

CHAPTER- I

INTRODUCTION

1.1 Background of the Study

Nepal is a landlocked country. Beside this it is the country of Himalayas and mountains. The development of economy of the country mostly depends upon the development of agro industry and partly on other industries and business. Inventory is the balance materials of trading houses. Inventory can be either raw materials or finished good ready for sale, or goods in the manufacturing process. So the inventory is recorded as an asset on a company. When the goods are purchased by the Trading houses they have to be stored until they are supplied to the market. Thus, inventory involves higher amount of investment blocking the huge amount of capital. Thus inventory management and control system should be the top priority of every management of the trading houses to reduce the cost of store. So, high inventory is not a good sign because it involves a high cost with storage of the extra inventory of the trading houses.

Modern concept of inventory management can be traced from 1915-1922 with several authors like Davis, Clark, Owen. They had develop an economic lot size equation which has minimize sum of holding cost and carrying cost where the demand is known and constant. Inventory makes a link between demand of the goods and supply of the goods. The inventory exists in manufacturing and non-manufacturing organization also. But, mostly the inventories are appearing in manufacturing and trading houses. There are four types of inventories in the manufacturing organization. First one is raw material purchased and stored for future production. Second is work-in-process refers to semi-manufactured products; they represent those products that need more work before they become finished product for sale. Third is finished goods inventories completely manufactured products and ready for sale and fourth is office and plant cleaning materials (Soap, brooms, oil, fuels, bulbs etc). But in the case of trading houses there finished goods as stock-in-trade. Inventory management involves planning of the optimal level of inventory and control of inventory cost. It involves both financial dimension as well as physical dimension and these dimensions are interrelated and can't be looked in isolation.

Inventory should be maintained in appropriate quantity so as to avoid the risk of both over and under stock situation. Level of inventory is a portion of current assets, which directly affect the outflow of cash. It may cause the scarcity as well as maximum liquidity level of cash in the organization. For this purpose, the inventory management is necessary; it is because the aim of optimum level of inventory is maintained for the smooth supply to the market and sales operation and to minimize the total cost of investment that will lead to optimal inventory investment for attainment of desired objectives. The growing number of business corporations in Nepal faces a lot of problem in inventory management. Due to lack of proper inventory policy and system, there are many organizations where large amount of capital are blocked up and very little measures have been taken to manage the inventory. The area of inventory management covers the following phases: determine the size of inventory with time schedule, procedure and lot sizes for new order, determine minimum safety stock level and co-ordinate the sales department for inventory policy such that proper store facility, arrange the receipt, disbursement and procurement of goods are in operation. Inventory management covers the development of recording the transaction, assign the responsibility for carrying out the inventory control function and provide the necessary report for reviewing overall activities of top management.

1.2 Introduction of the Organization

Salt Trading Corporation Limited (STC) was established in 1963 A.D. through the joint efforts of the HMG/Nepal and the private sector to ensure proper supply and distribution of essential consumer items throughout the country. Its first task was to make edible salt readily available. The salt trade in those days was disordered and unreliable. Later it dealt with essential commodities such as sugar, food grains and processed eatables into its distribution network. STC has equity in many pioneering and leading industries in the Kingdom such as Khadya Udyog Limited, Nepal Vegetable Ghee Udyog Limited, Butwal Spinning Mills Limited, Gorakhkali Rubber Udyog Limited, Morang Sugar Mills Limited and Gharelu Hastakala Udyog Pvt. Limited. Forty years of dedication and service to the nation has today made Salt Trading Corporation Limited a major catalyst in bringing about the desired economic changes and growth in Nepal. Main commitment of the STC is to maintaining high quality, reasonable price, easily available system in the Kingdom throughout the year

and preventing the dealings of the goods affecting public health is the characteristics and commitment of Salt Trading Corporation.

The organization began its trading activities by dealing in salt and now imports, exports, produces and supplies goods of vast diversities. Industrial products, agricultural products and industrial raw materials are the major components of its trade. With the introduction of the liberal economic policy the organization is committed to boosting exports to bring about a more favorable change in the balance of trade. The organization also conducts triangular trade dedicated to the task of promoting more exports for the benefit of exporters and importers alike.

1.3 Statement of the Problem

Inventory directly affects profitability of an organization. Managing inventory in a proper way is a great challenge to every organization. In Nepal, trading houses are given scope to build the infrastructure to stock the goods and supply consumer goods in partnership with the private as well as public sector. They are also expected to generate revenue and contribute the national economy through their operation. STC was established more than four decade ago through the joint efforts of the then Nepal Government and private sector. Its aim is to supply the essential consumer goods throughout the country. Its first task was to make edible salt readily available for all at reasonable price. It has also contributed capital to the national treasury. It also dealt with essential commodities such as sugar, food grains and processed eatables into its distribution network throughout the country. Sales determine the purchase and level of inventory. In the context of STC, sale increased unsatisfactorily and changed in inventory was more fluctuating. Excess and inadequate inventory would increase the cost and decreased the profit spontaneously. However, the inventory position of the corporation is increasing from the fiscal year.

1.4 Objectives of the Study

The major objectives of the study are:

- To analyze the condition of Inventory management and its relationship with other variables like net sales, net profit, purchases.
- To show the effects of inventory in cash flow of STC.
- To suggest proper inventory model to STC on the basis of analysis

1.5 Significance of the Study

One of the most important tasks of the Trading houses is Inventory management. If inventory of the organization is not effectively and efficiently managed the organization can't achieve their pre-determined goal. Proper management of the inventory helps to maximize the profitability. This study attempted to see the impact of inventory on profitability of STC and find out investment to be made in inventory. What is the present situation of inventory management system of STC and how the level of inventory affects the cash flow?

1.6 Limitations of the Study

This study dealt on inventory management, not on other dimensions of STC. Analysis was concentrated on some managerial, financial, accounting and planning aspects to which inventory management linkage.

The study has certain limitations which are given follows:-

- The study will be based on ten fiscal years of 2055/2056 to 2065/2066.
- The study will be more specific in inventory management and cash flow, not on the other financials area.
- The data are taken from secondary sources.

The conclusion derived from this study will not be applicable to all kinds of trading companies.

1.7 Organization of the Study

This strictly report was divided into five different chapters.

Chapter I: In the first chapter included introduction along with general background of the study, statement of the problem, objectives, significance, limitations and organization of the study.

Chapter II: is review of literature it includes the fundamental concept, various dimensions of inventory management and relation of inventory management to profit and control. This chapter was divided into two portions, first being theoretical framework and second was review of the previous studies.

Chapter III: dealt with research methodology consisting of introduction, research design, nature and sources of data, data gathering procedure, tools and techniques of data analysis.

Chapter IV: was the main portion of the study. It dealt with presentation and analysis of data collected from different sources. The collected data were analyzed to reach closer to the actual result by using various necessary financial and statistical tools and techniques.

Chapter V: provided the summary, conclusion and recommendation of overall study. At the end an extensive bibliography and annexes were also included.

CHAPTER-II

REVIEW OF LITERATURE

2.1 Inventory

Inventory is one of the most important liquid assets to many business concern, government as well as non-government sector. Inventory means all movable items that are store either ready for sale or for consumption in the course of production with a view to convert them into finished stock for sale. Thus inventory includes stock of raw material, work in process, finished goods and supplies. Inventory form a material part of working capital requires a considerable investment (Goet, et al., 2006: 255).

The term ‘inventory’ represents the stock of consumable items like raw materials, semi-finished goods, finished goods, supplies etc. held by the firm waiting either for sale or production or its utilization to achieve their respective goals. Every big or small business organization has to maintain the some level of inventory in the store. The term inventory refers to the input of the product, a firm is offering for sale and the components that make up the product, hence it includes raw material, work in progress, finished product etc.

“Inventory is composed of assets that will be sold in future in the normal course of business operation” (Khan & Jain, 2003:20.3).

Inventory serves as the cushions at the time of shortages and provides the efficient use of resources as well in the organization. Every organization requires inventory and inventory require careful plan and formulate the best policy, keeping in view the best for the organization. Depending upon the nature of the organization, inventory management technique may vary. Inventory management involves the optimal level of inventory planning and controlling which is supported by the trained employees and top management of the organization. It involves the financial dimension and physical dimension which keeps the cost of the organization and they are interrelated. They are not looked in isolation. Inventory management helps to maintain the required level of stock at the lowest cost. The required level of inventory is determined by the demand of the goods and the policy of the purchasing department of the organization. The duties of purchase department are to acquire, receive and

store the inventory safely and identify the surplus and risk relating to inventory and then taking action to reduce the risks.

Inventory management is the integral part of almost all of the organization. So, existing policy of the inventory management of the Salt Trading Corporation cannot be isolated, where as its aim is to avoid excessive and inadequate level of inventory and maintain sufficient level of inventory for the smooth sales and marketing operation. The main transaction of Salt Trading Corporation are related to consumable product, agricultural product, plant and machineries, construction product, fuel, lubricants and other product. Among the different aspect of management level, inventory management plays a significant role in management of raw materials, part of supplies, work in process and finished goods of these product, then records on the books and store safely. A system to maintain the optimum level of inventory based on number of ordering and following a recording procedure based on the predetermined inventory level. Basically the organization keeps the inventory for certain motive such as transaction motive, speculative motive and precautionary motive. Inventory is the tangible assets which are held for sale in the ordinary course of business, or in the process of production for sale.

2.2 Types of Inventory

Inventory lies in between the bridge of production and sale of product. The various forms of materials and goods held on store in the organization for future uses are known as inventory. Inventory remains in the various steps of the organization, at first for raw material, second for work in process, third for finished goods and then fourth for retail store. The various forms of inventory which appear in manufacturing as well as trading houses are raw materials, work in process, finished goods and part of supplies.

Raw Materials: The basic inputs for the organization are known as raw materials. They are converted into the finished goods through the various processing operation. These types of inventories are purchased and stored by the organization for the production purpose of finished goods. The level of raw materials inventories is influenced by anticipation production, seasonally of production, reliability of sources of supply and the efficiency of scheduling purchase and production operation. The

materials are classified in two type i.e. direct materials and indirect materials. Direct materials include all materials and parts that are an integral part of finished goods and its contribution can be directly identified into the finished goods. As well in indirect materials also includes, all materials which supported and facilitated in production process of the product.

Work- in- Process: The goods they need to work more before they are converted into the finished goods are known as work-in-progress. These categories include those materials that have been committed to the production process but have not been completed. “Goods in process include such items as components and sub assemblies that are not yet ready to be sold” (Hampton, 1990 :241).

Sometimes it is very difficult to identify whether that is finished goods or work in process or raw materials, because same materials may be finished goods for one organization or that is work in process for another organization and that is raw materials for other organization. It is depends upon the nature of an organization.

Finished Goods: The products which are ready to sale in the market and ready to use is finished goods. The inventories of such goods are completely finished products and they are ready for sale in the market. The stock of raw materials and work-in-process plays crucial role to facilitate production while stocks of finished goods are required to facilitate smooth marketing and sales operation. Thus, inventories play as bridge to link between the production and consumption of goods.

Office Supplies: The goods that play supporting role to operate day to day operation of an organization are supplies. Every organization must keep the stock of supplies for effective and efficient operation. Stocks of supplies includes, stationeries, spares parts for maintenance and operation of machinery, soap, brooms, oil, fuel and light bulbs etc. These materials are not directly used in production process but they are necessary for supporting materials for production process.

2.3 Objectives of the Inventory Management

The inventory is the most important aspects of all business organization or trading concern and manufacturing organization. So, it is necessary to manage inventory by

every organization properly, either by trading houses or by the Manufacturing houses as well. For the effective return, every organization must keep the adequate quantity of inventory. The stock of inadequate and excessive inventory may cause the increase in cost of the organization.

For example if the excessive stock of inventory is piled the fund of the organization is consumed, which indicate that the capital can't be used for another purpose thus the organization may lose another opportunity. The carrying cost such as the cost of insurance, storage, handling, recording and inspection also increases the proportion of volume of inventory increase. These costs ultimately affect the profitability for the organization. On the other hand inadequate level of stock of the inventory is harmful for the organization. Inadequate level of inventory means under investment or scarce supply of goods at the time of demand. As the result, the consumer may shift to competitors and organization loses their permanent customers. Whereas, if the organization keeps excessive quantity of inventory then liquid assets will be blocked and the carrying cost will be high. Therefore, the organization must keep optimal level of inventory. To maintain the proper level of stock or optimal level of inventory the organization used different types of tools and techniques. But it is difficult task to the top management. Optimal level of inventory lies in between the two danger points i.e. excessive and inadequate.

The optimal level of inventory management should be control over the investment in inventory and keep in at optimal level and ensure regular supply at the time of demand. Optimal level of inventory maintains the sufficient level of stock at the time of shortages and price changes. It also minimizes the carrying cost and ordering cost and reduces the lead time. Optimal level of inventory maintains a large size of inventory for efficient and smooth production and sales operation and maintains a minimum investment in inventories to maximize profitability. The main objectives of the inventory management are to determine and maintain the optimal level of inventory of an organization. The optimal level of inventory always lies in between the two danger points i.e. excessive and inadequate. Organization should always try to avoid the under investment and over investment in the inventory. Due to over investment, unnecessary amount of capital is tie-up and those capitals can't be invested in another purpose. So, the organization may lose another opportunity. This

keeps carrying cost as well as risk of liquidity. The excessive cost directly impacts the profitability of the organization or in other word decreases the profitability.

It is not easy to supply the inventory to the customer without demand. So over investment on the inventory should be cut down by the organization to maintain the optimal level. Whereas under investment on the inventory is also not good for the business organization. If the demand of the goods can't meet then the customer may shift to competitors and goodwill of the organization will be lost. Therefore optimum level of inventory is always maintained on the basis of trade off between the cost and benefit. Thus the objective of the inventory management of an organization is to maintain the optimum level of inventory which is neither excessive nor inadequate. The objectives of the inventory management are to supply all kinds of inventory regularly in such a manner that there is no shortage of materials and the production has got to be stopped. It also helps to collect the inventory at a fair price and reduce the wastage at the time of store in the warehouses. It reduces risk of spoilage and obsolescence of inventory by using the LIFO and FIFO and makes a proper supply of materials so that profit will be maximized.

