ANALYSIS OF INVENTORY MANAGEMENT

(A Case Study of Dairy Development Corporation)

A THESIS

Submitted By:

Tula Kanta Lal Karn

R.R.M. Campus Janakpur

Class Roll No.:- 53/065

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RECOMMENDATION

This is to certify that the thesis

Submitted by:

Tula Kanta Lal Karn

Entitled:

"**ANALYSIS OF INVENTORY MANAGEMENT**"

(**A Case Study of Dairy Development Corporation**)

Has been prepared as approved by this Department in the prescribed format of the faculty of management. This is forwarded for examination.

……	…….....
Dr. Chandra Kisoresingh	Prof. ShailendraLabh Karna
(Thesis Supervisor)	(Head, Research Department)
……	
Jugeshwarsah	
(Head of Department)	

Date ……../……./……..

VIVA-VOCE SHEET

We have conducted the Viva-voce Examination of the Thesis presented

By

Tula Kanta Lal Karn

Entitled:

"**ANALYSIS OF INVENTORY MANAGEMENT**"

(A Case Study of Dairy Development Corporation)

And found the thesis to be original work of the student and written according to the prescribed format. We recommend the thesis to be accepted as partial fulfillment of the requirements for the degree of Master of Business Studies (MBS)

Viva-Voce Committee

Head, Research Department ……

Member (Thesis Supervisor) ……

Member (External Expert) ……

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DECLARATION

I here by declare that the thesis report entitled "Analysis of Inventory management (A case study of Dairy Development Corporation, DDC) submitted to office of the Dean, Faculty of management, Tribhuvan University, is my original work done in the form of partial fulfillment of the requirement for the degree of Master of Business Studies (MBS) under the supervision of Chandra Kishor Singh of R.R.M. Campus Janakpur, Nepal.

.....

Tula Kanta Lal Karn

R.R.M. Campus, Janakpur

Roll No.:- 53/065

T.U. Regd No.:- 7-1-14-602-2001

Symbol No. :- 140144

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ABBREVIATIONS

A	-	Annual requirenents
ABC	-	Always Better Control
AD	-	Anno Domini
BOD	-	Board of Director
C	-	Carrying Cost per Liters per Year
DDC	-	Dairy Development Corporation
EOQ	-	Economic Order Quantity
FC	-	Fixed Cost
FY	-	Fiscal Year
GM	-	General Manager
HACCP	-	Hazard Analysis Critical Control Points
IBID	-	Ibiden (The Same Place)
i.e.	-	That Is
NG	-	Nepal Government
O	-	Ordering Cost Per Order
P	-	Page
P/L A/C	-	Profit and Loss Account
Fes	-	Public Enterprises
ROL	-	Re-order Level
ROP	-	Re-order Point

CHAPTER-1

INTRODUCTION

1.1 General Background of the Study

Inventory is the stock that a firm maintains to meet its future requirement for production and selling. The basic reason for holding inventory is to keep up the production activities unhampered. Inventories are a part of current assets, which are used within one year in a normal course of business operation manufacturing organization maintain the inventory of raw materials, work-in-progress, finished goods, Spars, suppliers etc. in case of manufacturing concern, inventories link the production and sales Trading Organizations are involved in buying and selling of goods. Therefore, inventory of trading organizations is unsold goods i.e. finished goods investment on inventory depends on certain risk and costs. Therefore the inventory manager should try to maintain optimal size of inventory without distribution the production and sales needs.

Accounting research Bulletin No:- 43 of the American Institute of Certified Public Accountant defines the term inventory or stock as the aggregate of those items of tangible asset, which are

(1). Held for sale in the ordinary course of business or

(2) In the process of production for such sale or

(3) to be currently consumed in the production of goods or services to be available for sale.

From the above definition it is clear that any stock that a firm keeps to meet its future requirement of production and sales is called inventory. The principal typed of inventories are, raw material and supplies, goods in process and finished goods. Raw material represents goods kept by a manufacturing firm prior to their being utilized in the production process. Supplies generally include tools, stores and spares which are consume in the production of goods and services. Goods in process represent the semi-finished goods. They include those materials that have been committed to production process but have not yet been converted in finished goods. Finished goods are completed goods awaiting sales.

The nature of inventory depends on the type of activity carried on. In case of manufacturing unit, inventory will generally include all types of inventories mentioned above, while in case of a trading concern, it will comprise only finished goods or stock in trades owned by it for sale to customers in the normal course of business (Dango, et all, 2069, 34)

Industrialization acts as backbone for the economic development of a nation. In context of Nepal, industrial development started from the very beginning with cottage and small scale industries making wooden craves, handicraft, woolen

garments and artistic works. These industries are now two running in classical way with the ancient concept and are still in infancy period of development. Industrial development is governed by laws and policies. Nepal formulated its first industrial policy in 1992AD. Modern industrialization started with the establishment of BiratnagarJute milis in 1973 AD before the enactment of policy and law. Huge capital is required to run industry so, Nepal Bank Ltd, was established in 1994 BS. As the first modern commercial band in the country in order to assist industrial and trading enterprises providing financial help. Since its establishment industrialization accelerated its speed. From then the numbers of industries have been established.

The growing number of corporations in Nepal is facing problem of inventory management. Due to lack of proper inventory policies, there are many corporations where large amount of capital has been blocked up and very little measures have been taken to manage the inventory decisions. The area of inventory management covers the following individual phases: determining the size of inventory table carried establishing time schedules. Procedure and a lot of sizes for new order, determining minimum safety levels of co-ordination of sale. Production and inventory, Policies for providing disbursement and procurement of materials, developing the forms of recording these transaction, assigning responsibilities for carrying out the inventory control function and providing the reports necessary for supervising these overall activity.

1.2Focus of the Study

The demand of milk and milk and milk product is gradually increasing. So it was found necessary to improve Dairy Development Centre. As a result Dairy Development Commission was converted into Dairy Development Board in 2021 B.S. DDC established on 1st Shrawan 2026 as manufacturing enterprise under the corporation Act. 2021B.S, public enterprise in Nepal constitutes a vital instrument for the social economic development of our country. Dairy Development Corporation was established to fulfill the need of people by supplying quality milk and milk product of reasonable price. It is also expected to be financially sound and contribute surplus to the national treasury. It enjoys a strategic and crucial position in our mixed economy.

The main objective of the DDC is to provide a guaranteed market for milk to the ruler farmers with fair price and to supply pasteurized milk products to urban consumers develop an organized milk collection system to meet increasing demand for pasteurized milk and milk products Developed organized marketing system for milk and milk products in urban areas. Due to public enterprise, its main object is fulfilling the social benefits rather than earning profit. DDC produce milk and milk related products. Its main products are Dairy

Ghee/ yak Ghee, Yoghurt, cheese, ice-cream, paneer Skimmed milk powder, Raswari (Sweets) in can Lalmohan (Sweets) in can.

Dairy Development Corkporation has been collecting buffalo milk, cow milk and chauri milk form the milk produce around the country. DDC has been recognized as an effective tool of poverty elimination and economic development of rural farmers especially during the flush season. As consequences it had to imposed milk holiday on certain days during the period. Of the other hand during the lean season DDC has been importing slimmed milk powder to meet consumers demand. So DDC is playing on important role to improve the economic condition of milk products and rural community.

1.3 Statement of the problem

Nepal is developing country. Here private companies are going research public companies. The DDC is one of the public enterprises. DDC is established in Nepal to fulfill the need of people by supplying quality milk at reasonable price. It is also expected to be financially sound and contribute surplus to the National treasury. As one of the manufacturing, it is required to contribute a return of at least ten percent on its capital employed.

Many enterprises could not achieve their pre-established objective and goods, due to the lack of an authority and communication of objective and goal from top to lower level management more over them. They are not maintaining responsibilities and co-ordination between various developments and responsibility center. Beside them integration of different activities and motivated to employees are more challenging problem behind the every management. There are other various problems, such a political interference, bureaucratic tendency, poor profitability, exposure to public enterprises, lack of continuity, stability, lack of enough investment, negligence of management, lack of effective managerial of skill etc. The vital reason is lack of study on effective and efficient inventory management tools and techniques for controlling inventory. Due to lack of study of inventory management huge amount of money should the firm invested in the inventory. How much inventory to be stocked, How can we minimize the ordering and currying cost, What is to be EOQ, How many times we order that minimize the currying costs are the some questions that evoke management always.

Present study is about an analysis of inventory management of DDC. So many short comings can be seen in the inventory system of DDC firms. For example, the economic order quantity; and actual order quantity of the project are not equal. They are not maintaining the desirable safety stock which the production in the production process. Maintain inventory quality, company doesn't know

when should be order and how the carry and ordering cost will be minimized. On the basis of the above mentioned issues, the following questions are put forward during the research period.

What should be the optimal level to reduce the inventory cost?

What is the impact of inventory overt the company profit?

What steps should be taken to improve the improve the existing problem of inventory management?

What are the major problems in the existing problem of inventory management and control?

How the company can utilizing its inventory resources effectively?

1.4 Objectives of the Study

The basic objectives of these study are:

→ To analysis the sales trend of DDC

→ To examine of inventory management practices DDC

→ To examine impact of inventory management on profitability of the company

→

1.5 Significance of the study

Inventory management is one of the important any manufacturing companies with our effective and efficient inventory management system on manufacturing company can achieve the goal proper inventory management helps to maximize the profitability and do bot block the inventories. A company should maintain adequate row materials/ finished goods. If slightly changes in the cost of materials it will effect in the profitability. So the company should keep adequate stock of inventory by keeping adequate inventory the company able to supply whatever the demand Nepal an under industrialized country is still using traditional technique in purchasing of inventory. To have sound achievement the company should apply modern tools and techniques. This study is needed for effective inventory management in DDC and to see the impact in profitability and find out how much money should be invested in inventory. How can we improve the inventory management and so on. I hope it will move beneficial to both companies and general public.

1.6 Research Methodology

The research activities are to be planned in a cautious, systematic and reliable ways of finding out or deepening understanding. The research process involves as series problem. The entire processes based on the philosophies, principles and mechanisms of research answers to solve problems or search the answers to questions are collectively known as the research Methodology.

Inventory management of DDC in which these institutional documents are the secondary data for the research work will be after analyzed. After finding the strength and weakness of inventory of the DDC the research thesis will recommend the appropriate suggestions to the concerned authorities for future improvement

1.6.1 Research Design

The research design is the task of designing a research work. It is a plan structure and strategy of investigation conceived so as to obtain answers to research questions and control variance (Kerlineer, 1986; cited in wolf and pant,2003: 74) in fact, the research design is the conceptual structure with in which the research is conducted. It constitutes the blue print for the collection measurement and analysis of data (Kotheri,)

The study aims at finding out the company inventory management. The company published annual reports balance sheet, P/L a/c and other accounting statement and supporting used for this study. On the basis of presented data and facts analytical research design adopted for assessing the inventory management. Thus the present study follows the descriptive as well as analytical approach

1.6.2 population and Sample

All the public manufacturing company are population for the proposed research at present, there are 55 Dairy milk companies. DDC is selected as the sample for the research.

1.6.3 Source of Data

The secondary data used of DDC. The sources of secondary data are both internal and external. The internal secondary data is include data available in financial statement and unpublished official records of DDC. The external secondary data include the data available in booda periodicals, unpublished official records of the government organization and published and unpublished report.

1.6.4Data Collection Procedure

Secondary data be required for the study will obtained through the annual report of the respective DDC. Annual reports collected visiting the respective

corporate companies. The other sources of secondary data were accessed through internet, Web site, Journals and news paper.

1.6.5 Data Analysis Tools

The inventory techniques like EOQ Re-order quantity etc the main tool for the purpose on analysis financial fact in the present study. In addition the statistical tool, like percentage , average , standard deviation and correlation will also be applied in order to make the analysis more systematic, scientific and useful.
Besides these graphs will also be construct to give a much more vivid picture of the trend and relationship of the facts under consideration.

1.7 Limitation of the Study

The study fundamentally will be based on the DDC document. The trueness and accuracy of which is believed as the public auditors certify them. The study will employ secondary data published by and collected from DDC. The study covers a period of 5 Fiscal years 2063/064 to 2067/68 which will be tabulated and processed for drawing conclusion. Time factor is major limitation of this study.

1.8 Organizations of the study

This study will be divided into five chapter. They are as following

→ Introduction
→ Review of literature
→ Research methodology
→ Data presentation and Analysis
→ Summary, Conclusion, and Recommendation.

CHAPTER-II

REVIEW OF LITERATURE

The scientific research is a procedure, a general strategy that indicates an ordered sequence of moves (or steps) which the researcher has to make (or go through) in order to reach the goal of his research (Marcello Pera, 2007).

Scientific research must be based on past knowledge. The previous studies cannot be ignored because they provide the foundation to the present study. Literature review is basically a stock taking of available literature in one's field of research.

Much research work has been made on inventory management in Nepalese Public enterprise. This chapter, attempts have been made to present the review of literature on inventory management. This chapter has been divided into two parts.

