CHAPTER - I

INTRODUCTION

1.1 General Background of the Study

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 till in infancy period of development. Industrial development is governed by laws and policies. Nepal formulated its first industrial policy in 1992 AD. Modern industrialization started with the establishment of Biratnagar Jute Mills 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 bank 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.

An inventory is the stock of any idle item or resource in a firm for future use. Inventories refer to the goods and materials used by a firm for the purpose of production and sales. It also includes the items, which are used as supportive materials to facilitate production. There are three basic types of inventory: raw materials, work-in-process and finished goods. Raw materials are the items purchased by firm for use in production of finished product. Work-in-process consists of all items currently in the process of production. These are actually the partly manufactured products. And, finished goods consist of those items, which have already been produced but not yet sold. Inventory constitutes one of the important items of current assets, which permits smooth operation of production and sale process of a firm. Inventory management is that aspect of a firm's working capital management. which is concerned with maintaining

optimum investment in inventory and applying effective control system of inventory so as to minimize the total inventory costs. Inventory as a type of current assets involves significant investment of funds. As the firm goes on investing more in inventories, the cost of funds being tied up will also be increasing. Therefore, inventory management is significant because it enables to resolve two basic but conflicting issues of a firm: (1) maintaining adequate inventory for smooth production and selling activities and (2) minimizing investment in inventory to enhance firm's profitability.

Investment in inventory should neither be excessive nor inadequate. It should just be optimum. Maintaining optimum level of investment in inventory is the basic issue of inventory management. Excessive investment in inventory results into higher cost of funds being tied up so that it reduces the profitability. Inventories may be misused, lost, damaged and holds cost in terms of more space and others. At the same time, insufficient investment in inventory creates stock-out problems, interruption in production and sales. So that firm may loose the customers as they shift to the competitors. Therefore, financial manager should always try to hold neither excessive nor inadequate investment in inventory. He/she should maintain the optimum level of inventory to run the production and sales operation smoothly.

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 and 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.

1.1.1 Introduction of Dairy Development Corporation

Dairy Development Corporation was established to fulfill the need of people by supplying quality milk and milk product at reasonable price. It is also expected to be financially sound and contribute surplus to the national treasury. The demand of 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 2019 B.S. DDC established on 1st Shrawan 2026 as manufacturing enterprise under the Corporation Act. 2021 B.S. Public enterprise in Nepal constitutes a vital instrument for the social economic development of our country. 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 rural Farmers with fair price and to supply pasteurized milk and milk products to urban consumers. Develop organized milk collection system to meet increasing demand for pasteurized milk and milk products. Develop an organized marketing system for milk and milk products in urban areas. Due to public enterprises, 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 Corporation has been collecting buffalo milk, cow milk, and chauri milk form the milk producer around the country. DDC has been playing a vital role to uplift the economic status of rural farmers. So it has been recognized as an effective tool of poverty elimination and economic development of rural farmers. DDC could not buy all milk offered by the farmers especially during the flush season. As consequences it had to impose milk holiday on certain days during the period. On the other hand during the lean season DDC has been importing slimmed milk powder to meet consumers demand. So DDC is playing an important role to improve the economic condition of milk producers and rural community.

1.1.2 Introduction of Sitaram Gokul Milk Pvt. Ltd.

Sitaram Gokul Milk Private Ltd. Was established on July 18, 1996. It is the Private limited company and promoted by Kedia Organization. The enterprise does not have any collaboration. The paid of capital of the company is NRs. 61.25 million. The main products of this enterprise are pasteurized milk, cream butter, ghee and yoghurt. The company perceived as the pioneer in the modern dairy industry from the private sector. Sitaram Gokul Milk Private Ltd. has been collecting buffalo milk and cow milk with the farmers by cooperative centers with the farmers at the price fixed by the enterprise, and then brought to chilling centers. The company has 13 chilling centers around Butwal area (about 259 km distance from the Kathmandu) in Rupandehi District in Western Development Region of the country.

To provide packaged drinking milk conforming to relevant specification. Incorporating Hazard Analysis and Critical Control Points (HACCP) requirements at to provide at competitive price to meet or exceeds requirements and satisfaction of valued customers, which should be achieved through continues imrpvements in quality of work, enhancing employee participation at all levels and by using best available resources. The Nepal Bureau of Standards and Metrology (NBSM) have fixed the quantity of milk e.g. fat, S.M.F. Contents. The enterprise follows the quality standards set by Nepal Bureau of Standards and Metrology. The enterprise is in the process of acquiring ISO-9000.

The sale of packaged drinking milk confirming to relevant specification, following HAACP requirements to some extent to provide at competitive price to meet or exceed requirements and satisfaction of valued customers is done though 620 dealers and 1,143 sub-dealers in Kathmandu Valley. The enterprise sells the pasteurized milk in half-liter plastic pouch through dealers and sub dealers.

1.2 Statement of the Problem

Nepal is developing country. Here, private companies are successful than public enterprises. So, we are going to research to public as well as private companies. The Dairy Development Corporation is one of the public enterprises and Sitaram Gokul Milk Private Ltd. is private company. Both are 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 objectives and goals, due to the lack of an authority and communication of objectives and goal from top to lower level management moreover 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 problems behind the every management. There are other various problems, such as 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 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 to blocked on the inventory. How much money should the firm invested in the inventory, how much inventory to be stocked, How can we minimize the ordering and carrying cost, what is to be EOQ, how many times we order that minimize the carrying costs are the same questions that evoke management always.

Present study is about a comparative analysis of inventory management of DDC and Sitaram Gokul Milk Private Ltd. So many short coming can be seen in the inventory system of both firms. For example, the Economic Order Quantity and actual order quantity of the projects are not equal. They are not

maintaining the desirable safety stock which the production department has been facing many interruption in the production process. Maintain inventory quality. Company doesn't know when should be order and how the carrying and ordering cost will be minimized.

On the basis of the above mentioned issues, the following questions were put forward during the research period:

1. What steps should be taken to improve the existing problem of inventory management?
2. What is the impact of inventory over the company's profit?
3. What are the major problems in the existing inventory management and control system?
4. How the firms are utilizing their inventory resources?
5. What should be the optimal level to reduce the inventory cost?

1.3 Objectives of the Study

The basic objectives of these studies are:

1. Sales trend of Sitaram Gokul Milk Private Ltd. and Dairy Development Corporation (DDC).
2. Trends of inventory of Sitaram Gokul Milk Private Ltd. & Dairy Development Corporation (DDC).
3. Whether the Sitaram Gokul Milk Private Ltd. & Dairy Development Corporation (DDC) are practicing EOQ or not?
4. To examine impact of inventory management on profitability of the companies.
5. To recommend some suggestion based on major findings and conclusions.

1.4 Significance of the Study

Inventory management is one of the important in any manufacturing companies with our effective and efficient inventory management system no one manufacturing company can achieve the goal. Proper inventory management helps to maximize the profitability and do not block the inventories. A company should maintain adequate raw materials/finished goods. If slightly changes in the cost of materials it will effect in the profitability. So the company should keep adequate sock of inventory by keeping adequate inventory the company able to supply what ever the demand. Nepal, an under industrialized country is still using traditional technique in purchasing of inventory. To have a sound achievement the company should apply modern tools and techniques.

This study in needed for effective inventory management in Sitaram Gokul Milk Private Ltd. And 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 system? What is the present situation of inventory management and soon. I hope it will move beneficial to both companies and general public.

1.5 Limitations of the Study

1. This study has employed secondary data published by and collected from Sitaram Gokul Milk Pvt. Ltd. & DDC.

2. The study covers a period of 5 fiscal years 2062/063 to 2066/067 which will be tabulated and processed for drawing conclusion.

3. The accuracy of the research work will be dependent on data provided by concerned organization.

4. Time factor is major limitation of this study.

1.6 Organizations of the Study

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

Chapter I : Introduction

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

Chapter II : Review of Literature

This chapter dealt with review of various Journals, books, published or unpublished reports, articles and previous thesis.

Chapter III : Research Methodology

This study tries to focus on how the 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 procedure and techniques of analysis.

Chapter IV : Data Presentation and Analysis

The data presentation and analysis is the main portion of the study because all the information and ideas will be analyzed in this chapter. In this regard, Inventory Control Techniques implies to control inventory of DDC and SGML. In this chapter, collected data were tabulated and analyzed by the use of various statistical tools, graphs and diagram and major findings.

Chapter V : Summary, Conclusion and Recommendation

This chapter dealt with summary, conclusion and recommendation of the study. Lastly, bibliography and appendixes are included in this study. Which are shown in the last of this study.

CHAPTER - II

REVIEW OF LITERATURE

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 enterprises and private enterprises. This chapter, attempts have been made to present the review of literature on inventory management. This chapter has been divided into two parts: The theoretical and conceptual review of inventory management is presented in the first part and review of related studies in the second part.

2.1 Meaning of Inventory Management

Inventory is store of goods and stocks. Items in inventories are called stock-keeping items held at stock point. In manufacturing organizations, inventory refers raw materials, parts and components, supplies, 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 concern for managers in all types of the business. Every business/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 taxation 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. Thus, 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 to be 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? (Sthapit et al., 2010, 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 as available unused labour 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 up in 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/preservation cost. It carries the risk of theft, spoilage, leakage or obsolescece. 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 an 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/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 shaped by purchasing and production executive. Work-in-progress inventory is influenced

by the decision of production executives and finished good's 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).

2.2 Types of Inventory

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, it must maintain some inventory of raw materials and work-in-process in order to keep the factory running and it must maintain some supply of finished goods in order to meet demand.

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 firm, there will be difference large heavy engineering companies produce long production cycle; therefore, they carry large inventories. On the other hand inventories of consumer, product company will not be large because of short production cycle and fast turnovers (Pandey, 1994; 884).

2.2.1 Raw Materials

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 have been purchased and stored for future production" (Pandey, 1995; 755). "It consists of item that firm purchase for use in 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 materials 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. There are following types of raw materials held by these two dairies:

(i) Auxiliary materials

(ii) General materials

(iii) Lubricant materials

(iv) Milk materials and

(v) Mechanical materials

2.2.2 Work-in-Process

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 are converted as finished product for sale." 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 same material may be a raw material may be a work-in-process as well as 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.

2.2.3 Finished Products

Finished goods consist 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 of raw materials and work-in-process facilitate production while stock of finished goods is required for smooth marketing operations. Therefore, finished goods are completed goods a waiting sale. In a manufacturing concern they are the finals output of production process." Firms 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:

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

2.2.4 Supplies, Stores and Spares

A fourth kind of inventory, supplies, stores and spares is also maintained by firms. Supplies include office and plant 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 trained persons and directed by top management. It involves both financial and physical dimension and these dimensions are interrelated and cannot be looked in isolation (Agrawal, 2002; 238).

The main objective of holding an appropriate level of inventories is to ensure the smooth and efficient operation of everyday business.

2.3.1 The Business 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.

2.3.2 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

materials. For example, the factors like strike, transport disturbances, shortage of supply, etc. may hamper in regular supply of raw materials. So, the firm should hold adequate quantity of raw materials to continue production operation in such situations. The company may loose its permanent customers when it cannot meet their demands on time.

2.3.3 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).

2.4 Need and Importance of Inventory Management

The basic reason to hold inventories is to keep up to 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 services immediately. Therefore, keeping of inventories is a must for efficient working of an industrial unit.