2.4 Need and Importance of Inventory Management

Inventory, by nature is circulating assets and exhausts frequently because of consumption or sale. Inventories of any organization are pivotal. If the organization does not pay attention on the management of inventories, the organization's efficiency and profitability are severely affected. So, some important roles played by inventory management of the organization are as follows:

- Inventory helps for the smooth and efficient operation of business organization.
- Inventory facilitates service to customer immediately or at the time of short period.
- If there is absence of inventory, the organization may have to pay high prices because of piece-wise purchasing of inventory. Inventory is maintained by the organization then price discount opportunities can be obtained on bulk purchasing.
- Inventory also acts as buffer stock when raw materials are received late which may force to reject many orders.

- Inventory also reduces product cost because there is an additional advantage of batch production and smoothen productions runs.
- Inventory helps to maintain the economy by taking advantages of the price fluctuations.

2.5 Costs Associated with Inventory

Inventory Management and control is an important approach in profit-oriented enterprises. Inventory Management is merely a tool of management. It is not an end of management or substitute for management. It facilitates the managers to accomplish managerial goals in a systematic way. As mentioned earlier, both excess and inadequate purchases are costly to the firm. It is because if less quantity is ordered, number of order increases and consequently ordering cost increases. On other hand, if more quantity is ordered, the carrying cost increases. The first step of inventory management is to identify all those cost which are associated with purchasing and maintaining.

Carrying/Holding Cost: The costs which are related to maintaining inventory in a company's warehouse is carrying cost. That cost includes things like rent, utilities, insurance, taxes, employee costs, maintenance cost, security cost, other overhead and the opportunity cost of having capital tied up in. These cost increases the cost of goods and the product's price is comparatively high in the market. Carrying cost is calculated by using the following formula:

Carrying Cost (cc) = Average Inventory * Carrying Cost per Unit

Symbolically,

$$C_c = \frac{Q}{2} c$$

Where, Q = quantity of order size

C = Carrying cost per unit

For example, if an organization sales 'S' units and number of order is 'N' times per year then, $Q = \frac{S}{N}$ unit will be purchased with each year. If the inventory is used to evenly over the year and numbers of safety stock are carried then, the average inventory (A) would be: Average inventory (A) = Unit per order /2=(S/N)/2=Q/2

Carrying cost of the inventory is also further explained as follows:

Opportunity Cost: This consists of cost of capital i.e. interest on capital used to finance for acquisition of inventory. If the capital of the organization is locked up in inventory then organization may lose best opportunity to invest for another purpose.

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: Those costs are associated which maintains the inventory at the time of store. These cost includes the expenditure made for the inventory staff, expenditure made for the various facilities like cost of heating, cost of floor space, cost of shelves, cost of lighting, cost of bin and container, cost of goods handling material, and other provision for safe and proper storage items. These costs are generally depended on the quantity of goods.

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.

Cost of Depreciation: Investment on the machinery and equipment decrease over time. Thus the organization must make provision of depreciation of the equipment used is storing of goods.

Ordering Cost: The ordering costs are based on the number of the order. The most obvious cost are those involved in the acquisition of the inventory, including the expenses of such clerical operations as filling, reviewing the requisition, processing the purchase orders, checking the incoming vouchers and paying the bills. The most important features of these costs are 'one time costs' and therefore they may be treated as fixed cost. Moreover, ordering cost which is also called procurement costs tend to

have both fixed and variable characteristics. They may vary considerable for different commodities. Larger the quantity, the ordering cost per unit will be because the entire expenses of the order are spread over more items. Firm's that purchase materials in large quantities are usually able to obtain a reduction in the unit price of the items. These quantities discounts presumably reflect cost reduction making lower handling, shipping, clerical or manufacturing costs. Generally, the carrying cost are variable and they are depended on the average size of inventory but in the case of ordering cost, it is usually fixed and does not change with size of the inventory. Ordering cost or procurement cost or acquisition cost is calculating by using the following formulae:

$$\text{Ordering Cost} = \frac{\text{Annual Re quirement}}{\text{Quantity order Size}} \times \text{Ordering Cost per order}$$

Stock out Cost: If the goods go out of the stock before the demand for the product is terminated or the stock of raw material go out of stock before the production process is called stock out cost. Alternatively, if the goods are not available at the time of receiving orders, it losses the possible profit as well as goodwill from customers. Stock out makes production process disruption. Some firms feel so strongly about avoiding this type of cost that they offer the customer substitutes of greater value than the item from a competition themselves and serves the customers at a loss. Stock out cost is calculated by using the following formula:

$$\text{Stock out cost} = \text{Inventory Cycles per year} \times \text{Stock out units}$$

- Probability of a possible stock out
- Units Stock out Cost.

Where,

$$\text{Inventory Cycles Per Year} = \frac{\text{Annual Uses}}{\text{Quantity Order Size}}$$

2.6 Technical Formulation

The most of the common problem appeared in every business firm is how to establish and execute inventory policies. How much they should buy at a time? How low should they let inventory to fall before they replenish it? From whom they should buy and how should they ensure getting the lowest price available. It should always consider such

kind of questions of every business firm inventory management which decreases cost of the firm to increase the profit.

2.7 Inventory Control System

Basically, there are two types of approaches for inventory control system i.e. unit control system and value control system. In unit control system, it involves the control over inventories in terms of unit on the other hand value control system entails the control over inventories in terms of value. The inventory control is a system it ensures the provision of the required quantity of inventories at the time of requirement with the minimum amount of investment. In the words of John L. Burbidge "Inventory control is concerned with the control of the quantities and or monetary values of these items at predetermined level or within safe limits." Thus, the function of inventory control system is to obtain the maximum inventory turnover with the sufficient stock to meet all requirements of the firm. These two approaches seem to be conflicting. Unit control system of inventories ensures stocks for continuity of operations and sales as well. It will increase the cost of handling the inventory and investment. Thus, an optimum control is achieved when the required materials can be obtained at a minimum cost through proper planning, formulation of policies and procedure in order to maintain the inventory level at a desired point. The quantity of inventory to be kept is decided after taking into consideration the availability of finance, the quantity discount allowed, the cost of shortage and store accommodation, order placing and receiving cost, risk of loss due to falling prices, deterioration, evaporation, obsolescence, theft, economic orders, quantity and obtaining time or delivery time etc. Therefore, it is necessary that proper co-ordination must be there in the activities and policies of purchase, production and sales department to affect the better inventory control.

2.8 Techniques of Inventory Control

For effective and efficient control of inventory, the following types of techniques are employed by the firm:

- a. Fixation of Stock Level:** The firm carrying excessive or inadequate inventories is dangerous. If the inventory is too little in the firm, the firm faces stock out involving high ordering cost and if the inventory level is too high in the firm, the

firm faces unnecessary tie up of capital. Therefore, an efficient inventory management requires maintaining an 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.

b. Minimum Stock Level: This represents the minimum quantity of the materials which must be maintained in hand at all times. The quantity is fixed so that production may be held up due to shortage of the material. In fixing this level, the following are taken into consideration:

- Lead time i.e. time lag between indenting and receiving of the material. It is the time requires replenishing the supply.
- Rate of consumption of the material during the lead time.
- Nature of the material. Minimum level is not required in case of special materials which is required against customer's specific order.

The minimum stock level is determined by the using following formula:

Minimum Stock Level = Reorder Level - (Normal Consumption × Normal Lead Time)

c. Maximum Stock Level: It represents the maximum quantity of an item of materials which can be held in stock at any time. Stock should not exceed this quantity. The quantity is fixed so that there may be no overstocking. Overstocking should be avoided as far as possible. It is an upper limit beyond which the quantity of any item is not normally allowed to rise. Holding of stock more than limit will increase material and storage cost, tied up working capital unnecessary. The maximum stock level is affected by availability of financial resources, store space, lead-time, and nature of material, reasonability of material and government control. The maximum level is fixed by considering the following points.

- Re-order level.
- Minimum consumption rate during lead time.
- Minimum lead time or re-order period and
- Re-order quantity.

Maximum stock level is determined by the following formulae:

Maximum stock level = Re-order level + Reorder quantity
- (Minimum consumption × Minimum recorder period).

d) **Average Stock Level:** An average stock level indicates the average stock held by the firm. It is calculated by the following formulae:

$$\text{Average Stock Level} = \text{Minimum level} + \frac{1}{2} (\text{Re order Quantity}).$$

e) **Re-order Level:** When the quantity of materials reaches in a certain figure then the fresh order is sent to get materials again. It is the point at which if stock of a particular material in store approaches, the storekeeper should initiate the purchase requisition for fresh supplies of those materials. This level is fixed somewhere between the maximum and minimum levels in such a way that the difference of quantity of the material between the re-ordering level and the minimum level will be sufficient to meet the requirement of production up to the time the fresh supply of the materials is received. The re-order level is calculated by using the following formulae:

Re-Order level = Maximum usage × Maximum lead time.

Re-Order level = Maximum level × Consumption during lead time.

Re-Order level = Safety stock + (Lead time × Daily Consumption).

Safety Stock: For practical purpose, minimum stock level is safety stock and it is calculated by using following formulae:

Danger Level: It is that level beyond which materials should not fall in any case. If the danger level arises then immediate steps should be taken to replenish the stock even if the more cost is incurred in arranging the materials. If materials are not arranged immediately there is possibility of stoppage of worker. This means a level at which normal issues of the materials are stopped and issues are made only under specific instruction. It is determined by the using following formulae:

Danger level = Average Consumption * Maximum Reorder Period for emergency purchase.

2.9 Economic Order Quantity (EOQ)

2.9.1 Introduction

Another important inventory control technique is economic order quantity. The quantity of material to be ordered at one time is known as economic ordering quantity. This technique is widely used these days in many countries irrespectively of under developed or developing in nature. A decision about how much to order has great significance in inventory management. The quantity to be purchased should neither be small nor big because of buying and carrying materials are very high. The economic order quantity is the size of the lot to be purchased which is economically valuable. This is the quantity of materials which can be purchased at minimum total cost.

EOQ is important concept in the purchase of raw material and in the storage of finished goods and transit inventories. To determine the optimal order quantity for a particular item of inventory, given its forecasted usage ordering cost and carrying cost. Ordering can mean either the purchase of the item or its production (Van Horne, 2003:377).

Generally, economic order quantity is the point at which inventory carrying cost are equal to ordering cost. Ordering or set up cost and holding or carrying cost constitute the total cost of inventory excluding materials cost. To determining EOQ, it is assumed that cost of managing inventory is made up solely of two parts i.e. ordering cost and carrying cost. Re-order quantity is such that when it is added to the minimum stock, it should not exceed the maximum stock. The following are the prerequisites of EOQ:

- Holding cost per unit per year (period).
- Ordering cost per order.
- Annual requirement or quantity required per period.
- Cost per unit.

Assumptions of the EOQ model are:

- The forecast/demand for a given period is known
- The usage/demand is even throughout the period

- Inventory orders can be replenished immediately, no delay in placing and receiving orders
- There are two cost associated with inventories i.e. ordering cost and carrying cost
- The cost per order is constant regardless of the size of order
- The cost of carrying is a fixed percentage of the average value of inventory.

2.9.2 Determine of Economic Order Quantity

a. Mathematical or Formulae Method: Mathematical models are also available to calculate EOQ. There are numerous model exist as the field of inventory management and can be studied in college programs such as production and operation research management. Even many mathematical models are exists, the main objectives of their model is to reduce and minimize the inventory costs. Without getting into highly refined models, the firm cannot get a good decision. We can illustrate the concept of EOQ with a basic mathematical model as follows. The order for the material to be purchased should be large enough to earn more trade discount and to take advantage of bulk transport, but at the same time it should not be too large to incur too heavy a payment on account of interest, storage and insurance costs. If the price to be paid is stable, the quantity to be ordered each time can be ascertained by the following formulae:

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

Where,

EOQ = Economic order quantity

A = Annual requirement of product

O = Ordering cost per order

C = Carrying cost per unit per year

If the firm orders EOQ units each time, it will minimize the total inventory costs. To sum up, EOQ is determined keeping in view the ordering costs and carrying costs.

b. Trial and Error Approach: This is another type of approach to calculate the EOQ. A firm has a different type of purchase policy of its inventory. It can purchase its entire requirement on a single lot. Alternatively, the firm can purchase its inventory in small lot periodically like weekly, monthly, bimonthly, half yearly and so on. It means more than one time the firm can place an order to purchase inventory. The smaller the lot sizes the lower average inventory and vice versa. How inventory holding are associated with high ordering cost and low carrying cost. This approach to determine of EOQ and uses different permutation and combination of total cost of inventory purchases so as to find out the total cost. According to this approach the carrying and ordering cost for a different sizes of order to purchase inventories computed and the order size with the lowest total cost (ordering + carrying) of inventory is the economic order quantity. A tabular arrangement of data relating to items of materials may allow.

