *Cumulative percentage* | *Grade* |
|---|---|---|---|---|---|---|
| Nandini éclairs | 168 | 192.02 | 32,259.36 | 2.54 | 81.83 | B |
| Ghee 15 kg tin | 120 | 216.66 | 25,999.20 | 2.05 | 83.88 | B |
| Dairy whitner | 133.0000 | 148.22 | 19,713.26 | 1.55 | 85.43 | B |
| Paneer 200gm | 86.000 | 206.07 | 17,721.71 | 1.40 | 86.83 | B |
| Peda(250 gm) | 76.250 | 20.06 | 16,779.34 | 1.32 | 88.15 | B |
| Dairy whitner | 104.000 | 157.91 | 16,422.64 | 1.29 | 89.44 | B |
| Butter 500gm | 76.000 | 207.95 | 15,804.2 | 1.24 | 90.68 | B |
| Ghee 50 mil sachet | 51.300 | 256.85 | 13,176.41 | 1.04 | 91.72 | B |
| Nandini bite | 70 | 186.90 | 13,082.97 | 1.03 | 92.75 | B |
| Dairy whitener (40 gm) | 79.000 | 162.58 | 12,843.82 | 1.01 | 93.76 | B |
| Tetra pack | 205.200 | 58.75 | 12,055.50 | 0.95 | 94.71 | B |

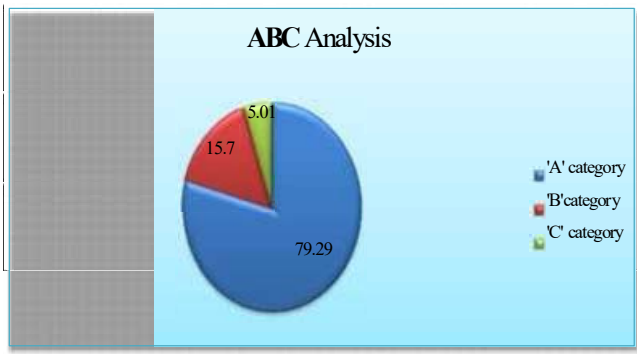
*Grade C:* characteristics of 'C' type product:

- moderate control
- high safety stock.

**Table 5** Showing items with grade 'C' for MPO and their milk products

| *Name of the raw materials* | *Quantity* | *Rate* | *Value* | *Percentage* | *Cumulative percentage* | *Grade* |
|---|---|---|---|---|---|---|
| Badam powder (500 gm) | 55.500 | 187.45 | 10,403.48 | 0.79 | 96.32 | C |
| Chit chat bar | 71 | 142.18 | 10,094.78 | 0.79 | 96.32 | C |
| Gulab jamoon | 65.000 | 130.20 | 8,528.10 | 0.67 | 96.99 | C |
| Cream 1 kg | 60.00 | 117.96 | 7,074.24 | 0.57 | 97.56 | C |
| Mysore pak | 27.50 | 245.44 | 6,749.62 | 0.53 | 98.09 | C |
| Kova 1 kg | 27.000 | 220.04 | 5,941.02 | 0.47 | 98.56 | C |
| Nandini cream bite | 37 | 160.41 | 5,935.17 | 0.46 | 99.02 | C |
| Payasa mix | 23.200 | 223.78 | 5,191.70 | 0.40 | 99.42 | C |
| Jamoon mix | 16.000 | 187.46 | 2,999.36 | 0.26 | 99.68 | C |
| Mysore pak 100 gm | 8.700 | 279.24 | 2,429.40 | 0.18 | 99.86 | C |
| Kova | 6.000 | 220.04 | 1,320.24 | 0.09 | 99.85 | C |
| Badam powder | 2.600 | 187.45 | 487.37 | 0.04 | 99.99 | C |
| Dharwad peda | 0.250 | 179.88 | 44.97 | 0.01 | 100 | C |
| Total | | | 1,270,119.6 | 100 | | |

**Figure 2** Chart showing ABC analysis for MPO and their milk products (see online version for colours)




## *5.2 Interpretation and analysis*

The above Table 5 indicates that 'A' category items contribute 79.29%, 'B' category items contribute 15.7%, and 'C' category items contribute 5.01% to the total value of earnings out of inventory. As 'A' category items holds major proportion in total value of

inventory so the company should give more attention and 'B' items the company can give reasonable attention. Was 'C' categories items can be neglected by the company?

### *5.3 Economic order quantity model*

To be able to calculate a basic EOQ certain assumptions are necessary;

- that there is a known, constant stock holding cost
- that there is a known, constant ordering costs
- that rates of demand are known and constant
- that there is a known, constant price per unit, i.e., there are no price discounts
- that replenishment is made instantaneously, i.e., the whole batch delivered at once.

