CHAPTER- I

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Nepal is a medium sized land locked country. It has adopted mixed economy since several years. With the adoption of mixed economy, Nepal has established several public enterprises with an aim of rapid economic development and social welfare. Nepal is a least developed and least industrialized country. In Nepal, both import substituting and export promoting industries are equally essentials. But in initial stage, import substituting should shift the export promoting industries, which finally help to strengthen the economic condition. It is hoped that these industries minimize the imports in one hand and on the other hand utilizes the available local resources including the unemployed or underemployed labour force.

Now a day's many people have shifted to industrial sector from agriculture. People have felt that without industrialization and emphasizing agro based industries, economic improvement is not possible. This fact can also be realized from the scenario of some developed countries like Japan, United States of America, Britain, etc. due to this reason; Nepal also has followed the practice of shifting from traditional agro based economy to industrialization. The history of public enterprises begins after the establishment of Biratnagar jute mill in 1994 B. S. Before the democracy prevailed in 2007, there were limited public enterprises in existence.

Nepalese public sector covers wide range of activities including key industries and the commercially oriented manufacturing and whole-sale business. But the performance and profitability of most of the public enterprises are much behind the targets and are operating below the installed capacity.

Management of inventory plays a vital role in any organisation whether it is manufacturing or trading. Any organization would like to keep some stock of goods as the cushion for uncertain sales of tomorrow. The size of stock of raw materials, semi-finished goods, and finished goods depends upon the size of transaction and nature of products. “Inventory enlists the names, quantities and monetary values of all or any group of items” (Goel BS). Modern concept of inventory management has been developed by several authors named; R.C Davis, H.S. Owen, E.F. Clark and R. N. Wilson during 1915-1922 AD. Acting independently they developed economic lot size equation, which, minimized the sum of carrying and ordering cost for where the demand was known and supposed to be constant.

The size of inventory differs from organization to organization. If the transaction of the organization is small and limited, the level and variety of inventory will be low and vice –versa. Higher level of inventory increases the carrying cost and lower level of inventory increases the ordering cost, so, right quantity at the right time is essential for sound inventory management. Since it is related with cost, inventory management has been an important part of cost accounting, financial management and profit planning and control. Hence inventory management plays a very significant role in any enterprise.

Dairy Development Corporation: an overview

The first five-year plan, stressed on the need of developing modern dairy industry in public sector. The dairy development commission was formed in 2012 B.S. (1955 A.D.). The dairy development section was established in the year 2010/011. As the demand of milk and milk products were gradually increasing, it was felt necessary to improve dairy development centre, as a result of this, dairy development centre was

established at Bhotahity from the year 2010/011. The centre started to distribute the collected milk after processing to the urban people in Kathmandu valley.

As the demand of milk and milk product was increasing day by day, the dairy plant become necessary, so, the centre established in Bhotahity was shifted to Lainchour in the open space with the addition of modern plants. At that time, Swiss development commission had been converted into dairy development board in 2009 B.S. (1952 A.D.).

The dairy development activities in Nepal outside Kathmandu valley was started in Tusal village of Kavre district in 2009 B.S. (1952 A.D.) for the experiment purpose with small scale milk processing plant. By the initiative of dairy development board the central dairy plant was established and started milk collection processing and marketing activities from the year 2014 B.S. (1957 A.D.). Now DDC is totally owned by Nepal government. It is also supported by foreign grants and loans at low interest rate. World food programme (WFP) has been supporting DDC since 2030/031 B.S, (1973/74 A.D.). The New Zealand and Danish Government have been contributing towards the establishment of milk processing plants. At present, USAID and Danish government are the major donors.

Before the establishment of DDC there was no potential market of milk to the farmer. Now DDC has been playing vital role for providing reasonable price to the milk producer and pasteurized healthy milk to the consumers. The economic condition of milk producing farmers is improving because DDC is continuing its efforts to supply increasing demand of milk to the consumers of urban area. The demand of milk is increasing because of rapid urbanization. DDC is trying to collect milk, through branch offices in different parts of the country such as chitwan, Kavre, Biratnagar, Ilam, Hetauda, pokhara, Lumbini and so on.

Kathmandu milk supply scheme (KMSS):

The foundation stone of central dairy Balaju was laid on Tuesday 1st May 1973 by His Excellence Mr. Rex Rainsford Cunninghame ambassador of New Zealand to Nepal in recognition of cooperation between the Government of Nepal and Government of New- Zealand for the development of KMSS.

The Dairy Rehabilitation and Extension Project agreed between The Government of Nepal and the Government of Denmark has been completed during the period (1988-1992) at KMSS Balaju was inaugurated on 24th May1992. Dairy Development Corporation established under corporation Act 2021 BS. DDC-a fully state owned corporation, initiated for the economic advancement of the poor farming communities, has flourished into a nationwide movement with an annual collection over 60 million liters of milk from more than 75 thousand milk producers through 970 milk cooperatives spread out in 29 district. With the sate-of-art infrastructure comprising of fully modern dairy plants, 11 cheese manufacturing units, 43 milk chilling plants and highly qualified dairy specialists, DDC is a precious asset in the economic development of our nation. Katmandu Milk Supply Scheme (KMSS) is a internationally certified company which is being certified with HACCP and ISO from International Certification Limited Auckland, New Zealand

Objective of Kathmandu based project of DDC:-

These are the main objective of Kathmandu based milk supply scheme of DDC:-

i) To provide a guaranteed market for milk to the rural farmers with fair price.

ii) To Supply pasteurized milk and milk products to urban consumers.

iii) Developed organised milk collection system to meet increasing

Demand for milk and milk products in urban areas.

iv) To make balance of demand and supply in current market.

Brief Description of the Products:

A brief introduction of the dairy products presently supplied by the DDC is as follows:

- **Pasteurized milk:** Milk collected from rural areas is standardized to contain 3% fat and 8% solids not fat (SNF) and pasteurized by the HTST pasteurizer. Milk is heated to 73 degree centigrade, for 15 seconds and promptly cooled to 4.5 degree centigrade. The pasteurized milk is filled in 500 ml polythene bags.

  Beside the pasteurized milk as a main product, other products are also produced in this project. Which are also helpful for the balanced and continued production of milk and also to utilize the excess milk at unexpected disturbance of distribution because of it's perishable nature.

- **Dahi/Curd:** By large sections of the population through out the country, Dahi is one of the best dairy products. DDC produces two kind of Dahi:
  - **Ordinary Dahi:** Ordinary Dahi generally contains 3% fat, 8% SNF, 2% additional sugar.
  - **Special Dahi:** Special Dahi contains not less than 5% fat, 3% SNF and 4% additional sugar. Both types of Dahi are set in earthen containers of different size as well as in plastic cups. In both the cases, tirable, acidity is 0.90% (Lactic acid).

- **Ice-cream:** Ice-cream is frozen dairy product having rich source of calcium, phosphorus and other minerals. It contains 10% milk fat, 3.5% protein and 36% total solids.
- **Ghee:** Ghee is the pure clarified fat derived from cow and buffalo milk in which no colour is added. It contains not more than 0.5% moisture and not less than 99.5% fat, ghee produced by DDC is packed in 1/2 kg and 1 kg of plastic containers as well as 1 kg plastic paunch. It is also packed in 15 kg tins.

1.2 STATEMENT OF THE PROBLEM:

Maintaining the right inventory level is one of the key factors to keep the economic health of an industry. The investment in inventory should be just sufficient at to optimum level. Excessive inventory increase the carrying cost and blocks up the capital as well. Similarly inadequate inventory increases the ordering cost and interrupts the production function; the firm fails to meet the market demand regularly. It is clear that proper inventory management plays a significant role in the profitability of the firm.

Under proposed research following points related with the problem of KMSS will be focused.

1. Whether or not KMSS has followed systematic and scientific inventory management system.
2. Trend of demand and supply of Dairy product.
3. What policy KMSS has adopted to minimize the inventory costs.
4. Problem of over and under inventory level.
5. About issuing and pricing policy of inventory.

1.3 OBJECTIVES OF THE STUDY:

The major objective of this study is to identify the inventory system of KMSS. Other specific objectives of the study are listed below.

- To examine existing inventory management system and policy including raw material, work-in-progress and finished product.
- To find out the impact of inventory management in profitability of the project.
- To identify the problem of the project faces in the way of inventory management.
- Finding out the efficiency and effectiveness of inventory policies the project has been working with.

1.4 SIGNIFICANCE OF STUDY:

Inventory management is one of the important functions of any organization. With out effective handling of inventory, manufacturing organization can not achieve its goals. Effective handling of inventory helps the organization reduce the inventory cost. So researchers think this study will be very important to improve the performance of KMSS. The significance of this study is as follows.

(i) This study reveals the actual doing and result of current inventory management system of KMSS, Balaju.

(ii) The study will be useful to manage the effective inventory policy of KMSS.

(iii) This research is about the related field which may provide material for the interested concerns.

(iv) This study will be helpful in management as it controls the unnecessary expenses of the firm.

(v) This study focuses on the inventory management. So it is useful in inventory control of KMSS.

1.5 LIMITATION OF THE STUDY:

Every thing will have to be confined into a certain boundary or circumferences. Like wise this study also falls in the same category and has the following limitations caused by time, technical as well as financial constraints. They are listed below as follows.

(i) This study will focus the inventory management of DDC Kathmandu based project but it does not concern to other sectors of management.

(ii) Past 6 years (2062/063 to 2067/068) data are used the analysis and interpretation of existing inventory management system of this project.

(iii) The study has been made on the basis of secondary data however some primary data are also introduced asking the representative of the company.

(iv) It has been studied the inventory management of DDC (Balaju) only. Being just a reference study, the conclusion pointed out form it does not ensure wide applicability in all types of public enterprise running in different situation.

1.6. ORGANIZATION OF THE STUDY:

The whole study is organized in to five different chapters are as follows:

Introduction:

This chapter concentrates on introduction, statement of problem, objective of study, significance of study and limitation of study.

Review of literature:

This chapter deals with review of various journals, books, published reports, articles and previous thesis.

Research methodology:

This chapter deals with various descriptions of tools and techniques for data collection, presentation and analysis.

Data Presentation and Analysis

In this chapter, collected data are tabulated and analyzed by the use of various statistical tools, graphs and diagram.

Summary, Conclusion and Recommendation

This chapter deals with summary, findings, conclusion and recommendation of the study.

During the time of preparing thesis ,I have used different articles published on national daily newspapers and others articles written by authors related to the dairy production ,scheme and others which the policy and scheme has been adopted by a DDC to make balance demand and supply in a national specially in Kathmandu where are a large number of population .

Past 6 years data provide by dairy development corporation ,Kathmandu have been used for the analysis of the study by different point of view like ratio analysis, BEP analysis, ABC analysis, Regression analysis and others method

CHAPTER- II

REVIEW OF LITERATURE

Inventory management is one of the basic components of the every manufacturing organization. Every manufacturing organization applies the methods of inventory management and control the input and output process. In this chapter attempts has been made to present the review of literature on inventory management and also the study about the relation with the profit planning and control.

2.1 CONCEPT AND MEANING OF INVENTORY MANAGEMENT

In general view, inventory may represent the stock of ready to use products. But in broad sense inventories are stock of raw materials, work-in-process, finished goods and office supplies. They are inevitable to any firm whether it be small or large. Inventories are essential for production and sales for every manufacturing or organization. Inventories can be in both forms - financial dimension as well as physical dimension. These dimensions are interrelated and both should be considered while analyzing inventory in a firm. Inventory in the form of raw materials work-in-process and semi-finished goods are of great significance for the success of enterprises. “However firms would prefer to hold little or no inventory and if it could be arranged, firms would like to time the production of their products to coincide perfectly with the arrival of demand” (Weston and Brigham, 1992, P-425).

It is well known fact that no firm knows its demand with perfect certainty. If we suppose that a firm can forecast its demand with perfect certainty, the firm may try to coincide its production of products with customers demand. But every production/manufacturing process take some amount of time and it varies with the

length of transportation process and value added to the original material purchased. Therefore every firm thinks it is necessary to hold inventory in one or more form or another. Firms hold inventories as it is known with perfect certainty when customers will arrive, when orders will be delayed or when production problems will arise while materials and products are in inventory they do not generate a return instead the firm must finance them. Excessive inventories are costly to the firm; but insufficient inventories also are costly because customers might purchase from competitors if products are not available when demand (this is called a stock out), and future business could be lost. Thus, firms need to determine the appropriate level of inventory to hold.

It is observed that irrespective of the size of an enterprise, the expenditure of materials is a major item of the budget. In many cases materials consumption various from 25% to 75% of sales turnover. The expenditure made on materials is money invested in inventories, cost of storage transportation cost, insurance, wastage etc. Because of the magnitude of expenditures required acquiring on controlling inventory and their impact on profit, a great deal of attention is required towards the management of operation associated with materials (Goel, 1985, p-270).

Under the inventory management there is not only essential production approach but also need of marketing management but actually inventory management is purely subject of production management.

Inventories are stocks of the product a company is manufacturing for sale and components that make up the product. The various forms in which inventories exist in a manufacturing company are; raw materials, work-in-process and finished goods. Raw materials are those basic inputs that are converted into finished product through the manufacturing process. Raw materials inventories are those units which have been

purchased and stored for future productions. Work-in-process inventories are semi-manufactured products. They represent products that need more work before they become finished products for sale. Finished goods inventories are those completely manufactured products which are ready for sale. Stocks of raw materials and work-in-process facilitate production, while stock of finished goods is required for smooth marketing operation. Thus, inventories serve as a link between the production and consumption of goods (Pandey, 1994, p-755)

Most of the manufacturing firm or enterprises need inventory for regular running of their activities. Inventory management helps between production and distribution process. Inventory management provides a cushion for future price fluctuations. About 90% part of working capital is invested in inventories, it is necessary for every management to give proper attention to inventory management. An efficient system of inventory management will determine:

(i) What to purchase?

(ii) When to purchase?

(iii) How to purchase?

(iv) From where to purchase?

(v) Where to store?

Inventory management is not only branch of production management; but also is a broad view of management "Companies devoted a great deal of attention to the efficiency of their materials and inventory management operation." a brief look at the historical evolution of material faction will give us a fuller appreciation of the current situation. Up until the time F.W. Taylor, the production foreman was focal intents and purpose in complete control of the production activity. He purchased the necessary

raw materials scheduled production and handled individuals almost all of the other aspects of production (Gareet and silver, 1986, p-357)

Thus, inventory management applies several tools and techniques for inventory control, since the time of orders of purchase until they are stored and issued or sold. It tries to maintain close relationship between sales and production which helps to reduce inventory levels and still meet production need and customer demand. Ultimately it aims to contribute to the profitability of a firm by reducing inventory costs and smooth operation.