The reasons behind maintaining the inventory by the business/manufacturing organization can be listed as below:

i. To provide and maintain good customer service.
ii. To enable the organization smooth flow of goods in the production process.

iii. To provide protection against the uncertainties of demand and supply.

iv. To perform various production operations economically and independently.

v. To allow flexibility in schedule.

vi. To ensure a reasonable utilization of equipment and labour.

vii. To take advantages of economic purchase order (Sthapit, et al, 2010; 189)

2.5 Cost Associated with Inventory

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

2.5.1 Carrying Cost

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 proportional 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 storemen'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:

$$\text{Total Carrying Costs (TCC)} = C \times \frac{Q}{2}$$

Where,

C = Carrying Costs per Unit

Q = Inventory Order Size

$\frac{Q}{2}$ = Average Inventory Unit

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 cost 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 generally depend upon the volume to value ratio 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 require 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 data 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 Whitin, 1999; 17).

2.5.2 Ordering Cost/Setup Cost

Ordering cost is incurred whenever the inventory is replenished. It includes costs associated with the processing and chasing of the purchase order, transportation, inspection for quality, expediting 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).

The total ordering cost is given as:

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

Where,

O = Ordering costs per order

R = Total requirement of inventory for the period

$\frac{R}{Q}$ = 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 costs resulting from stockout. 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 costs (Chase et al., 2009:625).

Stock out cost computed from following formula:

Stock Out Cost = Inventory Cycle Per Year × Stock Output Units × Probability of Possible Stock Out × Unit Stock Out Cost

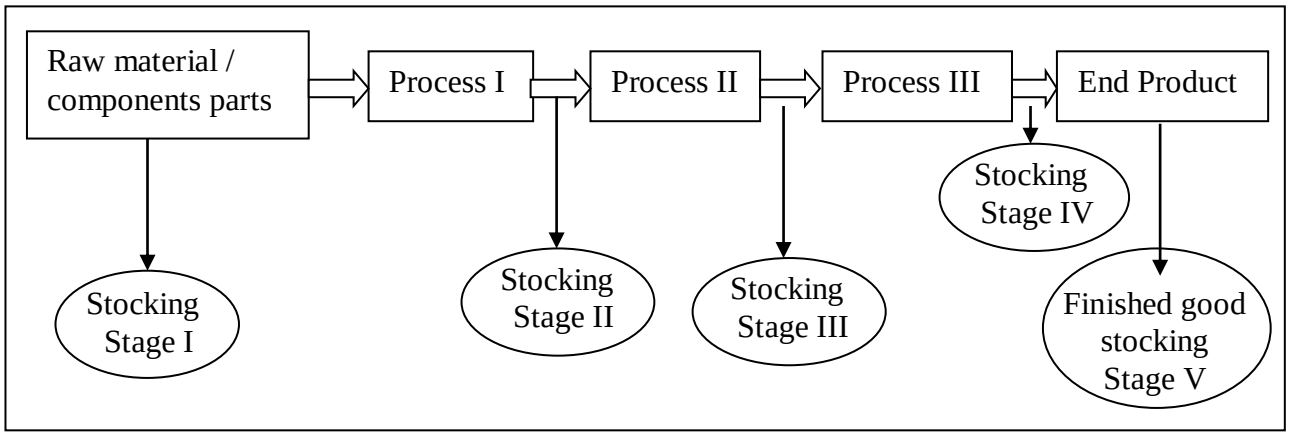
$$\text{Inventory Cycle Per Year} = \frac{AnnualUses}{QuantiyOrder\,Size}$$

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 follow-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 reordering, returning undesirable merchandise (P & Krishna, 1993; 483)?

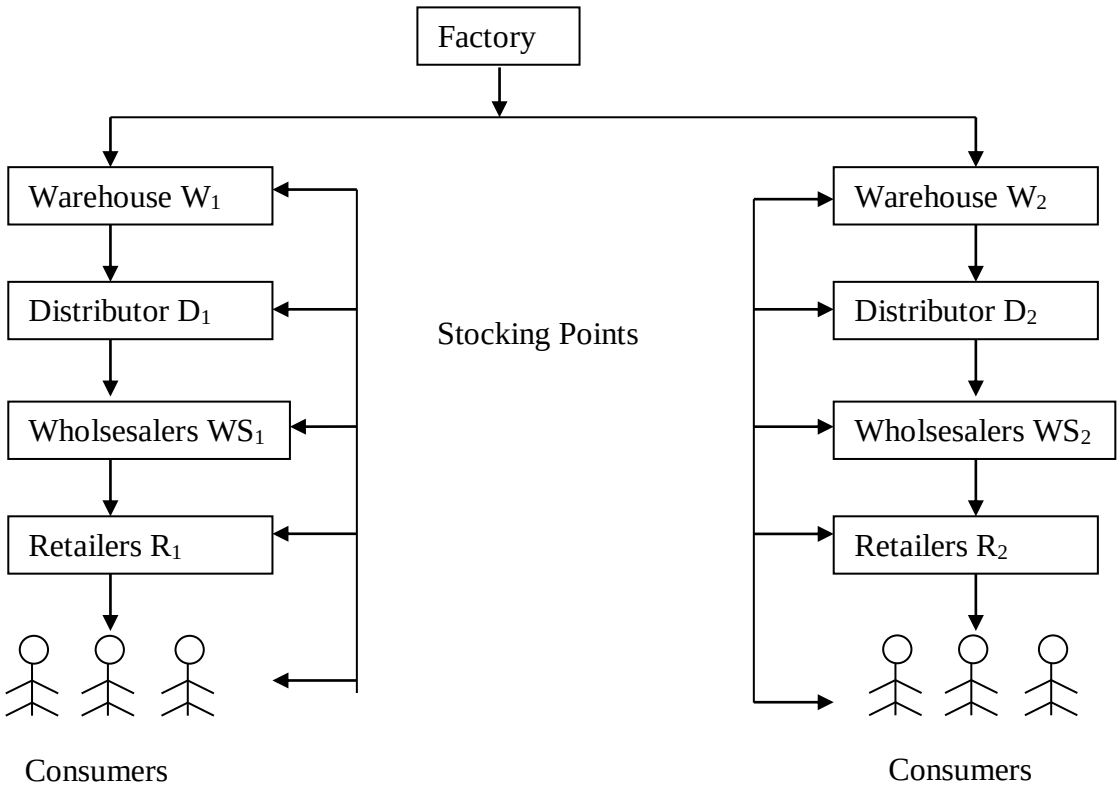
I. Multi-stage Inventory System

In 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 end products and services with optimal cost, quality and time. The main objective of the multistage inventory is to maintain the balanced inventory level at different production stages to ensure smooth production and operations (Sthapit, et al, 2010; 193).



II. Multi-Echelon (or level) Inventory Systems

Multi-echelon inventories are inventories of products at the various echelons/levels while 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 Techniques of Inventory Control

Adequate inventories facilitate smooth production activities and help to provide off shelf delivery to customers. On the other hand excessive inventory is idle resource of the firm and can prove costly because it tries up working capital unnecessarily which could have been better used had it been utilized for some other purpose. According to Alton N. Smith "Inventory is (money) on which a company pays interest rather than collect interest. it is money always in danger of deviation. Non controlled inventory is an industrial danger." The major problems of inventory management therefore, should be, to arrive at an optimum balance between too much inventory and too little inventory. So that, there may be no stock out problem and cost of inventory should be minimum.

Following are the inventory control techniques:

2.7.1 Economic Order Quantity (EOQ)

Economic order quantity (EOQ) is the inventory management technique for determining optimum order quantity which is the one that minimizes the total cost of inventory. EOQ is also known as economic lot size. The main objective of inventory management is to minimize the cost of inventory by placing an order at EOQ. The total cost of inventory is minimum at EOQ while total cost of ordering and carrying are equal at EOQ provided that the safety stock is zero. the basic assumptions of EOQ are given below:

- The firm knows with the certainty the annual consumption of a particular inventory.
- The rate at which the firm uses inventory is steady over time.
- The ordering cost per order and carrying cost per unit are constant.
- Instantaneous delivery of materials, that is, no needs of carry safety stock.

- The orders placed to replenish inventory stocks are received at exactly that point in time when inventories reach zero.

The EOQ can be determined by the following ways:

- **Graphic Method**

  It is graphic approach of determining optimum level of inventory. The ordering cost and carrying cost are represented in Y axis and economic order quantity is shown at X axis. The point of intersection between carrying cost curve and ordering cost curve is the point at which the total inventory costs is minimum and order size at this point is the economic order quantity. EOQ is given by the graphically as below:

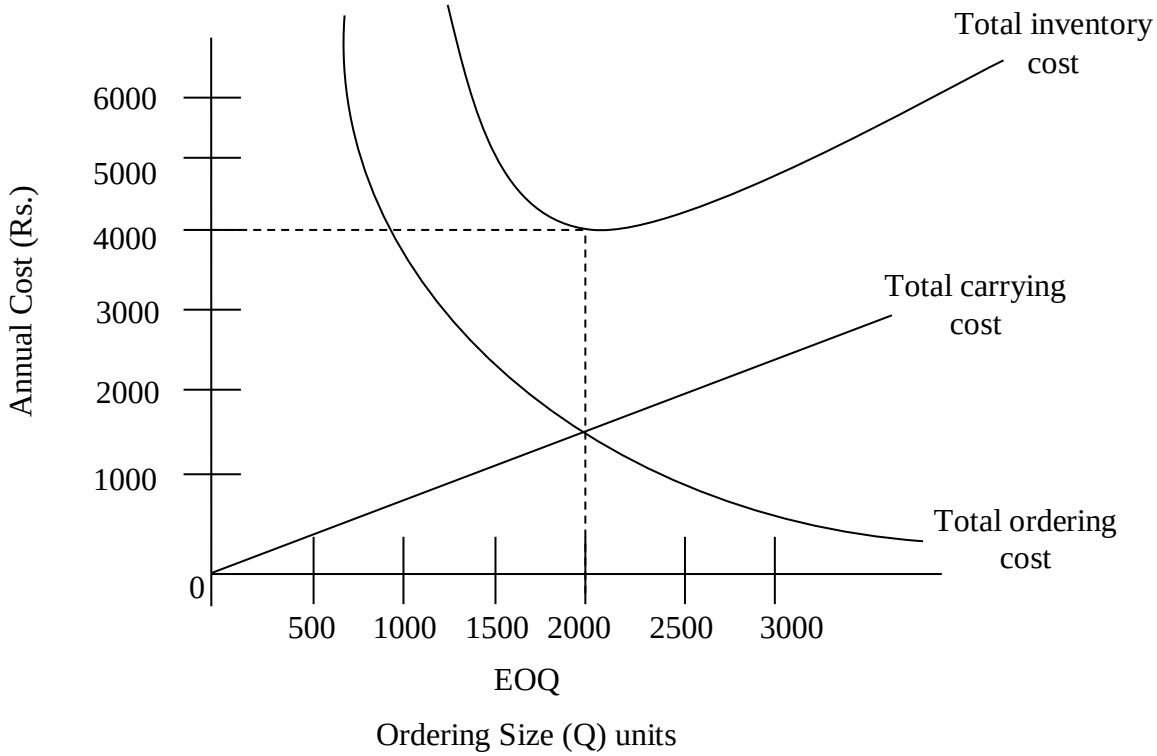


Fig. 2.1: EOQ

In this example, the EOQ is 2000 units at which total inventory cost (TIC) is Rs. 4,000, which is minimum. If we increase or decrease the order size from 2,000 units, TIC will be more than Rs. 4,000.