Conceptual Review

Review of previous studies,

Of inventory management is presented in the first part and review of related studies in second part

2.1 Conceptual Review

Inventory is store of goods and stocks items in inventories are called stock keeping items held of stick point. In manufacturing organizations, inventory, work-in-process and finished goods. In service organizations, it includes the tangible items to be sold and used for day to day operations (Regmi, et al 2010,88).

Inventory management is an important concept for managers in all types of the business. Every business or manufacturing organization however, big or small has to maintain some inventory. Inventory helps the company quickly responding to the customer demand, which is an important element of competitive strategy. Inventories of finished goods of the correct items to meet the market demand at the different point of the time within a reasonable response time play an important role in a company's ability to compete in the market. Inventories of raw materials or partially processed goods can help a company complete the production cycle in a much shorter time than would otherwise be possible.

Inventory for any organization is a necessary evil inventories require valuable space, consumes tax action and insurance charge tying up of more capital which leads to cost of capital losses and opportunity losses of investment. In the other

angle no organization can work without maintaining some inventory i.e. it is a necessity. It is observed that costs of not having inventory are usually greater than the cost of having them. This, inventories are necessary evil.

An inventory manager's job is to balance conflicting costs and pressures that argue for both low and higher inventories and determine appropriate inventory levels. There are following two questions are the answered genuinely by the operations manager regarding to the inventory.

- How much should the size of the order place to the supplier be?
- When should the order be placed? (stapitetal, 2010m 189)

An inventory may be defined as a stock of idle tangible resources of any kind having an economic value. The inventories can be in the form of raw materials, semi-finished goods or finished products not delivered to the customer. These could even be the human resources such an available unused labor or financial resources such as working capital etc. for many organizations, inventories may be using 30% to 70% of the total assets. It varies from organization to organization. It is the level of inventories that matters for any organization due to capital investment tied upon these resources.

Since it is blocking the working capital, which is so costly, it is not desirable to have a high inventory. The inventory requires holding and maintenance or preservation cost it carries the risk or theft, spoilage, leakage or obsolescence. The cost of keeping inventory may be very high. Hence, it is imperative to have a tight control over the level of inventory build up, it is a necessary evil, a must to keep uncertainty away in order to have business going, but should be kept only to the extent of minimum desired.

Controlling is a process by which the change in the system is modified to maintain the system on optimal performance level. Hence, in case of inventory also, the control is absolutely essential to release working capital from unwanted inventory, at the same time, to keep the inventory affecting cash flow and liquidity. Few of the examples of inventory in product or service industry are given below:

Factory: Raw materials, parts and components, semi-finished inventory and finished goods.

Bank: cash reserve tellers.

Hospitals: number of beds, specialized personnel and stocks of drugs.

Airline: aircraft seat miles per route, parts for repairs of aircrafts, stewards and other specialist persons for repair and maintenance (Sharma, 2011:276)

Inventory management is one of the aspects of production management. Production management is developed and handled by production engineer procurement is handling by its specialist. Therefore later inventory management becomes a separate and significant management for the development of industries. Under the inventory management there is not only essential production approach but also need marketing management but actually inventory management is purely subject of production management.

Executive in production, purchasing and marketing departments, take decisions relating to inventories primary, usually raw materials policies are shopped by purchasing and production executive, work-in-progress inventory, is influenced by the decision of production executives and finished goods inventory policy is evolved by production and marketing executive. Yet as inventory management has an important financial implication it has the responsible to ensure that inventories are properly monitored and controlled. It has to emphasis the financial point of view and initiate programmed with the participating and involvement of other for effective management of inventory (Chandra, 1998: 328)

The stock of different type of consumable goods held by an organization is called inventory. Inventory is one of the most important liquid assets to many business concerns. It is also equally important to both governmental as well as non-governmental sector. Inventory, by nature is a circulating capital and exhausts frequently either consumption or sale or by fire or other natural calamities. It occupies a large percentage of the total working capital employed by a firm. Firs generally maintain some inventory in stock to achieve a desired level of sale the major goal of inventory management is to determine and maintain the optimum level of inventory investment. Two limits must be considered in controlling inventory levels because there are two danger points that management wants to avoid. The first point is the inadequate inventories that disrupt production and may lose sales. The second point is the excessive inventories increase the unnecessary carrying cost as well as obsolescence risk. Thus both excess and inadequate inventory stock level in not desirable to the firm. The optimum inventory level lies in between these two danger points. The term 'inventory' represents the stock of consumable items like raw-materials, semi-finished goods, finished goods, supplies etc held by the firm awaiting either for sale or production or its utilization on to achieve their respective goals. Purchasing economically, using appropriately and preserving carefully are the main objective of inventory management. In other words, optimum investment in inventory is the essence of inventory management (Dongol ,et al , 2069:34)

2.2 Types of Inventory

The level of three kinds of inventories for a firm depends on the nature of its business. A manufacturing firm will have substantially high level of all three kinds of inventories, while a retail or wholesale firm will have a very high level of finished goods of inventories and no raw material and work-in-process of inventories. Within manufacturing form, there will be difference large heavy engineering companies produce long production cycle, therefore, they carry large inventories on the other hand inventories of consumer, and Product Company will not be large because of short production cycle and fast turnovers (Pandey, 1994, 884)

Inventory is defined as a stock or stock of goods. These goods are maintained on hand or near a business's location so that the firm may meet demand and fulfill its reason for existence. If the firm is a retail establishment, a customer may look elsewhere to have his or her needs satisfied, if the firm does not have the required item in stock when the customer arrives. If the firm is a manufacturer, if must maintain some inventory of raw materials and work-in-processing order to keep the factory running and it must maintain some supply of finished goods in order to meet demand.

Following are the important and inevitable factor of production. It includes physical commodities used to manufacture the final product.

2.2.1 Raw materials

Raw material is important and inevitable factor of production. It includes physical commodities used to menu facture the find product.

These are goods that have not yet committed to the production in the manufacturing firm, "Raw materials are those basic inputs which are converted into finished products through the manufacturing process raw material inventories are those units, which gave been purchased and stored for future production" (Pandey, 1995;755). "it consists of item that firm purchase for use it it's production process it may consists of basic materials and or manufactured goods maintaining adequate raw materials inventories provides a firm with advantage in both purchasing and production". Materials used in factory are traditionally classified as direct imperials and indirect materials. Direct materials are generally defined to include all materials and parts that are integral part of the finished product and their contribution can be directly identified. Indirect materials are generally defined as material used in manufacturing process as supporting materials. Here are following types of raw held by these two dairies:

(i) Auxiliary materials
(ii) General materials
(iii) Lubricant materials

(iv) Milk materials and
(v) Mechanical materials

2.2.2 Direct Materials

Direct materials are those materials which can be identified in the product and conveniently measured are direct charged to the product are direct materials. Thus these materials directly enter the product and form a part of finished product for example, timber in furniture making , cloth in dress making, bricks in building a houses, milk in dairy product making. Following are normally classified as direct materials

a. Raw materials like milk in the manufacturing of Dairy,
b. Materials specially purchased for a specific job, process, or order.
c. Parts or components purchased or product
d. Primary packing materials

2.2.3 Indirect Materials

Those materials which do not form the part of the finished product but are essential supplement of it are called indirect material. Indirect material though used in the production but they cannot be allocated

2.2.4 Work-in-Process

Work-in-process means partly finished goods into the process of manufacturing. Work-in process consists of all items currently in the process of production. These are actually the partly manufactured products. Work-in-process inventories are semi-manufactured products and they represent that need more work before they represent that need more work before are converted as finished product for sole. Sometimes it becomes very difficult to determine which materials is work-in-process and which are not because the same material in one industries and the some material may be a raw material may be a work-in-process as well as a finished goods in other industry, it depends upon the nature of production. For milk industry milk is the final product. But a sweet industry uses milk as raw material.

2.2.5 Finished Products

Finished goods of those items, which have already been produced but not yet sold. "These inventories are those completely manufacturing product which are ready for sale stocks a raw materials and work-in-process facilitate production while stock of finished goods is required for smooth marketing operations.

Therefore, finished goods are concern they are waiting sale. In a manufacturing concern they are the finals output of production process". Firm carry finished goods to ensure that order can be filled when they are received. If a firm don't have 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 arrive when demand arrives and there is no inventory to satisfy that demand a stock out situation exists.

In such situation, the firms will be danger in position of losing the customers to competitors permanently these two dairy has produced these types of products:

Yoghurt	Butter
Ice-cream	Ghee
Cheese	Milk powder
Other dairy products	Skimmed butter milk

2.2.6 Supplies, Stores And Spares

A fourth kind of inventory, supplies, stores and spares is also maintained by cleaning materials like soap, brooms, oil, fuel, light, bulbs etc. these materials do not directly relate to the production but are necessary for production process.

2.3 Objectives of the Inventory Management

Inventory management involves planning of optimal level of inventory and control of inventory cost supported by an appropriate organization structure which is stated by rained persons and directed by top management. It involves both financial and physical dimension and these dimensions are interrelated cannot be looked in isolation (Agrawal, 2002, 238)

2.3.1 The Regular Supply of Material

The main objective of inventory management is to supply all kinds of inventory regularly in such a manner that there is no shortage of materials and the production has not got to be stopped. For the minimum level of all kinds of material is pre determined and the business organization tries to maintain the materials at that level.

2.3.2 Least Investment in Inventory

The material has to be collected in such an amount that there is no shortfall for production. This is an important point but to collect a huge amount of material is

not fruitful for organization, since it involves investment of capital. If the business organization can make maximum profit. That is why; the maximum level is determined for various kinds of materials and collects the materials up to that level.

2.3.3 Suitable Price

One of the main objectives of inventory management is to collect the inventory at affair price when buying the inventory, a business organization must try to purchase of most economical rate. The quality should not be compromised for least price. Thus the objective of inventory management is to purchase quality material at the appropriate price and make it available for production.

2.3.4 Minimum Wastage

There is a possibility of wastage at the time of holding inventories in stores and handling the materials. Spoilage in storing, loss by theft, loss in handling or using etc. are the examples of wastage. Such wastage should be minimized and it is also an objective of inventory management.

2.3.5 Economy in Expense

In holding of materials, it is not enough to pay the cost price only. Besides, the other types of costs also have to be borne for obtaining it and holding it. To reduce such cost is another objective of inventory management.

2.3.6 Information about inventory

The management wants various information and to manage the materials. These information and data are important for planning and control. To provide these information and data regarding the inventory is also one of the main objectives of inventory management.

2.3.7 Availability of Finished Goods

The business organization will be greatly benefitted if it can supply finished goods in the market according to the future they will develop a habit of buying those materials which is harmful for the previous organization. That is why, the organization should always hold proper amount of inventory for supplying the goods accounting to customers demand and it is another main objective of inventory management.

2.3.8 Maximization of Profit

If the management of material is efficient, there will be no shortage of materials and the production will go on continuously. It will help the organization in a big

way to earn profit. That is why, one of the objectives of inventory management is to make a proper supply of materials so that profit will be maximized.

2.4 Need to Hold Inventories Management

The basic to hold inventories is to keep up the production activities unhampered. It is neither physically possible nor economically justifiable to wait for the stocks to arrive at the time when they are actually required. Production and delivery of goods are not instantaneous, so there is need to hold inventories so that customer may be delivered goods or service immediately. Therefore, keeping of inventories is a must for the efficient working of an industrial unit

According to Charles T.Horngren, "Inventories are cushions (a) to absorb planning errors and unforeseen fluctuations in supply and demand and (b) to facilitate smooth production and marketing operation".

Further inventories help to isolate or minimize the interdependence of all parts of the organization (for example departments or functions) so that each may work effectively (Dangol, et al ,2069,34)

Following are the motives of holding inventories.

2.4.1 Transaction Motive

Every firm holds adequate amount of inventories to facilitate smooth production and sales operation. The firms hold inventory of raw materials for an uninterrupted production, because it is not possible for a manufacturing firm to purchase raw materials whenever it is needed. It will take time to receive materials when the firm demand or order. So, the firm should hold adequate amount of raw materials. Similarly, the inventory of work in progress has to be maintained till the production cycle completes. Adequate quantity of finished goods should be held to supply goods to customers immediately, when they demand.

2.4.2 The Preventive Motive

The preventive motive can be defined as the purpose of holding inventory enough to avoid chances of interruption in production due to scarcity of raw. For example, the factors like strike, transport disturbance, shortage of supply, etc may hamper in regular supply of raw materials. So, the firm should hold adequate quantity of materials to continue production operation in such situations. The company may lose its permanent customers when it cannot meet their demands on time.

2.4.3 The Speculative Motive

The speculative motive is the purpose of making profit either in recession or economic boom. The firm would like to purchase and hold large quantity of raw materials and trading goods in anticipation of price rise. It helps to generate an extra amount of benefit to the firm. On the other hand, it does not keep a huge quantity of inventories when the price of goods and services are low (Koirala, et,al, 2012,406)

2.5 Cost Associated with Inventory

There are following types of costs involve, while discussing and making decision on inventory.