2.1.1 Inventory Classification

In a manufacturing organization inventories can be classified into three categories i.e. raw materials, work-in-process and finished goods.

a) Raw materials

Direct and indirect materials required for the production process is known as materials. Direct materials also known as raw materials are the prime factor for the production of a product which ultimately become an integral part of a final product. Indirect materials are those which are used in the production process but not become a part of a final product. Materials used for operation, repair, and maintenance of plants and equipments, packing materials, office supplies like stationeries, accessory equipments, cleaning materials etc. are indirect materials.

Raw materials are those basic inputs which are converted into finished products through the manufacturing process. Raw material inventories are those units, which have been purchased and stored for future production (Pandey, 1995, p-755).

b) Work-in-process

Work-in-process inventories are semi-manufactured products and they represent that need more work before they are converted as finished product for sale. Sometimes the materials are used in place of raw material and sometimes for finished product. In one industry and the same material may be a work-in-process and the some may be a finished goods in other industry; it depends upon the nature of production. WIP refers to inventory units that are at various stages of completion; some of the inventory in work-in-process will be at the beginning stages of completion and some will be nearly completed. If a firm has work-in-process at every stage of production process, then it will not have to completely shut down production if a problem arises at one of the previous production stages (J. F. Weston and E.F. Bigham, 1992, p-426).

c) Finished Goods

Finished goods are final output of a manufacturing organization. These products don't need to process further because it is ready for supply to customers for sales. If a firm did not have a finished goods inventory, it would have to wait for the completion of the production process before inventory could be sold, thus demand could not be satisfied when it arrived. When demand arrives and there is no inventory to satisfy that demand a stock out situation exists. In such situation the firm will be in danger position of losing the customers to competitors. Permanently DDC (KMSS) has been producing these types of product.

i) Butter

ii) Ghee

iii) Milk

iv) Skimmed Butter Milk

v) Yoghurt

vi) Cheese

vii) Ice-Cream.

2.1.2 Motives of Holding Inventory

It is necessary that inventory is necessary for the production and selling process. Inventory helps the daily activities for raw material and finished product. However firms hold inventories with some motives like transaction, precautionary, speculative.

a) Transaction motive

Transaction is not impossible with out inventory but very difficult for production, sales and daily work. So transaction motive helps smooth production, sales and daily operation.

b) Precautionary motive

Holding inventory helps to avoid the risk of unpredictable changes in demand and supply.

c) Speculative motive

It influences the decision to increase or decrease inventory level to take advantage of price fluctuation.

2.1.3 Advantage of Holding Inventory

By holding inventories, firms insure carrying cost and idle investment. The firms also expect major advantages, which are given below.

a) The de-coupling (independence) function

In the production process, there may occur many disturbances. To solve the problem of holding inventory is one part of the production. De-cupling of raw materials is needed to avoid the effect of short supply, price like etc. De-coupling of work in process is made for continuous operation of different production process despite breakdown of one or many production process. De-coupling of finished goods depends upon market demand, firm's ability to sell its products in the market etc.

b) Meet irregular supply and demand change

Sometimes in the market condition, price is raised. At that time, production process will be interrupted. By the help of holding inventory, the production process and market demand will not be interrupted.

(c) Quantity discount

Firm's policy of holding sufficient inventory eases to take quantity discount which will contribute to reduce material cost.

(d) Avoiding stock-outs (Shortages)

Raw materials' stock outs interrupt production process where as finished goods stock outs cause the inability of firm to meet customer demand on time and result in the loss of customers and goodwill as well. Hence, stock out is very harmful to the survival of a firm.

2.2 OBJECTIVES OF THE INVENTORY MANAGEMENT

Inventory is one of the important components of all manufacturing organization. Inventory is necessary to manage excessive or inadequate phase. The excessive level of inventories consumer funds of the firm can not be used for another

purpose and it involves an opportunity cost making the carrying cost too high. On the other hand, maintaining an inadequate level of inventory is also dangerous. Inadequate level of inventory means under investment of industry inadequate raw materials and work-in-process inventories will result in frequent production interruption. If the demand of customer does not meet regularly, customer may shift to competitors.

Therefore, to maintain the proper inventory or optimal level of inventory in industry is quite significant. But, it is difficult task for management because the optimal level of inventory is always between two dangerous points of excessive and inadequate inventories. An inventory management should (Pandey, 1999, p-887).

(i) Ensure a continuous stock/supply of materials to facilitate uninterrupted production.

(ii) Maintain sufficient stock of raw materials in periods of short supply and anticipate price changes.

(iii) Maintain sufficient finished goods inventory for smooth sales operation and efficient customer service.

(iv) Minimize cost of production.

(v) Control investment in inventories to maintain it on optimum level.

The objective of inventory management should be to determine and maintain optimum level of inventory lying between two points of excessive and inadequate inventories.

Objective of inventory management should be neither excessive nor inadequate level of inventories. But maintaining sufficient inventories level for the smooth production and sales operations. An optimum level of inventory should be determined on the basis of the trade off between costs and benefits. The various

objectives of inventory management can be summarized up as follows (Goyal, 1997, p-69).

(i) Availability of all items of inventory.

(ii) No excessive investment in inventory.

(iii) Reasonable price of raw materials.

(iv) Minimum wastage of store

(v) Right information about availability of stock.

2.3 NEED AND IMPORTANCE OF INVENTORY MANAGEMENT

Inventory is an important factor of any organization. Inventory helps the regularity for running any production and distribution firms. Inventories serve the vital function of development. The various operation in sequence beginning with the materials extending through all the manufacturing operations and in to finished goods, storage and continuing to warehouse and retail stores (Buffa, 1994, p-474)

Importance of inventory management can be written as follows:

(i) Inventory provide service to the customers immediately or at a short notice.

(ii) Inventory helps regular running of business.

(iii) Inventory helps for regular production when raw materials are received late.

(iv) If the company does not have inventory at the shortage period they have to pay high price for raw materials. So, inventory reduces the chance of shortage.

(v) Inventory also maintains the demand of customer, which is in the customer market.

2.4 INVENTORY COST CONCEPT

The critical factors to maintain optimum level of inventory are “when to purchase?” and “how much to purchase?” at a time. Systematic and scientific inventory management system considers various cost factors to get the optimum and ideal inventory management. The first step in inventory management is to identify all the costs involved in purchasing and maintaining inventories. Typical costs associated with the inventories are described below.

2.4.1 Purchase Price

Purchase price is incurred on purchasing materials/goods. Organizations try to minimize it without compromising specifications of materials/goods through purchase management.

2.4.2 Carrying /Holding Cost

Carrying cost consists of cost of capital tied-up, handing & storage costs, insurance costs, proper tax, spoilage and obsolescence cost, system cost associated with the administration of the inventory system in use such as information gathering cost, supervision cost, physical stock checking cost, record keeping requirement cost and other cost on holding inventories. Hence cost for holding inventory is carrying cost. It is variable in nature and often rises in proportion to the size of average inventory carried. To illustrate it a firm sales S unit per year and if it places equal order N times per year than Q = A/N unit, will be purchased with each order, if inventory is used evenly over the year and if no safety stock are carried, then the average inventory A will be

Average inventory (A) = unit per order/2- (S/N) = Q/2

Defining the annual percentage carrying cost as C, annual total carrying cost as (TCC), as the percentage carrying cost C times, price per unit P times the average inventory in unit A.

Total carrying cost (TCC) = CPP, A = CPP or Q/2.

or, Q/2×C.

2.4.3 Ordering/Procurement Cost

Ordering costs are the entire costs associated with acquiring raw materials. It includes cost incurred in the activities like requisitioning, purchase ordering, transporting and receiving inspection and storing. Ordering costs increase/decrease in proportion to the number of orders placed, i.e. more frequently the inventory is acquired, higher the firm's ordering costs and when large inventory levels are maintained, there will be few orders placed, hence ordering cost will be relatively small. Thus ordering costs decrease with the increasing size of inventory. The fixed costs associated with ordering inventories are O and we place N order per year the total ordering cost is given as:

Total ordering cost (TOC) = O×N = O(S/Q)

Where, TOC = Total ordering cost

O = Fixed cost per order

Q = Inventory quantity for each order.

N = No. of order placed per year.

The expenses involve in ordering cost

a) Transportation/shipping cost

b) Clearing and forwarding cost

c) Cost incurred when raw materials in transit

d) Insurance of raw materials

e) Telephone/Fax/Postage/Expenses

f) Stationary cost

g) Bank commission/LC Charge

h) Cost of placing an order

i) Requisition cost

j) Receiving, inspecting and shorting cost

2.4.4 Stock out Cost

Stock out cost is associated with demand and the depletion in stock result in loss in sales or bank order costs. When the sales are lost due to stock out, the firm looses both the profit margin on unmade sales and the firm's goodwill. If the customer uses another business else where, future profit margin may also be lost and bank order cost in needed to convince customers to use again after inventories have been replenished. Bank order cost includes loss of goodwill, money paid to reorder goods and notification to customers when goods arrived (Adams and Ebert, 1993, p-142).

Stock out cost = Inventory cycles per year- output units× probability of possible stock out × unit stock out cost

$$\text{Inventory cycle per year} = \frac{Annual\ Sales}{Quantity\ orer\ size}$$

2.4.5 Over stock Cost

As the demand for the product is terminated however, goods are still remained unsold; it is termed as over stock cost.

2.5 INVENTORY MANAGEMENT TECHNIQUES

In any production organization, adequate inventory level helps to provide regular delivery to the customer. If the inventory control system is sound and flexible, neither the production is adversely affected nor there occur unnecessary blocking of

capital due to overstocking of materials. According to Alton N. Smith, "inventory is (Money) on which a company pays interest rather than collect interest. It is money, always in danger of deviation. Non controlled inventory is an industrial danger." To maintain the inventory control, organization should apply the techniques of inventory.

2.5.1 Stock Level

Management of goods inventory plays the important role. Inventory should not be high or low for any organization. If inventory is going to be high, expenses increased, increase in investment in case of low inventory shortages of goods in consumers market. It is necessary to know about relation between over stock, safety stock, average stock and danger stock. So some stock levels are explained below.

2.5.1.1 Economic Order Quantity

How many quantities must to be ordered? EOQ solve this kind of question. In the order of any goods, the total cost should be minimum, this quantity is called economic order quantity. The quantity of materials that minimize the cost for ordering and carrying, the stock is known as economic ordering quantity. The order for the material to be purchased should be large enough to earn more trade discount and to take advantage or of bulk transport, but at the same time it should not be too large to insure heavy payment on account of interest, storage and insurance costs.

In 1915, F.W, Haris, developed the famous economic order quantity (EOQ) formula. Later, through the consultant named Willson, this formula gained wide use in industrial area. Later on, this formula was developed by Harris. The EOQ is still widely used in inventory for independent demand. The EOQ model is an inventory management technique used to find the optimal order included order quantity that minimizes the total cost which includes order and carrying cost.

If a firm places many orders ordering cost will not be needed. If the firm places very few orders, it will have excessive carrying cost: By EOQ model, we can identify the number of units to order that results in the lowest total costs. EOQ seeks that how much units of inventory should be purchased at an order, which minimizes that total cost. When we are going to calculate EOQ one thing should be kept in mind, to calculate the cost involved in the carrying and ordering. A fairly large error say, 21% in determining the carrying and ordering costs will introduce a much smaller error (11%) in the determination of EOQ (Buchan, 1970, P-362).

The optimal ordering quantity is calculated by following formula if the price of goods remains constant.

$$EOQ \text{ X} \sqrt{\frac{2AO}{C}}$$

Where, A = Annual requirement or annual demand.

O = Ordering costs per order

C = Carrying costs per units for a given period

A. Assumption of Economic Order Quantity.

i) Expected quantity of using material is fixed.

ii) Ordering cot must be fixed in each order.

iii) There is no change in ordering cost to be ordered.

iv) Store expenses must be fixed. It determines about average materials.

v) Unit cost of materials should be fixed.

B. Determination of Economic Ordering Quantity

The EOQ model determined by Mathematical approach, Trial and error approach and Graphical approach are explained below.

i) Mathematical Approach

Mathematical approach is the simple method to calculate EOQ. Without getting into highly refund decision models, we can illustrate the concept of EOQ with a basic mathematical model. We can calculate EOQ by using following formula,

$$EOQ \text{ X} \sqrt{\frac{2AO}{C}}$$

Suppose: Annual Requirement (A) = 6000 units

Ordering cost (O) = Rs. 30

Carrying cost (C) = Rs. 1 per unit.

Solution:

$$EOQ \text{ X} \sqrt{\frac{2AO}{C}}$$

$$= \sqrt{\frac{2 \mid 6000 \mid 30}{1}}$$

= 600 units

$\ldots EOQ \text{X} 600 \, units$

ii) Trial and Error Approach

In this approach, at first ordering number and ordering quantity are determined. After this to find the ordering cost and carrying cost separately, the sum of two cost called (ordering + carrying) is called total cost. After calculating the total cost of different order to select the minimum cost, that quantity is economic ordering quantity. Total cost is minimum in one condition, where the ordering cost and carrying cost both are equal. According to this approach, the carrying cost and ordering cost for different sizes of order to purchase inventories are computed. The

order size with the lowest total cost/ordering plus carrying of inventory is the economic order quantity.

We can see the numerical example of the above, by illustrating the following problem.

Table 1: Analytical Table

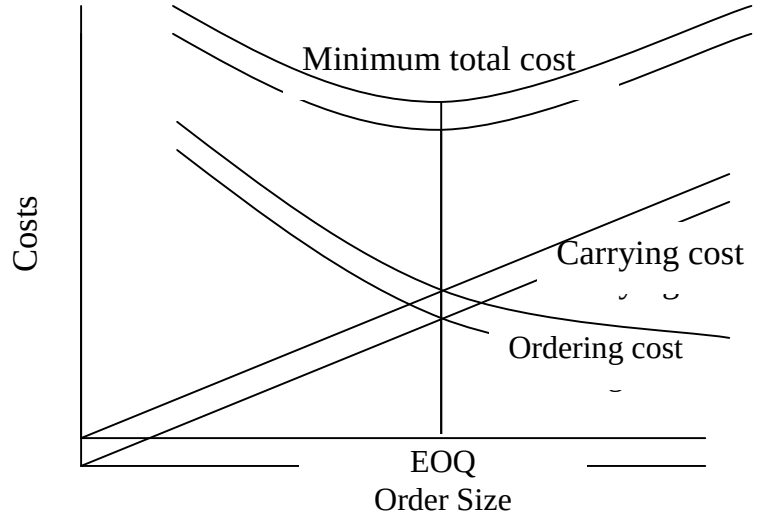
No of orders (N)	4	6	8	10	12	14	16
Order size(Q)	1500	1000	750	600	500	428.5	375
Average size (Q/2)	750	500	375	300	250	214.25	187.5
Total ordering cost (N×O)	1120	180	240	300	360	420	480
Total carrying cost (Q/2×C)	750	500	375	300	250	214.25	187.5
Total cost	870	680	615	600	610	634.25	667.5

From the above analytical table, EOQ is 600 units where total minimum costs is Rs. 600, ordering and carrying costs are equal ie. Rs.300 each.

iii) Graphical Approach

Interaction between ordering and carrying cost determines EOQ. Ordering and carrying cost are equal during a specific period and total cost to order and carrying is the lowest at the point.