- **Formula Method**

  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:

  Total Carrying Cost (TCC) = Total Ordering Cost (TOC)

  or, $\frac{Q}{2} \times C = \frac{A}{Q} \times O$

  or, $\frac{QC}{2} = \frac{AO}{Q}$

  or, $Q^2C = 2AO$

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

  or, Q (EOQ) = $\sqrt{\frac{2AO}{C}}$

  Thus, economic order quantity (EOQ) = $\sqrt{\frac{2AO}{C}}$

- **Trial and Error or Tabular Method**

  The EOQ also could be determined by trial and error or tabular method. Under this method total periodic requirement is split off into different order size and the total inventory costs of each order size are calculated in the tabular form. The order size with minimum total inventory costs is indicated as EOQ. It is determined by using the following table. Determination of EOQ using trial and error approach:

Order size (Q)	×××	×××	×××
No. of order (N) = $^{A}/_{Q}$	×××	×××	×××
Safety Stock (SS)	×××	×××	×××
Average inventory ($^{Q}/_{2} + SS$)	×××	×××	×××
Total Carrying Cost (TCC) = ($^{Q}/_{C} + SS$) × C	×××	×××	×××
Add: total Ordering Cost (TOC) = (N × Q) = ($^{A}/_{Q} \times O$)	×××	×××	×××
Total Inventory Costs before Discount (TCC + TOC)	×××	×××	×××
Less: Discount	×××	×××	×××
Net Total Inventory Cost After Discount	×××	×××	×××

(Koirala, et al, 2012; 411-413)

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	Percentage of the Total annual

	Item	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 and trival 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 total money value of consumption are called B category 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 costs. 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 overstocking, therefore, (s, S) inventory control system 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 usage in units and the value of each item to get annual value for each of these items:

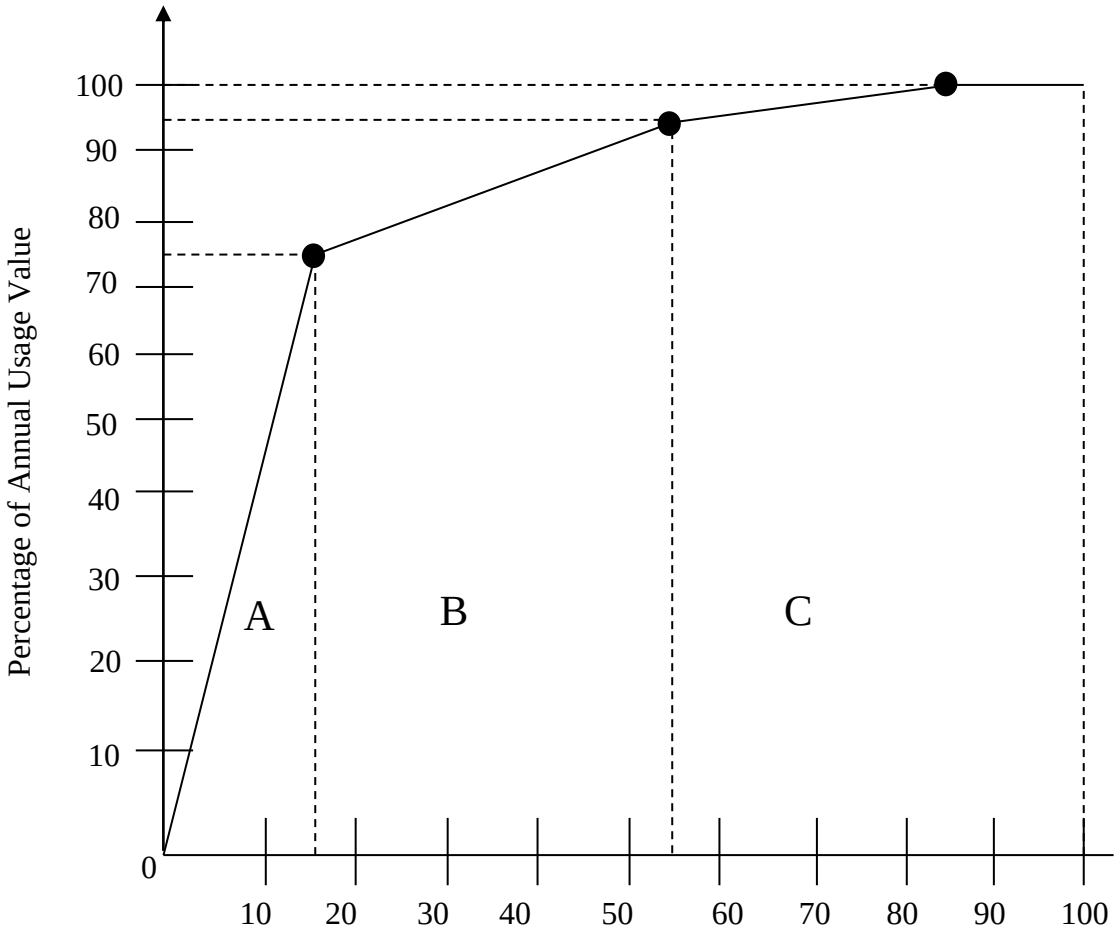
Annual Value = Unit Cost × Annual Consumption

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 of the items. That is, if there are 50 items involved in classification, then each item would represent $100/50 = 2\%$ of the total items. Also cumulate these percentage values.

Step 5: 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 slope as shown in fig. 2.2 (Sharma, 2008; 680-681).



(ABC Classification of Inventory Items)

2.7.3 System of Ordering: When to Order?

The problem how much to be ordered is solved by determining the economic order quantity (EOQ). The second problem is when 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 & 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 material received.

The re-order point is the level of inventory at which the firm places an order in the amount of the economic order quantity. If the firm places the order when the inventory reaches 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 termed 'transit stock' and represents the amount of 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 × 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 incurred by a stock out, but it adds to carrying costs. The reorder point is determined by adding transit stock to the safety stock level that the company determines to be cost effective.

Optimal Reorder 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 having additional inventory to guard against stock out situation such stocks are called safety stock.

2.7.4 Stock Level Subsystem

Carrying of too much and too little of inventories is detrimental to the firms. If the inventory is too little, the firm will face frequent stock-outs involving high reordering cost and if the inventory level is to 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 levels are (Nair, et al, 1998; 220)

- **Minimum Level**

  It represents the minimum quantity of inventory, which must be maintained in hand at any time. This quantity is fixed so that production as sales may not be held up due to shortage of inventory in this level. Formula for the calculation of:

  Minimum level = Re-ordering Level - (Normal Consumption × Normal Re-order Period)

- **Maximum Level**

  It represents the maximum quantity of an item of inventory that can be hold in stock at any time that stock should not exceed this quantity. The quantity is fixed so that their may be no over stocking. Formula for the calculation of:

  Minimum level = Re-order Level + Re-ordering Quantity -(Minimum Consumption × Minimum Re-ordering Period)

- **Re-ordering Level**

  It is the level of stock inventory at which it is decided to replenish the stock. It is connected with the lead time, such that the item should be received just at a time when the stock level is at the minimum desired level. In quite a few cases, when safety of buffer stock is planned, the re-order level should cater for the level of consumption of inventory just sufficient to reach safety stock level during the lead time.

  ROL = Safety Stock + [Daily Usage × Lead Time] - Goods in Transit

- **Safety Stock Level**

  It is the level of inventory kept procured when either the lead time is uncertain or the demand is critical and shortage cost may be high. This inventory is planned to meet the demand during uncertain supply period or else to cater for sudden spurt in demand for a short duration.

  ROL = Safety Stock + Daily Usage × Lead Time

- **Average Stock Level**

  Average stock is calculated as:

  Average Stock Level =

  $$\text{Minimum Stock Level} + \frac{1}{2}\ of\ reorder\ quantity$$

- **Danger Level**

  This is a level of which normal issue of the material are stopped and issued are made only specific instructions. The firms will make special arrangement to get the materially, which reach at their danger levels so that the production may not stop due to shortage of materials.

  Danger level = Average Consumption × Maximum Re-order Period

2.7.5 Just in Time System (JIT)

In recent years the management of inventory has become very sophisticated. Many firms apply just in time (JIT) inventory control. It is a system of inventory control in which a firm coordinates 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 the firm to minimize carrying cost of inventory. Application of JIT requires efficient purchasing procedure, most reliable suppliers 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 provides the service of information and access to the suppliers. 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 then bid for the contract of supplying inventory according to the need of the firm. Larger firms design 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 (Paudel, et al, 2009; 252).

2.7.6 Out - Sourcing

It is a recently developed practice of acquiring some components of inventory used in finished product from outside rather than producing by the firm itself. Just for example, a company that manufactures inverters can also manufacture the batteries required for inverters or acquire from the outside supplies. Out-sourcing 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 Actual Cost Method

Under this method, the materials issued are priced at their actual cost, which involves identification of each lot purchased. It is simplest but also the most time consuming method of determining cost of materials used and cost of the ending inventory. It entails keeping a record of the purchase price of each specific unit and the quantity of specific units used. Cost of material used is computed by multiplying the quantity used by the specific price of each material. In many when material are purchased, a tag showing the price is attached in order to identify them.

2.8.2 Weighted Average Price Method

The weighted average price method is based on the assumption that each issue of goods consists of a due proportion of the earlier lots and is valued at the weighted average price. Weighted average price is calculated by dividing the total cost of goods in stock by the total quantity of goods in stock. This weighted average price is used for pricing all the issues until a new lot is received when a new weighted average price would be calculated. This method evens out the effect of widely varying prices of different lots which make up the stock (Tulsian, 2004; 14.9).

2.8.3 First in First out Method (FIFO)

The first in first out method is based on the assumption that the goods which are received first are issued first. 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, consists of the earliest lots and are valued at the price paid for such lots. The ending inventory consists of the latest lots and is valued at the price paid for such lots. In periods of rising prices, higher income is reported since old costs are matched with current revenues. As a result, income tax liability is increased. The ending inventory is stated in the balance sheet at a value nearer the current market price (Tulsian, 2004; 14.4).

2.8.4 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 first. 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 and are valued at the price paid for such 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 (Tulsian, 2004; 14.5).

2.8.5 Base 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 upto 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 (Tulsian, 2004; 14.12).

2.8.6 Standard Cost Method

Under this method, a standard cost is set for each material 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, storing of materials and use of materials, normal levels of consumption of materials and supplies, labour 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 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., 1970; 362-363).

This model is also called maximum liability model. Inventory costs are not considered explicitly in the replenishment system and there is no fixed reorder quantity instead, 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 $L < R$

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

Where, I = Inventory at a review time

T = Number of unit in transit (Goods in transit)

The buffer stock B must be sufficient to guarantee an 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.

2.9.2 Inventory Model with Uncertainty

In simple inventory models, we assume that demand and supply, lead times are constant, in many real world applications, demand cannot be predicted with certainty and lead times 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 buffer 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).

2.9.3 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 system 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 for managing 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 bin 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 anytime. 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 reduced. The broader application of perpetual inventory records made feasible by computer will in turn result involves control of inventories.

The fixed order interval system lends itself to inventories that consist of large number of products 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) **Gurgain** (2006) studied on the thesis on a topic in "Inventory Management (A Comparative Study of DDC and SGML)" submitted to Faculty of Management, T.U. The objectives of the thesis were:

Objectives

- To carry out a comparative analysis of the present inventory management position of DDC and SGML.
- To examine the inventory management practice and to analyze its impact in profitability of the sampled two companies.
- To identify the optimum level of inventory to reduce inventory cost.
- To identify and analyze the problems faced by the companies at the time of inventory management and control system.
- To assess the study of companies towards utilizing inventory resources.

- To recommend some suggestion based on major findings and conclusion.

Major Findings:

Following findings were extracted about the inventory management system of DDC and SGML.