$$\text{No.of orders} = \frac{\text{Annual requiremen t}}{\text{EOQ}}$$

$$\text{OrderSize} = \frac{\text{Annual requiremen t}}{\text{no. of orders}}$$

$$\text{Averagge Inventory} = \frac{\text{Ordersize}}{2}$$

$$\text{Ordering Cost} = \text{No.of orders} * \text{ordering cost per order}$$

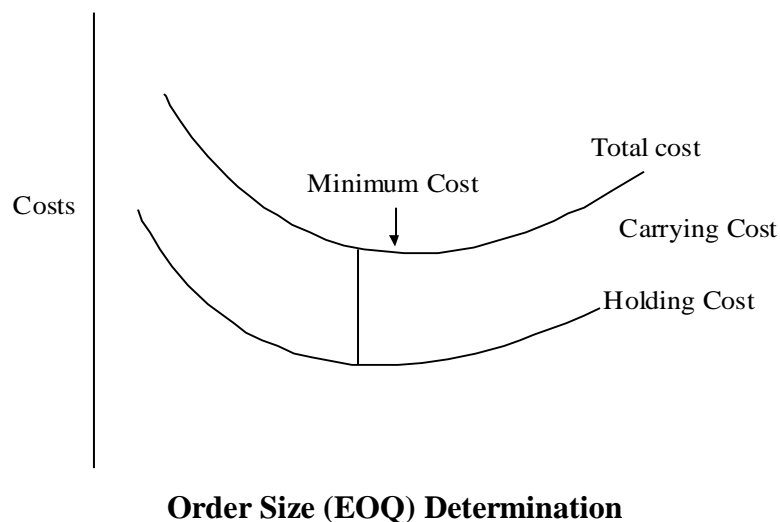
$$\text{Carrying Cost Average Inventory} * \text{Carrying cost per unit per year}$$

$$\text{Total Cost} = \text{Ordering cost} + \text{Carrying cost.z}$$

c. The Graphic Approach: By using graphic, economic order quantity can also find out. It can be seen given below picture very well and it also illustrates the EOQ function. The economic ordering quantity can also found out graphically. Figure 2.1 given below illustrates the EOQ function. In the figure, carrying, ordering and total costs are plotted on vertical and horizontal axis is used to represent the order size. From this figure, carrying, ordering and total costs are plotted on vertical and horizontal axis is used to represent the order size respectively. Total carrying cost increases as the order size increases because on average, a larger inventory will be maintained and ordering cost decline and vice versa. The behavior of total cost line is noticeable since it is a sum of two types of costs which have differently with order size. The total cost decline in the first instance but they start rising when the decrease in average ordering cost is more than offset by the increase in carrying costs. The

EOQ occurs at the point 'Q' i.e. at minimum total cost. Thus the firms operating profit is maximized at point 'Q'. It should be noticed that the total cost of inventory are fairly insensitive to moderate changes in order size. It may, therefore, be appropriate to say that there is an economic order range, not a point. To determine this range, the order size may be change by some percentage and impact on total cost may be studied. If the total costs do not change very significantly, the firm can change EOQ within the range without any loss (Pandey, 1999:888)

Figure: 2.1
Graphic Approach



2.10 System of Ordering (When to Order)

The problem of how much to be ordered is solved by determining the economic order quantity. The second problem is when to be ordered? It is related to determine the reorder point. It is also known as order point or optimal re-order point or re-ordering level or ordering level. It is the point at which if stock of material falls down then the store keeper initiates the purchase requisition for fresh supply of materials. This level is fixed somewhere between the maximum and minimum level in such a way that the difference between re-ordering level and maximum level will be sufficient to meet the requirement of production up to time the fresh supply of the material is received. As long as delivery is not instantaneous, an order must be placed so that inventory is not depleted till a new shipment arrives. This required inventory level is termed 'transit stock' and represent the amount of inventory that would be used or sold between the

time an order is placed and time delivered. Transit stock is determined by using the following formulae:

$$\text{Transit Stock} = \text{Stock Used per Time Period} \times \text{Transit time.}$$

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, the inventory reaches the re-order point and the new goods will arrive before the firm runs out of goods to sell (Hampton, 1993:245).

Thus, basically these items of information are needed as inputs to design the reorder point. The safety stock involves two types of i.e. stock out cost and carrying cost. Safety stock is necessary under the condition of uncertainty. In such a situation the demand and supply of goods may fluctuate day by day. If the actual usage or sales increase and delivery from 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. The following figure represent over the inventory levels overtime when transit and safety stock are taken into consideration.

2.11 Always Better Control (ABC) Analysis

Manufacturing organizations find it useful to divide materials into three categories for the purpose of exercising selective control on materials. An analysis of the materials costs will show that a smaller percentage of items of materials in the stores may contribute to a large percentage of the value of consumption and, on the other hand, large percentage of item may represent a smaller percentage of the value of item consumed. Between these two extremes will fall those the percentage number of which is more or less equal to their value of consumption. Item falling in the first category are taken as 'A' item, of the second category as 'B' items and item of the third category are treated as 'C' items. Such an analysis of materials is known as ABC analysis. Thus, under this technique of stock control, materials are listed in 'A', 'B' and 'C' categories in descending order based on money value of consumption. According to P.V. Kulkarni "Inventory control is a science based art of ensuring that enough

inventory or stock is held by an organization to meet both its internal and external demand commitments".

Usually, every business firm however big or small has to maintain several types of inventories. It is not desirable to keep the same degree of control on all the items. The Firm should pay maximum attention to those items whose value is the highest. The firm should therefore classify inventories to identify which items should receive the most effort in controlling. The firm should be selective in its approach to control investment in various types of inventories. This analytical approach is called the ABC analysis and tends to measure the significance of each item of inventories in terms of its value. In other words ABC analysis is the application of stock holding of Pareto's law which shows that the majority of inventory value will be represented by relating few items.

The ABC analysis concentrates on important items and is also known as Control by Importance and Exception (CIE). As the items are classified in the importance of their relative value, this approach is also known as proportional value analysis. The term ABC analysis is known as Always Better Control. Under this technique of material control, materials are listed in A, B, and C group in descending order based on money value of consumption as follows:

High price materials..... A

Medium price materialsB

Low price materialsC

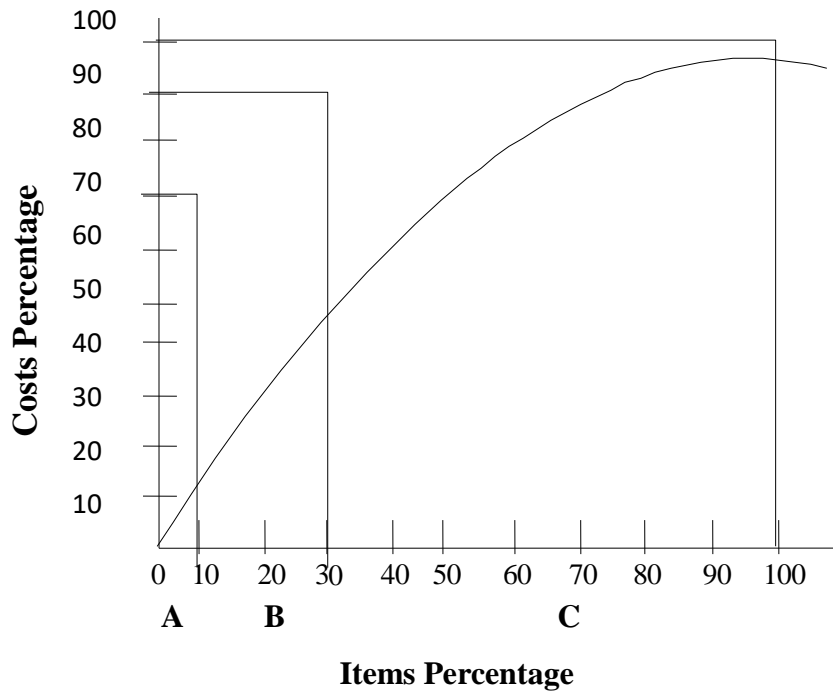
It has been shown the following classification as being representation in many industries:

Group	Items of %	Costs of 5
A	10%	70%
B	20%	20%
C	70%	10%

It has also been showing by graphic presentation which is given below:

Figure: 2.2

Presentation of ABC Analysis



Presentation of ABC Analysis

The above graphic presentation indicates that item A forms a minimum proportion i.e. 10% of total units of all items but represents the highest value i.e. 70%. On the other hand, item C represent 70% of the total items and only 10% of the total value. Similarly, item B occupies the middle place. It represents 20% of the total items and 20% of the total value. Thus, a highest control should be exercised on items A in order to maximize profitability on its investment. In case of items C simple control will be sufficient. Items B fall in between these two categories and require reasonable attention of management. The information necessary to pursue a selective ABC inventory policy is easy to obtain. High rupee value is treated first and most carefully. An example of the treatment that would be given the three divisions as follows:

Items A: Economic order quantities are carefully calculated for each item. The usage rate and procurement cost are reviewed continually with each other. Tight inventory control is maintained.

Items B: Economic order quantities are developed and reviewed periodically. Normal inventory control is exercised.

Items C: Specific order quantity calculation is not made. Rough table are used or quantities that will sufficient for long periods for e.g. a year or more are ordered. Inventories are checked physically once every six months or every year to determine if new order should be placed.

2.12 Just In Time (JIT) Inventory System

This is a new model for inventory management system so most of the modern business enterprises are nowadays applying for new strategy. It is just in time inventory management system. In this system the ordered materials and parts are arrive only at the time of supply to the customers. This system prime role is to save the cost of the corporation. Products are not produced or inventories are not ordered unless need arises under the system. Thus, inventories are not ordered or maintain relatively a low inventory level. The main objective of this system is to avoid or reduce the level of inventory of the corporations. The JIT system reduces the sizable amount spend on inventory and other related factors.

The special features of JIT system are as under:

- A smooth uniform production
- A full method of coordinating in the production process
- High quality of materials and finished goods
- Purchase of materials and parts in small lot size
- Effective preventive maintenance of equipment
- Skilled workers and flexibility in facilities

2.13 Inventory System

Basically, there are just two types of inventory system. They have a numerous variations. One is termed as the fixed order size system, a fixed quantity of goods is ordered whenever inventory deeps below a predetermined level. The time between orders varies with the demand rates, but the size of the order remains constant. In practice, fixed order size system is generally called perpetual inventory system, since up to date records of the inventory's status are kept. Each time, items are withdrawn from or added to reflect the new status. These posting operations may be done manually on inventory records cards or as in increasingly the case through remote input terminals to a computer file. In general, only class A and B inventory are

maintained in this fashion. The two bin system and application of the fixed order size approach is one of the oldest inventory systems in use. For e.g. let us imagine that all materials or given types is placed in two large bins. When the first is empty, the second is put into use and a replacement order for a fixed amount is dispatched immediately when the new materials arrive, it is placed in the empty bin and the process continues. In the second basic type of the fixed order interval system, periodic reviews of inventories are made at which time they are restored to some predetermined optimum level. No running records of daily inventory activities are kept. The status of the inventory is known only at the time of the review, which may take place weekly, monthly, quarterly or yearly.

Because of this, inventory systems of this are commonly called 'periodic inventory system' such system are generally used for class B or C inventories or instances where the large number of items precludes the updating of each inventory transaction.

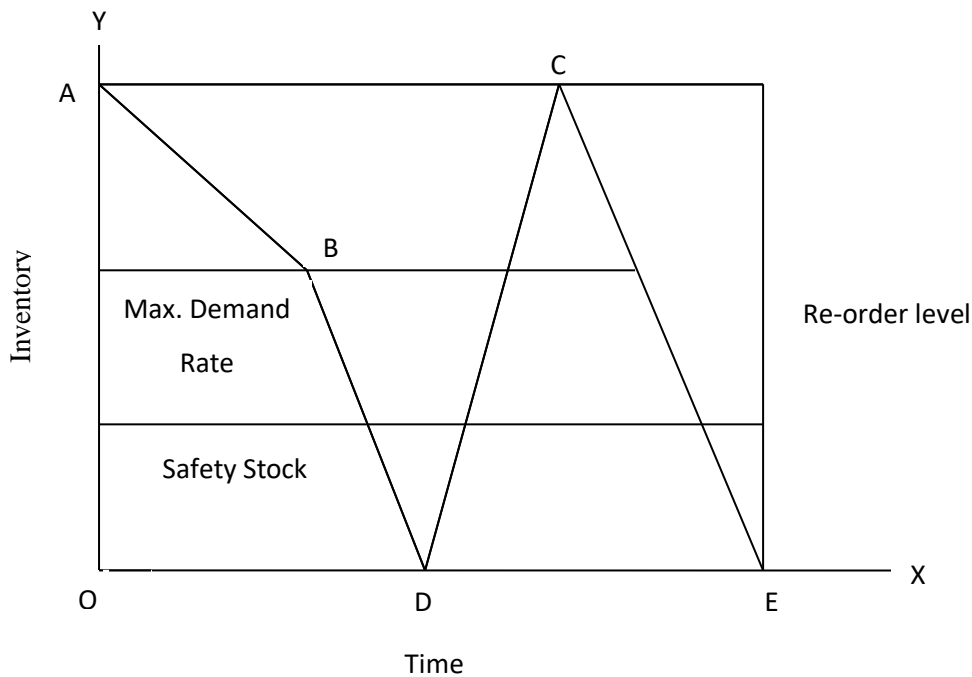
- Perpetual Inventory System: System that keeps track of removals from inventory continuously, thus monitoring current levels of each item.
- Two Bin Systems: Two containers of inventory, reorder when the first is empty.
- Universal Bar Code: Bar code printed on a label that has information about the item to which it is attached.

2.14 Safety Stock

The amount of safety stock required in perpetual inventory system is determined solely by the amount of stock needed to guard against a stock out during delivery time of the amount of safety stock added to normal inventory in hand is greater than the maximum amount sold during the delivery time, then the chances are excellent that no shortage will result. This is illustrated in as follows figure:

Figure: 2.3

Relationship of Fixed Order Size and Safety Stock



In the above figure 2.3, assume that the demand proceeded at an expected pace from point A to point B an order was entered for the fixed order quantity. Then in the interval from B to C and from C to D, demand rise to maximum levels. Since, the safety stock plus the inventory that remained when the order was placed were equal to maximum demand, no stock out occurred. Instead, all that happened was that orders were placed in an increasing rate.