The following formula is used in the calculation of EOQ:

$$\text{EOQ} = \sqrt{2\text{UA}/\text{IC}}$$

where

A annual usage

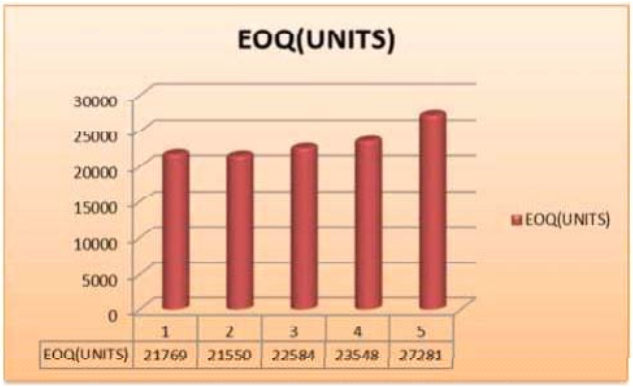
U cost of placing an order

IC inventory carrying cost per order.

**Table 6** Showing economic order quantity

| *Year* | *Annual usage* | *Ordering cost* | *Carrying cost* | *EOQ (units)* |
|---|---|---|---|---|
| 2010–11 | 101,555,039 | 1.47 | 0.63 | 21,769 |
| 2011–12 | 109,179,707 | 1.51 | 0.71 | 21,550 |
| 2012–13 | 120,793,511 | 2.28 | 1.08 | 22,584 |
| 2013–14 | 127,885,053 | 2.58 | 1.19 | 23,548 |
| 2014–15 | 131,070,865 | 2.47 | 0.87 | 27,281 |

**Figure 3** Chart showing economic order quantity (see online version for colours)



### *5.3.1 Interpretation:*

Figure 3 and Table 6 show that in the present year the EOQ is 27,281 units. The company should make the order in the above mentioned units in order to reduce production cost. The company must make an optimum order in order to reduce its carrying and ordering cost.

## 6 Findings

Through the course of study several functions have come to light. There are as follows

- Milk is a commodity that every household consumes daily weather high, middle or low level people. Thus raise in price will not affect in demand. Hence the producers will not face the loss in future.
- There is an increase in total inventory purchased in 2014–15 when compared to previous year.
- The current ratio has been declining year after year, this shows the short term solvency, that is, its ability to meet short term obligations.
- The collection period is stable every year, which is good for firm.
- MPO current assets as compare to current liabilities are less.
- The EOQ level of the company is 27,281 units. By using this amount of units the total cost of production is reduced during the present year.
- Inventory usage depends on sales that mean as sales increases, inventory usages should also be increased. Therefore, inventory management is a must for the continuity and survival of any goal focused manufacturing organisation.

## 7 Suggestions

- The firm should concentrate more on current asset because the current ratio is below the ideal ratio so that the company's liquidity position will be more effective.
- Company must follow ABC analysis and EOQ, one of the most important inventory techniques in order have a better control on the inventories.
- The firm is being monopolistic in nature it has to maintain the same increasing level of production and sales.
- The company should produce much more products out of milk so that the company can earn more profit than the present situation and also to get more number of consumers.

Since the MPO is dealing much with perishable stocks, inventory management has to be given more importance. Low turnover ratio showed accumulation of finished or semi-finished goods, which resulted in large holding of inventories in the concern. It is therefore, suggested that the management should check the size of the component

periodically and should also try to reduce its level. The company can increase its profitability by proper inventory management as it has borrowed bank and financial institution mainly to finance its working capital. Company should take step to bring down the inventory period to enhance the working capital.

### *7.1 Limitation of the study*

- The study is restricted to one MPO and therefore, result of the study cannot be generalised to other firms in the same segment.
- Due to confidentiality of certain information, all the details could not be obtained from the company.
- Tool of inventory control may differ or all the tools mentioned in inventory management may not have been used.

## 8 Conclusions

The study was conducted to analyse the inventory management and control techniques adopted in MPO. All the products are sold under the brand name. The objective of the study is to examine the technique used by the company to control the inventory. And also include study the effective tools and technique which could be adopted for the effective inventory managing MPO.

The tools which are used for study is ratio analysis and various control techniques like EOQ models, ABC analysis. Inventory management plays a very important role in the field of financial management. Raw materials inventory is like the first steps of the ladder without which we cannot proceed further. Profit can be maximised if and only investment inventory minimised in general, the company achieved tremendous progress over the recent years, and the company has a healthy financial performance. The company is enjoying good profits as well as paying well for their investors and suppliers and giving good impression to the society. The company is having very good inventory turnover ratio which determines that the production activities are taking place effectively. Due to increase in demand the inventory turnover has increased during the years. Hence the significant changes in the direction will definitely help to widen the market and above suggestion if implemented will enhance sales and profitability of MPO.

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