- There is not proper and timely improvement in inventory management in DDC and SGML.
- DDC and SGML have lack of study on effective and efficient inventory management system due to this; huge money is blocked in inventory.
- The EOQ model is not followed in the purchasing decision by both of companies.
- Both companies have not categorized its inventory for the purpose of control and paid equal attention for all the inventories held in the time store.
- Cost related with ordering and holding inventory are not recorded separately in DDC and SGML, but recorded as whole.
- There is no significant relationship between inventory and profit of both companies.
- The inventory turnover ratio of the companies was not satisfactory.
- The DDC and SGML efficiency in inventory is poor. Both the companies have not changed their inventory in to receivable/cash through sales.

(ii) **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 aforesaid 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 Findings:

- 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.

(iii) **Limbu,** (2007) conducted the thesis on "Inventory Management: A Case Study of Salt Trading Organization", submitted to Faculty of Management, T.U.

Objectives:

The study was pursued to achieve the following 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.
- Inventory to total assets ratio are not consistent over the study period.
- The inventories to net sales ratio of the last two years have been increased because of decreases in net sales.
- The inventories to current assets ratio of the last two years have been increased because of decreases in net sales.
- The ratio in between inventories and net profit are fluctuating trend but the ratio is more increases in last two years.

(iv) **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 underlying constrains in existing management and control system of inventory and their impact towards the Gorkhapatra Corporation's Profitability. Along with, the aforesaid objectives were:

- 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 given 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 to procure raw materials 3-4 times in a year instead of one time in a year.

(v) **Gaire** (2009) conducted the thesis on "Inventory Management of Bottlers Nepal Limited", submitted to the Faculty of Management of T.U.

Objectives:

- 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 1st year and onwards has a fluctuating trend. CU of purchase is higher to that of inventories which shows that variability of purchase is higher then inventories.

(vi) **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 ineffectively 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 was 33.45%. It indicates that the company had not been adopting appropriate inventory policy.
- Coefficient of correlation between net profit and inventory were .0057 which was far 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.

(vii) **Kshetri** (2010) conducted the thesis on "A Comparative Study on Inventory Management of DDC and SGML" submitted to the Faculty of Management of T.U.

Objectives:

The basic objectives of these studies were:

- To explore the present inventory management position of DDC and Sitaram Gokul Milk Pvt. Ltd.
- To analyze the problems faced by the companies at the time of inventory management and control system.
- To assess the status of companies towards utilizing inventory resources.
- To examine the inventory management practice and to analyze its impact in profitability of the sampled two companies.
- To analyze the optimum level of inventory to reduce inventory cost.

Major Findings:

There is not proper and timely improvement in inventory management in DDC and SGML.

- DDC and SGML have lack of study on effective and efficient inventory management system. Due to this, huge money is blocked in the inventory.
- Both company have not categorized its inventory for the purpose of control and paid equal attention for all the inventories held in the time store.

- The economic order quantity model is not followed in the purchasing decision by both of the companies.
- Cost related with ordering and holding inventory are not recorded separately in DDC and SGML but recorded as a whole.
- DDC and SGML have made re-order after stock is finished.
- The inventory turnover ratio of the companies was not satisfactory.
- The DDC and SGML's efficiency in inventory is poor. Both the companies have not changed their inventory in to receivable/cash through sales.

(viii) **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 fluctuating but DNL is in increasing trend.
- The inventory to current assets ratio of UL is acceptable whereas DNL has satisfactory ratio.

2.12 Research Gap

Various issues 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 two different companies (DDC and SGML) area as follows.

Previous studies are focused in other 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

RESEARCH METHODOLOGY

3.1 Introduction

Research is a systematic and organized effort to investigate specific problem that 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 and Sitaram Gokul Milk Private Ltd. 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

Research design is the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variation. 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. The analysis of this study is based on certain research design keeping in mind on the objective of the study.

3.3 Sources of Data

This study is based on secondary data. For the reliability and effectiveness of research work, true and fact information are necessary. In this study, secondary data has been used. Mainly, the following sources have been adopted to accumulate the secondary information:

a. Reports and financial statements of the both factories provided by the officials.
b. Books, magazines & previous dissertation of DDC and SGML.

3.4 Data Collection Method

Secondary sources refer to those for already gathered by others. Where data have been subjected to interpretation, they are referred to as coming from secondary sources. As this data already exists, it is often more cost-and-time effective to analyze it before looking for primary sources. The sources of secondary data can be divided into two groups: internal and external. The internal secondary data is found within the company. Sources of such data include sales information, accounting data and internally generated research reports. External secondary data is collected from sources outside the company.

Such sources may include books, periodicals, published reports, data services and computer data banks. The study covers a period of 5 years of fiscal year 2062/63 to 2066/67.

3.5 Tools Used for Analysis

Analysis is the careful study of available facts so that one can understand and drew conclusion from them on the basis of established principles and sound logic. This study based the analysis of secondary data with the help of different statistical tools. Therefore, the data have been 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 wherever 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 the order size, where total ordering cost is equal to total carrying cost. EOQ is one of the most commonly used tools 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 × Lead time] - Goods in Transit

- **Ratio 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 ratio 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 = $\frac{Cost\ of\ Goods\ Sold}{Average\ Inventory}$

- **Arithmetic Mean**

  The sum of all the observations divided by the number of observations 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.

$$\bar{X} = \frac{X_1 + X_2 + X_3 + \cdots \ldots \ldots \ldots \ldots + X_n}{n}$$

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

Where, ΣX = 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 also known as 'Root Mean-Square Deviation'. It is usually denoted by the Greek letter σ (small sigma). The mathematical formula for standard deviation is:

$$\sigma = \sqrt{\frac{\sum(X - \bar{X})^2}{n}}$$

- **Coefficient of Variation (CV)**

  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,

$$\text{CV.} = \frac{\sigma}{\bar{X}} \times 100$$

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

3.6 Research Question

The present study attempts to seek the answer of the following research questions:

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

CHAPTER - IV

PRESENTATION AND ANALYSIS OF DATA

The data presentation and analysis is the main portion of the study because all the information and ideas will be analyzed in this chapter. In this regard, Inventory Control Techniques imply to control inventory of DDC and Sitaram Gokul Milk Private Ltd. The main objective of this study is to examine the existing position of inventory management and comparative analysis of present practice of inventory management system in DDC and SGML. Thus, in this contexts, this section analyzes the relevant secondary data and information regarding inventory management of these 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 and SGML

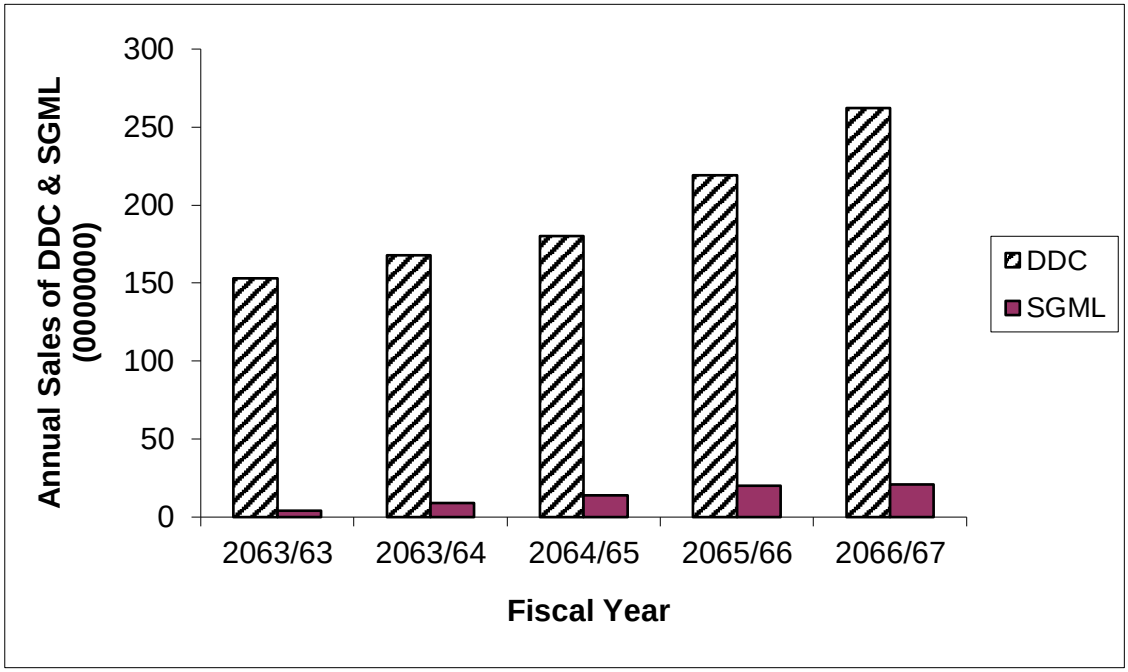
Fiscal Year	Annual Sales		Difference in Sales
	DDC	SGML	
2062/63	1536340564	47056747	1489283817
2063/64	1680353680	96793500	1583560180
2064/65	1800673560	145290750	1655382810
2065/66	2193309447	206009280	1987300167
2066/67	2628350971	218369837	2409981134

Source: DDC and SGML

From the above table, it is clear that annual sales of DDC are in increasing trend year by year. Annual sales of SGML are also in increasing trend year by year from 2062/63 to 2066/67. Differences in annual sales between DDC and SGML are very high. Sales condition of DDC is satisfactory than SGML.

Figure 4.1

Annual Sales Trend of DDC and SGML



From the above figure, it is clear that annual sales trend of DDC is in increasing trend, whereas annual sales trend of SGML is also in increasing trend year by year from fiscal year 2062/63 to 2066/67. Above figure presents huge gap between DDC and SGML in annual sales.

4.2 Trends Analysis of Inventory

Table 4.2

Analysis of Average Inventory of DDC and SGML

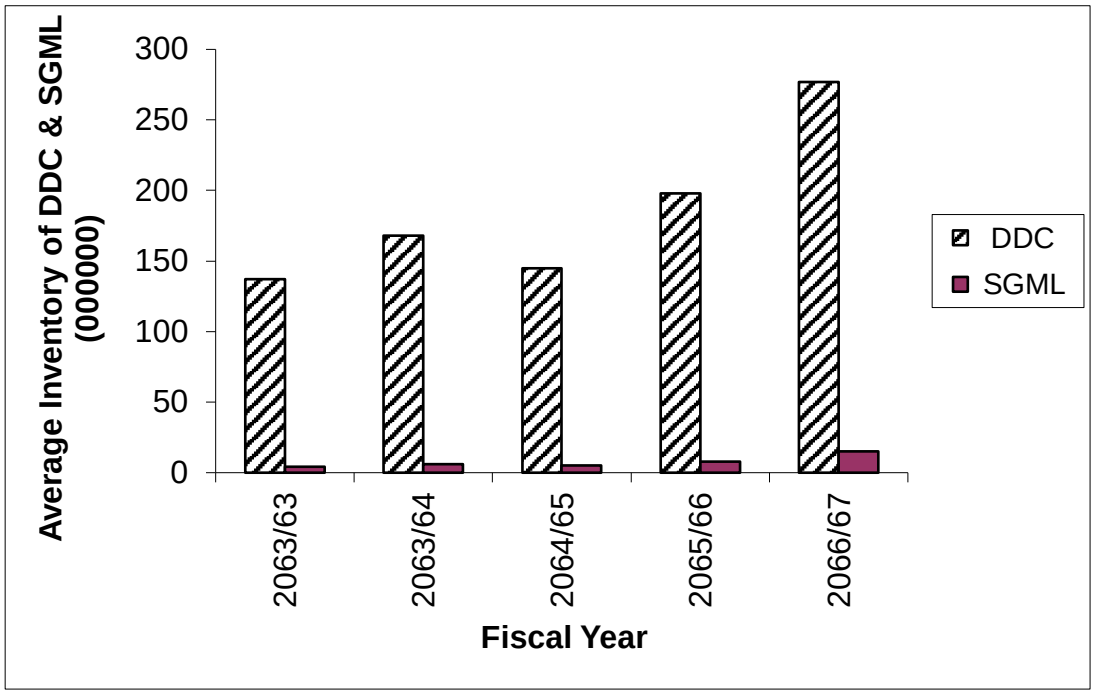
Fiscal Year	Average Inventory of DDC	Average Inventory of SGML	Difference in Sales
2062/63	137015578	4435330	132580248
2063/64	168996720	6055728	162940992
2064/65	145992339	5536518	140455821
2065/66	198200155	8011209	190188946
2066/67	277056336	15255751	261800585

Source: Appendix I & II

From the above table, it is clear that average inventory of DDC is in increasing trend from fiscal year 2062/63 to 2063/64 but in fiscal year 2064/65 average inventory is in decreasing trend in comparison of previous fiscal year 2063/64. It shows that the average inventory is in increasing trend upto 2066/67. Similarly, average inventory of Sitaram Gokul Milk Private Ltd. is also in increasing trend from fiscal year 2062/63 to 2063/64 but in fiscal year 2064/65 average inventory is in decreasing trend in comparison of previous fiscal year 2063/64. Then after again that it shows average inventory is in increasing trend upto fiscal year 2066/67. In this way, the differences in average inventory between DDC and SGML are very high year by year from fiscal year 2062/63 to 2066/67.