2.15. Perpetual Inventory System

The institute of cost and Management Accountant, London, defines the perpetual inventory as “a system of records maintained by the controlling department, which reflects the physical movement of stocks and their current balance”. The perpetual inventory system is maintaining of regular stock records is commonly known. In fact, perpetual inventory system implies a complete and up dated of each item of stores both on records and physical goods. The institute of cost and management accountant of England and Wales define perpetual inventory system as ' A system of record maintain by the controlling department, which reflect the physical movement of stock and their current balance'. Thus, this is a system of ascertaining current balance after recording every received and issue of materials and stock records. The continuous

stock taking is an essential feature of the perpetual inventory system. Inventory records maintained under LIFO and FIFO basis are the best example of perpetual inventory system. The perpetual inventory system means maintenance of such records (stock control cards, bin cards and store ledger) as it will reflect the receipts, issue and balance of all items in stock at all times.

2.16. Comparison of the Periodic and Perpetual Inventory

System both systems are designed to control inventories in the face of uncertainty. Whether one or the other is employed in a particular instance depend upon the nature of the items stocked, the type of controls needed and the nature of the source of supply. The fixed order size system is well suited for managing inventories of low value items since, it permits looser 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. They can be controlled by a simple two bin process without a large investment in record keeping, perpetual inventories also lend themselves to the stocking of high cost items that can be purchased at any time. Their items are controlled by continuous posting to inventory records. In this way of 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 costs are high, yet, with the use of computers, such costs can be reduced. The broader application of perpetual inventory records made feasible by computers will in turn result in closer of inventories. The fixed 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 supplier's demand for periodic orders so that they can plan their production runs economically. In order to use the fixed order interval system, however higher safety stocks must be maintained

2.17. Introduction of Cash Flow and Cash Flow Statement

Cash is the lifeblood of business enterprises. Without cash no activities can take place. So a business must have an adequate amount of cash to operate. As such the decision makers must pay close attention to the firm's cash position and events and

transactions that affect cash position to change. The analysis of events and transactions that affect the cash position of the company is termed as cash flow analysis.

Cash flows analysis is done through statement of cash flow. It is a statement which shows the inflows and outflows of cash and cash equivalents during the year. A cash flows statement is a statement of company's ability to generate cash from various activities such as operating, investing, and financing and their need of cash. A cash flow statement is defined as “a statement of company's ability to generate cash from various activities and their need of cash.” Every enterprise should prepare a cash flow statement and should present it as integral part of its financial statements for each period for which financial statements are presented.

2.18. Importance of Cash Flow and Cash Flow Statement

In recent year the statement of cash flows has come to be viewed as a part of full set of financial statement. Cash flow statement provides relevant information about the cash receipts and cash payments of an enterprise during a period. Information about enterprises cash flow is useful in assessing its liquidity, financial flexibility, profitability and risk. Information about cash flow is useful in many ways. It can also influence the decision makers in many ways. Decision makers may be investors’ creditors and management.

Investors have to decide whether to invest or not in a given company. Investors will value higher to the company whose regular operating cash flow is more than uses. Creditors have to decides whether to provide credit facility or not, to the given company. Information about cash flow can help creditors decide whether a company will have enough cash to pay the debts as they mature. Management has to evaluate whether the company has ability to meet unexpected obligations and ability to take advantage of new business opportunities that may arise. And for this, the management has to use cash flow analysis.

A cash flow statement, when used in conjunction with the rest of the financial statements, provides information that enables users to evaluate the changes in net assets of enterprises, its financial structure (including its liquidity and solvency) and

its ability to affect the amounts and timing of cash flows in order to adapt to changing circumstances and opportunities. Cash flow information is assessing ability of the enterprises to generate cash and cash equivalents and enables users to develop models to assess and compare the present value of the future cash flows of different enterprises. It also enhances the comparability of the reporting of operating performance by different enterprises because it eliminates the effects of using different accounting treatments for the same transactions and events. Historical cash flow information is often used as an indicator of the amount, timing and certainty of future cash flows. It is also useful in checking the accuracy of past assessments of future cash flows and in examining the relationship between profitability and net cash flow and the impact of changing prices.

2.19. Objectives of Cash Flow Statement

The cash flows statement of enterprises is useful in providing information to the users of financial statements about the ability of the enterprises to generate cash and cash equivalents and the needs of the enterprises to utilize those cash flows. Information about the cash flows of an enterprise is useful in providing users of financial statements with a basis to assess the ability of the enterprise to generate cash and cash equivalents and the needs of the enterprises to utilize those cash flows. The economic decisions that are taken by users require an evaluation of the ability of an enterprise to generate cash and cash equivalents and the timing and certainty of their generation. The objectives of International Accounting Standard is to require the provision of information about the historical changes in cash and cash equivalents of an enterprise by means of a cash flow statement which classifies cash flows during the period from operating, investing and financing activities. The main objectives of cash flow statement are mentioned below:

- Cash flow statement will help the financial manager to explain the situation of sufficient cash balance in hand despite the business incurred loss or short of cash balance even if the business is making huge amount of profit.
- Comparison between cash budget and cash flow statement may prove to be useful for the management for preparing cash budget for the period to come.

- With the help of cash flow statement, the management can find out the causes of changes in the cash position on two dates.
- Evaluation of financial policies can be done with help of cash flows statement.
- As the cash flow statement helps the management to know and predict its cash position, it can plan its policy and make decisions regarding the redemption of debentures, purchase of fixed assets and so on (Munankarmi, 2003; 13.02).

2.20 Review of Previous Research Works:

Literature review is basically a “stock taking” of available literature in one's field of research. The literature survey thus provides the students with the knowledge of the status of their field of research. The purpose of literature review is, thus, to find out what research studies have been conducted in one's chosen field of study, and what remains to be done. The studies have emphasized only the review of text books but attempt is only made to review the related studies conducted by different expert, scholars in related with inventory management. There are limited studies undertaken on 'Inventory management' in Nepal were reviewed in the course of study. A study relating to Nepal Transport Corporation with various aspects has been made by CEDA, one of the major findings was that though inventory management of this factor is rather simple but due to management of stocking of spare parts it hampered for the smooth operation of the enterprises.

Inventory management experts claims that the Inventory management in Nepal is probably the weakness aspect of management. The tools and techniques for controlling inventory have been apply in Nepalese enterprises for controlling their physical as well as financial dimensions The efficient management of inventory, there are the needs of tackling human element the third world country like Nepal. They have suggestion to orienting the attitude of the staff's towards materials cost because lack of knowledge and carelessness, which were the responsible of this management of inventory.

Govinda Prashad Dhakal (2006), has conducted a Research topic of “**A study on Inventory Management and Control of Royal Drug Ltd**” submitted to faculty of management T.U.

His Main Objective:

- To find out what types of tools and techniques has been applied by the RDL to manage the inventory.
- To identify the problems which were underlying the inventory management and control system and the techniques employed by it.

His Major Findings:

- The RDL had established a separate unit for management of inventory although the separate unit unable to manage the inventory.
- The economic order quantity model has not applied so that its chemical materials are overstocking day by day and its safety stock is estimated roughly.

His Major Recommendations:

- The RDL was able to produce good quality medicine because of its quality control system.
- There were inadequate level of finished goods, there were no attention for packaging materials managed efficiently.
- The RDL should identify its goals and objectives clearly.
- The company should follow the quantitative models and techniques such as EOQ model and ABC analysis model so that the total cost is reduced.

Puspa Prashad Guragain (2006), has conducted a research topic on “**Inventory Management (A Comparative Study of DDC and SGML)**” submitted to faculty of management T.U.

His Main Objectives:

- To examine present inventory management and control system of DDC and SGML and their impact towards the companies' profitability.
- To examine the inventory management system as practiced by the both companies' and to suggest some models for effectiveness of the companies'.

His Major Findings :

- The DDC and SGML had ineffective and inefficient inventory management system. The huge amount of money was blocked in the inventory.
- Both the companies did not followed economic order quantity model for purchasing purpose
- Both companies has not categorized its inventory for the purpose of control and paid equal attention for all type of inventory held in the time of store. Cost associated with ordering and holding inventory was not recorded separately which were recorded in total as a whole.
- There were no consistencies using principle of inventory management in closing stock of both companies. They made re-order after stock was finished.

His Major Recommendations:

- Both the company should manage effective and efficient inventory management system.
- Both the company should follow EOQ model for purchasing purpose.
- Both the company should maintain the consistencies using the principle inventory management closing store.

Surphuddin Miyan (2006), has conducted a research topic on '**Inventory management: A case study of Gorkhapatra Corporation**', submitted to faculty of management T.U.

His Main Objectives :

- To collect the information underlying constraints in existing management and control system of inventory and their impact towards the corporations' profitability.
- To examined the existing inventory management system applied by corporation.
- To analyze the relationship between inventory/material cost and profit.

His Major Findings:

- The tools and techniques of inventory control system are not effectively utilized
- The goals and objective are not clearly defined.
- The corporation does not consider the proper storing system to improve the efficiency.
- The corporation does not maintain a colour machine in modern age.

His Major Recommendations:

- The corporation should define its goals and objectives clearly.
- The corporation should follow all the scientific tools and techniques i.e. purchasing order, EOQ, safety stock, re-order point, ABC analysis etc.
- The company consideration for proper storing was essential to improve.
- The corporation should procure a color machine for this competitive world.

Shiva Kumar Mainali (2008), has conducted a research topic on “**Inventory Management and its Impact on Working Capital Management of Unilever Nepal Limited**”, submitted to faculty of management T.U.

His Main Objectives:

- To identify the inventory management system of Unilever Nepal Ltd.
- To identify the inventory position of UNL
- To know the relationship between sales and inventories with identifying their trend.
- To assess the inventories and their consequences on profitability of UNL

His Major Findings:

- To examine the inventory management system practiced by the company was unscientific.
- The carrying cost, ordering cost, order size safety stock maintained was unsatisfactory and unscientific.
- UNL did not pay much attention to the lead-time.

His Major Recommendations:

- The company should use the scientific technique to manage inventory management system.
- The cost associated inventory is unscientific so it should be managed properly.
- UNL should pay attention to lead time.

Tara Nath Gaire (2009), has conducted a research topic on “**Inventory Management of Bottlers Nepal Limited**”, submitted of the faculty of management of T.U.

His Main Objectives:

- To examine the inventory policy and inventory management by BNL.
- To assess the inventory management system of BNL is scientific or effective .

His Major Findings:

- Inventory management system of BNL are neither scientific nor effective.
- The inventory purchase and sales maintain by the company are fluctuating severally

His Major Recommendations:

- The company should manage inventory management system properly.
- The company should select scientific and effective tools and technique.
- The company should manage inventory under sales and purchase

D. Shrestha (2009), has conducted a research topic on "**Inventory Management and its Effects on cash flow of salt Trading Corporation**" submitted to faculty of management T.U.

His Main 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 with STC.

His Major Findings:

- Corporation applied ABC and EOP technique of inventory management. However; it is applied ineffectively and unsystematically.
- The company has not adopting appropriate inventory policy.
- Liquid ratio is not satisfactory during study period.

His Major Recommendations:

- To avoid excess inventory on inventory the co-operation and co- ordination among purchase, store, marketing and sales department.
- The company should manage the inventory according to the sales.
- The company should apply scientific and effective management system.

Dillp Kumar Yadav (2010), has conducted a research topic on "**Inventory Management of National Biscuits and Confectionary Limited NEBICO**". Submitted to the Faculty of management T.U

His Main Objectives:

- To find out applied techniques used to manage the inventory in NEBICO.
- To present and analyze the inventory management system of NEBICO.
- To compare sales revenue with production unit and Raw-material cost.

His Major Findings:

- The company does not follow the proper target for material purchase.
- The company is unable to utilized its existing capacity in the production of Biscuits and confectionary.
- The company has ignore about vital item, essential items and desirable items analysis.
- The company has not applied just in time management concept which helps to reduce extra expenditure for inventory.

His Major Recommendations:

- The company should follow the proper target for material purchase .
- The company should increase its existing capacity.

- The company should considered its vital item, essential items and desirable item.
- The company should apply JIT management concept which helps to reduce extra expenditure for inventory.

2.21 Research Gap

Various studies were made relating to inventory management of different organizations. But there are few studies related to inventory management in Nepalese context. Those studies show the relationship of inventory with purchase and sales. But the relationship of inventory with cash flow was not done yet. So, the researcher tried to show the affect of inventory in cash flow.

CHAPTER-III

RESEARCH METHODOLOGY

3.1 Research Design

Research design is an overall plan or framework for the collection and analysis of data. To achieve the specific objective of the study analytical as well as descriptive studies were carried out. This study is an examination and evaluation of inventory management practices of STC. The information and data were presented in an analytical method but the qualitative aspects of the research such as effectiveness of inventory management views of personal of the enterprise and the theoretical dimensions were explained, wherever necessary. To achieve the goal of study, the study used secondary as well as primary data. Necessary financial and statistical tools were used to examine in fact and figure.

3.2 Sources of Data

The raw data, essential for the study were in the forms of published and unpublished state. Both secondary as well as primary data were collected in order to achieve the objectives of the study. For the reliability and effectiveness of research work, true and fact information's are necessary because information's are the life blood for any research work. This study used secondary data but primary data were also used collected through the observation and survey technique. The major sources of data are as follow:

- **Primary Source of Data:** The primary data were collected through the observation, survey and formal and informal interviews to a responsive person.
- **Secondary Source of Data:** The secondary data were collected from annual reports, balance sheet, and profit/loss account of Salt Trading Corporation.

3.3 Method of Data Analysis and Presentation

The collected data from primary as well as secondary sources were managed, analyzed, present in proper tables, and tabulated into necessary format systematically. Following financial and statistical tools were used to analyzed and interpreted.