2.5.1 Carrying Cost

Carrying cost is the cost per unit of holding an item in inventory for a specified time period. Carrying cost also known as the holding cost or the storage cost, carrying cost represents the cost that is associated with storing an item in inventory. It is proportion to the amount of inventory and the time over which it is held. The elements of carrying cost include the opportunity cost of capital invested in the stock, the costs directly associated with storing goods (like store men's salary, rates, heating, and lighting, racking and pelletisation, store's transport etc.), the obsolescence cost, deterioration costs and costs incurred in preventing deteriorations, and fire and general insurance etc. the carrying cost is usually expressed as a rate per unit or as a percentage of the inventory value. It is taken to be fixed for each unit of a certain item of inventory held for a unit time (Vohra, 2010, 446).

The total carrying cost is given as:

Total carryingcosts (TCC)= $c * \frac{Q}{2}$

where

C= carrying cost per unit

Q= inventory order size

Q/2 = Average inventory.

The inventory carrying costs are further explained as

Capital Opportunity Cost

This consists of expenses of rising funds (interest on capital) to finance the acquisition of the inventory, if funds were not locked up in inventory. They would have earned a return. This is opportunity cost of the funds or financial cost of components of the cost.

Funds associated with inventory are not available for other uses. Therefore, an opportunity cost determined by alternative use to which could be put. For example, for the alternative uses if firm can earn 10% then the capital cast of the inventory is 10%.

Handling Cost

Those cost which are associated with receiving inspection of goods. It is determined on the basis of quantity of goods, distance of store houses and many more.

Storage Cost

The cost associated with maintenance of inventory is storage cost. These include expenditure made on inventory staff, expenditure to provide various facilities like heating, floor space, shelves, lighting and racks, bins and containers, materials handling equipments and other provision for safe and proper storage of items. These costs generically. Depend upon the volume to value ration of an item.

Spoilage and Shortage Cost

This is another type of inventory carrying cost because of shrinkage and pilferage of inventory makes adverse impact on profitability and assets of the organization.

Depreciation Cost

In every organization, the value of the capital investment decrease with time. Thus, there is tendency among organization to reduce its capital investment on machines and other equipments. The depreciation costs are thus reduced. Naturally the desired among of production with running the machines in stock period thus increasing the size of inventory.

Insurance and Taxes

Many of the goods in inventory required and it should be included in inventory holding cost, whether the year. The inventory a firm has on hand those data's the higher their tax bill will be, where such taxes are in effect prudent inventory management may dictate periodic reduction in inventory to coincide with the date on which the assessments are made. One final type of inventory holding cost remains to be discussed those associated with the administration of the inventory system in use such as information gathering, costs, supervision costs, physical stock checking costs and record keeping equipment cost. It is difficult to determine whether these expenses will be high or low expect by making a comparison among actual inventory system (Hadley and Whiting, 1999, 17).

2.5.2 Ordering Cost / setup cost

Ordering cost is incurred whenever the inventory is replenished. It includes cost associated with the processing and chasing of the purchase order, transportation, inspection for quality, expedition overdue orders, and so on. It is also known as the procurement cost.

The parallel of the ordering cost when units are produced within the organization is the set-up cost. It refers to the cost incurred in relation to developing the production schedules, the resources employed in making the production system ready, and so on (Vohra, 2010,446)

Total Ordering cost is given as;

Total Ordering Cost (TOC) = O X $\frac{R}{Q}$

Where ,

O= Ordering Costs per order

R= Total requirement of inventory for the period.

R/Q= Number of order to be placed.

2.5.3 Stock-out Costs

When the stock of an item is depleted, an order for that item must either wait until the stock is replenished or be canceled. There is a trade-off between carrying stock to satisfy demand and the cost resulting from stock out. This balance is sometimes difficult to obtain, because it may not be possible to estimate lost profits, the effects of lost customers, or lateness penalties. Frequently, the assumed shortage cost is little more than a guess, although it is usually possible to specify a range of such cost (Chase et al ,2009, 625)

Stock out cost computed from following formula. Stock out cost=inventory cycle year *stock output unit * probability of possible stock out *unit stock out Cost

Inventory cycle per year= $\frac{Annualuses}{Quantityordersize}$

2.6 Inventory System

An inventory system provides the organizational structure and the operating policies for maintaining and controlling goods to be stocked. The system is responsible for ordering and receipt of goods, timing the order placement and keeping track of what has been ordered, how much and from whom. Further, the system must provide following up to enable the answering of such question as : has the Vendor received the order ? Has it been shipped? Are the dates correct? Are the procedures established for recording, returning under sirable merchandise (P& Krishana, 1993,483)

I. Multi-stage inventories components, work in process (WIP) are stocked at more than one point in the production process for the production of desired and designed and end products and services with optimal cost, quality and time. The main objective of the multi stage inventory is to maintain the balanced inventory level of different production stages to ensure smooth production and operations (Sthapit, et as, 2010,193)

II. Multi -Echelon (or level) Inventory Systems

Multi-Echelon inventories are inventories of products at the various echelons/ levels whole distributing products from the factory to the consumption points as shown in figure below. The basic concept of multi-echelon and inventory is concerned with the study, analysis and control of inventories in various distribution echelons levels (Sthapit, et al, 2010, 194).

2.7 Inventory Decision Models

Both under-estimation and over-estimation of inventories are bad. If there is under-estimation of inventories, there would be production holdups, and the company fails to meet delivery commitments. We cannot produce at once as much of goods as we want. If there is over-estimation of inventories there would be more funds tied up in inventories which would result in more stock of goods and higher carrying costs. If inventory holding as large, there is also a possibility that inventory would become obsolete as taste of customer may change.

Managing assets of all kinds is basically an inventory problem; the some method of analysis applies to cash and fixed assets as to inventories themselves (Weston et, al 1996). First, a working stock must be on hand to meet expected needs for the items, with the size of the stock depending on expected production and sales levels. Demand, because demand may be greater than expected, it is necessary

to have a safety stock on hand. The additional costs of holding the safety stock must be balanced against the costs of soles lost due to inventory shortages.
There is always an optimum purchase size, defined as economic order quantity, EOQ in borrowing money, in buying raw materials for production, or in purchasing plants and equipment; it is chapter to buy more than just enough to meet immediate needs.

Some costs rise with larger inventories. Among these are (i) storage or ware hosing costs, (ii) cost of capit6al on funds tied up in inventories, (iii) insurance, (iv) depreciation and obsolescence, (v) property taxes, etc.These costs are known as carrying cost other costs decline with larger inventories. These costs known as ordering costs include such costs as cost of placing order, shipping and handling costs and quantity discounts lost. In addition, there are costs of running short (stock out costs) loss of profit resulting from sales lost because of lack of stock, and cost of production interruptions caused by inadequate inventories. The total costs curve is the total of the rising and declining curies. In other words, it represents the total cost of ordering and holding inventories. At the point where the obsolete value of the slope of the rising curve is equal to the absolute value of the slope of the declining curve (i.e. where marginal rising costs are equal to marginal declining costs), the total costs curve is at a minimum. This represents the optimum size of investment in inventory. Following are the inventory decision models

2.7.1 Economic Order Quantity (EOQ)

While placing an order or items, the purchasing officer frequently faces a problem to determine the appropriate quantity to be ordered. As mentioned earlier, both excess and inadequate purchases are costly to the firm. It is because if less quantity is ordered, numbers of order increase and consequently ordering cost increase on the other hand, if more quantity is ordered, the carrying cost increases. Then what is the appropriate quantity to be ordered? Determination of economic order quantity is the appropriate solution of this problem. Economic order Quantity (EOQ) also called Economic lost Size (ELS) is that quantity where the total cost of an inventory is minimum.
Total cost of inventory= total ordering cost+ Total carrying, Cost + Total acquisition cost

The costs incurred since placing an order to receiving the items against that order is called ordering cost or set up costs. The ordering costs usually consist of clerical costs of preparing a purchase order or production order and special processing and receiving cost related to number of orders processed. Remuneration on purchasing department, transportation expenses, postage, telegram, fax receipts and inspection expenses are the examples of ordering costs. Ordering costs are dependable on number of orders placed.

Another cost that includes in the total cost is the carrying costs or storing costs. The cost incurred after receiving inventory into stock before they are issued is called carrying costs. It usually consists of a desired after receiving inventory into stock before they are large, there is also a possibility that inventory would become obsolete as taste of customer may change.

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There is always an optimum purchase size, defined as economic order quantity, EOQ. In borrowing money, in buying raw materials for production, or in purchasing plants and equipment, it is chapter to buy more than just enough to meet immediate needs. Some costs rise with larger inventories. Among these are

i. Storage or ware hosing costs,

ii. Cost of capital on funds ties up in inventories,
iii. Insurance,
iv. Depreciation and obsolescence,
v. Property taxes, etc.

These costs are known as carrying cost. Other costs decline with larger inventories. These costs known as ordering costs include such costs as cost of placing order, shipping and handling costs and quantity discounts lost. In addition, there are costs of running short (Stock out costs) loss of profit resulting from sales loss because of lack of stock, and cost of production interruptions caused by inadequate inventories. The total costs curve is the total of the rising and declining curves. In other words, it represents the total cost of ordering and holding inventories. At the point where the obsolete value of the slope of the rising curve is equal to the absolute value of the slope of the declining curve (i.e. where marginal rising costs are equal to marginal declining costs) issued is called carrying costs. It usually consists of a desired rate of reform on the investment in inventory including remuneration of stores staffs, costs of storage space, breakage, obsolescence, deterioration, insurance etc. as opposed to ordering costs, carrying costs are increased when numbers of orders decreased.

The acquisition cost of inventory is usually unaffected unless quantity discounts are available when such acquisition costs are some for many alternatives, this cost is irrelevant. Thus the relevant coast to determine the economic order quantity is the ordering cost and carrying costs. These two costs behave in opposite directions. For examples, if huge inventories are carried ordering cost will be low and the carrying cost will be high.

The objective of inventory decision is to keep the relevant cost to minimum. So, the determination of economic order quantity is made on the basis of these two relevant costs i.e. ordering costs and carrying cost. Total cost will be minimum at a point where these two costs are equal. Thus, the economic order quantity is that quantity where the total annual cost of placing the orders is equal to total annual cost of carrying. At that quantity, the total cost will be minimum.

Assumptions Order Quantity is Based Quantity

Economic order Quantity is based on the following assumption:

(i) Required quantity of the item should be known
(ii) Ordering costs per order should be known
(iii) Ordering cost per order should not be changed
(iv) Average carrying costs of inventories should be fixed
(v) Unit cost of item should be known.

Determination of Economic order Quantity.

Economic order quantity may be determined under the following three approaches:

(i)Mathematical or Formula Approach

(ii) Analytical or Trial and Error Approach.

(iii) Graphical Approach

(I)Mathematical or Formula Approach

It is crystal clear that total ordering cost and total carrying cost are equal at economic order quantity (EOQ) provided that the safety stock is zero. Thus, the EOQ can be calculated on the ground of relationship developed as follows:

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

Where,

EOQ= Economic Order Quantity

A = Annual requirement

O = Ordering cost per order

C = Carrying cost per unit

The above EOQ model has been derived from following process

From COQ statement, we have

Again, Total ordering cost = Number of orders X Ordering Cost per Order

= $\frac{Annual\ Requirement}{Order\ Size}$X Ordering cost per unit

Symbolically, Total Order Cost= $\frac{A}{Q}$XO= $\frac{AO}{Q}$

Again, Total Carrying Cost = Average Quantity X Carrying cost per unit

= $\frac{Order\ Size}{2}$X Carrying cost per unit

Symbolically, Total carrying Cost= $\frac{Q}{2}$X C =$\frac{QC}{2}$

Now , we have, $\frac{AO}{Q}$= $\frac{QC}{2}$ [Total ordering cost = total carrying cost]

Or, Q^2C= 2AO

$Q^2 = \frac{2AO}{C}$

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

(II) Analytical or Trial and Error or Table Method

Under this approach first of all the different alternative order number along with the various order size of each alternative order is determined. Then, ordering costs and carrying costs for each order size are found out. By totaling the relative ordering cost and carrying cost total costs of each order size is determined. The lowest total cost is the cost of economic order quantity. The

total cost would be the lowest where the relevant costs are equal. The following steps are helpful to prepare the table.
Step-1 To estimate number of orders.
Step-2 To find out order size, by using the following formula:
Order size $= \frac{Annual\ Requirement}{Number\ of\ Orders}$
Step-3 To find out average quantity
Average Quantity $= \frac{Order\ Size}{2}$
Step-4 To find out carrying cost
Carrying Cost = Average Quantity X Carrying Cost Per unit
Step-5 To find out order cost
Ordering Cost= Number of orders X Ordering Cost Per unit
Step-6 To find out total Cost,
Total Cost = Carrying Cost + Ordering Cost

(III) Graphic Method

It is graphic approach of determining optimum level of inventory. The ordering cost and carrying cost are represented in Y axis. The point of inter section between carrying cost curve and ordering cost

curve is the point of which the total inventory costs in minimum and order size of this point is the economic order quantity. EOQ is given by the graphically as below:

In this example, the EOQ is 2000 units at which total inventory cost (TFC) is Rs. 4000, which is minimum. If we 2000 units, TFC will be more than Rs. 4000

2.7.2 ABC Analysis

The ABC analysis consists of separating the inventory items into three groups: A, B, and C according to their annual cost volume consumption (unit cost *annual consumption). Although the break points between these groups vary according to individual business conditions, a common breakdown might be as follows:

Category (or group)	Percentage of the item	Percentage of the total annual Value of the inventories (Rs.)
A	10-20	70-85
B	20-30	10-25
C	60-70	5-15

This type of classification is also known as the principle of law of vital few a trivial many. The ABC analysis facilitates analysis of yearly consumption. Value of items in the store to identify the vital few items which are generally referred to as a category items. Generally, these items accounting for about 70% of the total money value of consumption. Items accounting for about 25% of the items and the remaining ones accounting for about 5% consumption value as C category items.