Figure-1: Graphical Presentation of EOQ



From the above figure, carrying, ordering and total costs are plotted on vertical axis and horizontal axis is used to present the order size, where total carrying costs increases as the order size increases because on an average, a larger inventory level will be maintained and ordering costs decline with the increase in order size because the larger order size means less number of orders. the total costs decline in first instance, but they start raising when the decrease in average ordering cost is more than offset by the increase in carrying cost. The economic order quantity occurs at the point Q where the total cost is minimum (Pandey, 1994, p-762).

2.5.1.2 Re-order Point

"When should an order for the purchases of an item be placed, so that the concern does not run out of goods?" The re-order level provides the answer to this question. The re-order point is that inventory level at which an order should be placed to the inventory. To determine the re-order point under certainty, we should know: (a) lead time (b) average daily consumption (c) economic order quantity. Lead time is the time, normally taken in replenishing inventory after the order has been placed. By

certainty we mean that usage and lead time don't fluctuate. Re-order point is determined by the following formula.

i) Re-order level = lead time ×Daily consumption

ii) Re-order level = Maximum consumption × Maximum lead time

iii) Re-order level = Minimum level + (Lead time × Daily consumption)

If a new order is received, a goods-in-transit inventory will build up. Generally, goods in transit exist when lead time becomes longer than normal. If the order is already placed and the goods have been moved from the supplier but not received, such situation is known as goods in transit (Ibid, p-4.34)

ROL = Lead time × Average daily consumption-Goods lost in transit

Re-order level answer, the important question in any organization’s inventory management. The question is "when an order should be placed so that the firm does not run out the stock."

2.5.1.3 Safety Stock

The demand for material may fluctuate from day to day or from week to week. Similarly, the actual delivery time may be different from the normal lead time. If the actual usage increases or the delivery of inventory is delayed, the firm can face a problem of stock out. The stock-out can prove to be costly for the firm. Therefore, in order to guard against the stock out, the firm may maintain a safety stock. For maintaining safety stock, extra cost of goods (Materials) should be invested and additional carrying cost in proportion to the level of safety stock should be incurred. The level of such extra investment is determined by desirable trade-off between protection against demand and supply uncertainties and the level of investment in safety stock.

Safe stock = Average usage × Lead time

2.5.1.4 Minimum Stock Level

Minimum stock level means the lowest level of inventory, which must be maintained in hand at any time. The quantity is fixed so that production and selling may be held up due to shortage of materials. Some factors are taken into consideration.

i) Lead-time, i.e. times tag between indenting and receiving of the inventory.

ii) Rate of consumption of the material during the lead time.

iii) By the nature of inventory, minimum level is not required against in case of a special material, which is required against customer's specific order.

Minimum stock level can be calculated by the following formula.

Minimum stock level = ROL- (Normal consumption × Normal re-order period)

2.5.1.5 Maximum Stock Level

Maximum stock level refers to the maximum quantity of an item of inventory, which can be held in stock at any time. Stock should not exceed this quantity. It should be set on the basis of

i) Risks of obsolescence and deterioration

ii) Delivery time needed

iii) Storage space available and cost storage

Formula for computing maximum level

Maximum level = ROL + ROQ- (minimum consumption × minimum reorder period

2.5.1.6 Danger Stock Level

Danger stock level means normal issue of inventory should be stopped and issue are made only under specific instructions. The purchase officer will make special arrangements to get the materials, which reach at their danger levels so that the production may not stop due to shortage of material (Ibid, p-2.35)

Danger level = Average consumption × Maximum re-order period for emergency period.

2.5.1.7 Average Stock Level

In the sense of average, the store must be keeping in average stock that is called average stock level. Which is calculated by following formula, Average stock level = Minimum stock level +1/2EOQ.

2.5.2 ABC Analysis

ABC analysis is a mechanism for controlling inventories in an organization having multi product stores/stock. The organization should classify inventories to identify which items should receive the most effort in controlling. The firm should be selective in its approach to control investment in various types of inventories. This analytical approach is called the ABC analysis and tends to measure the significance of each item of inventories in terms of its value. The high value items are classified as "A items", and would be under the highest control. "C items" represent relatively least value and would be under simple control "B items" fall in between these two categories and require reasonable attention of management. This technique of stock control is also known as stock control. According to the value method or always better control method or proportional parts value analysis method. Thus under this technique of material controls, material or proportional parts value analysis method. Thus under this technique of material controls, materials are listed in 'A', 'B' and 'C'

categories in descending order based on money value of consumption. The ABC analysis concentrates on important items and is also known as control by important and exception (CIE) (H. J. Richmond, 1969, p-74)

Example of ABC analysis

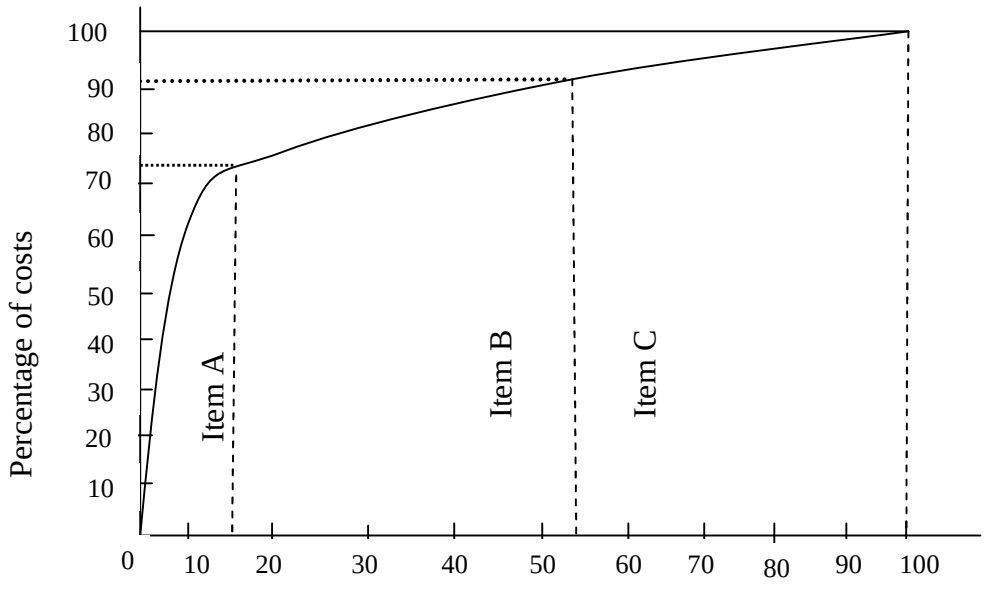
Group	**percentage of items**	**Percentage of cost**
A	10%	70%
B	20%	25%
C	70%	5%

In the above table, the item of a group which account for a high percentage of costs while less stringed control is adequate for categories B and very little control would be sufficient for category 'C' item.

The graphical representation of ABC analysis may be as given below.

Figure 2

Graphical Presentation of ABC Analysis



The above graphic presentations indicate that “Item A” forms a minimum proportion, 15 percent of total units of all items, but represent the highest value, 70 percent. On the other hand "Item C' represent 55 percent of the total units and only 10 percent of the total value. "Item B" occupies the middle place. Items A and B jointly represent 45 percent of the total units and 90 percent of the investment. More than half of the total units are item C, representing merely 10 percent of investment. Thus, a highest control should be exercised on "Item A" in order to maximize profitability on its investment. In case of "Item C", simple controls will be sufficient (Pandey, 1994, P-776).

2.5.3 Perpetual Inventory System

Perpetual inventory system is comprised of bin cards, store ledger and continuous stock taking is the physical verification (counting, weighting, measuring or listing etc) of the institute of cost and management account London," A system of records maintained by the controlling department, which reflects the physical movement of stocks and their current balance. There may be difference between the balance of stocks shown by perpetual and the actual balance of stock as ascertained by physical verification. The causes of such differences may be avoidable (clerical mistakes, pilferage and thefts, carelessness in materials/goods handling, short or over issue of materials/goods) and unavailable (loss due to shrinkage, evaporation, breakdown of fire, breaking up bulk material into smaller parts for issue and absorption of moistures). A stock adjustment account is opened for adjusting discrepancies between the physical balance and book balance. Excess or shortage is adjusted to store records; materials control account and stores adjustment accounts.

2.6 INVENTORY CONTROL SYSTEM

All the function of inventory management (purchase management, store keeping, issuing and pricing) should co-ordinate that will help in effective inventory control. Inventory management techniques like EOQ model; re-order system together with buffer stock can be used to establish proper inventory level. Depending upon the size of a concern and the nature of its inventories, inventory control system may be very simple to extremely complex. A simple control procedure is the red line method. For controlling purpose a red line is drawn around the inside to the bin at the level of reorder point, the inventory clerk places an order when redline shows. The two-bin method is other system of inventory control. First bin is assigned to the sufficient stock to meet current demand or production/ sales and second bin is assigned to the buffer stock. At first, issue are made from the first bin. When stock of first bin is finished, re-ordering occurs. Then the stock in the second bin is used to cover the requirement. When new stock is received, both bins are full and again same process is repeated. Besides these, several controlling are used in inventory control. ABC system, perpetual inventory system, EOQ systems are discussed in this second chapter.

2.7 INVENTORY MANAGEMENT AND ITS RELATION TO PROFIT PLANNING CONTROL

2.7.1 Concept of Profit Planning and Controls

Profit is considerable as the primary measure of business successes. The survival of the firm depends upon its ability to earn profit. Profit should be on among many, but not the sole objective of profit of both business and society. It is to be so formulated and pre-used to the legitimate social obligation by management. A company can make a social contribution only, if it is highly profitable (Ibid; p-3.36).

Planning is the guide sine concept of any organization or it is a basic function of organization. A fundamental purpose of management planning is to provide for a feed forward process. Management planning is a continuous process that includes setting enterprise objectives and goals, developing premises about the environment of entity, making decisions about courses of action, initiating actions to activate the plans, evaluating performance feed back for re-planning.

Control is the most important part of any organization. Without control, the desired goal cannot be achieved. So every manufacturing organization or company effective control process should be established. Control is used for the development and acceptance of objectives and goods, and moving an organization efficiently to achieve these objectives and goals.

Profit planning and control can be viewed as one of the major important approaches that have been developed to facilitate effective performance of the management. It is desired towards the final objectives of the organization. It has the ultimate objectives of attaining the optimum profit PCC using budgeting as a tool. A budget is future plan expressed in financial terms. It may also be short range or long range. Budget is one of the methods used for pre-planning and co-ordinating the activities of an enterprise. Some process of profit planning and control are given below.

i) Identification and evaluation of external variables

ii) Development of broad objectives of the enterprise

iii) Development of specific goals of the enterprise

iv) Development and evaluation of company strategies.

v) Executive management planning instruction

vi) Preparation and evaluation of project plans.

vii) Development and approval of strategies and tactical profit plans.

viii) Implementation of plans.

2.7.2 Setting Inventory Policies

Various factors should be considered to determine inventory policies; in a manufacturing concern. Some major factors are outlined below:

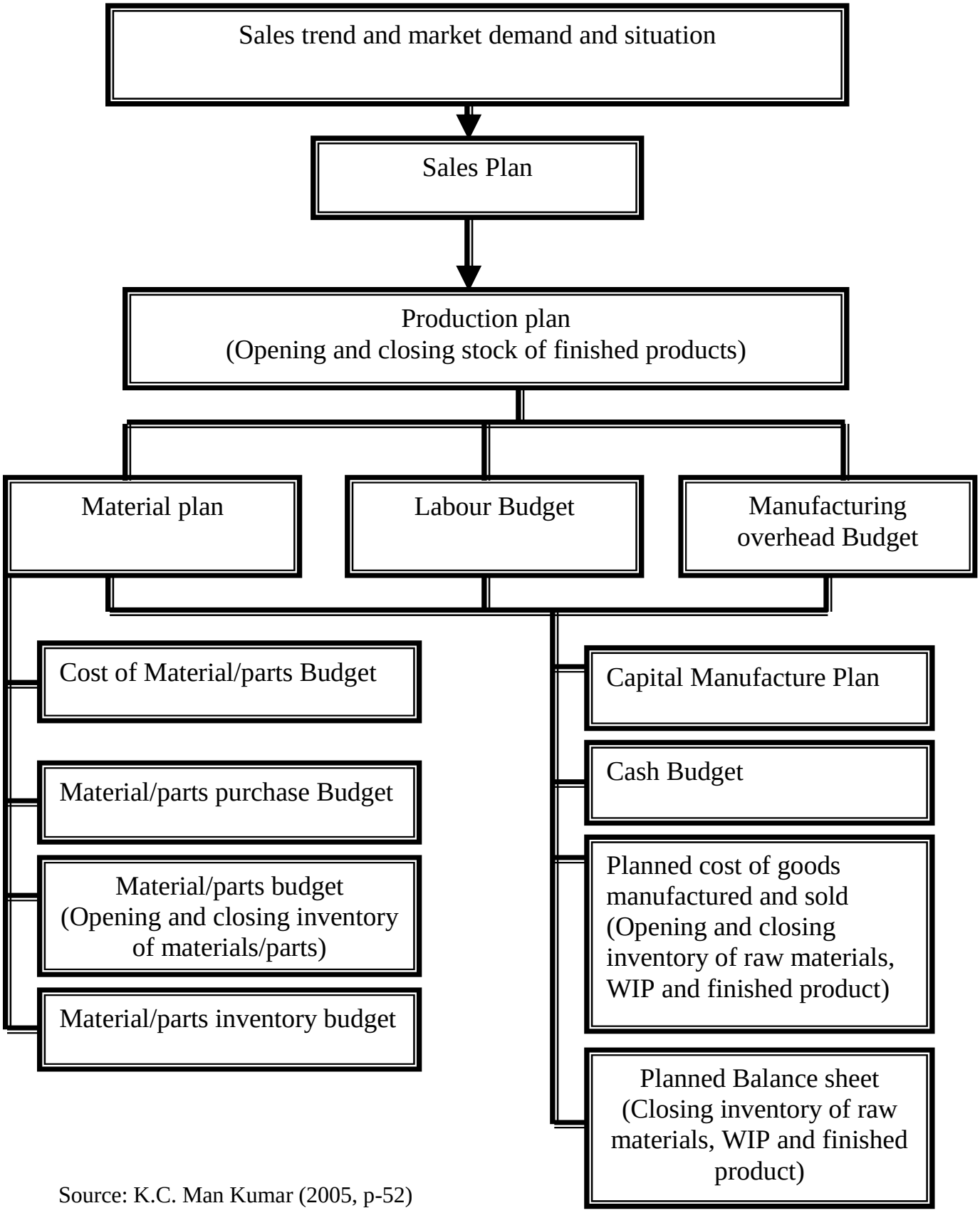
1) Quantities (units) needed to meet sales requirement.
2) Length of the production period
3) Strange facilities
4) Adequacy of capital to finance inventory production some time in advance of sales.
5) Distribution time requirements
6) Cost of holding inventory
7) Protection against labour shortage
8) Protection against materials and parts price increase
9) Risk evaluation

2.7.3 Profit Planning and Inventories

Inventory policies should be made harmonised with sales and production policies. Relation of inventories to profit planning can be well explained with the help of a flow chart.