Figure 4.2

Graphical Presentation of Average Inventory of DDC & SGML



From the above figure, it is clear that average inventory of DDC is in increasing trend from fiscal year 2062/63 to 2063/64 but in fiscal year 2064/65 average inventory is in decreasing trend. It shows that average inventory is in increasing trend upto fiscal year 2066/67. Similarly, average inventory of SGML is also in increasing trend but in fiscal year 2064/65 average inventory is in decreasing trend. In this way, the differences in average inventory between DDC and SGML are very high.

4.3 Economic Order Quantity (EOQ) MODEL

To calculate EOQ, only one raw material (milk) is considered. But DDC and SGML use 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 price 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 unit. So, it is difficult, therefore, in this study period. We do not involve additive and packing materials with respect to EOQ.

4.3.1 Calculation of Economic Order Quantity (EOQ)

- EOQ = $\sqrt{\frac{2AO}{C}}$
- No. 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 × Ordering Cost Per Order
- Carrying cost = Average Inventory × Carrying Cost per Liters Per Year
- Total Cost = Total ordering cost + Total carrying cost

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 2062/63

1. For DDC

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

a) Mathematical Formula Method

Annual requirement (A) = 64,966,400 liters

Total ordering cost = Rs. 10917424

Ordering cost per order (O) = Rs. 30048

Carrying cost per liters per year (C) = Rs. 1.12

No. of orders = 363 times

Applying formula,

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

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

= 1867059.56 liters

By multiplying A (64966400) and O (Rs. 30048) with 2 and dividing 1.12 and taking square of this figure, the result comes 1867,059.56 liters.

b) Trial and Error Method/Tabulation Method

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

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

$$= \frac{64966400}{1867059.56}$$

$$= 34.796 \approx 35 \text{ times}$$

Table 4.3

Calculation of EOQ of DDC

No. of order	Order size	Average Inventory	Ordering cost	Carrying cost	Total cost
7	9280914.28	4640457.14	210336	5197312	5407648
10	6496640	3248320	300480	3638118.4	3938598.4
25	2598656	1299328	751200	1455247.36	2206447.36
35	1856182.86	928091.43	1051680	1039462.4	2091142.4
40	1624160	812080	1201920	909529.6	2111449.6
362	179465.20	89732.60	10877376	100500.51	10977876.51

2. For SGML

On the basis of annual reports of SGML, the following data are available.

a) Mathematical Formula Method

Annual requirement (A) = 11184000 liters

Total ordering cost = Rs. 11050050

Ordering cost per order (O) = Rs. 30525

Carrying cost per liters per year (C) = Rs. 1.00

No. of orders = 362 times

Applying formula,

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

$$= \sqrt{\frac{2\times 11184000\times 30525}{1.00}}$$

= 826306.96 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.

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

$$= \frac{11184000}{826306.96}$$

= 13 times

Table 4.4

Calculation of EOQ of SGML

No. of order	Order size	Average Inventory	Ordering cost	Carrying cost	Total cost
5	2236800	1118400	152625	1118400	1271025
10	1118400	559200	305250	559200	864450
13	860307.69	430153.84	396825	430153.84	826978.84
20	559200	279600	610500	279600	890100
60	186400	93200	1831500	93200	1924700
360	31066.66	15533.33	10989000	15533.33	11004533.33

From the tabulation method, it is clear that the lowest inventory cost of DDC is Rs. 2,091,142.4, which includes total carrying cost of Rs. 1039462.4 and total

ordering cost of Rs. 1051680 and it takes 35 times in a year. In other words when DDC place order 35 times in a year, there will be total cost minimizes. Likewise the lowest inventory cost of SGML is Rs. 826978.84, which includes total ordering cost of Rs. 396825 and total carrying cost of Rs. 430153.84 and it takes 13 times in a year. In other words when SGML order 13 times in a year there will be total cost minimizes.

(II) 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) = 62307000 liters

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 = 363 times

Applying formula,

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

$$= \sqrt{\frac{2\times62307000\times30348}{1.14}}$$

= 1821360.98 liters

b) Trial and Error Method/Tabulation Method

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

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

$= \frac{62307000}{1821360.98}$

$= 34.21 \approx 34$ times

Table 4.5

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	171644.62	85822.31	11016324	97837.44	11114161.44

2. For SGML

On the basis of annual reports of SGML, the following data are available.

a) Mathematical Formula Method

Annual requirement (A) = 11351760 liters

Total ordering cost = Rs. 11215484

Ordering cost per order (O) = Rs. 30982

Carrying cost per liters per year (C) = Rs. 1.20

No. of orders = 362 times

Applying formula,

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

$$= \sqrt{\frac{2\times 11351760\times 30982}{1.20}}$$

= 765615.47 liters

b) Trial and Error Method/Tabulation Method

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

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

$$= \frac{11351760}{765615.47}$$

$$= 14.83 \approx 15 \text{ times}$$

Table 4.6

Calculation of EOQ of SGML

No. of order	Order size	Average Inventory	Ordering cost	Carrying cost	Total cost
5	2270352	1135176	154910	1362212	1517122
10	1135176	567588	309820	681105	990925
15	756784	378392	464730	454070	918800
20	567588	283794	619640	340553	960193
360	31358	15679	1121548	18815	1140363

From the tabulation method, it is clear that the lowest inventory cost of DDC is Rs. 2,076,390.53, which includes total ordering cost of Rs. 1,031,832 and total carrying cost of Rs. 1044558.53 and it takes 34 times in a year, which minimizes the total cost. Likewise, the lowest inventories cost of SGML is Rs. 918800, which include total carrying cost of Rs. 454070, and total ordering cost of Rs. 464730 and it takes 15 times in a year, which minimizes the total cost.

(III) For Fiscal Year 2064/65

1. For DDC

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

a) Mathematical Formula Method

Annual requirement (A) = 61845000 liters

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,

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

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

= 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 4.7

Calculation of EOQ of DDC

No. of order	Order size	Average Inventory	Ordering cost	Carrying cost	Total cost
10	6184500	3092250	307420	3587010	3894430
20	3092250	1546125	614840	1793505	2408345
34	1818970.59	909485.29	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

2. For SGML

On the basis of annual reports of SGML, the following data are available.

a) Mathematical Formula Method

Annual requirement (A) = 11499333 liters

Total ordering cost = Rs. 11361370

Ordering cost per order (O) = Rs. 31385

Carrying cost per liters per year (C) = Rs. 1.22

No. of orders = 362 times

Applying formula,

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

$$= \sqrt{\frac{2\times 11499333\times 31385}{1.22}}$$

= 769187.95 liters

b) Trial and Error Method/Tabulation Method

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

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

$$= \frac{11499333}{769187.95}$$

= 15 times

Table 4.8

Calculation of EOQ of SGML

No. of order	Order size	Average Inventory	Ordering cost	Carrying cost	Total cost
5	2299866.6	1149933.3	156925	1402918.63	1559843.63
11	1045393.91	522696.95	345235	637690.28	982925.28
15	766622.2	383311.1	470775	467639.54	938414.54
21	547587.28	273793.64	659085	334028.24	993113.24
362	31766.11	15883.056	11361370	19377.32	11380747.33

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. Likewise, the lowest total inventories cost of SGML is Rs. 938414.54, which includes total ordering cost of Rs. 470775 and total carrying cost of Rs. 467639.54 and it takes 15 times in a year to minimize the total inventories cost.

(IV) For Fiscal Year 2065/66

1. For DDC

On the basis of DDC records, the following data are available.

a) Mathematical Formula Method

Annual requirement (A) = 72010000 liters

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,

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

$$= \sqrt{\frac{2\times72010000\times31173}{1.18}}$$

= 1950561.73 liters

b) Trial and Error Method/Tabulation Method

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

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

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

$$= 36.92 \approx 37 \text{ times}$$

Table 4.9

Calculation of EOQ of DDC

No. of order	Order size	Average Inventory	Ordering cost	Carrying cost	Total cost
10	7201000	3600500	311730	4248590	4560320
20	3600500	1800250	623460	2124295	2747755
25	2880400	1440200	779325	1699436	2478761
37	1946216.2	973108.10	1153401	1148267.55	2301668.55
40	1800250	900125	1246920	1062147.5	2309067.5
363	198374.66	99187.33	11315799	117041.05	11432840.05

2. For SGML

On the basis of SGML records, the following data are available.

a) Mathematical Formula Method

Annual requirement (A) = 11660323 liters

Total ordering cost = Rs. 11531510

Ordering cost per order (O) = Rs. 31855

Carrying cost per liters per year (C) = Rs. 1.2383

No. of orders = 362 times

Applying formula,

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

$$= \sqrt{\frac{2\times 11660323\times 31855}{1.2383}}$$

= 774544.11 liters

b) Trial and Error Method/Tabulation Method

We have been used formula to calculate the no. of order size and that order size where total inventory cost will be minimize, will be the EOQ in trial and error method.

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

$$= \frac{11660323}{774544.11}$$

= 15.05 ≈ 15 times

Table 4.10

Calculation of EOQ of SGML

No. of order	Order size	Average Inventory	Ordering cost	Carrying cost	Total cost
10	1166023.2	583011.6	318550	721943.26	1040493.26
13	896940.92	448470.46	414115	555340.97	969455.97
15	777348.8	388674.40	477825	481295.5	959120.50
20	583016.15	291508.07	637100	360974.50	998074.50
362	32210.58	16105.29	11531510	19943.18	1155143.18

From the tabulation method, it is clear that the lowest total inventory cost of DDC is Rs. 2,301,668.55, which includes total ordering cost of Rs. 1,153,401

and total carrying cost of Rs. 1,148,267.55 and it takes 37 times in a year to minimize the total inventory cost. Similarly, the lowest inventory cost of SGML is Rs. 959120.50, which includes total ordering cost of Rs. 477825 and total carrying cost of Rs. 481295.5 and it takes 15 times in a year. In other words when we place order 15 times in a year, there will be total cost minimizes.