Carrying out the ABC analysis of the store items helps identifying the few items that are vital from financial point of view and require careful watch scrutiny and follow up. The application of ABC analysis extends overall of the aspects of materials management like purchasing, inventory control, value analysis etc.

After the items are so classified, the inventory control policies are made on the basis of this classification 'A' category items require special managerial attention, therefore, fixed interval inventory control system might be used for these items. 'C' category items can be managed in a little casual manner. For these items, a fixed order quantity system might be used. The order quantities can be relatively large without incurring excessive consists. A large reserve stock can also be maintained 'B' items are not so costly as to require special managerial attention, but these are not so cheap as to ignore might be used for these items.

The procedure of ABC analysis is summarized in the following steps.

Step-1 Obtain data on the annual usage (or consumption) in units and unit cost of each inventory item. Multiple the annual usages in units and the value of each item to get annual value for each of these items.

Annual Values= Unit cost X Annual Consumption.

Step-2: Arrange these inventory items in a decreasing order of their value computed in step 1.

Step-3 : Express the annual value of each item as percentage of the total value of all items. Also compute the cumulative percentage of annual consumption rupees spent.

Step-4 : obtain the percentage value for each or the items. That is, if there are so items involved in classification, then each item would represent $\frac{100}{50}$=2% of the total items. Also cumulate these percentage values.

Step5 : Draw a graph between cumulative percentage of items (on X-axis) and cumulative annual percentage of usage value (on Y-axis), and mark cut-off points where the graph changes slopes as shown in fig. 2.2 (Sharma, 2008, 680-681)

2.7.3 System of ordering: when to order?

The problem how much to be order. This question is when to be ordered. This question is related to determine the reorder point. It is also known as order point or optimal re-order point or recording level of ordering level. It is the point which if stock of material falls down then the store keeper initiates the purchase requisition up to time the fresh supply of the materials. This level is fixed somewhere between the maximum and minimum level in such a way that the difference recording level and maximum will sufficient to meet the requirement of production of to time the fresh supply of the materials received.

The re-order point is the level of inventory at which the firm places on order in the amount of the economic order quantity. If the firm places the order when the inventory realties the re-order point, the new goods will arise before the firm runs out of goods to sell. As long as delivery is not instantaneous an order must be placed so that inventory is not depleted till new shipment arrives. This required inventory level is inventory that would be used (or sold) between the times of an order is placed and time delivered. Transit stock is determined by using the following formula

Transit stock=stock used per time period X transit time ,

Uncertainly in demand can be accommodated by adding safety stock for the transit stock level. Safety stock refers to extra inventory held as a hedge or protection against the possibility of a stock out. Safety stock reduces or eliminates the costs increased by a stock out, but it adds to carrying costs. The recorder point is determined by adding transit stock to the safety stock level that the company determines to be cost effective optimal Recorder Point = Transit stock +Safety Stock.

The safety stock involves two types of cost (i) stock out cost and (ii) carrying cost. Safety stock in necessary under the condition of uncertainty in such situation the demand and supply of goods may fluctuate day by day. If the actual usage or sales increases and delivery from the supplies are delayed the firm would face a stock-out problem. The firm would therefore be advised to

keep a sufficient safety margin by giving additional investor to guard against stock out situation such stocks are called safety stock.

2.7.4 Stock Level Subsystem

Carrying of too much and two little of inventories is detrimental to the firms. If the inventory is too title, the firm face frequent stock-outs involving high reordering cost and the inventory level is too high, it will be unnecessary ties of capital. Therefore, an efficient inventory management requires that a firm should maintain the optimum level of inventory where inventory the optimum level of inventory where inventory costs are the minimum and at the same time there is no stock out which may result in loss of sale or stoppage of production various stock level are (Dangol, et al, 2069, 41).

Re-order Level

An important question in any inventory management system is "when an order for the purchase of an item should be placed so that the concern does not run out of goods". The answer to this question is provided by the reorder level.

The reorder point is that level of inventory at which the store keeper should initiate the purchase requisition for the purchase of inventory in the amount of the economic order quantity. This point is fixed somewhere between the maximum and minimum level in such a way that the difference of the quantity of inventory between the reordering point and the minimum level will be sufficient to meet the requirements of production up to the time the fresh inventory is recorded. For calculation reorder level, the following points should be taken into consideration

(i) Lead time i.e. the time log between ordering and receiving of the inventory . It is usually expressed in number of days.
(ii) Usage rate or daily consumption i.e. the quantity per day at which the item is consumed in production process or sold to customers.
(iii) Minimum stock level i.e., the quantity below which stock should not be allowed to fall.
Re-order point may be determined by using any one among the given three formulae.
(I) Re-order point= Lead Time X Daily consumption
(II) Re-order Point = Maximum consumption X maximum lead Time
(III) Re-order Point = minimum level X (lead time X Daily consumption)

Maximum Level

The maximum stock level indicates the maximum quantity of an item of material which can be held in stock at any time. The maximum stock level is fixed by taking into consideration the following factors.

(i) Average rate of consumption
(ii) Availability of funds.
(iii) Risk of obsolesce sense, depletion, evaporation and material waste
(iv) Future fluctuation of price of materials.
(v) Availability of storage space.
(vi) Cost of storage and insurance
(vii) The nature of material-seasonal supplies etc.
(viii) Economic order quantity
(ix) The lead time
(x) Any restriction imposed by the government with regard import etc.

The maximum stock level can be calculated by applying the following formula:
Maximum level = Re-order level +Re-order Quantity - (minimum consumption X minimum Re-cored period)

Minimum level

The level represents the quantity below which the inventory of any item should not be allowed to fall. In other words an enterprise must maintain the minimum quantity of stock so that the production is not hampered due to non-availability of materials. It is same butter inventory axing as a cushion against reasonable expected maximum usage. The minimum stock level is fixed by taking into account.

(i) Re-order level
(ii) Lead time, i.e. time lag between dates of issuing orders and the receipts of materials.
(iii) Average rate of consumption of materials.

Formula

Minimum level = Re-order level- (Normal consumption X Normal Re-order period)

Danger Level

It means a level of which normal issues of the material is stopped and issues are made only under specific instructions. The purchase officer will make special arrangements to get the materials which reach at danger levels so that the production may not stop due to shortage of materials.

The danger level is below the minimum level and represents a stage where immediate steps are taken for getting stock where immediate steps are taken for getting stock replenished. Generally, the danger level of stock is fixed

about the minimum but below the re-ordering level it is calculated by the following formula:

Danger level = Average consumption X max. Re-order period for emergency purchases.

Average Stock Level

Stocking of materials on an average consumption is called as 'Average Stock level'. It is determined by using the following formula:

Average Stock Level = Minimum Level + $\frac{Re-Order\ Quantity}{2}$

Safety Stock

For the regular availability of raw material, safety stock is determined by using the following formula:

Safety Stock = lead Time (Maximum Consumption - Average consumption)

2.7.5 Just in Time System (JIT)

In recent years the management of inventory has become very sophisticated. Many firms apply just in (JIT) inventory control. It is a system of inventory control in which a firm co-ordinates production with suppliers so that in which a firm co-ordinates production with suppliers so that raw materials or components arrive just as they are needed in the production process. In the system the inventories are received as and when they are needed for production that facilitates t he firm to minimize carrying cost of inventory. Application of JIT requires and effective method of handling inventory. The use of computerized data processing and information system has made JIT the most effective method. Various commodity exchanges provide the service of information and access to the supplies. If a firm needs specified types of inventory, it could simply go through the internet web site of those commodity exchanges where it could call for all possible suppliers. Various suppliers the bid for the contract of supplying inventory according to the need of the firm larger firm designs a specific computer programming to count the stock of inventories. It is a system in which a computer is used to determine the re-order point and to adjust inventory balances. The computer starts with the level of inventory counted in memory. When inventories are drawn, the computer records them and balances of inventories are revised.

This system significantly reduces the cost of paper work and other costs associated to the search of competitive suppliers. The JIT and computerized system is more applicable for reducing the ordering costs associated to inventory so that EOQ and its cost could be minimized significantly. The

reduction in EOQ also enables the firm to minimize the average inventory level so that inventory carrying cost also decreases (Paudelet. All 2009, 252)

2.7.6 Out-Sourcing

It is a recently developed practice of acquiring some component of inventory used unfinished product from outside rather than producing by the firm itself. Just for example, a company that manufactures inventoried can also manufacture the batteries required or acquire from outside supplies. Outsourcing is mainly considered for cost effectiveness of components of inventories. The firm may decide to use out-sourcing if buying from outside is cheaper than manufacturing by itself (Poudel et al, 2009,252)

2.8 Cost Basis of Inventory Valuation.

There are a number of generally accepted methods of determining the cost of inventories at the close of the accounting period. These methods are to identify a suitable method as a basis of inventory valuation. The selection of a suitable method assumes significance in view of the fact that it has a direct bearing on the cost of goods sold and consequently on profit. Therefore, the method can be selected in the light of the probable effect on profit over a period of years. Keeping this view in mind the following methods to value inventory mentioned.

2.8.1 Weighted Average Price Method

According to this method inventories received first are issued first after the first lot of inventory purchased is exhausted, the next lost is taken up for supply. The units in the opening stock of inventories are treated as if they are issued the units from the first purchase issue next, and so on until the units left in the closing stock of materials are valued at latest cost of purchases.

2.8.2 First IN First out Method (FIFO)

According to this method inventories received first are issued first after the lost is Inventory purchased is exhausted, the next lost is taken up for supply. The units in the opening stock of Inventories are treated as if they are issued the units from the first purchase issue next, and so on until the units left in the closing stock of material are valued at latest cost of purchase.

2.8.3 Last in First out Method (LIFO)

The last in first out method is based on the assumption that the goods which are received last are issued forts. This assumption is made for the purposes of

assigning costs and not for the purposes of the physical flow of goods. The physical flow of goods therefore, need not necessarily coincide with the pattern of cost flow assumption. The goods sold, therefore, consist of the latest lots. The ending inventory consists of the earliest lots and is valued at the price paid for such lots. In periods of rising prices, lower income is reported since current costs are matched with current revenues. As a result, income tax liability is reduced. The ending inventory is understand in the balance sheet at old costs (Tulsion, 2004, 14.5)

2.8.4 Based Stock Method

The base stock method proceeds on the assumption that a minimum quantity of inventory (base stock) must be held at all times in order to carry on business. Inventories up to this quantity are stated at the cost at which the base stock was acquired. Inventories in excess of the base stock are dealt with on some other basis, e.g. by using any one of the above mentioned methods. The base stock method requires a minimum level of inventory to be held at all times and therefore, has a limited application. Most enterprises customarily maintain certain minimum stock level at all times but that is not by itself a justification for use of base stock method because there must exist clear circumstances to permit use of base stock method (Tulsain, 2004m 14.16)

2.8.5 Standard Cost Method

Under this method, a standard cost is set for each materials and this cost is used as a basis for pricing the material issues while determining standard costs, the management takes into account the specified efficiency in efforts relating to purchase of material, issue of material, stoning of materials and use of materials, normal levels of consumption of materials and supplies, labor efficiency and capacity utilization.

2.9 Inventory Models

Inventory modeling is the quantitative techniques of developing inventory models using quantitative techniques for the optimization of the inventory costs. Inventory models tries to precisely answer two questions: (i) when to order? And (ii) how much to order?
There are three types of inventory models. They are as follows.

2.9.1 Inventory model with uncertainty

In simple inventory models, we assume that demand and supply, local times are constant, in many real would applications, demand cannot be predicted with certainty and lead tics often vary from one order to another. A consequence of this variation is that stock outs may occur if future demand exceeds our estimate if an order arrives later than expected. It is possible to reduce the risk of stock. Outs by carrying larger inventories called safety stock or butter stocks, however additional costs are incurred by trying up additional funds in inventories and risking the possibility of obsolescence. The objective then, is to develop a model for determining inventory policy that balances these risks and minimizes expected total incremental costs (Buffa and Sarin, 2000, 112)

2.9.2 Replenishment Model

Replenishment models of base stock models are effective in many real inventory situations, particularly when delivery lead time are long and shortage cost are extremely high or when stock counts are infrequent (Buchan et al, 1970m 362-363)

The model is also called maximum liability model. Inventory costs are not considered explicitly in the replenishment system and there is no fixed reorder quantity in steadm inventory is reviewed at periodic intervals, and if there have been any sales since the last review, an order is placed. In this model, there is only one number to be determined is the base stock of maximum inventory, we can develop an equation by assuming mean lead time goods in transit, and inventory review time and safety stock for the period.