Figure No: 3

Flow Chart of Profit Plan



Source: K.C. Man Kumar (2005, p-52)

In the above figure, profit plan have various types of inventories, involved in different levels. Opening and closing levels of inventories of finished products influence production plan. So level of inventories at production plan should be well-determined such that regular supply of finished product is ensured as per sales plan. To purchase the required material/plants for production, material/parts purchase quantity should be determined and it can be determined after determining the opening and closing level of materials/parts. Hence adequate level of opening and closing inventories of materials/parts is necessary to maintain regular production.

CHAPTER- III

RESEARCH METHODOLOGY

3.1 INTRODUCTION

To achieve the objectives of the study, research methodology purposes some methods. It includes research design, nature and sources of data, data gathering procedure, data processing procedure and methods of data analysis. This study tries to focus on how can the effective inventory management be maintained systematically, how can we control inventory management and how can we minimize the inventory property among the question.

3.2 RESEARCH DESIGN

To achieve the objectives of the research study the primary and secondary data from different source are used. Descriptive research design has been used to clarify the situation through presentation and analysis of various data as well. These studies attempt to obtain a complete and accurate description of a situation. Exploratory research design also has been used to provide the meaning of items.

3.3 NATURE AND SOURCES OF DATA

In the process of the study of this organization, secondary data have been used. Secondary data were collected from the following information.

Published data were collected through organization's record books. All the gathered data have been used according to need and requirement of this study.

i. Secondary data were directly obtained from various sources specially to obtain the data from official records. Unpublished documents related to chitwan, dairy farm.

ii. Books, articles, magazines, previous dissertations, reports and financial statements of KMSS provided by officials.

3.4 DATA GATHERING METHODS

Regarding to the sources of the data secondary data were directly obtained from various sources mentioned above specially to obtain the data from official records. The researcher had to visit the company frequently to get it from the records. All the gathered data have been used according to the need and requirement of the study.

3.5 DATA PROCESSING PROCEDURE

All financial statements (Balance sheet, profit and loss accounts, stock verification set and other related data) were collected from the company from analysed sources. After collection, data were grouped on the single place and analyzed thoroughly. After analyzing information it is re-arranged, summarized and presented in suitable table form and graphs to make analysis easy.

3.6 METHODS OF DATA ANALYSIS

After collecting the data they were analyzed using different techniques. In inventory management system financial and statistical tools were used to analyze the effectiveness of inventory management wherever necessary. The analytical tools used to analyze inventory management are described below.

a) Economic Order Quantity

In inventory management system there are too many techniques for analysis but the economic order quantity is the most important of all, and easy to understand. EOQ establishes the economic balance between the carrying cost and ordering costs

determining the quantities to be ordered. The economic order quantity is that inventory level where the total of ordering and carrying costs are used. Here is the mathematical formula used in calculation of EOQ.

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

Where,

A = Annual uses in units

O = Ordering cost

C = Carrying cost per unit

This is the simple formula for calculation of EOQ but graphic method and Trial and error method are also used in this study. At last the researcher has studied about the result by using hypothesis testing.

b) Selective inventory control: ABC Analysis

Every firm has different types of inventory and different type of value. The firm should pay attention to those which have highest value. The firm should therefore classify inventories to identify which item should receive the most effort in controlling inventory. This analytical method is called ABC analysis, where inventory of goods are classified into three different groups A, B and C. ABC analysis tends to measure the significance of each item of inventories in terms of its value. The high value of goods or items come under 'A items' and are be used in the highest control. "C items" fall in last position of the categories and are paid less attention and "B items" fall in between A and C and are paid medium attention.

c) Re-order level

In inventory control, when the inventory level goes down there must be needed to re-order other goods. So to keep sufficient level of inventory there should

be re-order. New supplies will be received before the stock reaches the minimum level. Re-order level is calculated on the basis of rate of consumption, minimum level and delivery time. There are some formulas used in calculation.

Re-ordering level = minimum level + consumption during the time required to get the fresh delivery (i.e. Daily requirement × time required for fresh delivery)

Re-order level = maximum consumption × maximum delivery time.

d) Safety stock

Safety stock is necessary for any manufacturing organization. How much safety stock to keep depends upon a company's policy. The size of safety stock is determined on the basis of predicable lead time and demand variation which can be calculated by using the following methods.

i. On situation when demand rate varies.

Safety stock = lead time (maximum demand rate-average demand rate)

ii. On the situation when both demand rate and lead time fluctuate.

Safety stock = (maximum lead time ×Average demand rate)

iii) On the situation lead-time varies demand uniform

Safety stock = (maximum lead time-average lead time × demand rate)

e) Turnover Ratio

Turnover Ratio shows the relation between inventory level and cost of goods sold. Turnover ratio indicates the quickness of the selling inventory. If a company has a high turnover ratio that indicates good inventory management, as a result finished goods are quickly sold at a desirable time. While calculating the inventory turnover ratio, this formula is used.

$$ITR \, \mathrm{X} \frac{Cost\ of\ Good\ Sold}{Average\ Inventory}$$

f) Ratio Analysis

Ratio analysis can determine the current status of the company's financial position and also forecast the future direction. Ratio analysis shows the clear relationship between two quantities figures. Here the researcher tries to study about inventory in different situations. Ratios are analyzed as follows.

i) Inventory to total fixed ratio = $\frac{Inventory}{Total\ fixed\ Assets}$

ii) Inventory to sales ratio = $\frac{Inventories}{Net\ sales}$

iii) Inventory to current assets ratio = $\frac{Inventories}{Current\ Assets}$

g) Regression Analysis

If the two or more variables are related to each other we can predict the value of on variable for given value of the other variable. For instance, if price and quantity demand of goods are related, we can predict the quantity demand for several years' given price. Hence, regression is a statistical device used to estimate or predict the variable of interest from the known values of other variable Regression analysis is a mathematical measure of the average relationship between two or more variables in terms of original units of the data.

In this analysis regression equation Y and X are used. In calculation of regression, dependent variable Y is determined by the independent variable X by using following equation.

$Y = a + bx$…….(i)

Where,

Y = Dependent variable

X = Independent variable

a = Intercept of the line

b = Slope of the line (it measures the average change in the value of Y as a result of one unite change in value of X), It is also called regression coefficient of Y on X. In other words, it measures the rate of relationship.

The values of the contents a and b can be determined by solving following two normal equations (applying principle of method of least squares).

Now, substituting the value of a and b in equation (i), we get required estimated regression of Y on X.

$\Sigma Y = na + b\Sigma x$

$\Sigma xy = a\Sigma x + b\Sigma x^2$

Where n is the number of pair observation.

This topic is related with the analysis of the relationship between.

i) Closing inventory and net sales, where net sales are the dependent svariables Y and closing inventory is the independent variable X.

ii) Net sales and sales expenses, where net sales are the dependent variables Y and sales expenses are the independent variable X.

iii) Net profit and average inventory, where net profit is dependent variable Y average inventory is independent variable X.

CHAPTER-IV

DATA PRESENTATION AND ANALYSIS

Data presentation and analysis is the main portion of any research work. Raw data available in the source of related organization or companies are needed to process and analyze properly which helps to come to the conclusion. In this chapter, data and information collected from the company will be analyzed. In this regard an inventory control technique implies to control inventory of Dairy Development Corporation. There are many techniques to control the inventory management. These techniques are as follows:

4.1 ECONOMIC ORDER QUANTITY MODEL

The inventory model is very often popularized by the use of the term economic order quantity (EOQ). EOQ refers to the size of order that leads to lowest total cost of order costs and carrying costs. In this analysis, to calculate EOQ, only one raw material (milk) is considered. Dairy Development Corporation has different types of production, but here only the condition of milk is analyzed. KMSS uses three types of raw materials among which milk additive material is difficult to calculate. The company collects materials on annual tender basis, so it is difficult to calculate the ordering and carrying cost. Packing milk is also difficult to calculate by using EOQ model because there is not similarity in the packing quantity. Some packs are big; some are small having different weight measurement. So in this study only milk is taken, which is daily processed in KMSS (DDC).

KMSS produces many other milk products, but lack of proper record keeping system the data are not sufficient to calculate EOQ. Here only six years' data are used for the calculation of EOQ (i.e. from 2062/063. to 2067/068). We do not involve

additive and packing material with respect to EOQ. In the following EOQ calculation of these six years, mathematical method and trial and error method are used.

EOQ Determination of Milk

a) EOQ for fiscal year 2062/063 B.S.

To calculation the Economic order quantity of the fiscal year 2061/062; following data are available.

Annual requirement = 7, 16, 41,670 litres

Total ordering cost = Rs. 91, 98,420

Ordering cost per order = Rs. 25,340

Carrying cost = Rs. 0.78 per litre

No of orders = 363 times

i) Mathematical/Formula Method

Given,

Annual requirement (A) = 7164670 litres

Ordering cost per order (O) = Rs. 25, 340

Carrying cost per litre (C) = Rs 0.78

Applying formula,

$$EOQ = \sqrt{\frac{2AO}{C}}$$

$$= \sqrt{\frac{2 \mid 71641670 \mid 25{,}340}{0.78}}$$

$$= 2185719.15 \sim 2185719 \text{ litres}$$

$\therefore$ EOQ = 2185719 litres

ii) Trial and Error/Tabulation method

Trial and error method of calculating EOQ determines the sum of ordering and carrying cost, which is the least total cost and that order size will be the economic order quantity. Trial and error method also called tabulation method is calculated by using the table format. In this calculation different order sizes are used to check the status of total cost. To Calculate EOQ by trial and error method we use the following formula:

$$\text{No of order size} = \frac{Annual\ demnd}{EOQ}$$

$$= \frac{71641670}{2185719}$$

$$= 32.78 \sim 33 \text{ times}$$

$$\text{Order size} = \frac{Annual\ demand}{No\ of\ order}$$

$$\text{Average inventory} = \frac{Order\ size}{2}$$

Ordering cost = No of order × ordering cost per order

Carrying cost = Average inventory × carrying cost pr litre.

Total cost = Ordering cost + carrying cost

Table-2

Calculation of EOQ

No of order	Order size	Average inventory	Ordering cost	Carrying cost	Total cost
20	3582083.50	1791041.75	506800	1361191.73	1867991.73
25	2865666.80	1432833.40	633500	1088953.38	1722453.38
30	2388055.67	1194027.83	760200	907461.15	1667661.15
33	2170959.70	1085479.85	836220	824964.68	1661184.68
40	1791041.75	895520.88	1013600	680595.87	1694195.87
150	477611.13	238805.57	3801000	186268.34	3987268.34
363	197359.97	98679.99	9198420	74996.79	9273416.79

Source: DDC

The above table shows that lowest inventory cost of KMSS is Rs. 1661184.68 which includes ordering cost of Rs. 836220 and carrying cost of Rs. 824964.68 and it takes order 33 times in a year, where total cost of inventory is minimum.

Above calculation table shows that if the company order is less then 33 times the total cost is high. When KMSS orders 30 times the ordering cost is Rs. 760200 and carrying cost Rs. 907461.15. The total cost of the 30 times is Rs 1667661.15; it is grater than the order size of 33 times. When the company orders 35 times, total amount is also higher than 33 times. Ordering cost is Rs. 886900 and carrying cost Rs. 777823.85 and the total is Rs. 1664723.85. KMSS should order 33 times in a year but the company has placed an order of 363 times; where the total inventory cost is of Rs. 9273416.79. This amount is very high as compared with 1661184.68. Company orders the 363 times in a year because it needs daily fresh material (milk) to provide

consumer with good fresh product. This is company's policy to supply the fresh milk and milk product.

Calculation shows that, if KMSS (DDC) orders less than 33 times in a year, carrying cost increases and ordering cost decreases. So the total cost of inventory increases. If KMSS (DDC) orders more than 33 times ordering cost increases and carrying cost decreases. The total cost also increases. So in the optimal order size, the total cost of inventory is minimum and economic order quantity is determined. While calculating of the total cost, ordering cost and carrying cost play major roles. When ordering cost increases carrying cost will decreases and when carrying cost increases ordering cost decreases.

b) EOQ for fiscal year 2062/063

To calculate EOQ, some information about KMSS (DDC) is needed. In KMSS the following data are available

Annual requirement = 66934400 litres

Total ordering cost = Rs. 12260325

Ordering cost per order = Rs. 33775

Carrying cost = Rs. 0.80 per litre

No of orders = 363 times

1. Mathematical/Formula Method

Given,

Annual requirement (A) = Rs. 66934400 litres

Ordering cost per order (O) = Rs. 33775

Carrying cost per litre (C) = Rs. 0.80

Applying formulas,

$$EOQ=\sqrt{\frac{2AO}{C}}$$

$$=\sqrt{\frac{2 \mid 66934400 \mid 33775}{0.80}}$$

$$= 2377345.87 \sim 2377346 \text{ litres}$$

$\therefore$ EOQ = 2377345.87 litres

ii) Trial and Error/Tabulation Method.

To calculate EOQ by trial and error method we can use the following formula.

$$\text{No of order size} = \frac{Annual\ demand}{EOQ}$$

$$= \frac{66934400}{2377346}$$

$$= 28.18 \sim 28 \text{ times}$$

$$\text{Order size} = \frac{Annual\ demand}{No\ of\ order}$$

$$\text{Average inventory} = \frac{Order\ size}{2}$$

Ordering cost = No of order ×ordering cost per order.