3.3.1 Ratio Analysis

Ratio analysis, financial techniques which were used to analyzed and interprets financial statements. It helps in making decision as it helps establishing relationship between various financial figures. Ratio analysis isn't just comparing different numbers of the balance sheet, income statement, and cash flow statement. Ratios evaluate the relationships between individual values and relate them to how a company has performed in the past, and might perform in the future. Financial analysis is an evaluation of firm's post financial performance and its prospects for the future. Financial statement analysis involves the calculation of various ratios. The ratio analysis is the financial tools by which the financial strength and weakness are measured by relating two accounting data. The following ratios were used to analyses financial data:

1. Current Ratio = $\frac{\text{Current Assets}}{\text{Current liabilities}}$
2. Quick Ratio = $\frac{\text{Quick Assets}}{\text{Current liabilities}}$
3. Inventory to Total Assets Ratio = $\frac{\text{Inventory}}{\text{Total Assets}}$
4. Inventory to Current Assets Ratio = $\frac{\text{Inventory}}{\text{Total Current Assets}}$

3.3.2 Inventory Turnover Ratio

The stock turnover ratio indicates whether the investment in inventory management was efficiently used or not. It indicates the relationship between the cost of goods sold and the inventory level. In general, turnover ratios indicate the performance of inventory management. A lower turnover rate may point to overstocking, obsolescence, or deficiencies in the product line or marketing effort. However, in some instances a low rate may be appropriate, such as where higher inventory levels occur in anticipation of rapidly rising prices or shortages.

1. Inventory Turn over Ratio = $\frac{\text{Cost of Goods Sold (COGS)}}{\text{Average Inventory}}$
2. Inventory Turn over Ratio = $\frac{\text{Net Sales}}{\text{Inventory}}$

Where,

$$\text{Average Inventory} = \frac{\text{Beginning Inventory} + \text{Ending Inventory}}{2}$$

3.3.3 Inventory Holding Days (IHD)

An inventory to holding days represents the how many days the corporations hold the inventories in the warehouse year by year. An inventory holding days shows how many days corporation holds the average inventories. High inventories holding day's indicates availability of maximum stock of finished goods for sale. IHD will be calculated by using following formula:

$$1. \text{ Inventory Holding Days} = \frac{\text{Avarage Inventory}}{\text{Cost of GoodSold}} * 365$$

OR,

$$2. \text{ Inventory Holding Days} = \frac{\text{Closing Stock}}{\text{Sales}} * 365$$

3.3.4 Trend Analysis

The collected data from various sources were managed, analyzed and presented in proper tabular formats and diagrams. The techniques here included were statistical and inventory management techniques such as graph, time series analysis, Karl Pearson's coefficient of correlation, mean, standard deviation and coefficient of variance had been used as necessary. The trend analysis was used for different variables which were as follows:

1. Trend Analysis of Net Sales and Inventories.
2. Trend Analysis of Net Profit and Inventories.
3. Trend Analysis of Purchases and Inventories.
4. Trend Analysis of Net sales and Purchases.
5. Trend Analysis of Cash flow and Inventories.

3.3.5 Correlation Coefficient and Regression Analysis

Regression Analysis was used as a tool of determining the nature of relationship between two variables. The models were used to make predictions of the unknown value of one variable from the known value of the other variable. Regression analysis was a mathematical measure of the average relationship between two or more variables in terms of original units of the data. In this analysis, regression equation x and y were used. Regression analysis models shows the relationship between one response variables (also called dependent variables, explained variables, predicted

variables, usually named Y_1, \dots, Y_n), and the predictors (also called independent variables, explanatory variables, control variables, or repressors', usually named X_1, \dots, X_n).

Where,

a = Y intercept or value of Y when $X = 0$ or constant

Y = Dependent Variables

X = Independent variables

b = slope of regression line (i.e. it measures the change in Y due to percentage change in X) or the regression of y on x, which is denoted by or coefficient.

According to the principle of least square, two normal equations for estimating two numerical 'a' and 'b' is given below:

$$\sum Y = na + b\sum X$$

$$\sum XY = a\sum X + b\sum X^2$$

Where,

n = the number of pair observation.

The topic is related with the analysis of the relationship between:

1. Purchase of inventory and sales,
2. Inventory and net profit
3. Inventory and purchases
4. Net sales and purchases
5. Inventory and Cash flow

The two variables were said to be 'correlated' when they are related that the change in the value of one variable accompanied by the change in the value of the other. The measure of correlation called the 'correlation coefficient' summarizes in one figure, the degree and direction of movement. But the important thing that is to be noted here is that correlation analysis helps in determining the extent to which the two variables were correlated or not but it does not tell us about cause and effect. Karl Pearson's correlation coefficient is denoted by or simply 'r'. The correlation coefficient can be calculated by following formula:

$$r = \frac{\sum XY}{n\sigma_X\sigma_Y}$$

Where,

σ_x = Standard deviation of X (i.e. independent variable)

σ_y = Standard deviation of Y (i.e. dependent variable)

r = the calculated value of correlation coefficient from a sample of 'nth' pair of observations.

n = number of pair of observations.

To test the reliability of the calculated value of 'r' probable error (P.E.) can be defined as follows:

$$\text{Probable Error (P.E.)} = 0.6745 \times \text{S.E. (r)} = 0.6745 \times \frac{1-r^2}{\sqrt{n}}$$

If, $r < \text{P.E.}$ It is insignificant or not significant. So, there is no evidence of correlation.

If, $r > \text{P.E.}$ It is significant. In other cases, nothing can be concluded.

CHAPTER -IV

DATA PRESENTATION AND ANALYSIS

4.1 Analysis of Secondary Data

4.1.1 Inventory to Net Sales Ratio

Inventories to net sales ratio is desired to be low in corporation. Net sales mean that sales amount or actual amount which comes from the sales of salt, sugar, ghee, tea, cement, coal, tyre and tubes, wheat etc. The inventories to net sales ratio show the relationship between inventories to net sales in the corporation. If net sales increases, the net sales with low inventories level generate low ratio and vice versa. The low ratio indicates good inventories management where sales were generated by keeping minimum inventories.

Table: 4.1
Inventory to Net Sales Ratio

(In Crore Rs)

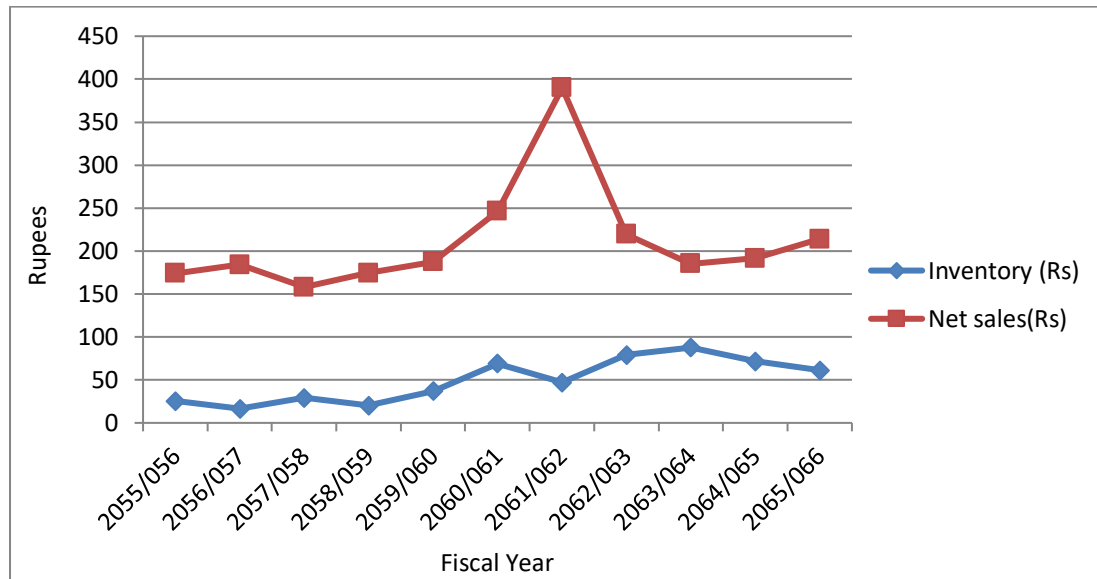
Fiscal Year	Inventory (Rs)	Net sales(Rs)	Inventory to Net sales Ratio (%)
2055/056	25.50	173.85	14.67
2056/057	16.55	184.24	8.98
2057/058	28.99	158.05	18.34
2058/059	19.99	174.32	11.47
2059/060	37.07	187.59	19.76
2060/061	68.81	246.10	27.96
2061/062	47.07	389.89	12.07
2062/063	78.99	219.39	36.00
2063/064	87.66	185.06	47.37
2064/065	71.45	191.63	37.29
2065/066	61.17	213.90	28.60

(Sources: STC Annual Reports)

In the above table 4.1 shows the inventories to sales ratio of eleven years. The lower ratio is 8.98 in the fiscal year 2056/057 while higher ratio was 47.37 in the fiscal year 2063/064. Taking ratio 14.67% as base, ratios of fiscal year 2056/057, 2058/059 and 2061/062 are formed low and satisfactory. While the ratios of the rest year, are higher than other years. The inventory ratio to the sales is 47.37% in the fiscal year 2063/064, is unsatisfactory. The ratios of the years 2064/065 has been decreased

because of decreases in inventory and increase in net sales. But in last year, ratio decreased to 28.60% due to increase in net sales or decrease in inventories.

Figure: 4.1
Sales and Inventory



4.1.2 Current Ratio

Current ratio is the test of liquidity. It measures short-run debt paying ability of the STC. In order words, it measures the availability of current assets for meeting current liabilities. It is calculated by dividing current assets by current liabilities. Current assets are those assets which are expected to be converted into cash or consumed in the production of goods and services in normal course of time. Current liabilities are those liabilities which fall due for payment in the relatively short period of time.

Table: 4.2
Current Ratio

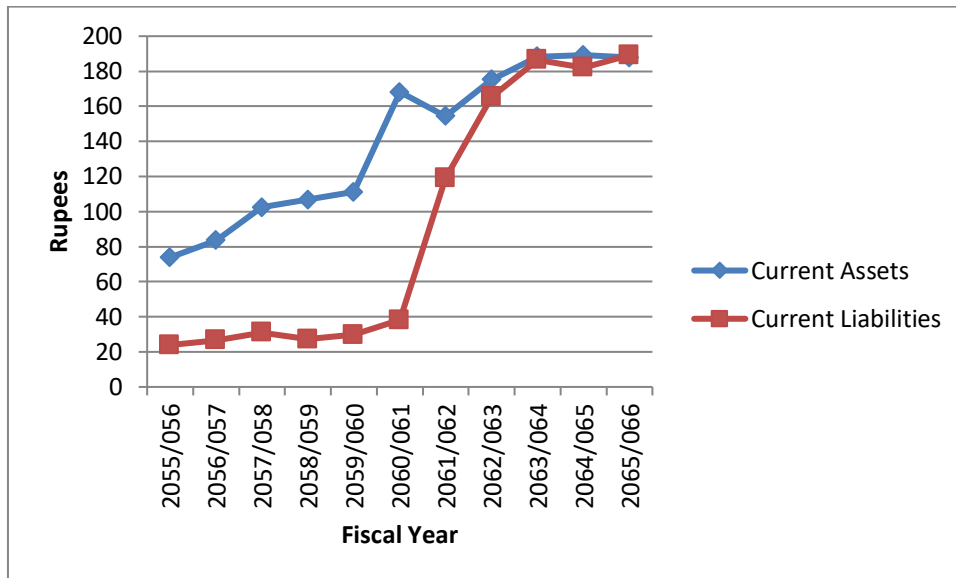
(In Crore Rs)

Fiscal Year	Current Assets	Current Liabilities	Current Ratio
2055/056	73.87	23.89	3.09
2056/057	83.57	26.71	3.13
2057/058	102.31	30.98	3.30
2058/059	106.85	27.26	3.92
2059/060	111.16	29.82	3.73
2060/061	168.12	38.08	4.42
2061/062	154.39	119.01	1.30
2062/063	175.29	165.42	1.06
2063/064	188.43	186.50	1.01
2064/065	189.20	182.23	1.04
2065/066	187.75	189.20	0.99

(Source: STC Annual Report)

The standard current ratio is equal to 2:1, i.e. current assets double the current liabilities. Higher current ratio indicates high liquidity and indicates ability to pay its current obligations in time as and when they become due. In table 4. 2 comparatively, current ratio of STC is not satisfactory. The maximum current ratio is 4.42 in the fiscal year 2060/061 whereas the minimum current ratio is 0.99 in the fiscal year 2065/066. The current ratio up to the fiscal year 2060/061 is high. The current ratio increased from 3.09 to 4.42. But in the fiscal year 2061/062 current ratio dropped to 1.30 and then, it decreased to 0.99 in the fiscal year 2065/066. Over the study period the current ratio of STC is not satisfactory. These current ratios presented in the following figure no. 4. 2.

Figure: 4 .2
Current Assets and Current Liabilities



The above figure 4.1.2 shows the condition of current assets and currents liabilities of the STC. Current assets of STC increased slowly until 111.16 in the fiscal year 2059/060.

4.1.3 Quick Ratio

Quick ratio measures the short-term liquidity of the firm but it emphasis the instant debt paying capacity of the firm. Liquidity refers to the ability of a concern to meet its current obligations as and when these become due. It is calculated by dividing liquid assets by current liabilities. Liquid assets include current assets less stock and prepaid expenses.