$M = SW (L+R) + B$

Where,

M= Base stock or maximum inventory level

SW= Mean weekly demand

L= mean lead time in a week

R= inventory review time in week

B = Buffer stock in units (safety stock in units)

Depending on whether lead time is greater or less than the review time, one of the following two rules is used for determining the reorder quantity (Q) under the replenishment model:

$Q = M-I$.....if $L<R$

$Q = M- I$.....if $L<R$

Where, I = Inventory at a review time.

The buffer stock B must be sufficient to guarantee on adequate service level in the face of variations in both demands and lead times. If we take the

replenishment times as being the total of lead time and review time and have a measure of the distribution in demand over.

2.9.3 Periodic Review System

A common alternative system of control fixes the order cycle instead of the reorder quantity. In such system, the inventory status is reviewed on a periodic basis and an order is placed for an amount that will replenish inventories to a planned maximum level. The reorder quantity, therefore various from one review period to the next (Buffa and Sarin, 2000, 123).

The most important benefit of the periodic reorder system is that the periodic review of inventory and usage level provides the basis for adjustment to take account of demand changes.

2.10 Comparison of the periodic and perpetual Inventory system

The systems are both designed to control inventories in the face uncertainty, whether one of the other is employed in a particular instance depend upon the nature of the items stocked; the type of controls needed the nature of the sources of supply.

The fixed order size system is well suited formanging inventories of low value items, since it permits loser control. Items of this sort are usually bought in large quantities relative to their use and can be readily obtained from the supplier at any time. A simple to been process without a large investment in record keeping can control them. Perpetual inventories also lend themselves to the stocking of high-cost items that can be purchased at any time. Continuous positing to inventory records controls these items. In this way, the status of the high cost items can closely watched. This is costly, however for inventories with a large number of items, since the critical cost is high yet, with the use of computer such cost can be reduce. The fixed order interval system lends itself to inventories that consist of large member of product because the clerical cost of periodic evaluation is substantially below that required for perpetual recording. This system is also well suited for items whose availability may be limited because of the suppliers demand for period order so that they can plan their production runs economically. In order to use, the fixed order-interval system, however, higher safety stock must be maintained.

2.11 Unpublished Thesis

(i) Limbu, (2007) conducted the thesis on "Inventory Management: A case study of Salt Trading Organization", submitted to Faculty of Management, T.U.

Objectives:

- To examine the practice of inventory management functions
- To analyze relationship of inventory with net sales, net profit, purchase and interest expenses
- To analyze the position of inventory levels and its trend.

Major Findings

The major findings of the study were as follows:

- Corporation is applying techniques of inventory management like ABC analysis and EOQ analysis, however it is found ineffectively and unsystematically applied.
- The inventories to net sales ratio of the last years have been increased because of decreases in net sales
- Inventory to total assets ratio are not consistent over the study period.
- The ratio in between inventories and net profit are fluctuating trend but the ratio is more increases in last two years.

(ii) Miyan (2007) conducted a thesis on Inventory Management: a case study of Gorkhapatra Corporation", and submitted to Faculty of management, T.U.

Objectives:

This study was aimed to explore the under lying constrains in existing management and control system of inventory and their impact towards the Gorkhapatra Corporations Profitability. Along with, the a foresaid

- To examine the existing inventory management system applied by Gorkhapatra Corporation.
- To analyze the relationship between inventory / material cost and profit

Major Findings

- The inventory can be managed smoothly by classifying them according to their value i.e. ABC analysis. Those items that are higher usages value then other have to give precise control with less control applied over items having low usages value, when this type of classification is made, it will be easier for the corporation to know which items in inventory have higher usage value and which have not accordingly a precise control over the items inventory can be applied. But the corporation is not maintaining ABC analysis system.

- Annual usages of news print, ink, film sheet and aluminum sheet by the corporation seems highly fluctuated although the normal working days are same and annual usages expenses in the own material is also highly fluctuated.
- Corporation need procure raw materials 3-4 times in a year in a year instead of one time in a year.

(ii) Shrestha (2010) conducted the thesis on Inventory Management and its Effects on Cash Flow of Salt Trading Corporation". Submitted to the Faculty of Management of T.U,

Objectives:

- To analyze the condition of inventory management and its relationship with other variables like net sales, net profit, purchase.
- To show the effects of inventory in cash flow of SCT.

Major Findings

- Corporation applied ABC and EOQ techniques of inventory management; however it was applied in effectively and unsystematically.
- The value of correlation and probable error between sales and inventory was +02 and was 20. It seems that there was low degree of positive correlation.
- Mean of inventory to current assets ratio 33.45 %. It indicates that the company had not been adopting appropriate inventory policy.
- Coefficient of correlation between net profit and inventory were cost which was for from +1. So there was low degree of positive relationship between net profit and inventory.
- Correlation coefficient and probable error between inventory and purchase were. 0065 and 203 respectively which shows the low degree of correlation coefficient between inventory and purchase.

(iii) Poudel (2012) the thesis on a topic on "Practice of Inventory Management System of Manufacturing Company in Nepal" was focused to achieve the following objectives;

Objectives

- to analyze the present position of inventory management of the company.
- To study of prevailing inventory management practices and identifying the problem faced by the company.
- To examine the profitability and efficiency of the company regarding inventory management
- To provide logical suggestion for improvement on the basis of the study diagnosis.

Major Findings

The major findings of the study were as follows;

- They purchase raw material through locally, India and third countries as far as the availability and necessity

- They do not follow exactly EOQ model and ROL model for the management of inventory. Basically their focus in on inventory on demand and supply likewise, they pay more attention on ABC system. Although they are not using ABC system.
- The trend of production cost and sales of UL is acceptable where as DNL has satisfactory ratio.

(iv) Gaire (2009) conducted the thesis on "Inventory Management of bottlers Nepal limited", submitted to the Faculty of Management of T.U.

0bjectives:

- To study the practice of inventory management bottlers Nepal Ltd. (acquisition of raw materials, storing of goods and issuing of goods)
- To analyze the position of inventory level and its trend in different periods of operation.
- To analyze the relationship between the factors like net profit, sales, purchase, etc.

Major Findings:

- The inventories maintained are of different types and there is a huge fluctuation of inventories from period to period, in some fiscal year the firm has not maintained some inventories.
- Inventories to total assets ratio, the ratio are not consistent, though there is not a huge fluctuation.
- Raw material occupies the largest portion of the inventories for each inventories type where finished goods occupy the least portion on total.
- The inventories to total current assets ratio is negative due to negative current assets.
- The purchase has increased for the Ist year and onwards has a fluctuating trend. CU of purchase is higher to that of inventories which shoes that variability of purchase is higher than inventories.

(v) Dhakal (2006) has conducted a thesis on the topic of "A Study on Inventory Management and Control of Royal Drug Ltd". submitted to Faculty of management, T.U. the objectives of thesis were:

Objectives:

The general objective of this study was to identify the problem underlying the inventory management and control system of royal drugs ltd. along with the foresaid objectives of the following were specific objectives that have been embodies in this study.

- To assess the type of inventory maintained on the Royal Drugs Ltd.
- To examine the techniques employed to manage inventory in Royal Drugs Ltd.
- To suggest proper inventory model to Royal Drugs Ltd. based on analysis.

Major Finding

- Chemical materials are over Stocking
- The packing materials were not managed efficiently
- Inadequate level of finished goods.
- Stock items were not classified properly.
- They have not recognized the minimum stock and reorder level.

2.12 Research Gap

Various issued and gaps are found during the course of literature review which is being faced by Nepalese public enterprises during the study period. The major problems related to area of inventory management faced by one companies DDC are as follows.

Previous studies are focused in an inventory management system. But in this studies mostly focused on stock level EOQ system, JIT and out sourcing. This study shows the relationship of inventory with sales, net profit, cost of goods sold and closing stock. These types of studies which shows relationship with each other was not done yet.

CHAPTER III

3.1 Introduction

Research is a systematic and organized effort to investigate specific problem than needs a solution. And methodology is the systematic way of finding solution to a problem i.e. systematic collection, recording analysis, interpretation and reporting of information about various facts of a phenomenon under study. Therefore, research methodology describes the methods and procedures applied in the entire aspect of the study.

Research methodology is the way to solve systematically about the research problem. It is the process of arriving at the solution of problem through the planned and systematic dealing with collection, analysis and interpretation of facts and figures. The basic objective of the study is to visualize the comparative present position of the inventory management and its impact of profitability of DDC. To achieve the objective, the study needs appropriate research methodology.

This study tries to focus on how the effective inventory management be maintained systematically and how can we control inventory management and how can we minimize the inventory properly. For the purpose of achieving the objective the following research methodology has been purposed, which includes research design, nature and sources of data, data, collection producer and techniques of analysis.

3.2 Research Design

Helps the investigator for obtaining answers to questions of research and also helps him to control the experimental, extraneous and error variance of the particular research problem under study (Pant, 2009, 112).

A research design is the logical and systematic planning and directing of piece of research. Thus, a research design is research plan or structure which is path for conducting research work. Without research design, it is not possible to conduct a research design keeping in mind on the objective of the study.

The study aims at finding out the company inventory management. The company published annual report balance sheet, P/L a/c and other accounting statement and supporting will have used for this study. On the basis of presented data facts analytical research design will have adopted for assessing the inventory management. Thus the present study follows the descriptive as well as analytical approach.

3.3 Population and Sample

All the dairy manufacturing companies are population for the proposed research at present, there are 55 milk (organization) manufacturing company. DDC is selected as the sample for the research. There are eight productions DDC. They are KTM DDC, Biratnagar DDC, milk sales and distribution KTM Corporation Getauda DDC, Lumbini DDC, JNK DDC, Nepalgang DDC, Dhanding DDC;

3.4 Sources of data

The secondary data used of DDC. The sources of secondary data are both internal and external. The internal secondary data included data available in financial statement and unpublished official records of DDC. The external secondary data include the data available in books periodicals, unpublished official records of the government organization and published and unpublished report.

3.5 Data collection Procedure

Secondary data required for the study is obtained through the annual report of the respective DDC. Annual reports collected visiting the respective corporate companies. The other sources of secondary data were accessed through internet, web site, Journals and news papers. The study covers a period 5 years of fiscal year 2067/68.

3.6 Data Analysis Tools

Analysis is the careful study of available facts so that one candy understand and drew conclusion from the on the basis of established principles and sound logic. This study based the analysis of secondary data with the help of different statically tools. Therefore, the data have become collected accordingly and managed, analyzed and presented in suitable tables, formats, diagrams, graphs and charts. Such presentations have been interpreted and explained wherever necessary. To analyze the collected data, financial and statistical tools are used to analyze the effectiveness of inventory management w3 herever necessary for this the tools applied in the study are as follows;

Economic Order Quantity (EOQ)

EOQ refers to the size of inventory to be ordered at which total inventory costs is minimum. Total inventory cost is the minimum at order size, where total ordering cost is equal to total carrying cost. EOQ is one of the most commonly used for determining the optimal order quantity for an item of inventory. EOQ is calculated from the following mathematical formula:

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

Where

A= Annual requirement

O= Ordering Cost Per Order

C= Carrying Cost Per Unit Per year

Re-order Level

ROL is the level of inventory at which order should be placed for delivery before depleting the inventory level to the zero, so that we can get supply just before being stock out.

ROL= Safety Stock +(Daily usage X Lead time) - Goods in Transit.

Ration Analysis

Ratio is the relationship between two quantitative figures. The ratio analysis is the financial tool by which the financial strength and weakness are measured by relating two accounting data following ration will be used to analysis data,

(i) Inventory to fixed Assets Ratio $= \frac{Inventory}{Total\ Fixed\ Assets}$

(ii) Inventory to Sales Ratio $= \frac{Inventory}{Net\ Sales}$

(iii) Inventory to Current Assets Ratio $= \frac{Inventory}{Current\ Assets}$

(iv) Inventory to Profit Ratio $= \frac{Inventory}{Net\ Profit}$

(v) Inventory Turnover Ratio Order size $= \frac{Cost\ of\ Goods\ Sold}{Average\ Inventory}$

Arithmetic Mean

The sum of all the observations divided by the number of observation is called arithmetic mean. The most popular and widely used measure of central tendency is the arithmetic mean. It is also called simply the mean. The arithmetic mean, usually denoted by $\bar{X}$ is defined by the following formula.