(V) For Fiscal Year 2066/67

1. For DDC

On the basis of annual report of DDC, the following data are available.

a) Mathematical Formula Method

Annual requirement (A) = 74081000 liters

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,

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

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

= 1936563.075 liters

b) Trial and Error Method/Tabulation Method

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

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

$= \frac{74081000}{1936563.075}$

= 38.25 ≈ 38 times

Table 4.11

Calculation of EOQ of DDC

No. of order	Order size	Average Inventory	Ordering cost	Carrying cost	Total cost
10	7408100	3704050	316400	4630062.5	4946462.5
30	2469366.66	1234683.33	949200	1543354.17	2492554.17
38	1949500	974750	1202320	1218437.5	2420757.5
40	1852025	926012.5	1265600	1157515.63	2423115.63
50	1481620	740810	1582000	926012.5	2508012.5
363	204079.88	102039.94	11485320	127549.93	11612869.93

2. For SGML

On the basis of annual reports of SGML, the following data are available.

a) Mathematical Formula Method

Annual requirement (A) = 11835228 liters

Total ordering cost = Rs. 11716130

Ordering cost per order (O) = Rs. 32365

Carrying cost per liters per year (C) = Rs. 1.258

No. of orders = 362 times

Applying formula,

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

$$= \sqrt{\frac{2\times 11835228\times 32365}{1.258}}$$

= 780370.42 liters

b) Trial and Error Method/Tabulation Method

To calculate EOQ by Trial and Error method, we have to develop the following formula:

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

$$= \frac{11835228}{780370.42}$$

$$= 15.16 \approx 15 \text{ times}$$

Table 4.12

Calculation of EOQ of SGML

No. of order	Order size	Average Inventory	Ordering cost	Carrying cost	Total cost
5	2367045.6	1183522.8	161825	1488871.68	1650696.68
10	1183522.8	591761.4	323650	744435.84	1068085.84
15	789015	394507	485475	496290.56	981765.56
17	696189.88	348094.94	550205	437903.4	988108.43
23	514575.13	257287.56	744395	323667.75	1068062.75
362	32694	16347	11716130	20564.53	11736694.53

From the above tables, it is clear that the lowest total inventory cost of DDC is Rs. 2,420,757.5, which includes total ordering cost of Rs. 1202,320 and total carrying cost of Rs. 1,218,437.5 and it takes 38 times in a year to minimize the total inventory cost. Similarly, lowest total inventory cost of SGML is Rs. 981765.56, which include total ordering cost of Rs. 485475 and total carrying cost Rs. 496290.56 and it takes 15 times in a year, which minimizes the total inventory cost.

DDC should order 38 times in a year but the company has placed an order with 363 times, which involve total inventory cost Rs. 11,612,869.93. This amount is very high as compared with Rs. 2420757.5. SGML should order 15 times in a year but the company has placed 362 times which involves total inventory cost Rs. 11736694.53. This amount is very high as compared with 981765.56.

According to both companies they had placed an order in every day because they need daily fresh material (milk) to provide consumer good fresh product.

Above table shows that if DDC order less than 38 times in a year that results carrying cost increased and ordering cost decreasing and finally total inventory cost increased. If DDC order more than 38 times in a year, that results carrying cost decreased and ordering cost increased. Likewise, if SGML orders less than 15 times in a year, that results carrying cost increased and increased. When the carrying and ordering costs are likely same or equal to it at that point the total inventory costs will minimizes. In inventory management two costs i.e. carrying and ordering costs play an important role. These costs more opposite direction i.e. when carrying cost increase, the ordering cost will decrease and vice-versa.

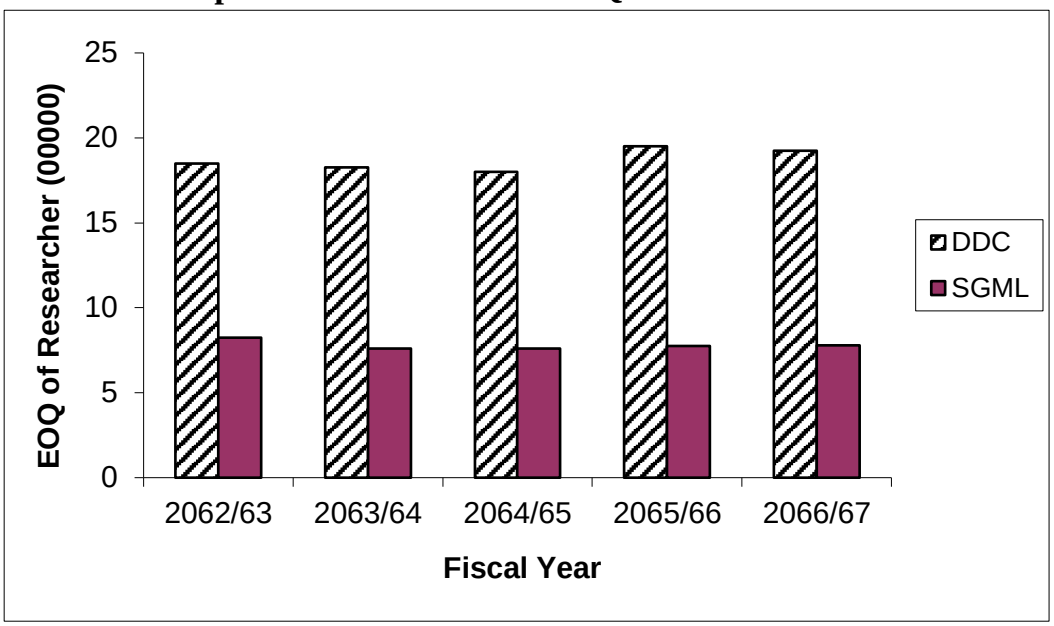
Table 4.13

Findings of EOQ of DDC and SGML

Fiscal Year	EOQ of Researcher (DDC)	EOQof Researcher (SGML)
2062/63	1867059.56	826306.96
2063/64	1821360.98	765615.74
2064/65	1810524.305	769187.95
2065/66	1950561.73	774544.11
2066/67	1936563.07	780370.41

Figure 4.3

Graphical Presentation of EOQ of DDC and SGML



From the above figure EOQ of DDC is higher than EOQ of SGML. The EOQ obtained through our calculations. The company need to calculate its cost of EOQ and apply the optimal order quantity as suggested which will reduce cost of inventory of the company.

4.4 Re-order Point of Milk in DDC and SGML

Re-order is that level of inventory of firm places an 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 years i.e. 2062/63 to 2063/64.

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

[When safety stock is not given]

Re-order Point (ROP) = [Usage Rate × Lead Time] + Safety Stock

[When safety stock is given]

Table 4.14

Calculation of Re-order Point of DDC

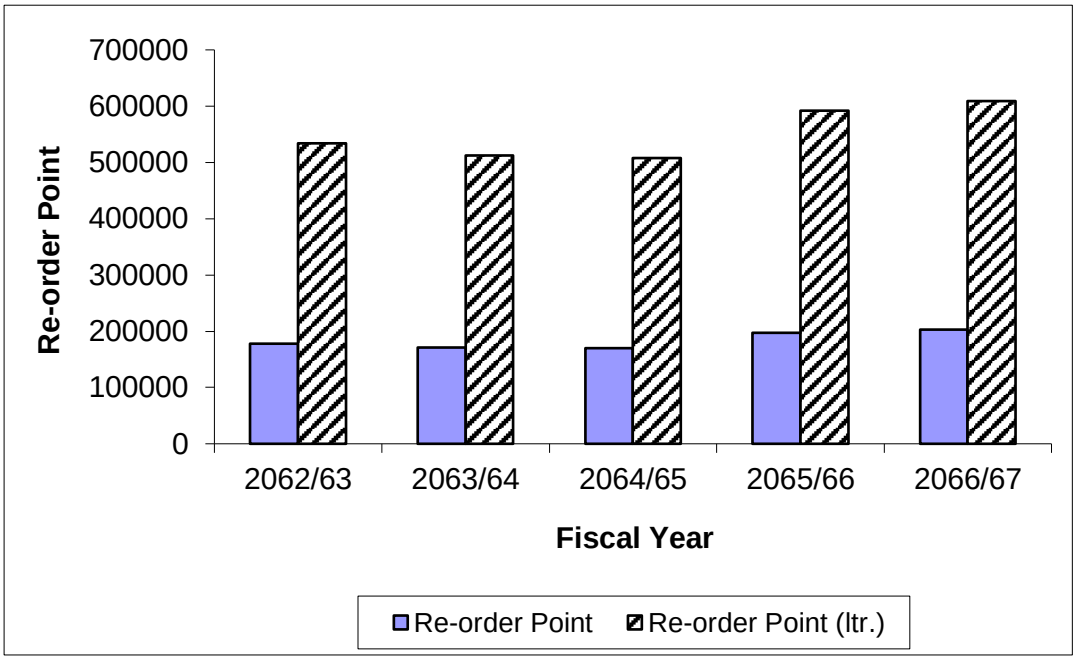
Fiscal Year	Usage rate (Ltr.)	Lead time (days)	Re-order Point	Safety stock (days)	Safety stock (ltr)	Re-order Point (ltr.)
2062/63	177990	1	177990	2	355980	533970
2063/64	170704	1	170704	2	341408	512112
2064/65	169438	1	169438	2	338876	508314
2065/66	197288	1	197288	2	394576	591864
2066/67	202961	1	202961	2	405922	608883

Source: Appendix - V

Figure 4.4

Graphical Presentation of Re-order Point

(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 strike.

Table 4.15

Calculation of Re-order Point of SGML

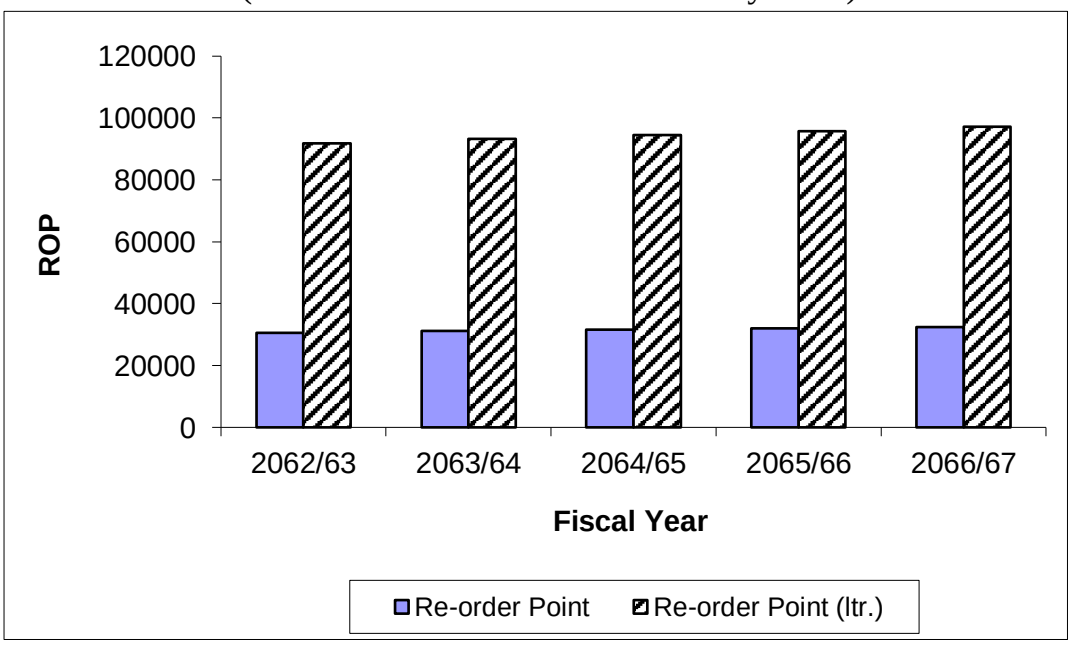
Fiscal Year	Usage rate (Ltr.)	Lead time (days)	Re-order Point	Safety stock (days)	Safety stock (ltr)	Re-order Point (ltr.)
2062/63	30641	1	30641	2	61282	91923
2063/64	31100	1	31100	2	62200	93300
2064/65	31505	1	31505	2	63010	94515
2065/66	31946	1	31946	2	63892	95838
2066/67	32425	1	32425	2	64850	97275

Source: Appendix - VI

Figure 4.5

Graphical Presentation of Re-order Point

(with lead time and lead time + safety stock)



Note: This data is given by SGML collection and processing department. SGML need daily fresh milk so lead time one day and it have 2 days safety stock all day it hold safety stock for the view point strike in Nepal.