Table: 4 .3
Quick Ratio

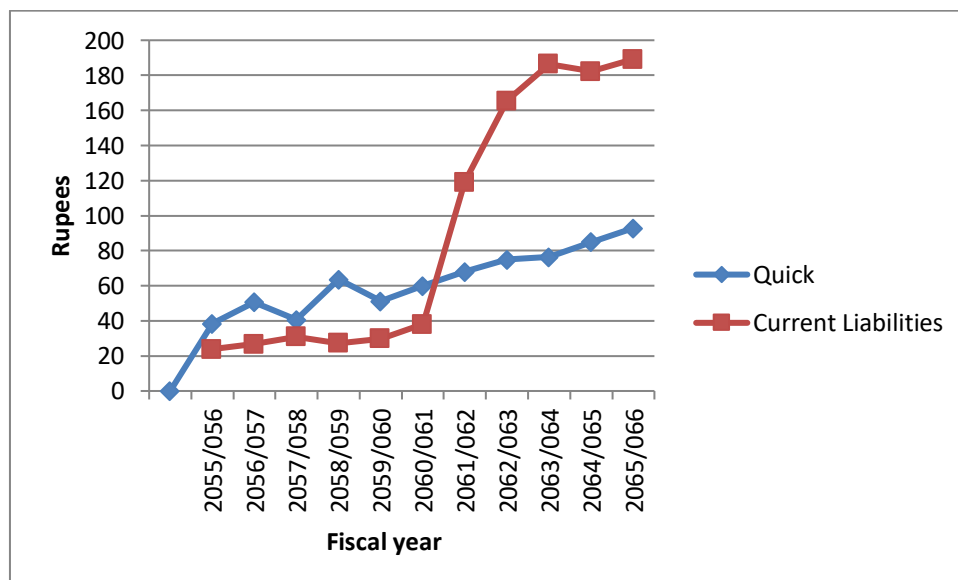
(In Corer Rs)

Fiscal Year	Quick Assets	Current Liabilities	Quick Ratio
2055/056	38.47	23.89	1.61
2056/057	50.65	26.71	1.90
2057/058	40.67	30.98	1.31
2058/059	63.60	27.26	2.33
2059/060	51.11	29.82	1.72
2060/061	60.03	38.08	1.58
2061/062	67.90	119.01	0.57
2062/063	74.87	165.42	0.45
2063/064	76.32	186.50	0.41
2064/065	85.01	182.23	0.47
2065/066	92.88	189.20	0.49

(Source: STC Annual Report)

The quick ratio is very useful in measuring the liquidity position of the firm. The standard quick ratio is 1.1. Nearest ratio with standard one is 1.90 in the fiscal year 2056/057, which indicates the ability of STC to meet its current liabilities in the time. This study shows the satisfactory ratio over the whole study period. Lowest quick ratio in the fiscal year 2063/064 is 0.41 and highest quick ratio is 2.33 in the fiscal year 2057/58.

Figure: 4. 3
Quick Ratio



4.1.4 Inventory to Total Assets Ratio

Inventories to total assets ratio shows the relationship between the inventories and assets. Here, inventories means closing inventories comprising salt, sugar, ghee, oil, rice, cement, etc and equipments and constructing machinery and spare parts. The total assets included the total fixed assets after deducting the depreciation and total current assets. Low inventories to total assets ratio is preferred as efficient inventory management. The low ratio means, the portion of inventories remaining low to assets.

Table: 4 .4
Inventory to Total Assets Ratio

(in Crore Rs)

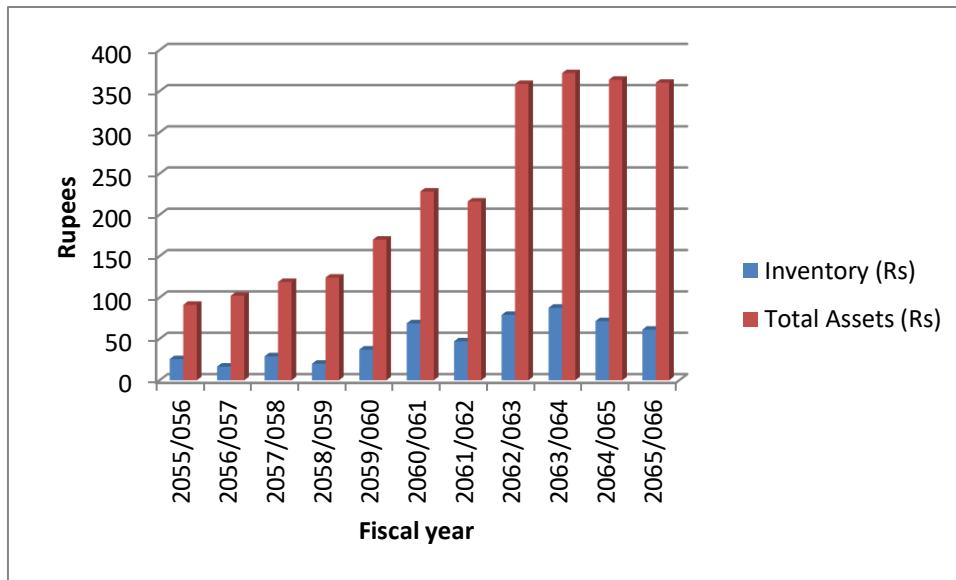
Fiscal Year	Inventory (Rs)	Total Assets (Rs)	Inventory to Total Assets Ratio (%)
2055/056	25.50	91.20	27.96
2056/057	16.55	102.12	16.21
2057/058	28.99	118.83	24.40
2058/059	19.99	124.02	16.12
2059/060	37.07	169.96	21.81
2060/061	68.81	228.28	30.14
2061/062	47.07	216.17	21.77
2062/063	78.99	358.78	22.02
2063/064	87.66	371.95	23.57
2064/065	71.45	363.85	19.64
2065/066	61.17	360.23	16.98

(Sources: STC annual reports)

The table 4 .4, show lowest ratio of inventory to total assets is 16.12 in the fiscal year 2058/059. The maximum inventory to total assets ratio is 30.14 in the fiscal year 2060/061. Assuming 2055/056 as base year, inventories ratio up to the fiscal year 2059/060 is reasonable while inventories ratio of the fiscal year 2060/061 is high and unusual. This table shows that inventories to total assets ratio are not consistent over the study period. In the fiscal year 2061/062 the ratio is decreased and then it started to increased.

Figure: 4 .4

Inventory to Total Assets Ratio



4.1.5 Inventory to Current Assets Ratio

This ratio shows the relationship of inventories to current assets. Current assets includes debtors, inventories, prepaid or advance expenses, deposits, staff loan and advance, different revenue expenses, cash in hand and cash at bank. High inventories to current assets of the corporation indicate the company's hold more inventories. The investment made in the inventory directly affects the profitability of the company. Therefore, low ratio in between the inventories to current assets is efficient inventory management.

Table: 4.5
Inventory to Current Assets Ratio

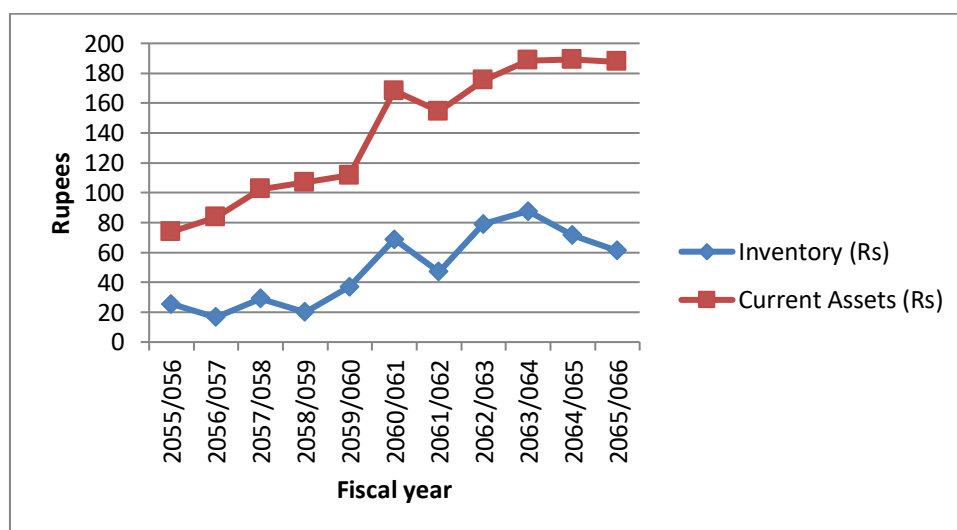
(In Crore Rs)

Fiscal Year	Inventory (Rs)	Current Assets (Rs)	Inventory to Current Assets Ratio (%)
2055/056	25.50	73.87	34.52
2056/057	16.55	83.57	19.80
2057/058	28.99	102.31	28.34
2058/059	19.99	106.84	18.71
2059/060	37.07	111.48	33.25
2060/061	68.81	168.11	40.93
2061/062	47.07	154.39	30.49
2062/063	78.99	175.29	45.06
2063/064	87.66	188.42	46.53
2064/065	71.45	189.20	37.76
2065/066	61.17	187.76	32.58

Sources: STC Annual Reports

As the inventories to current assets ratios presented in the above table 4.5, the inventory management of STC is not efficient. There is more fluctuation in the ratio. The highest and lowest ratios of STC are 46.53 and 18.71 respectively in the fiscal year of 2063/064 and 2058/059. Taking ratio of 34.52 as basis ratio in the fiscal year 2055/056, the inventories to current assets ratio in the fiscal year 2058/059 formed low and satisfactory, but the ratios of the rest years were higher. The ratios of the last two years has been decreased due to decreased in inventory level.

Figure: 4.5
Inventory to Current Assets Ratio



4.1.6 Inventory to Net Profit Ratio

Large quantity of inventories indicates low sales, and low sales generate low profit. This ratio represents the quantity of inventories to generate a good profit of the corporation. STC's accounting figures of net profit pattern for eleven years study period presented in the following table.

Table: 4 .6
Inventory to Net Profit Ratio

(in Crore Rs)

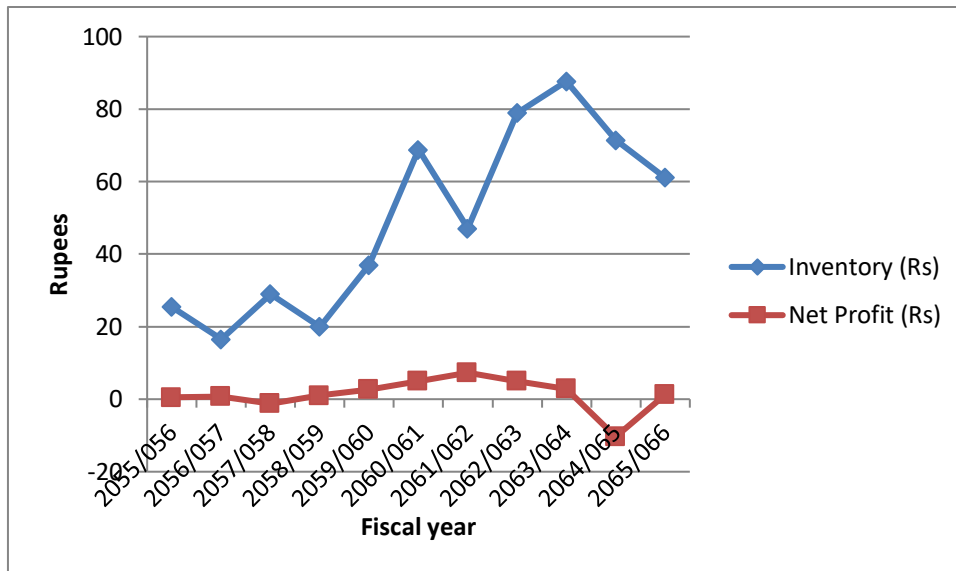
Fiscal Year	Inventory (Rs)	Net Profit (Rs)	Inventory to Net Profit Ratio (%)
2055/056	25.50	0.53	48.11
2056/057	16.55	0.79	20.95
2057/058	28.99	-1.23	-23.57
2058/059	19.99	1.06	18.86
2059/060	37.07	2.67	13.88
2060/061	68.81	5.03	13.68
2061/062	47.07	7.30	6.44
2062/063	78.99	4.98	15.86
2063/064	87.66	2.91	30.12
2064/065	71.45	-10.37	-6.89
2065/066	61.17	1.31	46.70

Sources: STC Annual Reports

Table 4 .6 shows that the corporation is suffered loss in the fiscal year 2057/058 and 2064/065. Highest profit about Rs.7.30 Crore earn by the corporation in the fiscal year 2061/062 but inventories to profit ratio is only 6.44. This is the lowest inventory to net profit ratio over the period. Lowest profit of Rs.0.53 Crore in the fiscal year 2055/056 shows the highest inventories to net profit ratio about 48.11.

Figure: 4 .6

Trend of Inventory to Net Profit Ratio



4.1.7 Inventory Turnover Ratio (ITR)

ITR ratio used to measure the efficiency of sales of an organization. It is also known as stock turnover ratio or stock velocity ratio. Finished goods inventory is the cushion between sales and purchase for non-manufacturing organization. Level of inventory depends upon sales and purchase of the goods of the corporation. Detail calculation of cost of goods sold (COGS) and average inventories of the STC are shown in appendix I and II.