$\bar{X} = \frac{X1+X2+X3+\cdots X\,n}{n}$

$\bar{X} = \frac{\sum X}{n}$

Where,

$\sum X$ = The sum of observations

N = no of observations

Standard Deviation

The standard deviation is defined as the positive square root of the arithmetic mean of the squared deviations from their arithmetic mean of a set of values. It is usually denoted by the Greek latter (Small sigma). The mathematical formula for standard deviation is

$$\sigma = \sqrt{\frac{\sum(X-\bar{X}}{n}}$$

Coefficient of Variation (C.V)

The relative measure of dispersion based on standard deviation is called coefficient of standard deviation. Thus,

Coefficient of Standard deviation $= \frac{\sigma}{\bar{X}}$

100 times coefficient of standard deviation is called coefficient of variation. It is denoted by C.V. thus

C.V.$= \frac{\sigma}{\bar{X}} * 100$

Coefficient of variation being a pure number is independent of the units of measurement and thus is suitable for comparing the variability, homogeneity or uniformity of two or more distribution (Chaudhary, 2066, 193)

3.7 Research Question

The present study attempts to seek the following research questions:

1. Has the company applied EOQ model
2. What steps should be taken to improve the existing problem of inventory management?
3. What are the methods of inventory determining?
4. What is the current status of inventory of the companies?
5. Which forms of inventory do maintain in your company?
6. Who determine the inventory in the company?
7. What are the basic reasons for keeping inventory in the company?
8. How the firms are utilizing their inventory resources?
9. What should be the optimal level to reduce the inventory cost?
10. What is the impact of inventory over the company's profit?
11. What are the major problems in the existing inventory management and control system?

CHAPTER- IV

PRESENTATION AND ANALYSIS OF DATA

Inventory control Techniques imply to control inventory of DDC. The data presentation and analysis is the main portion of the study because all the information and ideas will be analysis in this chapter. The main objective of this study is to examine the exaction position of inventory management and analysis of present parched of inventory management system in DDC. Thus, in these contexts this section analyzes the relevant secondary data and information regarding inventory management of thes 4e companies which are presented in suitable format and comparison is made. To achieve the fruitful result, it is tried to divide the analysis part in two sections as the first part is analysis of inventory management and second part is analysis of its effect on the present position of inventory management by using different tools and techniques. There are many techniques to control the inventory management. These techniques are as follows:

4.1 Sales Trend Analysis

Table 4.1

Annual Sales of DDC

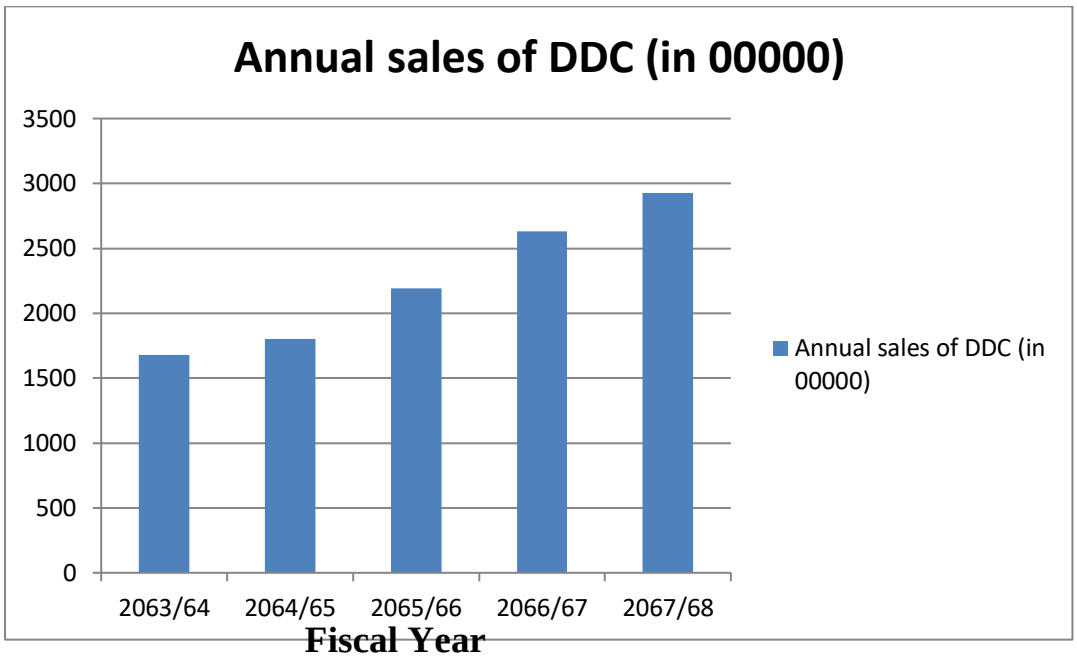
Fiscal year	Annual sales of DDC
2063/64	1680353680
2064/65	1800673560
2065/66	2193309447
2066/67	2628350971
2067/68	2926888212

Source, DDC.

From the above table, it is clear that annual sales DDC are in creasing in trend year by year sales condition of DDC is satisfactory.

Fig. 4.1

Annual sales Trend of DDC



From the above figure, it is clear that annual sales trend of DDC is in increasing trend year by year from fiscal year 2063/ 64 to 2067/68

4.2 Trends Analysis of Inventory

Table 4.2

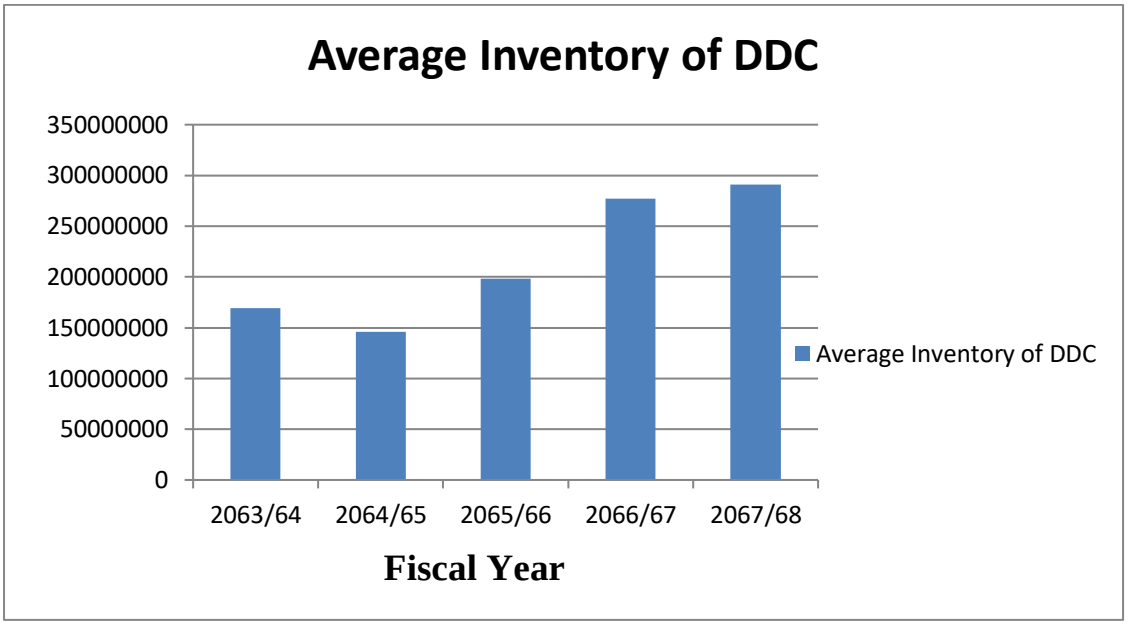
Analysis of Average Inventory of DDC

Fiscal year	Average Inventory of DDC
2063/64	168996720
2064/65	145992339
2065/66	198200155
2066/67	277056336
2067/68	290678780

Source: Appendix I

From the above table, it is clear that average inventory of DDC is in clearing trend from fiscal year 2063/64 to 2064/65 and in fiscal year 2065/66 average inventory is in increasing trend in comparison of previous fiscal year 2063/64. It shows that the average inventory is in increasing trend upto 2068/69.

Fig. 4.2
Graphical presentation of Average Inventory of DDC



Fiscal year
From the above figure, it is clear average inventory of DDC is in decreasing trend from fiscal year 2064/65 but in fiscal year 2063/66 average inventory is in increasing trend. If shows that average inventory is in increasing trend uptofiscaly.

4.3 Economic Order Quantity (EOQ) Model

To calculate EOQ only one raw material (milk) is considered. But DDC uses three types of raw materials, which include milk additive and packing material. To calculate the EOQ of additive is difficult. Because this material is collected through annual tender method and tender holders delivered these items in companies so calculation of ordering and carrying cost is difficult and also company makes availability of this data on the basis of tender prece not in quantity. And also to calculate the EOQ of packing material is difficult packing material includes many types of materials which we measure by different units/variable such as pieces, big, small, liters, cup, kg, packing, jar, tin, etc. so we can't measure all of these things in a single period. We do not involve additive and packing materials with respect to EOQ.

4.3.1 Calculation of Economic Order Quantity (EOQ)

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

Not of Order Size = $\frac{A}{EOQ}$

- Order Size = $\frac{Annual\ Requirement}{No\ of\ Order}$
- Average Inventory= $\frac{Order\ size}{2}$
- Ordering Cost = No. of Order X Ordering cost per order.
- Carrying Cost = Average Inventory X Carrying Cost per liters per year
- Total Cost = Total Ordering Cost + Total Carrying

Where,

A= Annual requirement / usage of material

O= Ordering cost per order

C= Carrying cost per unit per year

EOQ= Economic order quantity

(I) For Fiscal year 2063/64

1. For DDC

On the basis of annual reports of DDC, the following data are available

(a) Mathematical Formula Method;

Annual requirement (A) =64966400
Total ordering costs= Rs. 10917424
Ordering cost per order (O) =Rs. 30048
Carrying cost per liters per year © = Rs. 1012
No. of orders = 363 times
Applying Formula,

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

$=\sqrt{\frac{2*64966400*30048}{1.12}}$

=1867059.56 liters

By multiplying A (64966400) and (Rs. 30048) with 2 and dividing 1012 and taking square of this figure, the result comes 1867059.56.

(b) Trial and Error Method / Tabulation Method

To calculate EOQ Trial and Error Method, we have to develop following formula

No of Order Size $= \frac{\text{Annual Requirement}}{\text{EOQ}}$

$= \frac{64966400}{1867059.56} = 34.796 \approx 35$ times

Table 4.3

Calculation of EOQ of DDC

No of Order	Order of Size	Average Inventory	Ordering Cost	Carrying Cost	Total Cost
7	9280914.28	4640457.14	21033.6	5197312	5407648
10	6496640	3248320	300480	3638118.4	3938598.4
25	2598656	1299328	751200	1455247.96	2206447.36
35	1856182.86	928091.43	1051680	1039462.4	2091142.4
40	1624160	812080	1201920	909529.6	211449.6
365	179465.20	89732.60	10877376	100500.51	10977876.51

From the tabulation method it is clear that the lowest inventory cost of DDC is Rs 2091142.4 which includes total carrying cost of Rs. 10394624.4 and total ordering cost of Rs 1051680 and takes 35 times in a year. In other words when DDC place order 35 times in a year, there will be total costs minimizes.

II For Fiscal year 2064/65

1 For DDC

On the basis of annual reports DDC, the following data are available

a) Mathematical Formula Method

Annual requirement (A) =62307000 litres

Total ordering cost = Rs 10972011

Ordering cost per order (O) = Rs 30348

Carrying cost per liters per year (C) = Rs 1.14

No. of orders = 365 times

Applying formula,

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

$= \sqrt{\frac{2*62307000*30348}{2}}$

1821360.38 Liters

(b) Trial and Error Method / Tabulation method

To determine the no of order size by tabulation method and that order size the total inventory cost in EOQ.

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

$=\frac{62307000}{1821360.98}$

= 34.21 times

Table 4.4

Calculation of EOQ of DDC

No of order	Order size	Average inventory	Ordering cost	Carrying cost	Total cost
4	15576750	7788375	121392	8878747.5	9000139.5
10	6230700	3115350	303480	3551499	3854979
15	4153800	2076900	455220	2367666	2822886
34	1832558.82	916279.41	1031832	1044558.53	2076390.53
37	1683972.97	841986.48	1122876	959864.59	2082740.59
363	171644062	85822.31	11016324	97837.44	11114161.44

From the tabulation method, it is clear that the lowest inventory cost of DDC is Rs. 2076390.53, which includes total ordering cost of 1031832 and total carrying cost of Rs. 1044558.53 and takes 34 times in a year which minimizes that total cost.

(II) For fiscal year 2065/66

(i) For DDC

On the basis of annual reports of DDC, the following data are available

(a) Mathematical formula Method

Annual requirement (A) =6184500 litres

Total ordering cost = Rs 11159346

Ordering cost per order (O) = Rs 30742

Carrying cost per liters per year (C) = Rs 1.16

No. of orders = 363 times

Applying formula

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

$$= \sqrt{\frac{2*61845000*30742}{1.16}}$$

= 1810524.305 Liters

(b) Trial and Error Method / Tabulation Method

To determine the no. of order size by trial and error method and that order size minimize the total inventory cost in EOQ

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

$$= \frac{61845000}{1810524.305}$$

$$= 34.15 \approx 34 \text{ times}$$

Table 4.5

Calculation of EOQ of DDC

No of order	Order size	Average	Ordering cost	Carrying cost	Total cost
10	6184500	3092250	307420	3587010	3894430
20	3092250	1546125	614840	1793505	2408345
34	1818970.66	90948529	1045228	1055002.94	2100230.94
36	1717916.66	858958.33	1106712	996391.66	2103103.66
263	170371.90	85185.95	11159346	98815.70	11258161.7

From the trial and error method, it is clear that the lowest total inventory cost of DDC is Rs. 2100230.94, which includes total ordering cost of Rs. 1045228 and total carrying cost of Rs. 1055002.94 and it takes 34 times in a year. In other words, when we place order 34 times in a year, there will be total cost minimizes.