Carrying cost = Average inventory × carrying cost per litre

Total cost = Ordering cost + carrying cost

Table: 3

Calculation of EOQ

No of order	Order size	Average inventory	Ordering cost	Carrying cost	Total cost
15	4462293.33	2231146.67	506625	1784917.33	2291542.33
20	3346720	1673360	675500	1338688	2014188
24	2788933.33	1394466.67	810600	1115573.33	1926173.33
28	2390514.29	1195257.14	945700	956205.7	1901905.71
50	1338688	669344	1688750	535475.20	2224225.20
180	371857.75	185928.89	6079500	148743.11	6228243.11
365	184392.29	92196.14	12260325	73756.91	12334081.91

Source: DDC

From the tabulation method it is clear that the lowest inventory cost of KMSS has Rs. 1901905.71 which includes total ordering cost of Rs. 945700 and total carrying cost of Rs. 956205.7 and it takes 28 times in a year. KMSS should order 28 times in a year but the company has placed 363 times which involves total inventory cost of Rs. 12334081.91. This amount is very high as compared with Economic order quantity.

C) EOQ for fiscal year 2063/064

Following data are available in KMSS:

Annual requirement = 70303300 litres

Total ordering cost = Rs. 11202906

Ordering cost per order = Rs. 30862

Carrying cost = Rs. 1.10 per litre

No of order = 363 times

i) Mathematical/ Formula Method

Given,

Annual requirement (A) = 70303300 litres

Ordering cost per order (O) = Rs. 30862

Carrying cost per litre (C) = Rs. 1.10

Calculation by formula

$$EOQ = \sqrt{\frac{2AO}{C}}$$

$$= \sqrt{\frac{2 \mid 70303300 \mid 30862}{1.10}}$$

= 1986179.73 ~ 1986180 litres

…EOQ = 1986180 litres

ii) Trial and Error/Tabulation Method

Formula are used to determine the no of order, order size, average inventory, ordering cost, carrying cost, and total cost, where total inventory cost is minimized, that will be the economic order quantity in trial and error method.

$$\text{No of order} = \frac{Annual\ demand}{EOQ}$$

$$= \frac{70303300}{1986180}$$

= 35.40 ~ 35 times

$$\text{Order size} = \frac{Annual\ demand}{No\ of\ order}$$

$$\text{Average inventory} = \frac{Order\ size}{2}$$

Ordering cost = No of order × ordering cost per order.

Carrying cost = Average inventory × carrying cost per litre.

Total cost = Ordering cost + carrying cost

Table 4

Calculation of EOQ

No of order	order size	Average inventory	Ordering cost	Carrying cost	Total cost
20	3515165	1757582.50	617240	1933340.75	2550580.75
25	2812132	1406066	771550	1546672.60	2318222.60
30	2343443.33	1171721.67	925860	1288893.83	2214753.83
35	2008665.71	1004332.86	1080170	1104766.14	2184936.14
55	1278241.82	639120.91	1697410	703033	2400443
210	334777.62	167388.81	6481020	184127.69	6665147.69
363	193673	96836.50	11202906	106520.15	11309426.15

Source: DDC

In the above calculation table the total minimum cost lies in 35 orders, where the sum of total ordering and carrying cost is minimum. If the company orders less than 35 times, carrying cost increases and ordering cost decreases but the sum of total inventory cost will be high. If the company order is more than 35 times, ordering cost increases and carrying cost decreases but total cost will be high. 363 is the company's order size, where ordering cost is Rs. 11202906 and carrying cost Rs. 106520.15 and total inventory cost Rs. 11309426.15. The inventory cost is very high as compared with No. of order 35.

d) EOQ for fiscal year 2064/065

According to the KMSS record following data are available.

Annual requirement = 71110000 litres.

Total ordering cost = Rs. 10846440

Ordering cost per order = Rs. 29880

Carrying cost = Rs. 1.11 per litre

No of order = 363 times

i) Mathematical/Formula Method

Annual requirement (A) = 71110000 litres.

Ordering cost per order (O) = Rs. 29880

Carrying cost per litre (C) = Rs. 1.11

Applying formulas,

$$EOQ = \sqrt{\frac{2AO}{C}}$$

$$= \sqrt{\frac{2 \mid 71110000 \mid 29880}{1.10}}$$

$$= 1956631.97 \sim 1956632 \text{ litres}$$

…EOQ = 1956632 litres

ii) Trial and Error/Tabulation Method.

We have used some formula to determination of economic order quantity in tabulation method.

$$\text{No of order size} = \frac{Annual\ demand}{EOQ}$$

$$= \frac{71110000}{1956632}$$

$$= 36.34 \sim 36 \text{ times}$$

$$\text{Order size} = \frac{Annual\ demand}{No\ of\ order}$$

$$\text{Average inventory} = \frac{Order\ size}{2}$$

Ordering cost= No of order × ordering cost per order

Carrying cost = Average inventory × carrying cost per litre.

Total cost = Ordering cost + Carrying cost.

Table 5

Calculation of EOQ

No of order	**Order size**	**Average inventory**	**Ordering cost**	**Carrying cost**	**Total cost**
25	2844400	1422200	747000	1578642	2325642
30	2370333.33	1185166.67	896400	1315535	2211935
35	2031714.29	1015857.14	104500	1127601.43	2173401.43
36	1975277.78	987638.89	1075680	1096279.17	2171959.17
40	1777750	888875	1195200	986651.25	2181851.25
190	374263.16	187131.58	5677200	207716.05	5884916.05
363	195895.32	97947.66	10846440	108721.90	10955161.90

Source: DDC

In the above calculation table EOQ determines the calculation of ordering cost and carrying cost. Economic order quantity is determined, using total minimum cost where the order size is 36, the ordering cost is Rs. 1075680 and carrying cost Rs. 1096279.17. The total cost of 36 orders size is minimum. KMSS should determine 36 times of order but the company has 363 order size where inventory cost will be Rs. 10955161.90. The total amount of inventory is very high. If company orders less than 36 times in a year carrying cost increases and ordering cost decreases and finally total inventory cost increases. If DDC orders more than 36 times, carrying cost decreases and ordering cost increases.

e) EOQ for fiscal year 2065/066

To calculate EOQ, KMSS provided the following information and date:

Annual requirement = 67590000 litres

Total ordering cost = Rs. 11255904

Ordering cost per order = Rs. 31008

Carrying cost = Rs. 0.90 per litre

No of order = 363 times

1) Mathematical/Formula Method

Given,

Annual requirement (A) = 67590000 litres

Ordering cost per order (O) = Rs. 31008

Carrying cost per litre (C) = 0.90

Using the formula,

$$EOQ = \sqrt{\frac{2AO}{C}}$$

$$= \sqrt{\frac{2 \mid 67590000 \mid 31008}{0.90}}$$

= 2158101.39 ~ 2158101 litres

…EOQ = 2158101 litres

ii) Trial and error/Tabulation method

We have used formula to determine the No-of order size. And that order size where total inventory cost will be minimized, will be the economic order quantity in trial and error method.

$$\text{No of order size} = \frac{Annual\ demand}{EOQ}$$

$$= \frac{67590000}{2158101}$$

$$= 31.32 \sim 31 \text{ times}$$

$$\text{Order size} = \frac{Annual\ demand}{No\ of\ order}$$

$$\text{Average inventory} = \frac{Order\ size}{2}$$

Ordering cost = No of order × ordering cost per order

Carrying cost = Average inventory × carrying cost per litre.

Total cost = Ordering cost + carrying cost.

Table: 6

Calculation of EOQ

No of order	**Order size**	**Average inventory**	**Ordering cost**	**Carrying cost**	**Total cost**
20	3379500	1689750	620160	1520775	2140935
25	2703600	1351800	775200	1216620	1991820
28	2413928.57	1206964.29	868224	1086267.86	1954491.86
31	2180322.58	1090161.29	961248	981145.16	1942393.16
40	1689750	844875	1240320	760387.50	2000707.50
200	337950	168975	6201600	152077.50	6353677.50
363	186198.35	93099.17	11255904	83789.26	11339693.26

Source: DDC

The above calculation table shows that when KMSS orders 31 times the total cost is minimum, where total ordering cost is Rs. 961248 and carrying cost Rs. 981145.16. The sum of inventory cost is Rs. 1942393.16 which is the lowest amount of inventory cost. If KMSS(DDC) places an order 25 times in a year that result

carrying cost increased to Rs. 1216620 and ordering cost decreased to Rs. 775200 and finally total inventory cost increased to Rs 1991820 which will be greater than 31 times. If KMSS orders more than 31 times in a year that results carrying cost decreased and ordering cost increased and finally total inventory cost increased. KMSS should order 31 times in a year but the company has placed an order of 363 times which involves total inventory cost of Rs. 11339693.26. This amount is very high as compared with Rs. 1942393.16.

f) EOQ for fiscal year 2066/067

On the basis of KMSS records, following data are available

Annual requirement = 69955740 litres

Total ordering cost = Rs. 11862840

Ordering cost per order = Rs. 32680

Carrying cost = Rs. 1.08 per litre

No of orders = 363 times.

i) Mathematical/ Formula Method

Given,

Annual requirement (A) = 69955740 litres

Ordering cost per order (O) = RS. 32680

Carrying cost per litre (C) = Rs. 1.08

Applying formulas,

$$EOQ = \sqrt{\frac{2AO}{C}}$$

$$= \sqrt{\frac{2 \mid 69955740 \mid 32680}{1.08}}$$

= 2057575.70 ~ 2057576 litres

…EOQ = 2057576 l litres

ii) Trial and Error/Tabulation Method

For calculation of EOQ by using trial and error method, some formulas are used.

$$\text{No of order size} = \frac{Annual\ demand}{EOQ}$$

$$= \frac{69955740}{2057576}$$

$$= 34 \text{ times}$$

$$\text{Order size} = \frac{Annual\ demand}{No\ of\ order}$$

$$\text{Average inventory} = \frac{Order\ size}{2}$$

Ordering cost = No of order × ordering cost per order

Carrying cost = Average inventory × carrying cost per litre

Total cost = Ordering cost + carrying cost.

Table: 7

Calculation of EOQ

No of order	order size	Average inventory	Ordering cost	Carrying cost	Total cost
10	6995574	3497787	326800	3777609.96	4104409.96
20	3497787	1748893.50	653600	1888804.98	2542404.98
30	2331858	1165929	980400	1259203.32	2239603.32
34	2057521.77	1028760.88	1111120	1111061.75	2222181.75
40	1748893.50	874446.75	1307200	944402.49	2251602.49
175	399747.09	199873.54	5719000	215863.43	5934863.43
363	192715.54	96357.77	11862840	104066.39	11966906.39

Source: DDC

From the above tabulation method it is clear that the lowest inventory cost of KMSS is Rs. 2222181.75 which includes total ordering cost of Rs. 1111120 and total carrying cost Rs. 11111061.75 and it takes 34 times in a year. KMSS should order 34 times in a year but the company has placed 363 times which involves total inventory cost Rs. 11966906.39. This amount is very high as compared with EOQ.

After calculation of EOQ by using both formula method and tabulation method it is proved that economic order quantity lies on the lowest inventory cost. In the above calculation we saw the status of economic order quantity by applying the method of EOQ but company has its own policy to order. According to the company's policy no of order is 363 times in a year so here company's economic order quantity is calculated by using following formula.

$$\text{EOQ (Company)} = \frac{Annual\ demand}{No\ of\ orders}$$

Table: 8

Economic Order Quantity of KMSS

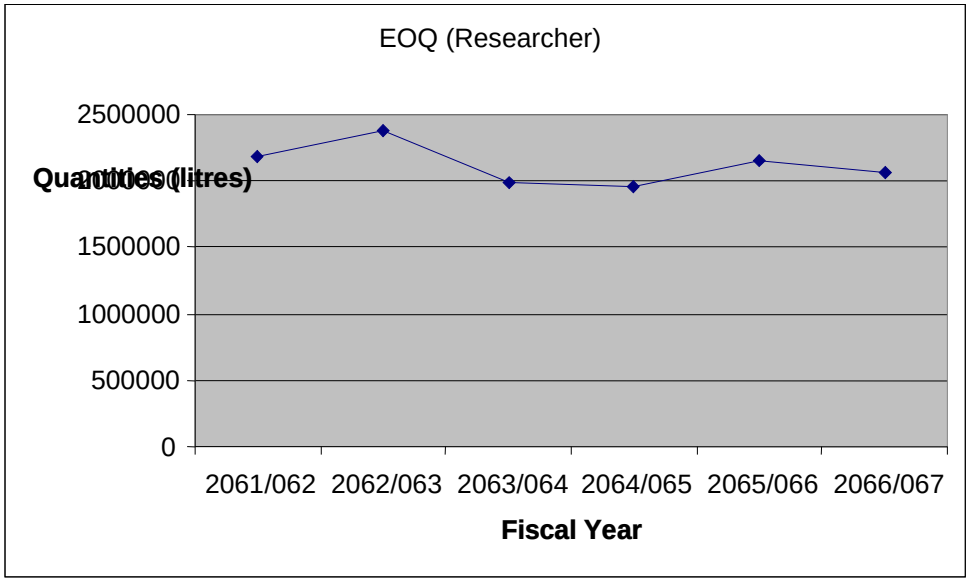
Fiscal year	EOQ (Researcher)	EOQ (Company)	Annual demand	No of order (Company)
2062/063	2185719	197360	71641670	363 times
2063/064	2377346	184392	66934400	363 times
2064/065	1986180	193670	70303300	363 times
2065/066	1956632	195895	71110000	363 times
2066/067	2158101	186198	67590000	363 times
2067/068	2057576	192716	69955740	363 times

Source: DDC

The table shows economic order quantity of KMSS. Two types of EOQ are in the table. On the one side a researcher calculates the economic order quantity to use theory of EOQ and on another side company has its own policy to order milk. Following figure shows the status of EOQ.