Table: 4.7
Inventory Turnover Ratio

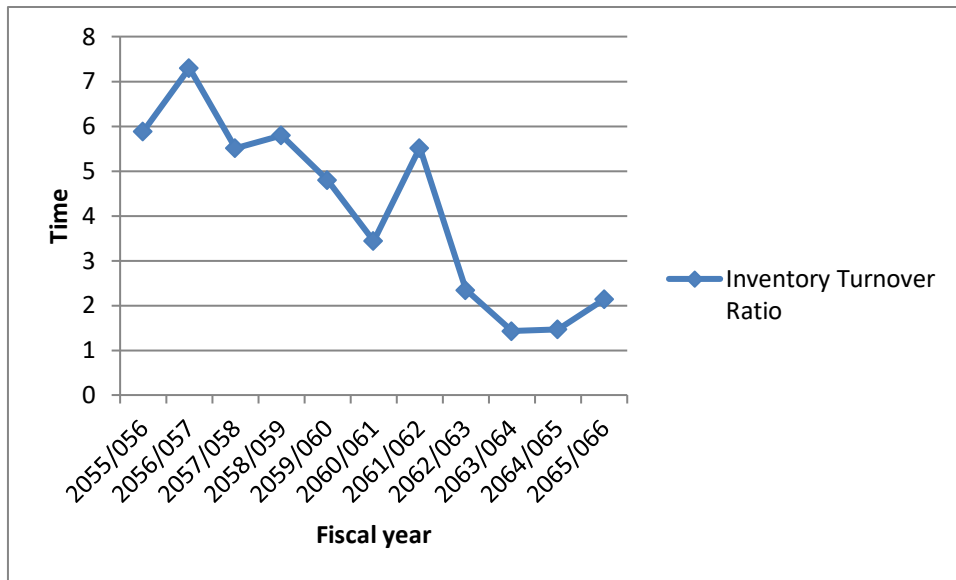
(In Crore Rs)

Fiscal Year	Cost of Goods Sold (COGS) (Rs)	Average Inventory(Rs)	Inventory Turnover Ratio (Times)
2055/056	141.02	23.98	5.88
2056/057	153.43	21.03	7.30
2057/058	125.49	22.77	5.51
2058/059	142.16	24.49	5.80
2059/060	137.00	28.53	4.80
2060/061	182.07	52.94	3.44
2061/062	319.99	57.94	5.52
2062/063	147.92	63.03	2.35
2063/064	119.30	83.33	1.43
2064/065	117.04	79.56	1.47
2065/066	142.01	66.31	2.14

Sources: STC Annual Reports

The table 4.7 shows that the inventories turnover ratio is decreasing to the fiscal year 2063/064 except the fiscal year 2061/062. In the fiscal year 2063/064, turnover ratio is very low i.e. 1.43 while maximum is 7.30 in the fiscal year 2056/057. It represent more inventories are kept in the stock, unnecessary investment tied up on it. The average inventory level is decreased but inventories turnover ratio start to increasing in last three years and the COGS are increasing in these years. The inventories turnover ratio of the study period seems satisfactory. Computation of COGS and Average Inventory are shown in appendix I and II.

Figure: 4.7
Trend of Inventory Turnover Ratio



As shown in figure 4. 6 the inventory turnover ratios are fluctuating. In the fiscal year 2056/057 this ratio is increased and then after the ratio is decreased till 3.44. Again in the fiscal year 2061/062 turnover ratio is increased to 5.52 and then decreased. So the trend of the turnover ratio is not constant.

4.1.8 Inventory Holding Days (IHD)

IHD shows the period that the average inventories hold by the corporation. It represents the how many days the corporation holds the average inventories. The detail calculations of IHD of STC were shown below:

Table: 4 .8
Inventory Holding Days

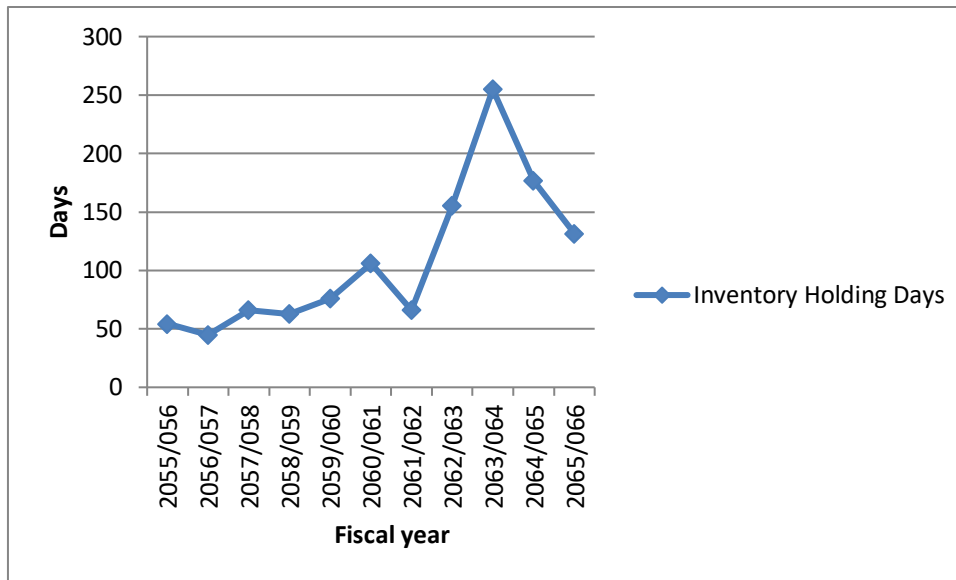
(in Crore Rs)

Fiscal Year	Cost of Goods Sold (COGS) (Rs)	Average Inventory(Rs)	Inventory Holding Days
2055/056	141.02	23.98	54.37
2056/057	153.43	21.02	44.85
2057/058	125.48	22.77	66.23
2058/059	142.16	24.49	62.88
2059/060	137.00	28.53	76.01
2060/061	182.07	52.94	106.13
2061/062	319.99	57.94	66.09
2062/063	147.92	63.03	155.53
2063/064	119.30	83.33	254.95
2064/065	117.04	79.56	176.58
2065/066	142.01	66.31	131.59
Mean = 108.66			

Sources: STC Annual Reports

From the 4.8 table, average Inventories Holding Days of STC from the fiscal year 2055/056 to 2065/066 is 108.66. In other words, the corporation holds average inventories 108.66 days in regards of mean in eleven fiscal years. From the fiscal year 2062/063 to 2064/065, IHD has crossed the mean, whereas the rest of the years, IHD have remained below the mean. The minimum holding day period is 44.85 days in the fiscal year 2055/056 and maximum holding days is 254.95 days in the fiscal year 2063/064, which is more than twice of average holding period 108.66. Maximum holding days increased the overall carrying cost of the corporation. So, this is not good for the corporation. The trend of inventory Holding Period are presented in following figure no. 4. 7.

Figure: 4.8
Inventory Holding Days



4.1.9 Relationship between Inventory and Cash Flow

Cash flow presents the state of the total cash inflow and outflow of the organization within certain period. Cash flow from operating activities shows the flow of cash to operate the organization regularly. Changes in inventory level directly affect the cash flow from operating activities. The following table 4.9 is prepared to found the affect of inventory in operating activities. Cash flow from operating activities before and after adjusting inventory was shown.

Table: 4.9**Effects of Changes of inventory in Cash Flow**

In Crore Rs.

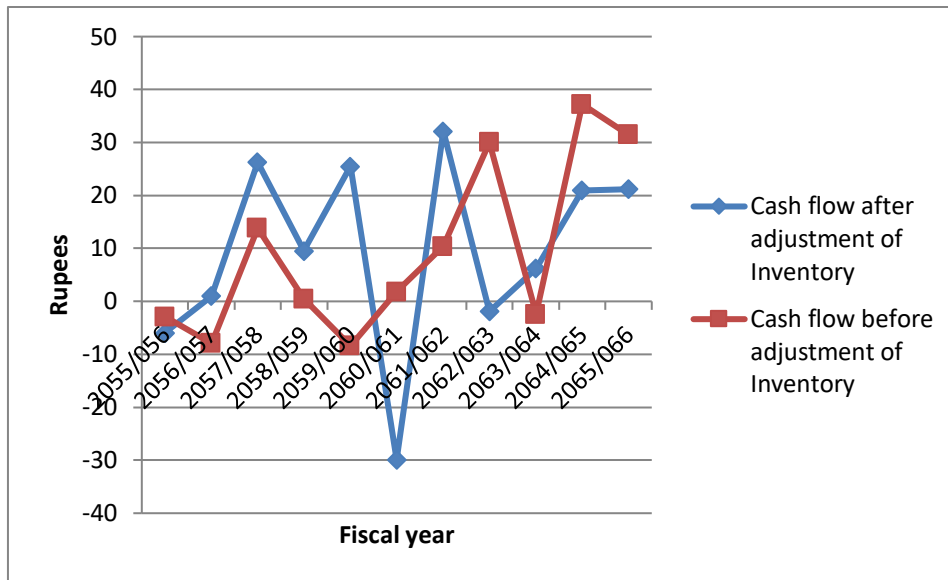
Fiscal Year	Cash flow before adjustment of Inventory	Change in Inventory (Rs)	Cash flow After adjustment of Inventory
2055/056	-5.95	3.05 (Increase)	-2.90
2056/057	1.02	8.95 (Decrease)	-7.93
2057/058	26.28	12.46 (Increase)	13.82
2058/059	0.51	9.01 (Decrease)	9.52
2059/060	25.48	17.07 (Increase)	-8.41
2060/061	-29.91	31.74 (Increase)	1.83
2061/062	32.15	21.75 (Decrease)	10.40
2062/063	-1.88	31.92 (Increase)	30.04
2063/064	6.25	8.67 (Decrease)	-2.42
2064/065	20.99	16.22 (Increase)	37.21
2065/066	21.22	10.28 (Increase)	31.49

Source: Annual Report of STC

In the above table, cash flows before adjusting changed level of inventory in the fiscal year 2055/056, 2056/057, 2058.059 and 2063/064 are show maximum out flow beyond the cash balance. But, the cash flow after adjusting changed level of inventory in the fiscal year 2056/057, 2058/059, 2060/061 and 2062/063 shows the negative cash balance. In the fiscal year 2056/057, 2058/059, 2061/062 and 2063/064, inventory level is decreased but in the remaining seven years the inventory level is increased. Increased inventory level decreased the cash balance and vice-versa. Highest cash flow before adjusting inventory is Rs. 37.21 Crore in the fiscal year 2064/065 whereas minimum cash flow is Rs1.83 in the fiscal year 2060/061. But highest cash flow after adjusting inventory is Rs.32.15 Crore in the fiscal year 2061/062 and minimum cash flow is Rs.0.25 Crore in the fiscal year 2055/056. Inventory and cash flow both are fluctuated severally over the study period.

Figure: 4.9

Relationship between Cash Flow and Inventory



4.1.10 Trend Analysis

In this section, the researcher tried to explain the trend of inventories with the different variables in different fiscal years.

4.1.10.1 Trend Analysis of Net Sales and Inventory

The following table represents the net sales and inventories of STC through the fiscal year 2056/2057 to 2065/066.

Table: 4.10

Net Sales and Inventory

(In Crore Rs)

Fiscal Year	Net Sales (Rs.)	Inventory (Rs.)
2055/056	173.85	25.50
2056/057	184.24	16.55
2057/058	158.05	28.99
2058/059	174.32	19.99
2059/060	187.59	37.07
2060/061	246.10	68.81
2061/062	389.89	47.07
2062/063	219.39	78.99
2063/064	185.06	87.66
2064/065	191.62	71.45
2065/066	213.90	61.17

Sources: STC Annual Reports

Table 4.10 shows that the level of total net sales and inventories of different fiscal years. Both of them are changing over in the same pattern. Net sales are increased to 184.24 from 173.85 in the fiscal year 2056/057 and then started to decreased and increased severally. The table depicted net sales are upward until the fiscal year 2060/2061 but then after it is decline. On other hand same fluctuating trend occurs in inventory level too. Level of inventory is increased and decreased severally. Inventory is slightly decline in the fiscal year 2058/059 but go up till the fiscal year 2060/061 and again it started to decline.

Table: 4.11

Relationship between Net sales and Inventory

(In Crore Rs)

Statistical Tool	Net Sales (Rs.)	Inventory
Mean	211.27	49.39
Standard Deviation (S.D)	61.17	24.18
Co-efficient of Variation (C.V)	28.95	48.96

Table 4.11 shows mean, standard deviation and co-efficient of variation of net sales and inventories. Mean of net sales and inventories in the eleven fiscal years are 211.27 and 49.39, standard deviations are 61.17 and 24.18 and coefficients of variance are 28.95% and 48.96% respectively. The co-efficient of variance of inventories is higher than the coefficient of variance of net sales. So, the variability of inventories is higher than the net sales or there are less uniformity and consistency of inventory.

4.1.10.2 Trend Analysis of Purchases and Inventories

The following table shows that the purchases and inventories of STC throughout the fiscal year 2055/056 to 2065/066.

Table: 4.12
Purchases and Inventory

(In Crore Rs)

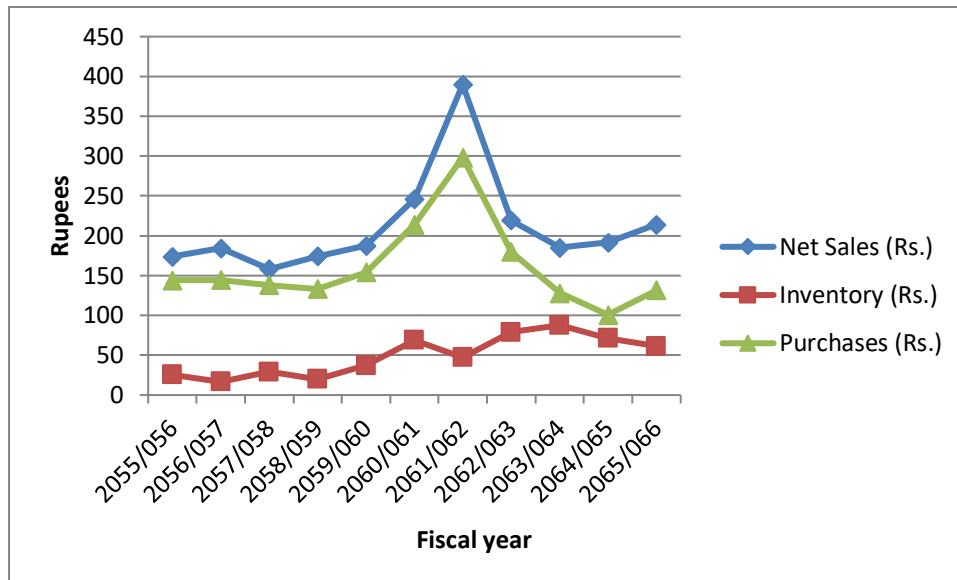
Fiscal Year	Purchases (Rs.)	Inventory (Rs.)
2055/056	144.07	25.50
2056/057	144.48	16.55
2057/058	137.93	28.99
2058/059	133.16	19.99
2059/060	154.08	37.07
2060/061	213.81	68.81
2061/062	298.25	47.07
2062/063	179.84	78.99
2063/064	127.97	87.66
2064/065	100.83	71.45
2065/066	131.73	61.17

Sources: STC Annual Reports

From the study of the above table 4.12 shows the procurement trend of STC is fluctuating every year. Purchase is increased up to 298.25 in the fiscal year 2061/062 continuously but inventory level is fluctuated severally in these periods. After the fiscal year 2061/062 the purchases is decreased to the fiscal year of 2064/065 then it started to decline. In other side the inventory level is also fluctuated severally. Inventory level increased as increased in purchase in the fiscal year 2065/067, 2059/060 and 2060/061. Inventory level decreased as decreased in purchase in the fiscal year 2056/057, 2058/059. But in the fiscal year 2061/062 purchase is increased but the inventory level is decreased. From the fiscal year 2062/063 to 2064/065 purchase had been decreasing but inventory had been increasing up to 87.66%, then again started to decrease till 61.17% in fiscal year 2065/066. Trend of purchase, net sales and inventory is shown in following diagram 4.10.