From the above table, calculation of ROP including and excluding safety stock. The highest re-order point of DDC, in which safety stock excluding and including is 202961 liters and 608883 liters in year 2066/67. And the lowest re-order point in which safety stock excluding and including is 169,438 liters and 508,314 liters respectively in year 2064/65. While the highest re-order point in which safety stock excluding and including is 32425 liters and 97275 liters respectively in year 2066/67 of SGML. And the lowest re-order point in which safety stock excluding and including in 30641 liters and 91923 liters respectively in year 2062/63.

In year 2066/67, DDC has purchased 1936,563 liters of milk in a year with the no. of order 38 times. According to ROP when the balance remains for 1 days consumption (202961 liters) another order for 1936563 liters should be placed. And every 10 days next fresh order should be made in other words next orders should be placed in the difference of 10 days i.e. practices used by the company for the safety stock is equal to 2 days consumption. If we consider this safety stock, the order should be place by keeping 3 days consumption (i.e. 3×202961 = 608883 liters). It means, when the inventory falls to 608883 liters that another order for 1936563 liters has to be placed. While SGML has purchased 780370.42 liters of milk in a year with the number of order 15 times, according to ROP when the balance remain for one day consumption (32425 liters), another order for 780370.42 liters should be placed. And every 28 days, next fresh order should be made.

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 or 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.

Ratio 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 calculated the relation between inventory to total fixed assets is

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

Table 4.15

Calculation of Inventory to Total Fixed Assets Ratio of DDC

Fiscal Year	Inventory	Total Fixed Assets	Inventory to Total Assets Ratio
2062/63	169199578	270316397	62.59
2063/64	168793861	254143382	66.41
2064/65	123190816	234316243	52.57
2065/66	273209494	246655983	110.76
2066/67	280903178	245283773	114.52

Source: DDC

Figure 4.6

Graphical Presentation of Inventory to Total Assets Ratio of DDC

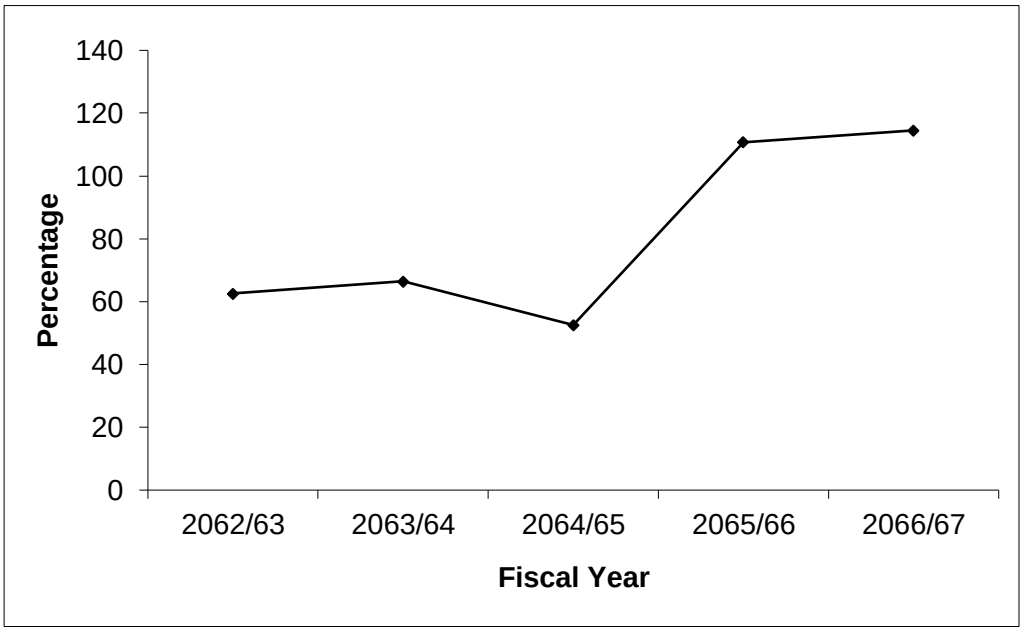


Table 4.16

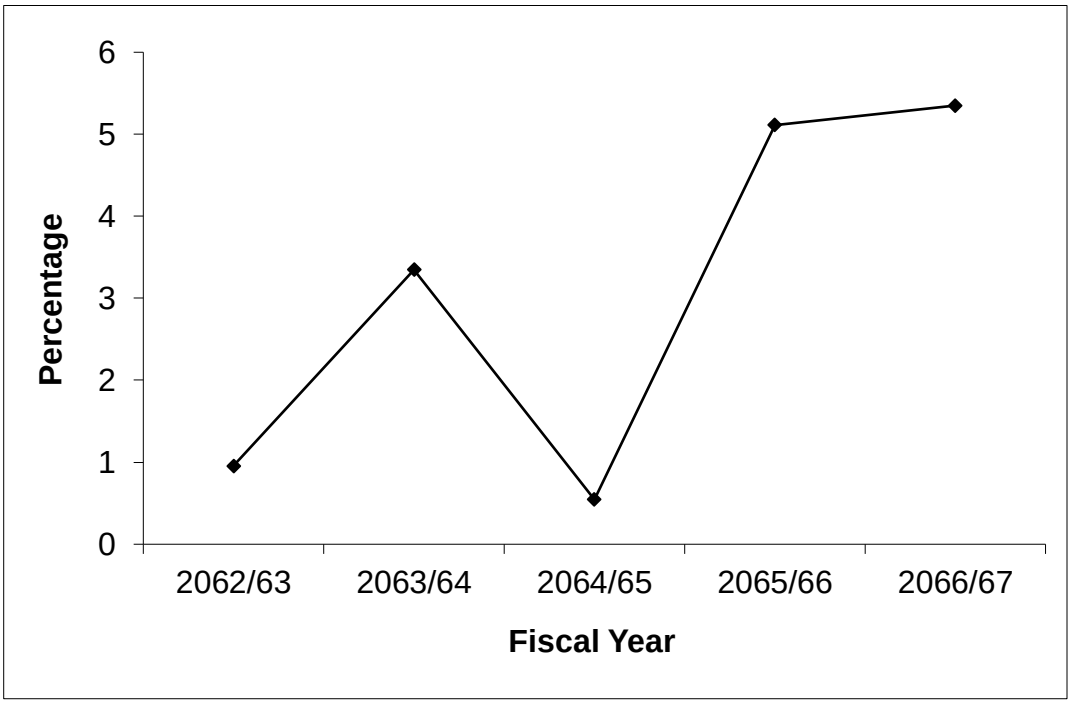
Calculation of Inventory to Total Fixed Assets Ratio of SGML

Fiscal Year	Inventory	Total Fixed Assets	Inventory to Total Assets Ratio
2062/63	2523150	264372512	0.954
2063/64	9588306	286455122	3.347
2064/65	1484732	272545256	0.545
2065/66	14537686	284255320	5.114
2066/67	15973817	298468086	5.35

Source: SGML

Figure 4.7

Graphical Presentation of Inventory to Total Assets Ratio of SGML



From the study of SGML, we know that minimum inventory to total fixed assets ratio 0.545 percent in year 2064/65. Maximum inventory holds as an assets in 5.35 percent in year 2066/67. In year 2064/65 the inventory to total fixed assets ratio is good. In other words the company has minimum inventory level in relation to total fixed assets.

4.5.2 Inventory to Current Assets Ratio

Inventories include 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 4.17

Calculation of Inventory to Total Current Assets Ratio of DDC

Fiscal Year	Inventory	Total Current Assets	Inventory to Current Assets Ratio (%)
2062/63	169199578	542880523	31.17
2063/64	168793861	558331546	30.23
2064/65	123190816	463426144	26.58
2065/66	273209494	583782890	46.79
2066/67	280903178	680990300	41.25

Source: DDC

Table 4.18

Calculation of Inventory to Current Assets Ratio of SGML

Fiscal Year	Inventory	Current Assets	Inventory to Current Assets Ratio (%)
2062/63	2523150	12851601	19.63
2063/64	9588306	14896696	64.36
2064/65	1484732	16758944	8.86
2065/66	14537686	18643240	77.97
2066/67	15973817	19575402	81.60

Source: SGML

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 2065/66. As that situation we can conclude the companies hold more inventory as current assets whenever more inventories kept by the company. They can't mobilize the amount, which have blocked in inventory and they can't see it immediately. So, it direct affects the profitability 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 2065/66, which is standard inventory ratio. Likewise, the highest ratio of SGML is 81.6% in 2066/67. In the context of DDC has satisfactory level in 5 years in comparison of SGML.

4.5.3 Inventory of Sales Ratio

Inventories 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 and SGML.

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

Inventory to sales ratio is wanted low in manufacturing industries.

Table 4.19

Calculation of Inventory to Sales Ratio of DDC

Fiscal Year	Inventory	Net Sales	Inventory to Sales Ratio (%)
2062/63	169199578	1536340564	11.01
2063/64	168793861	1680353680	10.04
2064/65	123190816	1800673560	6.84
2065/66	273209494	2193309447	12.45
2066/67	280903178	2628350971	10.68