Figure 4

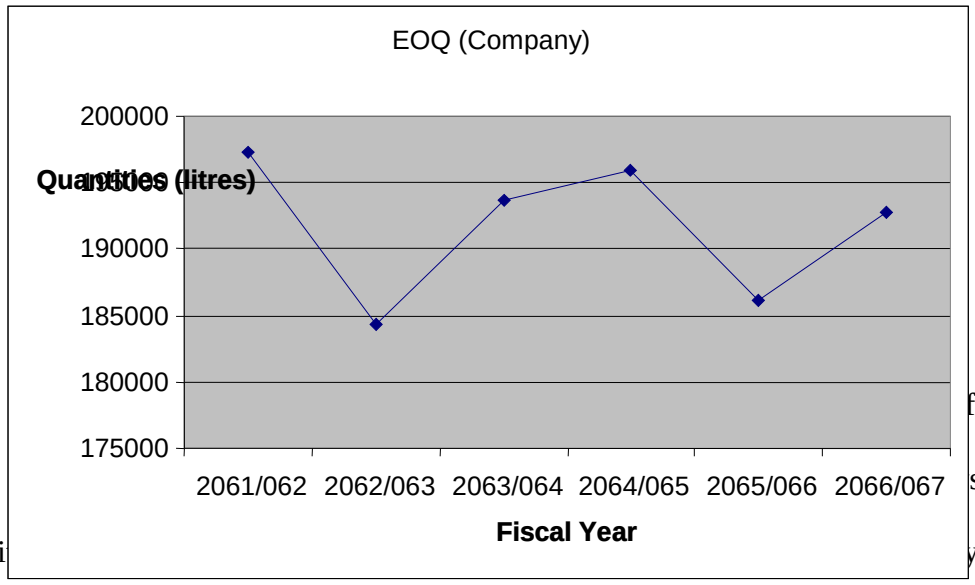
Graphical Presentation of EOQ of KMSS (*From researcher's point of view***)**



Given figure shows the economic order quantity of different six fiscal years. Where vertical axis shows the quantities and horizontal axis shows the different fiscal year. In fiscal year 2062/063seconomic order quantity shows 2185719 litres and so on other year. Graphic line fluctuates every year because of the difference of annual requirement and no of order size.

Figure: 5

Graphical Presentation of EOQ of KMSS (*The Company's point of view*)



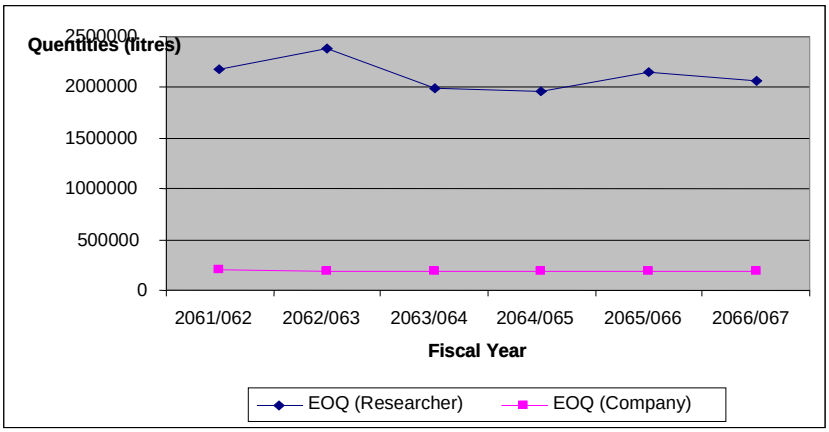
fiscal years, s the quanti yzing it on graphical view, size of economic order quantity seems very small because of the greater no of order ie.363 times.

From the above analysis it is seemed that KMSS could not follow the economic order quantity in ordering milk. Rather KMSS totally follows the every day's demand. The reason behind this is the perishable product (milk). Milk can not be stored more than 2 days. For KMSS this short period is spent in collecting and transporting milk to the chilling centre and hence KMSS can not follow the EOQ technique.

Now both graphical figures are presented in a single graph, which will show the comparative status of economic order quantity of KMSS.

Figure: 6

Graphical Presentation of EOQ of KMSS



4.1.1 Testing of Hypothesis

Hypothesis means a tentative theory or supposition provisionally adopted to explain certain facts and to guide in the investigation of other. The test of hypothesis is a process of testing significance regarding the parameter of the population on the basis of the sample drowns from the population. Thus the test of hypothesis discloses whether the difference between the computed statistical and hypothesis parameter is significant. In statistic, by a hypothesis we mean a tentative conclusion logically drawn regarding any parameter of the population. The statistical hypothesis may be divided in to two types, Null hypothesis and alternative hypothesis. There is direct relationship between null and alternative hypothesis.

a) Null hypothesis

A statistical hypothesis which is started for the purpose of possible acceptance is called a null hypothesis and is denoted by Ho for example null hypothesis may be expressed symbolically as.

Ho = μ =120

While formulating a null hypothesis we should take care of the following two points.

i) If we want to test the significance of the difference between two sample statistics than we formulate a null hypothesis that the difference is not significant. This implies that the difference is just due to fluctuation of sampling.

Ho= μ= x

ii) If we want to test any statement about the population we formulate the null hypothesis that it is true. For example if we want to find whether the population mean has specified value μ_0, then we formulate the null hypothesis,

Ho:μ =μ 0.

b) Alternative hypothesis

Any hypothesis, which is complementary to the null hypothesis is called an alternative hypothesis and is denoted by H_1. Generally we use 3 types of alternative hypothesis.

i) If the given sample com from the given population whose mean is 24 and sample mean (X) = 21

Ho: μ = 24

H1: μ ≠24 (μ>24; μ<24)

It is called two tailed alternative hypothesis

ii) If the samples come from the population whose population mean is less than exist one and population mean μ=24 sample means (X) = 21

Ho: $\mu = 24$ the given sample come from the given population whose population mean is 24 and difference in population mean and sample mean is due to sample fluctuation.

H1: $\mu < 24$, the given sample come from this whose population mean is less than 24.

It is called left tail alternative hypothesis.

iii) If the given samples come from the population whose population mean is grater than existing one. $\mu = 24$, $X = 27$

Ho: $\mu = 24$

H1: $\mu > 24$

It is called right tailed alternative hypothesis.

Here, we use t- test for hypothesis testing because sample size is less then 30 ($H < 30$).

Table: 9

EOQ of Milk and t-test (in litres)

Fiscal year	**EOQ (Researcher)**	**Company's order quantity at a time (Daily)**	**$(X-\bar{X})2$**	**$(Y-\bar{Y})2$**
2062/063	2185719	197360	4285011600	31967716
2063/064	2377346	184392	66093725569	53494596
2064/065	1986180	193673	17977178241	3869089
2065/066	1956632	195895	26773795129	17547721
2066/067	2158101	186198	1432016964	30338064
20667/068	2057576	192716	3929158489	1020100
	ΣX=12721554	ΣY=1150234	$\Sigma(X-\bar{X})^2$= 120490885992	$\Sigma(Y-\bar{Y})^2$= 138237286
Mean	2120259	191706		
SD	155236	5258		
CV	7.32%	2.74%		

Source: DDC

Here,

Let x and y are the EOQ determined by researcher and company respectively.

Working note

Researcher

$\bar{X} = \frac{\varepsilon}{N}$

$= \frac{12721554}{6}$

= 2120259

Company

$\bar{Y} = \frac{\varepsilon}{N}$

$= \frac{1150234}{6}$

= 191706

SD dX = $\sqrt{\frac{fX\ Z X\bar{A}^{2}}{n\ Z1}}$

= $\sqrt{\frac{120490885992}{6\ Z1}}$

= 155236

CV X = $\frac{|i}{i}$

= $\frac{155236}{2120259}$

= 7.32%

SD dY= $\sqrt{\frac{fY\ Z\overline{Y}\bar{A}^{2}}{n\ Z1}}$

= $\sqrt{\frac{138237286}{6\ Z1}}$

= 5258

CVY = $\frac{|Y}{Y}$

= $\frac{5252}{191706}$

= 2.74%

1) Testing Difference between Means of two Samples (Independent samples)

Null hypothesis Ho: µx= µy (the samples have been drawn from the normal populations with the same mean. There is no significance difference between two mean of EOQ determined by the researcher and company.

Alternative hypothesis H1: µx ≠ µy (the samples have not drawn from the normal populations with the same mean. There is significant difference between two mean of EOQ determined by the researcher and company.

Test statistic,

$$t = \frac{\overline{X}\ Z\overline{Y}}{S} \mid \sqrt{\frac{n_1 \mid n_2}{n_1\ \Gamma\ n_2}}$$

Where,

$\overline{X}$ = mean of the researcher's calculation

$\overline{Y}$ = mean of the company's calculation

n_1 = No of observations in the researcher's calculation

n_2 = No. of observations in the company's calculation

S = combined standard deviation.

Therefore,

$$t = \frac{2120259 - 191706}{109831} \times \sqrt{\frac{6 \times 6}{6 + 6}}$$

$$= 17.56 \times 1.73$$

$$= 30.38$$

…/ t / = 30.38

Degree of freedom = $n_1 + n_2 - 2 = 6+6-2 = 10$

Level of significance (a) = 5%

Critical value: The tabulated value of t for two tail test at 5% level of significance and for 10 d. f. is 2.228.

Decision: Since calculated value of 't' is greater than tabulated value, therefore the difference is significant and null hypothesis is being rejected or not accepted at 5% level of significance on (two tailed test). i.e.; the mean of the sample has not been drawn from the normal population.

Working

$$S = \sqrt{\frac{1}{n_1 + n_2} \times \left(f_x (x - \bar{x})^2 + f_y (y - \bar{y})^2 \right)}$$

$$= \sqrt{\frac{1}{6 + 6 - 2} \times (120490885992 + 138237286)}$$

= 109831

2) Significance test of the mean, a random sample.

In the population mean calculated by company, target milk collection is 65535000 litres in 363 days so mean = 180537 litres.

Null hypothesis Ho: μ = $\overline{X}$ (The samples have been drown from the normal population with the same mean. There is no significant difference between population and sample mean or this sample come from this mean. Difference between this mean is due to sample fluctuation.

Alternative hypothesis H_1: μ ≠ X (the samples have not been drawn from the normal population with the same mean. There is significant different between population and sample or this sample not come from this.

Test statistic,

$$t = \frac{\overline{X} Z \sqrt{N}}{S}$$

Where,

$\overline{X}$ = the mean of the sample (*View point of researcher*)

μ = the actual or hypothetical mean of the population (*View point of Company*).

N = the sample size

S = the standard deviation of the sample.

Therefore,

$$t = \frac{2120259 Z 180537 \sqrt{6}}{155236}$$

= 10.81

…/*t* / X10.81

Degree of freedom = n -1= 6-1 = 5

Level of significance (x) = 5%

Critical value**:** The tabulated value of t for two tail test at 5% level of significance and for 5 d.f. is 2.571.

Decision**:** since the calculated value of t is greater than tabulated value, the difference is significant and null hypothesis is being rejected or not accepted at 5% level of significance on two tailed test. The mean of the sample has not been drawn from the normal population.

4.2 ABC ANALYSIS

ABC technique helps the firm to classify inventories to identify the items which should receive maximum attention of the management. Group 'A' includes items of high value, Group 'B' of medium value and Group 'C' of low value.

According to the inventory policy of KMSS (DDC) it is found that there are different categories of milk. There are three types of milk which are as follows.

Group A- milk- 78% of total value

Group B- Additive (Chemical) - 13% of total value

Group C- Packing materials- 9% of total value

After analysis of the three types of milk categories, group A is the most important for the whole production process of milk and investment which is 78% of total value. The items of B group hold middle investment and it is only the 13% of total value. The group C holds more quantity but lower value of inventory. Category C covers only the 9% of total value. It shows that from the perspective of investment, A category is best of all. ABC analysis should however be an item of inventory which may be very cheap. Under ABC analysis cheapest items have been given less attention, but it is very critical in the production process to give importance to any kind of inventories.

Different types of efforts are needed to control inventory management. Same kind of effort is not fit for every situation. We have to give such items of inventory in which the company has invested more money and the inventory of which materials

are not available easily and have no enough sources or it is difficult to supply. In this regard, three categories of raw materials have been used by KMSS (DDC). But in calculation of the inventory level there is difficulty because of measurement process. Milk is packed in kg., litres, packet, sum cup, and pot. So in different types of packing the main problem is of categories of inventory.

Procedure of ABC Analysis

i) First we calculate annual usage multiplying the quantity (number of units) of the item consumable in one year by its unit price.

ii) Arranging all inventory items, first item will show maximum annual usage in rupees, the second item the second maximum, the third item the third maximum and so on. After having done this total of annual usage in rupees is put at the bottom of the list.

iii) Inventory items are categorized on the basis of annual usage and its price. The item which has more annual usage has higher price and these items are categorized as A item. Those items which contribute lesser than categories A, should be kept in categories B and the rest contribution of the total percentage of annual usage are called C categories.

iv) Finally, placing of the orders on the basis of this classification is done to choose the best categories and invest it.

4.3 RE-ORDER POINT OF MILK IN KMSS (DDC)

While ordering and receiving the goods, there may be delay in transportation, loading, unloading, clearing and custom and many other factors, which are beyond the control of any management. Such log between order and delivery is called lead time. Now the question arises 'when to order'? If the order is placed too delay order placing may result the firm incur stock out cost. In such cases, calculation of appropriate level

for reordering is very essential. Hence the point at which stock on hand must be replenished is re-order point or the re-order level of inventory. In which the firm places an order with the supplies for procuring additional inventory which is equal to economic order quantity. This is the point there inventory equals to economic order quantity and the inventory reaches to the re-order point. The researcher tries to analyse the re-order point of milk on the basis of lead time safety stock kept by the company as well as daily usage rate of this years i.e. 2062/063 to 2067/068.s

In calculation of re-order point, some formulas are used

$$\text{Usage Rate} = \frac{Annual\ consuption}{No\ of\ days\ in\ a\ year}$$

Reorder point (ROP) = Usage rate × Safety stock

(When safety stock is not mention)

Re-order point (ROP) = Usage rate × [lead-time × safety stock]

(If safety stock is mentioned)

Table: 10

Fiscal year	Usage rate (litres)	Lead time (day)	Order point (litre)	Safety stock	safety stock in units	Safety stock lead time	Re-order point (litre)
2062/063	196279	1	196279	2 day's consumption	392558	3 (days)	588837
2063/064	183382	1	183382	2 ,,	366764	3 ,,	550146
2064/065	192612	1	192612	2 ,,	385224	3 ,,	576486
2065/066	194822	1	194822	2 ,,	389644	3 ,,	584466
2066/067	185178	1	185178	2 ,,	370356	3 ,,	555534
2067/068	191656	1	191656	2 ,,	383312	3 ,,	574968

Calculation of Re-order Point (in litres)

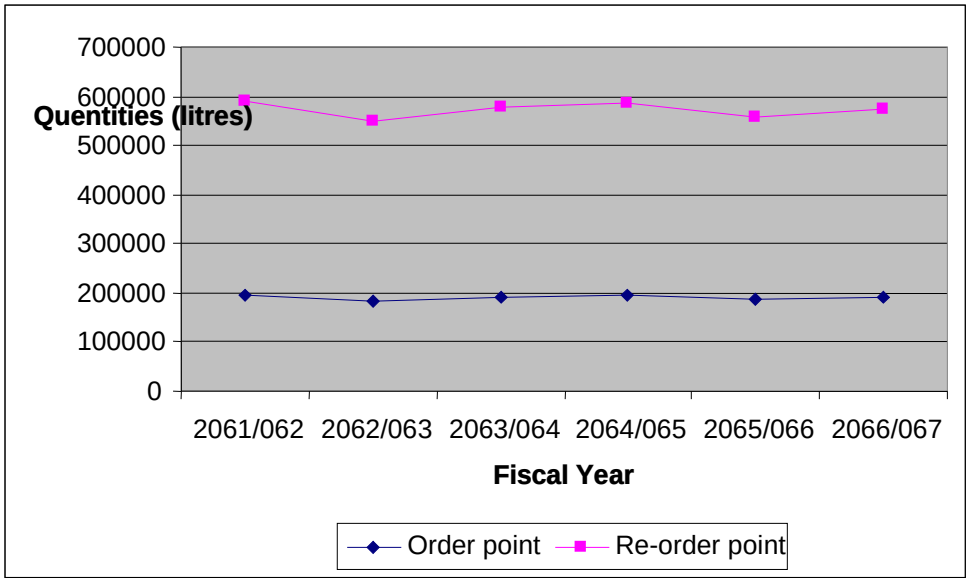
Source: DDC

In the above table, calculation of the re-order point including safety stock and excluding safety stock both have been presented. The highest re-order point in which safety stock excluding and including is 196279 litres and 588837 litres in the year 2062/063. And lowest re-order point in which safety stock excluding and including is 183382 litres and 550146 litres respectively in the year 2063/064. The above calculation can better be shown in graphical presentation.