(VI) For fiscal year 2066/67

(i) For DDC

On the basis of annual reports of DDC, the following data are available

(a) Mathematical formula Method

Annual requirement (A) =72010000 litres

Total ordering cost = Rs 11315799

Ordering cost per order (O) = Rs 31173

Carrying cost per liters per year (C) = Rs 1.18

No. of orders = 363 times

Applying formula

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

$$= \sqrt{\frac{2*72010000*31173}{1.18}}$$

= 1950561.73 Liters

(b) Trial and Error Method / Tabulation Method

To calculate EOQ by trial and error method which have to develop following formula,

$$\text{No of order size} = \frac{annual\ requirement}{EOQ}$$

$$= \frac{72010000}{1950561.73}$$

$=36.92 \approx 37$ times

Table 4.6
Calculation of EOQ of DDC

No of order	Order size	Average	Ordering cost	Carrying cost	Total cost
10	7201000	3600500	311730	4248390	4650320
20	3600500	1800250	623460	2124295	2747755
25	288044	1440200	779325	1699436	2478761
37	19462162	973108.1	1153401	1148267.55	2301668.55
263	198374.66	99187.33	11315799	117041.05	11432840.05

From the tabulation method it is clear that the lowest total inventory cost of DDC is Rs 2301668.55 which includes total ordering cost of Rs. 1153401 and total carrying cost of Rs. 1148267.55 and it takes 37 times in a year to minimize the total inventory cost.

(V) For fiscal year 2067/68

(I) For DDC

On the basis of annual reports of DDC, the following data are available

(c) Mathematical formula Method

Annual requirement (A) =74081000litres

Total ordering cost = Rs 11485320

Ordering cost per order (O) = Rs 31640

Carrying cost per liters per year (C) = Rs 1.25

No. of orders = 363 times

Applying formula

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

$$= \sqrt{\frac{2*74081000*31640}{1.25}}$$

= 1936563.075 Liters

(d) Trial and Error Method / Tabulation Method

To calculate EOQ by trial and error method which have to develop following formula,

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

$$= \frac{74081000}{1936563075}$$

=38.25≈ 38 times

Table 4.7
Calculation of EOQ of DDC

No of order	Order size	Average	Ordering cost	Carrying cost	Total cost
10	7408100	3704050	316400	4630062.5	494662.5
30	2469366.66	1234683.33	949200	1543354.17	2492554.17
38	1949500	974750	1202320	1218437.5	2420757.5
40	1852025	926012.5	126500	1157315.63	2423115.63
50	1481620	740810	1582000	926012.5	2308012.5
363	204079.88	102039.94	11485320	127549.93	11612869.93

From the above tables, it is clear that the lowest total inventory cost of DDC is Rs. 2420757.5 which includes total ordering cost of Rs. 1202320 and total carrying cost of Rs. 1218437.5 and it takes 38 times a year to minimize the total inventory cost.

4.4 Re-order Point of milk in DDC

Re-order is that level of inventory of firm places on order with the suppliers for purchasing additional inventory equal to EOQ when the inventory reaches the re-order point. The researcher try to analyze 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 5 year i.e. 2063/64 to 2067/68.
Some formula ,to calculate Re-order point

Usages Rate=$\frac{Annual\ consumption}{No.of\ days\ in\ a\ year}$

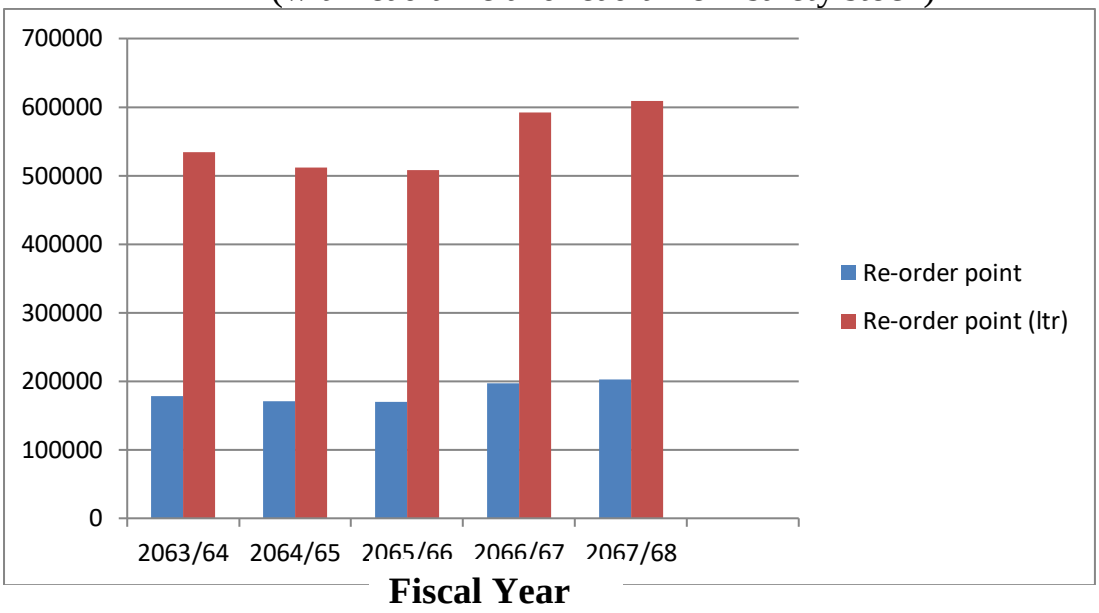
Re-order Point (ROP) =[Usage Rate ×Lead time]+ safety stock[when safety stock is given]

Table 4.8
Calculation of Re-order Point of DDC

Fiscal year	Usage rate	Lead time (day)	Re-order point	Safety stock (days)	Safety stock (ltr)	Re-order point
2063/64	177990	1	177990	2	355980	533970
2064/65	170704	1	170704	2	341408	512112
2065/66	169438	1	169438	2	338876	508314
2066/67	197288	1	197288	2	394576	591864
2067/68	202961	1	202961	2	405922	608883

Figure 4.3

(with lead time and lead time + safety stock)



this data is given by DDC Collection and processing department. DDC need daily fresh milk, so lead time days and it have 2 days safety stock all day hold safety stock for the view point of stidere,v

4.5 Ratio Analysis

Ratio analysis is the numerical relationship between any two variables of financial statements, which should serve some meaningful purpose. Ratios are expressions of logical relationships between items in the financial statements of a single period. Analysts can compute many ratios from the same set of financial statements. A ratio can show a relationship between two items on the same financial statement between two items on different financial statements (e.g. balance sheet and income statement). The only limiting factor in choosing ratios is the requirement that the items used to construct a ratio have a logical relationship to one another.

Financial statements including the income statements, statement of retained earnings, balance sheet and the cash flow statement reflect the overall financial position of an enterprise, which is the health of the entity. These statements provide information to insiders and outsiders both.

Ration analysis is a tool of scanning the financial statements of the firm. Through this, one comes to know in which areas of the operation the organization is strong and in which areas it is weak.

4.5.1 Inventory of Total Fixed Assets Ratio

Inventory means closing inventories of raw materials, finished goods, other stock and constructing material and spare parts. And total fixed assets include these assets, which observed the depreciation cost year by year. The formula to calculate the relation between inventory to total fixed assets is

$$\text{Inventory to Total Assets Ratio} = \frac{Inventory}{Total\ Fixed\ Assets}$$

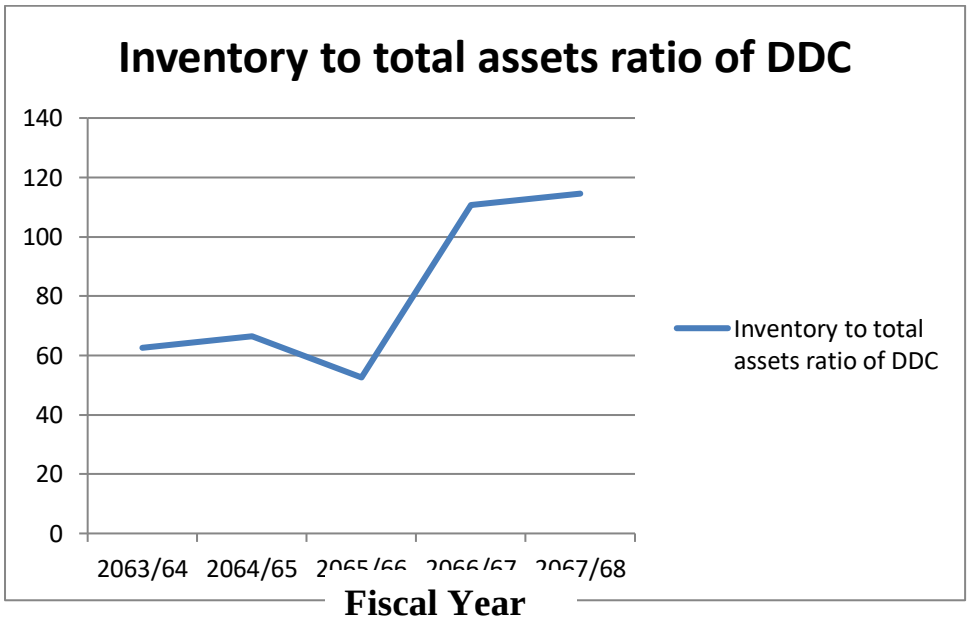
Table 4.9

Calculation of Inventory to Total Fixed Assets Ratio of DDC

Fiscal year	Inventory	Total fixed assets	Inventory to total assets ratio
2063/64	169199578	270316397	62.59
2064/65	168793861	254143382	66.41
2065/66	123190816	234316243	52.57
2066/67	273209494	246655983	110.76
2067/68	280903178	245283773	114.52

Source : DDC

Figure .4.4



4.5.2 Inventory to Current Assets Ratio

Inventory includes closing stock of raw materials, finished goods, other stock and stores and spares parts. Current assets includes debtors, inventories,

prepaid expenses, advance, deposits, staff loan and advance, different revenue expenses, cash in hand and cash at bank.

Inventory to Current Assets Ratio= $\frac{Inventory}{Current\ Assets}$

Table 4.10

Calculation of Inventory to Total Current Assets Ratio of DDC

Fiscal Year	Inventory	Total Current Assets	Inventory to Current Assets Ratio (%)
2063/64	169199578	542880523	31.17
2064/65	168793861	558331546	30.23
2065/66	123190816	463426144	26.58
2066/67	273209494	583782890	46.79
2067/68	280903178	680990300	41.25

Source : DDC

From the above tabulation, it is clear that both companies have not any satisfactory situation about inventory to current assets ratio through out the study period one or two years. The standard inventories to current assets ratio should about 45 to 50%. But DDC has only such ratio in fiscal year 2066/67. As that situation we can conclude the companies shod more inventory as current assets whenever more inventories kept by the company. They can't see it immediately. So, it direct affects the probability of the company. Blocked amount in inventory, both can't reinvest in other areas. So, they loose the return of that blocked amount inventory. According to above table of inventory to current assets it is clear that the highest ratio of DDC is 46.79% in 2066/67 which is standard inventory ratio. Likewise, the highest ratio of SGML is 81.6% in 2067/68. In the context of DDC has satisfactory level in 5 years in comparison of SGML.

4.5.3 Inventory of Sales Ratio

Inventory include closing stock of raw material, finished goods, other stocks and stores and spare parts. Net sales mean that sales amount or actual amount which comes from the sale of milk and milk product at DDC.