Source: DDC

Figure 4.9

Graphical Presentation of Inventory to Sales Ratio of DDC

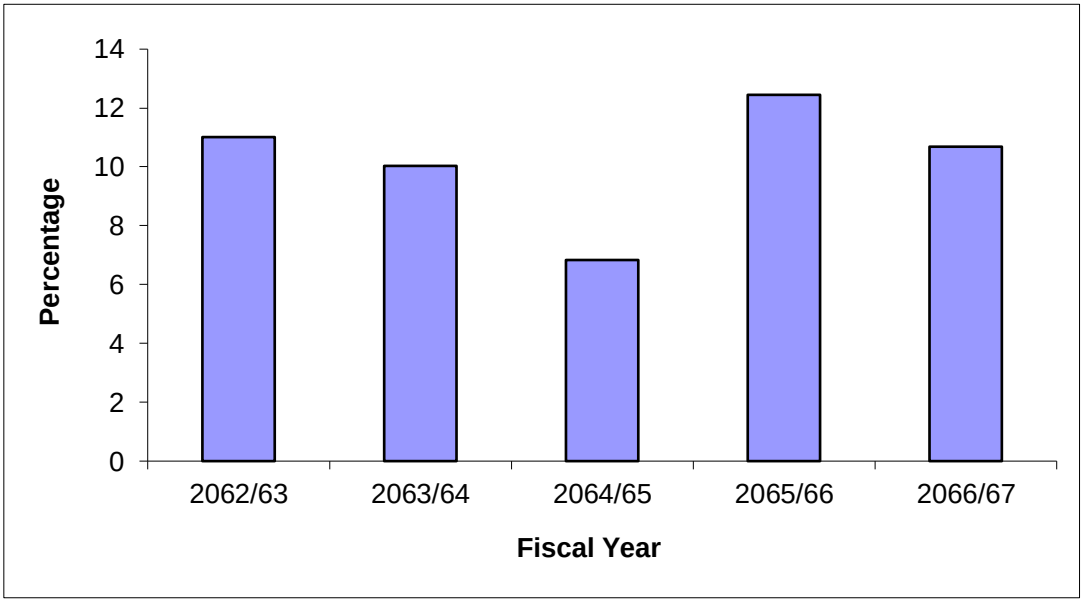


Table 4.20

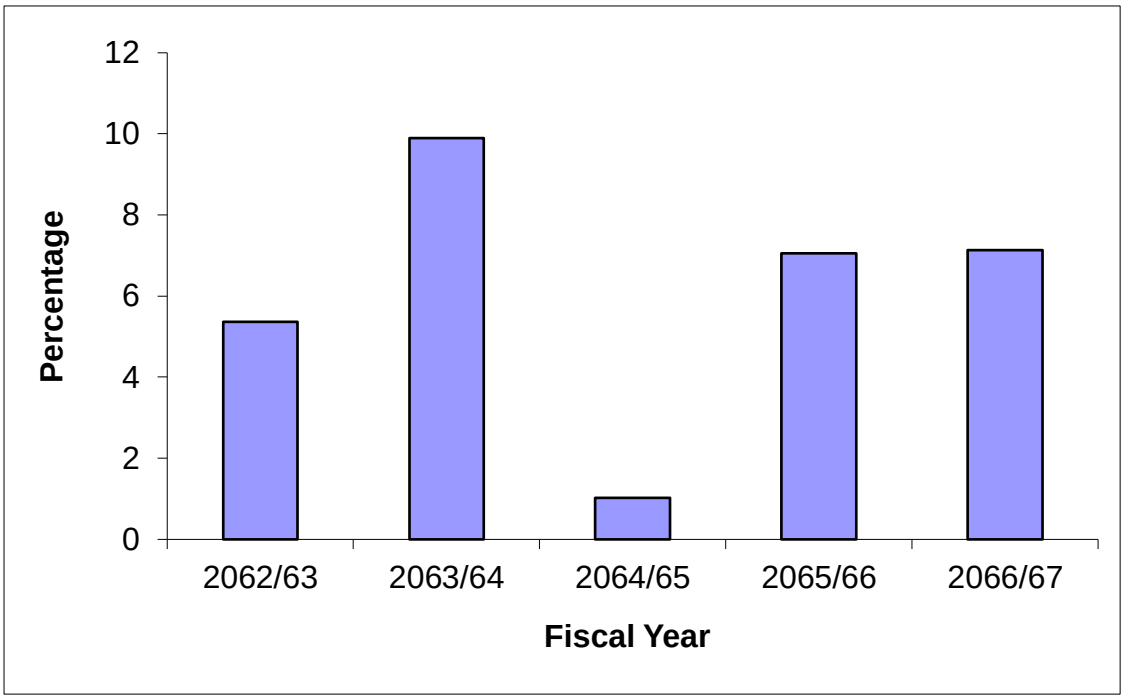
Calculation of Inventory to Sales Ratio of SGML

Fiscal Year	Inventory	Net Sales	Inventory to Sales Ratio (%)
2062/63	2523150	47056747	5.36
2063/64	9588306	96793500	9.90
2064/65	1484732	145290750	1.02
2065/66	14537686	206009280	7.05
2066/67	15973817	218369837	7.31

Source: SGML

Figure 4.10

Graphical Presentation of Inventory to Sales Ratio of SGML



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 2065/66, while highest ratio of SGML 9.90% in 2063/64 and other year relationship with sales is little bad.

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 4.21

Calculation of Inventory to Profit Ratio of DDC

Fiscal Year	Inventory	Net Profit	Inventory to Profit Ratio (%)
2062/63	169199578	(247456480)	Negative
2063/64	168793861	(246089469)	Negative
2064/65	123190816	(335879651)	Negative
2065/66	273209494	(344489135)	Negative
2066/67	280903178	(325080997)	Negative

Source: DDC

Table 4.22

Calculation of Inventory to Profit Ratio of SGML

Fiscal Year	Inventory	Net Profit	Inventory to Profit Ratio (%)
2062/63	2523150	(20820000)	Negative
2063/64	9588306	(18394000)	Negative
2064/65	1484732	(11151000)	Negative
2065/66	14537686	(4686000)	Negative
2066/67	15973817	(4920300)	Negative

Source: SGML

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

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

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

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

Table 4.23

Calculation of Inventory Turnover Ratio of DDC

Fiscal Year	Cost of Goods Sold	Average Inventory	Turnover Ratio (Times)
2062/63	1371815215	137015578	10.01
2063/64	1497384582	168996720	8.86
2064/65	1629164826	145992339	11.16
2065/66	1916107145	198200155	9.67
2066/67	2312063599	277056336	8.34

Source: Appendix III

Table 4.24

Calculation of Inventory Turnover Ratio of SGML

Fiscal Year	Cost of Goods Sold	Average Inventory	Turnover Ratio (Times)
2062/63	36172447	4435330	8.15
2063/64	86371600	6055723	14.26
2064/65	129644550	5536518	23.41
2065/66	184016080	8011209	22.97
2066/67	195716841	15255751	12.83

Source: Appendix - IV

Low inventory turnover ratio is dangerous. It signifies excessive 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 in their process and so on.

So, companies have to keep optimum level of inventory. Through the study of inventory turnover ratio it helps to detect the imbalance investment in the various inventory components.

According to table, it is clear that inventory turnover ratio is fluctuating every year. In case of DDC, inventory turnover ratio is very low in fiscal year 2066/67. 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 2064/65. And also next remaining year inventory turnover ratio is below but little good. Likewise, in fiscal year 2062/63 inventory turnover ratio of SGML is very low, it means more inventory are kept in stock. It direct effect on company's profitability, the high turnover ratio is 23.41 times in 2064/65 fiscal year. And also next remaining year inventory turnover ratio is below but little good.

The DDC and SGML's efficiency in inventory is poor. Both are not able to change their inventory into cash through sales. So, they 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 and Sitaram Gokul Milk Private Ltd. is suffering from a number of internal and external problems in the way of inventory management.

From the analysis of the companies data, the following findings are extracted about the inventory management system of DDC and SGML:

- Sales of DDC are increasing trend but decreasing rate.
- Sales of Sitaram Gokul Milk Private Ltd. are increasing trend at decreasing rate.
- Huge gap between DDC and SGML sales.
- Trend of inventory of DDC are fluctuating trend.
- Trend of inventory of SGML are also fluctuating trend.
- Trend of EOQ of DDC and SGML are fluctuating trend.
- DDC and SGML have lack of study on effective and efficient inventory management system. Due to this, huge money is blocked in the inventory.

- DDC and SGML are not calculating EOQ and no. of order.
- DDC and SGML are not classified carrying cost and ordering cost systematically.
- DDC and SGML are not recorded data properly.
- DDC and SGML are not classified cost on product wise.
- DDC and SGML are not recorded inventory productwise separately.
- Inventory to total fixed assets ratio is not satisfactory of DDC but SGML has satisfactory.
- Inventory to current assets ratios of DDC and SGML are not satisfactory according to standard.
- Inventory to sales ratios of DDC and SGML are satisfactory.
- Inventory to profit ratios of DDC and SGML are worst because both companies does not generate the profit.
- Inventory turnover ratio of both companies are not satisfactory.
- Re-order point of both companies are not satisfactory.

CHAPTER - V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Being agricultural 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 a 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 and 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 is concerned to appraise Daily Development Corporation and Sitaram Gokul Milk Private Limited 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 SGML 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 and SGML.

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, price of raw material 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 both the companies. If DDC and SGML initiate steps to an appropriate management of inventory, certainly both the companies 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 pre-sent conditions on above topics.

The following suggestions are recommended as follows:

- DDC and SGML should define their goals and objectives clearly with regards to their inputs and outputs separately i.e. quantities, time periods should be specified.
- DDC and SGML should improve their sales.
- DDC and SGML should keep clear vision about inventory.
- DDC and SGML 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 and SGML should classify their carrying cost and ordering cost separately.
- DDC and SGML should mention their data on the basis of productwise.
- The post of general manager should be professional and it should be far from political intervention.
- Dairy Development Corporation and Sitaram Gokul Milk Private Ltd. should develop effective re-order level policy.
- The company should spring out the corruption from their factory.
- The companies should improve their profitability index and various related ratios.
- The companies should research about market condition and their related competitors.
- The companies should drop out unprofitable product and invest in profitable product.
- The companies should try to utilize full capacity at off and on season and unutilize the capacity by giving on lease.

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APPENDIX - I

Calculation of Average Inventory of DDC

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

$$\text{F.Y. 2062/63} = \frac{104831580+169199577}{2} = 137015578$$

$$\text{F.Y. 2063/64} = \frac{169199578+168793862}{2} = 168996720$$

$$\text{F.Y. 2064/65} = \frac{168793862+123190816}{2} = 145992339$$

$$\text{F.Y. 2065/66} = \frac{123190816+273209494}{2} = 198200155$$

$$\text{F.Y. 2066/67} = \frac{273209494+280903178}{2} = 277056336$$

APPENDIX - II

Calculation of Average Inventory of SGML

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

$$\text{F.Y. 2062/63} = \frac{6347510+2523150}{2} = 4435330$$

$$\text{F.Y. 2063/64} = \frac{2523150+9588306}{2} = 6055728$$

$$\text{F.Y. 2064/65} = \frac{9588306+1484732}{2} = 5536518$$

$$\text{F.Y. 2065/66} = \frac{1484732+14537686}{2} = 8011209$$

$$\text{F.Y. 2066/67} = \frac{14537686+15973817}{2} = 15255751$$

APPENDIX - III

Calculation of Cost of Goods Sold of DDC

Cost of goods sold = Annual Sales - Gross Profit

F.Y. 2062/63 = 1536340564 - 164525348 = 1371815215

F.Y. 2063/64 = 1680353679 - 182969097 = 1497384582

F.Y. 2064/65 = 1800673560 - 171508734 = 1629164826

F.Y. 2065/66 = 2193309447 - 277202301 = 1916107146

F.Y. 2066/67 = 2628350971 - 316287372 = 2312063599

APPENDIX - IV

Calculation of Cost of Goods Sold of SGML

Cost of goods sold = Annual Sales - Gross Profit

F.Y. 2062/63 = 47056747 - 10884300 = 36172447

F.Y. 2063/64 = 96793500 - 10421900 = 86371600

F.Y. 2064/65 = 145290750 - 15646200 = 129644550

F.Y. 2065/66 = 206009280 - 21993200 = 184016080

F.Y. 2066/67 = 218369837 - 22652996 = 195716841

APPENDIX - V

Calculation of Usage Rate (ltr.) of DDC

Usage rate = $\frac{Annual\ requirement}{No.of\ days\ in\ a\ year}$

F.Y. 2062/63 = $\frac{64966400}{365}$ = 177990

F.Y. 2063/64 = $\frac{62307000}{365}$ = 170704

F.Y. 2064/65 = $\frac{61845000}{365}$ = 169438

F.Y. 2065/66 = $\frac{72010000}{365}$ = 197288

F.Y. 2066/67 = $\frac{74081000}{365}$ = 202961

APPENDIX - VI

Calculation of Usage Rate (ltr.) of SGML

Usage rate = $\frac{Annual\ requirement}{No.of\ days\ in\ a\ year}$

F.Y. 2062/63 = $\frac{11184000}{365}$ = 30641

F.Y. 2063/64 = $\frac{11351760}{365}$ = 31100

F.Y. 2064/65 = $\frac{11499333}{365}$ = 31505

F.Y. 2065/66 = $\frac{11660323}{365}$ = 31946

F.Y. 2066/67 = $\frac{11835228}{365}$ = 32425