Figure: 7

Graphical Presentation of Re-order Point of DDC

(With lead time and lead time + Safety stock)



Note:

[This data is given by KMSS (DDC) collection and processing department. KMSS needs daily fresh milk, so it has a lead time of 1 day and it has 2 days safety stock. It always holds safety stock from the view point of present condition of Nepal.]

In above graphical presentation the re-order point of KMSS with lead time and lead time+ safety stock has been shown where vertical axis shows the quantities of milk and horizontal axis shows the five fiscal years. In the year 2066/067; KMSS has procured 2057576 litres of milk in a year with the number of orders 34 times. According to ROP when the balance remains for 1 day's consumption (191656 litres) another order for 2057576 litres should be placed. And every 11 days, next fresh order should be made. In other words, next orders should be placed in the difference of 11 days i.e. Practices used by the company for the safety stock is equal to 2 days consumption. If we consider this safety stock, the order should be placed by keeping 3

days' consumption (i. e. 3×191656 = 574968 litres) it means when the inventory falls to 574968 litres another order for 2057576 litres has to be placed.

From the above analysis it is seemed that KMSS could not follow the re-order point in placing order. Rather KMSS totally follows the every day's demand. The reason behind this is the perishable product (milk). Milk can not be stored more than 2 days. For KMSS this short period is spent in collecting and transporting milk to the chilling centre and hence KMSS can not follow the re-order point.

4.4 TURNOVER RATIO

4.4.1 Inventory Turnover Ratio

As the cost of sales is usually listed on a firm's income statement, the average inventory has to be calculated. This can be done in a number of ways. For example, if a firm has been experiencing a significant and continuing rate of growth in sales, the average inventory may be computed by adding the figures for the beginning and ending inventories for the year and dividing by 2. If sales are seasonal or subject to wide fluctuations it would be better to add the month-end inventory balances for the entire year and divide by 12.

Some analysts calculate inventory turnover as simply the ratio of annual sales to ending inventory. Although the sales to inventory ratio is technically inferior and gives different results than more commonly used ratios, it may be satisfactory if used consistently when making comparisons between firm and the industry as a whole. However, the problem with this ratio is that it tends to differ from one firm to another, depending on policies regarding markets on the cost of sales. Inventory turnover ratio measures the efficiency on inventory management and how quickly inventory is sold. It shows the relationship between cost of goods sold and the inventory level. If firm's inventory turnover ratio is too high, it means the firm is frequently running out of

certain items in stock and losing sales to competitors. For inventory to contribute fully to profitability, the firm has to maintain a reasonable balance of inventory levels. A very low inventory turnover ratio is dangerous. It signifies excessive inventory or over investment in inventory. Low inventory level shows that firm has more stock of finished good for sale. A low ratio may be the result of obsolete goods, over-valuation of closing stock, reduced demand in market, more purchase of raw materials.

Before the computation of inventory turnover ratio we should determine cost of goods sold and average inventory. For KMSS (DDC) use, cost of goods sold is determined by adding opening stock, purchase (milk purchase, raw materials, and other purchase), manufacturing expenses (processing cost, administrative cost, depreciation cost, deferred cost, interest cost) and deducting closing stock. To compute average inventory, opening inventory and closing inventory is added and divided by 2.

Formula for calculation of inventory turnover ratio

$$\text{Inventory turnover ratio} = \frac{Cost\ of\ Goods\ Sold}{Average\ \ inventory}$$

[The annual cost of goods sold was directly taken from the company's ledger.]

$$\text{Inventory turnover ratio} = \frac{Sales}{Clo\sin g\ \ stock}$$

Table: 11

Calculation of Inventory Turnover Ratio of KMSS (DDC)

Fiscal year	Cost of goods sold (Rs.)	Average inventory (Rs.)	Turnover ratio (times)
2062/063	1497554372	61225730	24.46
2063/064	1537208655	68817422	22.34
2064/065	1590698705	61541848	25.85
2065/066	1611932218	63070820	25.55
2066/067	1596429434	62067020	25.72
2067/068	1657423613	55372192	29.93

Source: DDC

The above table shows the turnover ratio between costs of goods sold and average inventory. It is clear that the inventory turnover ratio is fluctuating every year. In the year 2062/063 turnover ratio is low. It means more inventories are kept in the stock, unnecessary investment tied up on it. It directly affects the profitability of the firm. From the study of five fiscal years period the high turnover ratio is 29.93 times in 2067/068 fiscal year. In the fiscal year 2064/065, 2065/066 and 2066/067 the turnover ratios are almost same. There were same kinds of fluctuation between cost of goods sold and average inventory. From the inventory turnover ratio, year 2067/068is the best in totality. The Kathmandu based Dairy Development Corporations efficiency in inventory is poor. KMSS is not able to change its inventory into receivable/cash through sales. So KMSS has to give more attention in inventory management.

4.4.2 Inventory Holding Days (DIH)

Inventory holding day's means to calculate the time period of inventory keep in factory or how many days company hold the inventory in factory or warehouse

without any work year by year. Low DIH represents or indicates good inventory management; finished goods are quickly sold over a period of time and firm is able to earn profit by it. On other way high DIH represents or indicates dangerous situation of the production process. More stock of finish good is kept on the warehouse. Due to this, inventory involves cost in terms of interest of blocked amount; rental of warehouse, damage/deterioration and so on and company is not able to earn profit in this situation.

To calculate the inventory holding days we use two types of formula. Which are given below:

$$\text{DIH} = \frac{Average\ \ inventory}{Cost\ of\ \ goods\ sold} \times 365$$

$$\text{DIH} = \frac{Clo\sin g\ \ stock}{Sales} \times 365$$

Table: 12

Calculation of Inventory Holding Days of DDC

Fiscal year	**Cost of goods sold (Rs.)**	**Average inventory (Rs.)**	**Inventory holding days**
2062/063	1497554372	61225730	14.92
2063/064	1537208655	68817422	16.34
2064/065	1590698705	61541848	14.12
2065/066	1611932218	63070820	14.28
2066/067	1596429434	62067020	14.19
2067/068	1657423613	55372192	12.19
		Mean	14.34

Source: DDC

Holding of the inventory is a main part of any manufacturing organization. In above table inventory holding days of KMSS (DDC) from 2062/063 to 2067/068 fiscal year have been represented in which the mean of inventory holding days is 14.34. In other words the project holds average inventory 14.34 days in regards of mean. In 2062/063, 2063/064, fiscal year DIH had crossed the mean where as in the rest of the years, DIH has remained below the mean. The lowest inventory holding days in the fiscal year 2067/068is the lowest among 6 fiscal years.

4.5 RATIO ANALYSIS

Ratio analysis is given to serve as a statistical yardstick to interpretation of numerical figures to find out the significant relationships. Ratios are relationships, expressed in mathematical terms between figures which have cause and effect relationship or which are connected with each other in some other manner. But similar to the characteristics of good financial statement, ratio analysis helps interested parties to serve their respective purpose. Ratio analysis is an evaluation of both a firm's post financial performance and its prospects for the future. In mathematics a ratio is the relationship between two quantities figures. Ratio analysis expressed by the financial strength and weakness are measured by relating two accounting data.

4.5.1 Inventory to Total Fixed Assets Ratio

In calculation of inventory to total fixed assets ratio, Inventory is determined by adding closing inventories of raw materials, finished goods, other stock and constructing material spare parts. And total fixed assets include current fixed assets and parts remains to installation. To calculate ratio inventory to total fixed assets the following formula is used.

$$\text{Inventory to total assets ratio} = \frac{Inventory}{Total\ fixed\ assets} \times 100\%$$

Table: 13

Calculation of Inventory to Total Fixed Assets Ratio

Fiscal year	Inventory (Rs.)	Total fixed assets (Rs.)	Inventory to total assets ratio
2062/063	66213850	270528139	24.48%
2063/064	71421310	293560340	24.33%
2064/065	51662386	286255606	18.05%
2065/066	74479254	304864158	24.43%
2066/067	49654786	273618540	18.15%
2067/068	61089598	308765120	19.79%

Source: DDC.

After calculation of inventory to total fixed assets ratio we know that minimum inventory to total fixed assets ratio 18.05% in year 2063/064. In year 2062/063 the inventory to total fixed assets ratio is maximum 24.48%. High ratio is not good for the manufacturing organization so the ratio of year 2063/064 is good. According to our study inventory management low inventory total fixed assets ratio preferred the good efficiency in inventory management.

4.5.2 Inventory to Current Assets

Inventory to current assets ratio shows the relationship between inventory and current assets. In this calculation researcher uses closing stock of inventory including closing stock of raw materials, finished goods other stocks for calculation of current assets to use the whole current assets and shows in balance sheet. To calculate inventory to current assets ratio following formula is used.

$$\text{Inventory to current assets ratio} = \frac{Inventory}{Current\ assets} \times 100\%$$

Table: 14

Calculation of Inventory to Current Assets Ratio of DDC

Fiscal year	Inventory (Rs.)	Current assets (Rs.)	Inventory to current assets ratio
2062/063	66213850	422620178	15.67%
2063/064	71421310	444641658	16.06%
2064/065	51662386	450761640	11.46%
2065/066	74479254	463869236	16.06%
2066/067	49654786	496260287	10.01%
2067/068	61089598	501327580	12.19%

Source: DDC

In above calculation table the status or relationship between inventory and current assets is shown. The calculation gives position of inventory to current assets ratio. It is clear that KMSS (DDC) has not any satisfactory situation about inventory to current assets ratio through out the study period of 6 different fiscal years. If a company keeps a more quantity of the inventory that is not good and if it keeps the low quantity of the inventory it does not satisfy the out comes. KMSS (DDC) has highest ratio in 16.06% both 2062/063 and 2064/065 fiscal year. And in other years it fluctuates. In year 2065/066 the ratio comes down to 10.06%. So we can say KMSS (DDC) had bad position in respect of inventory to current ratios.

4.5.3 Inventory to Sales Ratio

The relationship between inventory and sales is called inventory to sales ratio. In this part we try to analyse the relation of the inventory and sales. If inventory to sales ratio is low the result will be good. Here, inventories include closing stock of

raw material, finished goods, and other stocks. Net sales mean that sales amount or actual amount of sales which comes from the sale of milk and milk product at KMSS (DDC). Calculating formula is as follows.

$$\text{Inventory to sales ratio} = \frac{Inventory}{Net\ sales} \times 100\%$$

Table: 15

Calculation of Inventory to Sales Ratio of DDC

Fiscal year	Inventory (Rs.)	Net sales (Rs.)	Inventory to sales ratio
2062/063	66213850	1484771891	4.46%
2063/064	71421310	1548239961	4.61%
2064/065	51662386	1595906712	3.24%
2065/066	74479254	1535810462	4.85%
2066/067	49654786	1589663476	3.12%
2067/068	61089598	1723652140	3.54%

Source: DDC

In above calculation it shows the relation between inventory and net sales amount of KMSS. Researcher focused study on inventory management for requiring fulfilment and Calculation of KMSS (DDC) inventory management efficiency through the inventory to sales ratio. To fulfil my study calculation shows that highest inventory to net sales ratio year 2065/066 is 4.85% where inventory is Rs. 74479254 and net sales Rs. 1535810462. Another side lowest inventory to net sales ratio year 2066/067 where inventory is Rs. 49654786 and net sales Rs. 1589663476. If the company has low ratio of inventory to net sales that is good point. So, low inventories to seals are necessary to the firm.

4.6 REGRESSION ANALYSIS

Regression analysis is used to estimate the likely value of one variable from the known value of the other variable i.e. in regression analysis we establish a kind of average irreversible functional relationship between the two variables. Regression analysis is a mathematical measure of the average relationship between two or more variables in terms of original units of data.

In study of regression analysis, there are two types' variables dependent variable and independent variable. The variable whose value is influenced or is to be predicted is called dependent variable whereas the variable which influences the value or is used for prediction is called independent variable. The dependent variable is also known as regressed on explained variable while the independent variable is called as regression or predictor or explanatory variable. The main objectives of regression analysis are to predict or estimate the value of dependent variable corresponding to a given value of independent variables.

This topic tries to analyse the relationship between two variables which is used in Dairy Development Corporation. In this part try to know the relationship between net sales and closing stock of milk product. Net sales and sales expenses average inventory and net profit and total income and total expenses of the Dairy Development Corporation.

4.6.1 Regression on Net Sales and Closing Inventory

On the available of data from KMSS, to analysed the regression between net sales and closing inventory. Closing inventory includes closing stock of milk and milk product and sales also have milk and milk product.

In part of analysis there are two type of variables here we assume the sales are the values of the dependent variable which is denoted by Y and closing inventory is the values of independent variable denoted by X. The regression equation of Y on X is used to describe the variation in the value of Y for given changes in the value of X.

Table: 16

Calculation of Regression Result of DDC (Amount '0000000')

Fiscal year	Net sales (Y)	Closing inventory (X)
2062/063	148.4771891	6.6213850
2063/064	154.8239961	7.1421310
2064/065	159.5906712	5.1662386
2065/066	153.5810462	7.4479254
2066/067	158.9663476	4.9654786
2067/068	172.3652140	6.1089598

Source: DDC

According to this data we calculate regression of Y on X

a = 177.9121256, b = -3.1952342

Y = 177.9121256-3.1952342X

The above regression equation shows a negative relationship between closing inventory and net sales of KMSS. The slope of coefficient of -3.1952342 means the marginal propensity to earn sales revenue Rs. -3.195234 meaning that if the value of inventory increases by a rupee, the average net sales goes up by = Rs -3.195234. The intercept value of 'a' 177.9121256 means the average value of closing inventory would be 177.9121256 million respectively.