Inventory to Sales Ratio $=\frac{Inventory}{Net\ Sales}$

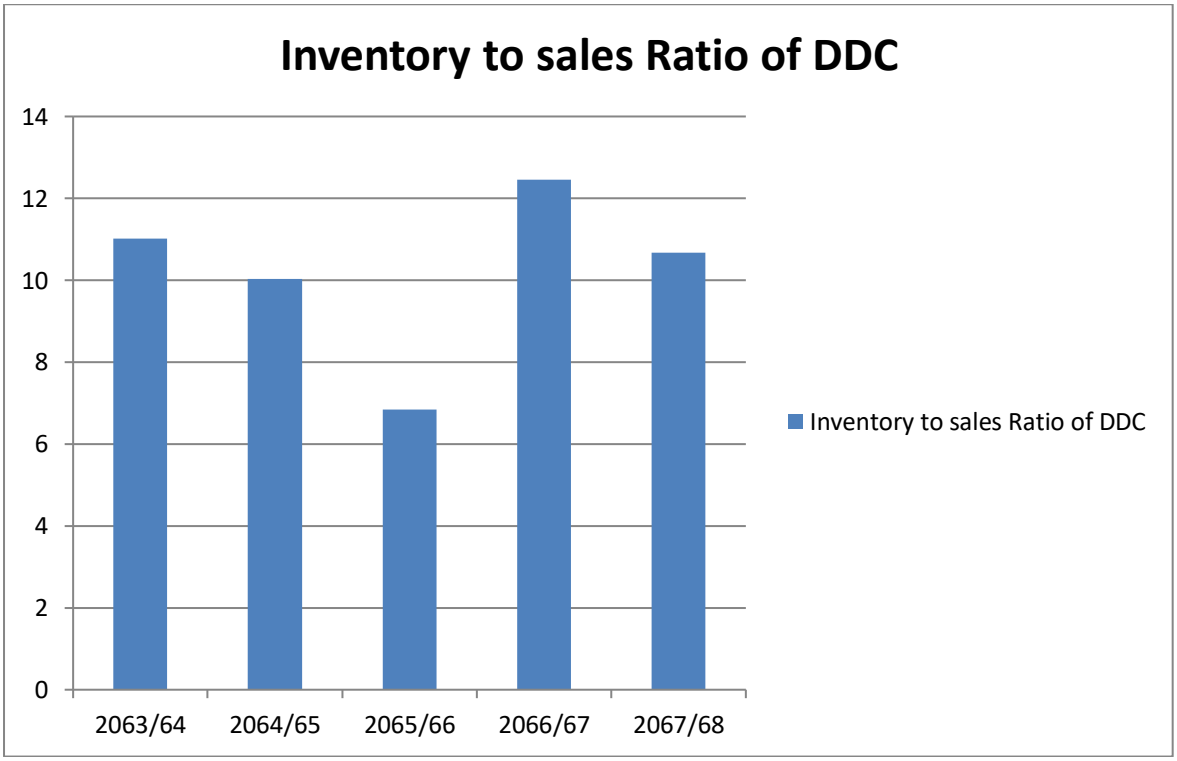
Inventory to sales is wanted low in manufacturing industries.

Table 4.11
Calculation of Inventory to Sales Ratio of DDC

Fiscal Year	Inventory	Net Sales	Inventory to sales Ratio (%)
2063/64	169199578	1536340564	11.01
2064/65	168793861	1680353680	10.04
2065/66	123190816	1800673560	6.84
2066/67	273209494	2193309447	12.45
2067/68	280903178	2628350971	10.68

Source: DDC

Figure 4.5
Graphical Presentation of Inventory to Sales Ratio of DDC



From the above table, we calculate inventory to sales ratio. By the calculation we know the relationship between inventory and sales are negative. If sales are

increase inventory are decreases and if sales are decrease inventory are increases. Therefore, firm always want to minimize the closing inventory in the firm. So, low inventory to sales are necessary to the firm. According to the above table of inventory to sales, it is clear that highest ratio of DDC is 12.45% in 2066/67.

4.5.4 Inventory of Profit Ratio

Inventories includes stock of raw materials and finished goods. According to both companies main material is milk. We need total amount of milk except collection cost. Profit includes total amount of profit/loss, which earn by companies in five fiscal years respectively. The formula to calculated inventory to profit ratio is as follows:

Inventory to Profit Ratio $=\frac{Inventory}{Net\ Profit}$

This ratio tells how much inventory is needed to create a good profit.

Table 4.12
Calculation of Inventory to Profit Ratio of DDC

Fiscal Year	Inventory	Net Profit	Inventory to Profit Ratio (%)
2063/64	169199578	(247456480	Negative
2064/65	168793861	(246089469)	Negative
2065/66	123190816	(335879651)	Negative
2066/67	273209494	(344489135)	Negative
2067/68	280903178	(325080997)	Negative

Source: DDC

According to above table of inventory to profit ratios are negative in each and every fiscal year of DDC. It means companies didn't generate the profit DDC is suffering from loss year by year. So, no ratio can be calculated in negative position. In other hands company need high positive in this ratio. DDC company earn loss year by year. So DDC companies suffer bad condition year by year.

4.5.5 Inventory Turnover Ratio

This ratio measures the efficiency on inventory management and how quickly inventory is sold. It indicates the relationship between the sales and the inventory level. In general, high turnover ratio is better than low ratio. High

turnover ratio indicates good inventory management; finished goods are quickly selling over a period of time and firm able to earn profit by it. Inventory turnover ratio can be calculated by dividing sales by the closing inventory.

$$\text{Inventory Turnover Ratio}=\frac{\textbf{Sales}}{\textbf{Closing inventory}}$$

In this formula sales is valued at market price and closing stock is valued at cost price, so it not comparable. Appropriate formula to calculate inventory turnover is as follows:

$$\text{Inventory Turnover Ratio}=\frac{Cost\ of\ Goods\ Sold}{Average\ Inventory}$$

Table 4.13
Calculation of Inventory Turnover Ratio of DDC

Fiscal Year	Cost of Goods Sold	Average Inventory	Turnover Ratio (Times)
2063/64	1371815215	137015578	10.01
2064/65	1497384582	168996720	8.86
2065/66	1629164826	145992339	11.16
2066/67	1916107145	198200155	9.67
2067/68	2312063599	277056336	8.34

Source: Appendix II

Low inventory turnover ratio is dangerous. It signifies excess inventory or over investment in inventory, low inventory level shows firm has more stock of finished good for sale. Due to this, inventory involves cost in terms of interest of blocked amount, rental of warehouse, damage and so on. A low ratio may be the result of obsolete goods, over valuation of closing stock, reduce demand in market, more purchase of raw materials in anticipation of future increase their process and so on.

So, company has to keep optimum level of inventory. Through the study of inventory turnover ratio t helps to detect the imbalance investment in the various inventory components.\

According to table, it is clear that inventory turnover ratio is fluctuation every year. In case of DDC, inventory turnover ratio is very low in fiscal year 2067/68. It means more inventories are kept in the stock, unnecessary investment tied up on it. It direct effect on company's profitability, the highest turnover ratio is 11.66 times in fiscal year 2065/66. And also next remaining year inventory turnover ratio is below but little good.

The DDC efficiency in inventory is poor. DDC in not able to change their inventory into cash through sales. So, DDC have to give more attention in inventory management.

4.6 Major Findings

After analysis in detail of secondary data and information which is collected from the management through observation, informal discussion and supplementary questionnaire; it is clear that Dairy Development Corporation is suffering from a number of internal and external problems in the way of inventory management.

From the analysis of the company data, the following findings are extracted about the inventory management system of DDC.

- Sales of DDC are increasing trend but decreasing rate.
- Trend of inventory of DDC are fluctuating trend.

- Trend of EOQ of DDC is fluctuating trend.
- DDC have lack of study on effective and efficient inventory management system. Due to this, huge money is blocked in the inventory.
- DDC is not calculating EOQ and no. of order.
- DDC is not classified carrying cost and ordering cost systematically.
- DDC is not recorded data properly.
- DDC is not classified cost on product wise.
- DDC is not recorded inventory product wise separately.
- Inventory to total fixed assets ratio is not satisfactory of DDC.
- Inventory to current assets ratio of DDC is not satisfactory of according to standard.
- Inventory to sales ratios of DDC is satisfactory.
- Inventory to profit ratios of DDC is worst because both companies do not generate the profit.
- Inventory turnover ratio of DDC Company is not satisfactory.
- Re-order Point of DDC Company is not satisfactory.

CHAPTER-V
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Being agriculture country, Nepal covering largest section of the economic activity needs diversification and commercialization to raise the economic level of Nepalese farmers. Currently this sector contributes more than 33% of the GDP and provides employment to more than 74% of the active population. In modern age, for economic development many subsection of the economy identified in agriculture area of Nepal. For example: fishing, pastoral, bee keeping, grain production, field crops, horticulture, livestock and forestry. Milk production and supply is one of the activities in agricultural economics.

Nepal has to give importance to milk production. So that, production of milk should be given more attention from the side of farmer and from the side of government, it has to be managed properly. Government should encourage producing much milk. This may be good job for jobseeker of the country and backbone of our agricultural economy. Success of any enterprise basically depends upon the strength of management along with efficient management of the various functional aspects ad modeling them to achieve the company is objectives. In other words, whatever may be the nature of business enterprises must important element i.e. management is basically concerned with getting the jobs done effectively and efficiently.

This study id concerned to appraise Dairy Development Corporation to examine the extent of inventory management and control system. So, as to minimize its cost, that ultimately affect the profit of the company. Most of the manufacturing and non-manufacturing firms invest a huge amount of capital in the form of inventories. The expenses involved for carrying on functions associated with inventory such as purchasing, handling, storage and record keeping is also large. Thus in recent years, the subject of inventory management has engaged the attention of management and extensive literature has involved which encompass effective tools like economic order quantity for how much to purchase together with the re-order point. The basic problem of this study was to examine the inventory management system as practiced by the company. The order size, carrying cost, ordering cost, safety stock of the companies are unscientifically and are not given proper attention to the lead time and all those function increased the total cost of the company.

The main objective of this study is to find out what techniques are applied by those companies to manage the inventory and suggest to use the scientific techniques to help to reduce cost for this purpose. The researcher interview with officials and observe the inventory system personally data are collected from various sources. Quantitative tools are applied in this study to analyze the collected data.

All the collected data and facts are analyzed on the basis of inventory management theory and with the help of EOQ with re-order level, Ratio analysis, sales trend. To make certain type of inventory management decisions, many mathematical techniques are available for controlling the inventory but the both companies have not applied any sort of techniques available for managing inventory.

5.2 Conclusion

On the basis of analysis of data and information collection from DDC and separately the following conclusion have been drawn. To meet the consumer demand effective and timely production is needed. The study focus on the need for a good inventory system to maintain suitable level of inventory and also control the cost for the DDC.

The values maintaining proper stock of inputs as discussed previously are necessary to know the answer about when and how much to buy. The models and formula as discussed previously are necessary for every manufacturing and non-manufacturing enterprise to reduce unnecessary cost incurred on ordering and carrying the inventory.

Though, these models, example and formula etc. for managing inventory are available they could not be used fully for finding out the necessary operation of the company because of the lack of adequate data. No technique for inventory management is applied to decide when to buy because of lack of planning and unsystematic methods of recording cost. If no concrete step is taken with regards to recording and maintaining of proper data on stock out cost, carrying cost, ordering cost, process of raw materials etc. future researcher would not be able to predict the re-order period and maintain the safety stock properly. Thus, in the real situation of the operation of the company systematic inventory managing system could not be found.

5.3 Recommendations

The study focuses on the need of good inventory management system to the better performance of DDC the company. If DDC initiate steps to an appropriate management of inventory, certainly DDC the company achieve their set objectives successfully.

Based on the analysis, interpretation and conclusion, some recommendations are made here so that the concerned authorities, future researchers, academicians can get some insights on the present conditions on above topics.

The following suggestions are recommended as follows:

- DDC should define their goals and objectives clearly with regards to their inputs and outputs separately i.e. quantities, time periods should be specified.
- DDC should improve their sales.
- DDC should keep clear vision about inventory.
- DDC should follow scientific tools and techniques i.e. economic order quantity and economic lot size, which help to reduce the relevant total cost for manufacturing the product.
- DDC should classify their carrying cost and ordering cost separately.
- DDC should mention their data on the basis of product wise.
- The post of general manager should be professional and it should be far from political intervention.
- Dairy Development Corporation should develop effective re-order level policy.
- The company should spring out the corruption from their factory.
- The company should research about market condition and their related competitors.
- The company should drop out unprofitable product and invest in profitable product.
- The company should try to utilize full capacity at off and on season and unutilized the capacity by giving on lease.

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APPENDIX-I

Average Inventory = $\frac{\text{Opening Inventory+Closing Inventory}}{2}$

F.y. 2063/64 = $\frac{104831580+169199577}{2}$ = 137015578

F.Y.2064/65 = $\frac{169199578+168793862}{2}$ =168996720

F.Y. 2065/66 = $\frac{168793862+123190816}{2}$ =145992339

F.Y. 2066/67 = $\frac{123190816+273209494}{2}$ = 198200155

F.Y. 2067/68 = $\frac{273209494+280903178}{2}$ = 277056336

APPENDIX-II

Cost of goods sold = Annual sales – Gross Profit

F.y. 2063/64 = 1536340564-164525348 = 1371815215

F.y. 2064/65 = 1680353679-182969097=1497384582

F.y. 2065/66 = 1800673560-1771508734= 1629164826

F.y. 2066/67 =2193309447-277202301 = 191610714

F.y. 2067/68 = 262628350971-316287372 = 2312063599

APENDIX-III

Calculation of Usage Rate (Ltr) of DDC

Usage Rate = $\frac{Annual\ requrirment}{No.of days\ in\ a\ Year}$

F.Y. 2063/64 = $\frac{64966400}{365}$ = 177990

F.Y. 2064/65 = $\frac{26307000}{365}$ = 170704

F.Y. 2065/66 = $\frac{61845000}{365}$ = 169438

F.Y. 2066/67 = $\frac{72010000}{365}$ = 197288

F.Y. 2067/68 = $\frac{74081000}{365}$ = 202961