4.6.2 Regression on Net Sales and Sales Expenses

To calculate regression on net sales and sales expenses some information is needed. According to data procurement and processing department following data are available. Here, expenses are defined as sales expenses and it is the main part of expenses during the period of milk production. And net sales are the total part of sales of milk and milk product.

Here, in the analysis it is assumed that the net sales is the values of the dependent variables which is denoted by Y and sales expenses which is actually spent in area of sale of milk and milk products are the values of independent variables which is denoted by X. The regression equation Y on X is used to describe the variation in the value of Y for given change in the value of X.

Table: 17

Calculation of Regression Result of KMSS ('0000000')

Fiscal year	Net sales (Y)	Sales expenses (X)
2062/063	148.4771891	3.8370438
2063/064	154.8239961	3.8633228
2064/065	159.5906712	4.0905163
2065/066	153.5810462	3.9302977
2066/067	158.9663476	4.1093440
2067/068	172.3652140	4.3461238

Source: DDC

According to this data we calculate regression of Y on X be

a = -5.9936694, b = 40.6907717

Y = -5.9936694 + 40.6907717X

The above regression equation shows a positive relationship between sales and sales expenses. The slope of coefficient of 40.6907717 means that marginal propensity to earn sales revenue of KMSS (DDC), sales revenue Rs. 40.6907717. The intercept value of 'a' -5.9936694 means the average value of sales expenses would be -5.9936694 million if the sales were zero. Regression equation can express the clear relationship between sales and sales expenses of the KMSS (DDC).

4.6.3 Regression on Average Inventory and Net Profit.

With the help of average inventory and net profit it is easy to show the relationship between both items, where average inventory means the average of opening and closing inventory of milk. And net profit is determined by the whole profit of each year which has been earned by dairy development corporation.

To analyze the regression relation between two variables, assume that the net profit is the dependent values, and denoted by Y and average inventory of milk is the independent variable denoted by X. The regression equations of Y on X describe the value of change in Y for given change in the value of X.

Table: 18

Calculation of Regression of DDC (Amount '000000')

Fiscal year	Net profit (Y)	Average inventory (X)
2062/063	10.590200	61.225730
2063/064	7.613294	68.817422
2064/065	8.931871	61.541848
2065/066	14.117594	63.070820
2066/067	37.915032	62.067020
2067/068	46.522004	55.372192

Source: DDC

According to this data calculate regression of Y on X

a = 190.860134, b = 2.739813

Y = 190.860134- 2.739813X

After calculation of regression equation, it shows the negative relationship between average inventory and net profit. The slope coefficient of -2.739813 means the marginal propensity to earn net profit. If the value of average inventory increases by a rupee the average net profit will decrease by -2.73.9813. If the intercept value of 'a' is 190.860134 the average value of average inventory will be 190.860134 lakhs, if net profit were zero.

4.6.4 Regression on Total Income and Total Expenses

Calculation of regression between total income and total expenses is done with the help of their data. Total income is described by the total income of each year which was earned by KMSS(DDC).

To calculate regression, it is assumed that total income is the dependent variable and denoted by Y and total expenses is the independent variable which is denoted by X. Calculation of regression equation, Y on X:

Table: 19

Calculation of Regression Result of DDC (Amount '0000000')

Fiscal Year	Total income (Y)	Total expenses (X)
2062/063	151.7356298	149.2834490
2063/064	155.9347953	157.3417918
2064/065	160.9457297	162.6386977
2065/066	154.7356197	151.3695254
2066/067	164.3988840	168.1903872
2067/068	169.2531062	165.7789210

Source: DDC.

According to this data, we calculate, regression of Y on X

a = 34.9223405 b = 0.7830165

Y = 34.9223405+0.7830165X

The above regression shows a positive relationship between total income and total expenditure. The slope coefficient of 0.7830165 means the marginal propensity to earn total income. Total income 0.7830165 means that if the value of total expenditure increased by one rupee on the average the total increased by 0.7830165. The intercept value of 'a', 34.9223405 means that the average value of total expenditure is 34.922340 million, if total income were zero.

4.7 MAJOR FINDINGS

KMSS is a manufacturing organization, which is manufacturing different kinds of milk and milk products. In this study, researcher briefly studies about internal part of organization. After analysis, primary and secondary data and information are gathered from the management, through observation, informal discussion and

supplementary questionnaire. It becomes clear that KMSS is suffering from different problems which are internal and external both. After the brief study and analysis of the data, the major findings are presented as follows

i) There is not good inventory control system in the KMSS and lack of effective inventory management.

ii) Lack of effective and efficient inventory management system and because of un-systematic planning there is a large amount of money losses to the inventory.

iii) Economic order quantity is the best model of the valuation of inventory management but KMSS is not following the rules of EOQ on purchasing decision.

iv) KMSS record keeping system is very poor. They don't keep the record on ordering cost and carrying cost separately which makes easy to calculate the inventory cost.

v) The KMSS does not have any policy to categorize the inventory; all are paid equal attention for the purpose of control.

vi) Good inventory management policy is not used in applying KMSS; re-order point is determined after the stock level is finished.

vii) The KMSS doesn’t have any good policy of EOQ which reduces the total inventory cost. KMSS is not following the No. of order 363 times in a year but it is much higher than researcher’s calculation.

viii) After calculation of the inventory turnover ratio, the result shows it is not satisfactory.

ix) There is no good relationship between inventory management and other factors of company.

x) The KMSS efficiency in inventory is poor; It has not changed its inventory into receivable cash through sales.

CHAPTER- V

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 SUMMARY

Nepal is still known as under industrialized country. In Nepal, import substituting and export promoting types of industries are equally needed. At initial stage import substituting industry should be promoted for the self-dependency. After then it should be shifted to the export promoting type of industry. In modern age, for economic development many subsection of the economy should be identified in agriculture , for example fishing, beekeeping, pastoral and grain production, filed crops, horticulture, livestock and forestry. One of these is milk production and supply is one of the helpful businesses. Being on agricultural country, Nepal has to give importance to milk production. So that production of milk should be give more attention from the side of farmer and from the side of government it has to manage properly.

A Dairy development Commission was formed in 1955 A .D. The first five-year plan (in 1952-57 AD) had stressed the need for developing a modern dairy industry. The dairy development commission was converted to the dairy development board in 1962 AD. In order to meet the growing milk demand in Kathmandu the board was converted to the dairy development corporation (DDC) in 6 July 1969 under the corporation act of 1964.

Any organization invests a huge amount or capital in the form of inventories if they are manufacturing or non-manufacturing organization. The expenses involved for carrying on functional association with inventory such as purchasing, handling, storage and records keeping are also large. The basic problem of this study is to

examine the inventory management system as practised by the company. The order size, carrying cost, ordering cost, safety stock are determined unscientifically in KMSS(DDC) and not given proper attention to the lead time and all those functions lead to increase the total cost of the company.

The main objective of this study is to find out what techniques have been applied by those companies to manage the inventory and suggest using the scientific techniques to help to reduce cost for this purpose. The researcher interviewed with officials and observes the inventory system personally, data were collected from various sources, and quantitative tools were applied in this study to analyze the collected data. After analyzing the data the researcher comes to the point of conclusion about the inventory position of KMSS(DDC).

In the part of analysis and presentation, all the collected data and facts are analyzed on the basis of inventory management theory and with the help of ABC analysis, EOQ with re-order level ratio analysis and Regression analysis. To make certain type of inventory management decision, may mathematical techniques have been available for controlling the inventory but the companies have not applied any sort of techniques available for managing inventory.

After analyzing the inventory management of KMSS (DDC) the researcher come to the finding which was the objective of the study. KMSS has not properly used the inventory in raw material, work-in process and finished product. KMSS have own EOQ policy which has No. of orders 363 times in a year that increases total cost of inventory. It can clearly be said that there is no effective use of inventory theory. The main problem with KMSS is not use the scientific and proper use of inventory management.

5.2 CONCLUSION

The inventory management of KMSS (DDC) and it's behavioural uses has been analyzed by using various financial and statistical tools. The various ratio and financial analysis has shown performance of the KMSS. On the basis of analysis of data and information collected from KMSS, following conclusion have been drawn.

5.2.1 Economic Order Quantity Analysis

In this study researcher calculated the EOQ of the Dairy Development Corporation. It is calculated by dividing the No. of orders ordered by KMSS(DDC) to annual requirement of raw materials. Milk is the main material used in this study. EOQ of company is lesser then researcher's EOQ in all fiscal year between 2061/062 to 2067/068. KMSS (DDC) orders 363 times in a year the average, standard deviation and coefficient of variation of the company is lesser than the calculated by researcher. The hypothesis testing through t-test results that the difference is not significant at 5% level of significant that the mean of sample have not been drawn from the normal population.

5.2.2 The Selective-ABC Analysis

ABC analysis is important that a firm should not exercise the same degree of control on all types of inventories. We have to classify of all types of inventories on the basis of nature involved in the investment and importance of this items. In ABC analysis we have to plan properly of all inventories items in 3 categories. In the context of KMSS (DDC) 3 groups of raw materials are classified in categories; in categories A we found milk at 78% of total value. In categories B we found additive (Chemical) at 13% of total value and in categories C we found packing materials at 9% of total value. In the aspect of quantity A, B and C categories hold low, middle and high degree of quantity but not exact figure.

5.2.3 Re-Order Point Analysis

Re-order point analysis helps to know about the inventory ordering process. In the context of KMSS(DDC) it has been found that lead-time is 1 day during fiscal year 2062/063 to 2067/068. Project has maintained 3 days of safety stock +lead time during fiscal year 2062/063 to 2067/068. The highest re-order point in which safety stock and safety stock + lead time are 392558 litres and 88837 litres in fiscal year 2062/063 and lowest ROP in which safety stock and safe stock + lead time are 366764 litres and 550146 litres in fiscal year 2063/064. The company holds high daily usage 196279 litres and lowest usage 183382 litres in fiscal year 2062/063 and 2063/064 respectively. According to ROP theory when the balance remains 3 days (lead time + safety stock) consumption the next order should be made eg. fiscal year 2064/065 when stock remain 577836 litres next order should be made.

5.2.4 Turnover Ratio

The average inventory turnover ratio and DIH (inventory holding days) of DDC of 6 years study period (fiscal year 2062/063 to fiscal year 2067/068) is 25.64 times and 14.34 days respectively. The highest IT ratio is 29.93 times in fiscal year 2066/067 because average inventory of finished goods is very low. It means company is able to change its inventory (Finished goods) into receivable/cash through sales. The lowest IT ratio is 22.34 times only in fiscal year 2063/064.

Similarly, the lowest DIH is 12.19 days in fiscal year 2067/068 because of lowest average inventory of finished goods. It means company holds 12.19 days average inventory. The highest DIH is 16.34 days in fiscal year 2063/064, which is not good performance.

5.2.5 Ratio Analysis

The average of Inventory to Fixed Assets Ratio, Inventory to Current Assets Ratio and Inventory to Sales Ratio through out the period is 21.54%, 3.58% and 3.97% respectively. The highest inventory to total fixed assets ratio in percentage is 24.48% in fiscal year 2062/063 and lowest ratio in percentage is 18.05% in fiscal year 2064/065. The highest and lowest inventory to current assets ratio is 16.06% and 10.01% in both (2063/064, 2065/066) and 2066/067 respectively. The highest and lowest inventory to sales ratio is 4.85% and 3.12% in 2065/066 and 2066/067 respectively. The average of this ratio is 3.97%. This ratio is wanted low in manufacturing company. Therefore inventory relationship with sales is satisfactory.

5.2.6 Regression Analysis

The regression equation between closing stocks and sales shows a negative relationship. The slope of coefficient of -31952342 means that the marginal propensity to earn sales revenue Rs. -3.1952342 meaning that if the value of closing stock increased by a rupee, on the average the sales goes down by 3.1952342. The intercept value of 'a' is 177.9121256 means that average value of closing inventory would be 177.9121256 million if sales were zero.

The regression equation between sales and sales expenses shows a positive relationship. The slope of coefficient of 40.69077777, it means that marginal propensity to earn sales revenue Rs. 40.6908 meaning that if the value of sales expenses increases by rupee on the average sale goes up by 40.6908. The intercept value of 'a' is -59936694 means that average value of sales expenses would be -5.9936694 if sales is zero.

The regression equation between net profit and average inventory shows negative relationship the slope of coefficient of -2739813 means that the marginal

propensity to earn profit Rs. -0.2739813 meaning that if the value of average inventory increase by a rupee, on the profit goes down by 2.739813. The intercept value of 'a' is 190.860134 means that average value of average inventory is 190.860134 lakes if net profit were zero.

The regression equation between total income and total expenses shows the positive relationship. The slope of coefficient of 0.7830165 means that the marginal propensity to earn total income of Rs. 0.7830163 mining that if the value of total expenses increased by a rupee the average total income increased by 0.7830165. The intercept value of 'a' is 34.9223405 means that average value of total expenses is 134.9223405 million if total income were zero.

5.3 RECOMMENDATIONS

Good inventory management system is necessary for the better performance of the company. The study stresses that whether KMSS(DDC) has any appropriate inventory control system. After analysing the different parts of inventory management the following suggestions are recommended.

a) KMSS does not have good practice for optimum No. of order to procure the materials which reduces the total inventory cost. Company has order of raw materials 363 times during one year. KMSS (DDC) fails to calculate how many times the raw materials are order? It should be better to order 30 to 34 times in a year.

b) ABC model is the scientific and specific model for the inventory management. The ABC analysis helps to know which items in inventory have higher usage value and which not and accordingly a precise control over the items in inventory can be applied. KMSS (DDC) should keep an ABC system in inventory control.

c) The KMSS should pay more attention for the better performance for e.g., how much money should the company invest in the inventory? How much inventories should be stocked? How can we minimize the inventory cost? What is optimum EOQ? What is optimum ROP?

d) The KMS should follow scientific tools and techniques i.e. Economic order quantity and economic lot size formula, which help to reduce the relevant total cost for manufacturing product.

e) Job evaluation should be launched in certain time interval so that the hard-working employees can be rewarded and motivated.

f) Effort should be made to employee-more computers and competent personnel to handle it in order to keep the records inventory and solve the problem of inventory control.

g) Inventory information will be valuable to the decision making. Therefore, the factory should keep its inventory record up to date and old spare parts should be replaced to save the inventory carrying costs.

h) The actual economic order quantity of the company in all fiscal study period is bigger than calculated EOQ, so it means poor inventory management makes this type of difference and increases the production cost or this makes both carrying and ordering cost being higher than required.

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