Figure: 4.10

Trend of Purchase, Net Sales and Inventory



In the above figure 4.10 relationship between purchases, net sales and inventory are shown. In the fiscal year 2056/057 both sales and purchases are increased but inventory is decreased. In the fiscal year 2061/062 total sales and purchases are increases to maximum point but inventory decreased. The figure shows that there is negative relationship between purchases, sales and inventories. When the level of purchases and sales are increased the level of inventory is decreased spontaneously.

Table: 4.13

Relationship Between Purchase and Inventories

Statistical Tool	Purchase	Inventory
Mean	160.56	49.39
Standard Deviation	51.75	24.18
Co-efficient of Variation	32.23	48.96

Table 4.13 shows mean, standard deviation and co-efficient of variation of purchases and inventory. Mean of purchases and inventories in eleven fiscal years are 160.56 and 49.39 standard deviation are 51.75 and 24.18 and coefficient of variance are 32.23% and 48.96% respectively. The co-efficient of variance of inventories is higher than the coefficient of variance of purchases. So, the variability of inventories is higher than the purchases.

4.1.10.3 Trend Analysis of Net Profit and Inventory

The following table shows that the net Profit and inventories of STC through 2055/056 to 2064/2065.

Table: 4.14
Net Profit and Inventory

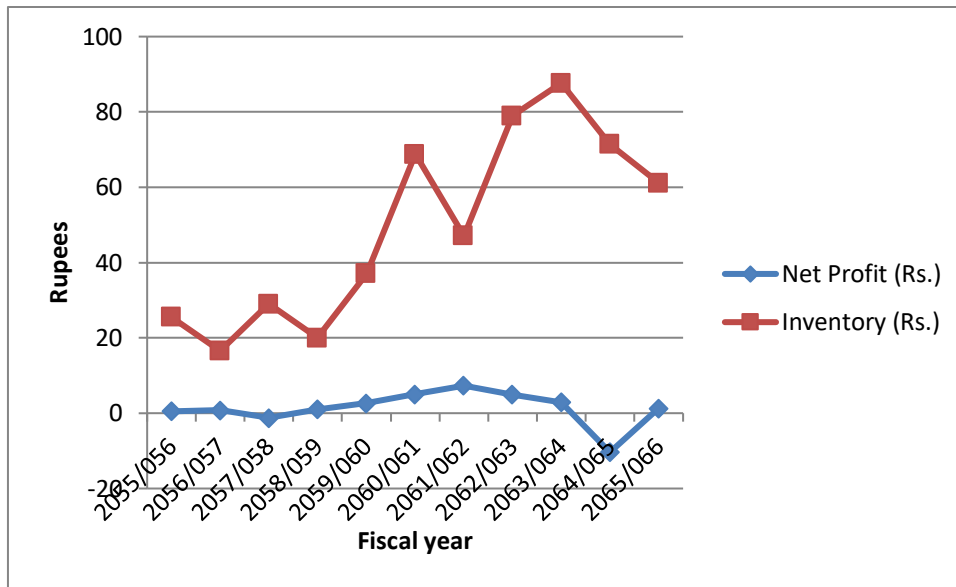
(In Crore Rs)

Fiscal Year	Net Profit (Rs.)	Inventory (Rs.)
2055/056	0.53	25.50
2056/057	0.79	16.55
2057/058	-1.23	28.99
2058/059	1.06	19.99
2059/060	2.67	37.07
2060/061	5.03	68.81
2061/062	7.30	47.07
2062/063	4.98	78.99
2063/064	2.91	87.66
2064/065	-10.37	71.45
2065/066	1.31	61.17

Sources: STC Annual Reports

The table 4.14 shows the negative net profit in the fiscal year 2056/2057 and 2064/065. Net profit from the fiscal year 2058/059 started to increase 7.30 in the fiscal year 2061/062 and again it started to decline. On the other side, inventories are fluctuating severally. The fluctuating trend of net profit and inventory is shown in the following figure

Figure: 4.11
Trend of Net Profit and Sales



The figure 4.10 shows the trend of net profit is less fluctuated than of inventory. Figure indicates that increased or decreased in inventory level did not directly affect the net profit. In order to find the variability of net profit and inventories of different fiscal years, the statistical tools like mean, standard deviation, co-efficient of variance are calculated. It is presented in below.

Table: 4.15
Relationship Between Net Profit and Inventory

Statistical Tool	Net Profit (Rs)	Inventory
Mean	1.36	49.39
Standard Deviation	4.39	24.18
Co-efficient of Variation (CV)	321.89	48.96

Table 4.15 shows mean, standard deviation and co-efficient of variation of net profit and inventory. Mean of net profit and inventories in the eleven fiscal years are 1.36 and 49.39, standard deviation is 4.39 and 24.18 and coefficients of variance are 321.89% and 48.96% respectively. The co-efficient of variance of net profit is higher i.e. 321.89% than the coefficient of variance of inventory i.e. 48.96%. So, the variability of net profit is higher than the inventories.

4.1.10.4 Trend Analysis of Net Sales and Purchases

The following table shows that the net sales and purchases of STC through the fiscal year 2055/056 to 2065/066.

Table: 4.16
Net Sales and Purchases

(in Crore Rs)

Fiscal Year	Net Sales (Rs.)	Purchases (Rs.)
2055/056	173.85	144.07
2056/057	184.24	144.48
2057/058	158.05	137.93
2058/059	174.32	133.16
2059/060	187.59	154.08
2060/061	246.10	213.81
2061/062	389.89	298.25
2062/063	219.39	179.84
2063/064	185.06	127.97
2064/065	191.62	100.83
2065/066	213.90	131.73

Sources: STC Annual Reports

The net sales are going up year by year till the fiscal year 2060/2061 with high rate after the fiscal year 2061/2062 it started to decline. But, in the fiscal year 2065/066, sales is increased by 22.28 crore. Similarly, the purchases are gone up year by year except the fiscal year 2058/059. The purchases are also started to decline after the fiscal year of 2061/062 with increasing rate. Above table shows, the increased and decreased in purchases and sales are in same trend except the year 2058/059. Sales are increased when the purchases are increased and vice versa. Their trends are shown in figure 4.12 more clearly.

Figure: 4.12

Total Purchases and Net Sales

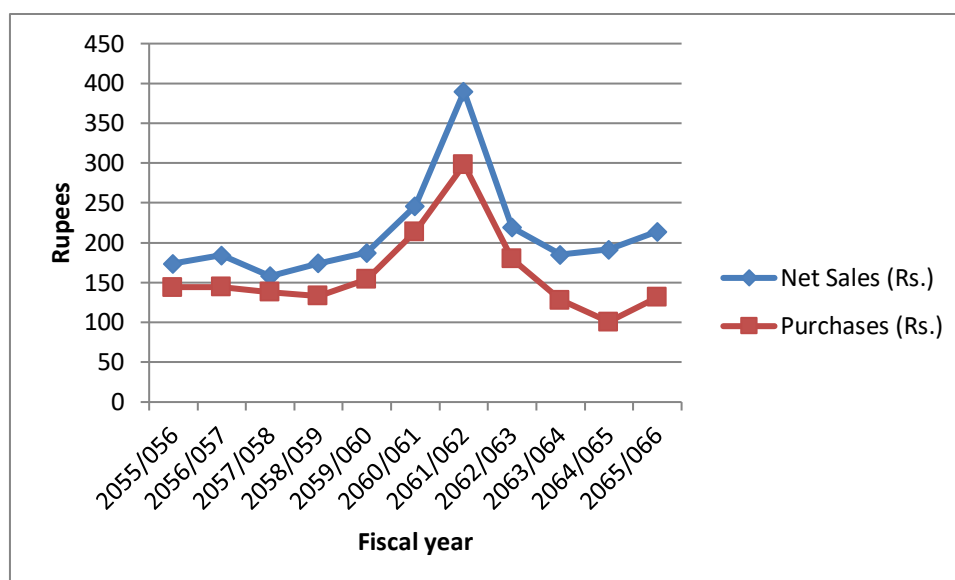


Figure no 4.12 show the purchases and sales of various periods. The Trend indicates positive relation between sales and purchases. Sales increased as purchase increased and decreased as it decreased. Sales and purchases both are higher in the fiscal year 2061/062 over the study period. But the sales increased from the year 2055/056 to 2059/060 in decreasing rate and then increased in increasing rate up to the fiscal 2061/062. Purchases and sales are severally fluctuating over the study period.

Table: 4.17

Relationship Between Purchase and Sales

Statistical Tool	Purchase	Sales
Mean	160.56	211.27
Standard Deviation	51.75	61.17
Co-efficient of Variation (CV)	32.23	28.95

Table 4.17 shows mean, standard deviation and co-efficient of variation of net sales and purchases. Mean of net sales and purchases in the eleven fiscal years are 211.27 and 160.56, standard deviation are 61.17 and 51.75 and co-efficient of variance are 28.95% and 32.23% respectively. The co-efficient of variance of purchases is higher than the coefficient of variance of net sales. So, the variability of purchases is higher but uniformity and consistency is lesser than the net sales.

4.1.10.5 Trend Analysis of Cash Flow and Inventory

The following table shows the Cash Flow and inventories of STC through the fiscal 2055/056 to 2065/066. The table also shows the level of increased and decreased quantity of inventory.

Table: 4.18
Cash Flow and Change in Inventory

(in Crore Rs)

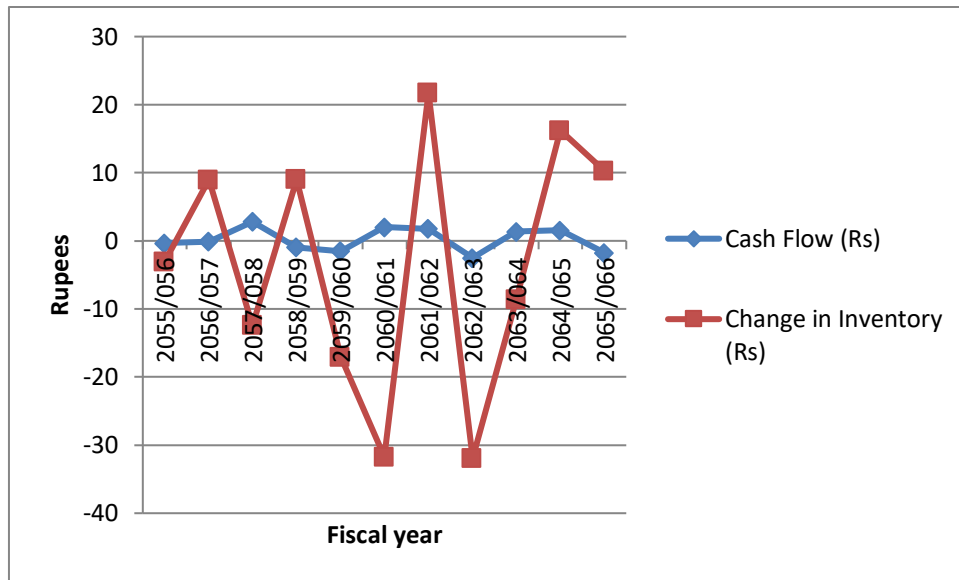
Fiscal Year	Cash Flow (Rs)	Opening Inventory (Rs)	Closing Inventory (Rs)	Change in Inventory (Rs)	Remarks
2055/056	-0.35	22.45	25.50	-3.05	Increased
2056/057	-0.08	25.50	16.55	8.95	Decreased
2057/058	2.81	16.55	28.99	-12.44	Increased
2058/059	-0.93	28.99	19.99	9.00	Decreased
2059/060	-1.53	19.99	37.07	-17.08	Increased
2060/061	2.03	37.07	68.81	-31.74	Increased
2061/062	1.78	68.81	47.07	21.74	Decreased
2062/063	-2.49	47.07	78.99	-31.92	Increased
2063/064	1.34	78.99	87.66	-8.67	Increased
2064/065	1.53	87.66	71.45	16.21	Decreased
2065/066	-1.74	71.45	61.17	10.28	Decreased

Sources: STC Annual Reports

The 4.18 table shows the fluctuating trend of cash flow and changed in inventory level. Inventory level is decreased in the fiscal years 2056/057, 2058/059, 2061/062, 2063/64 and 2065/066. Trend of Cash flow is very fluctuating. Table shows the Cash flow of five years is positive and negative in remaining years. Cash flow shown in table is total cash inflow and outflow. Negative cash flow represents the cash outflow and positive cash flow represents the cash inflow. Minimum cash outflow is 0.08 Crore in the fiscal year 2056/057 when the inventory level is decreased by 8.95 Crore. Maximum cash outflow is 2.49 Crore in the fiscal year 2062/063 when the inventory level is increased by 31.29 Crore. Maximum cash inflow is 2.81 Crore in the fiscal year 2057/058 and minimum cash inflow is 1.34 Crore in the fiscal year 2063/064. Inventory level increased by 12.44 Crore in the fiscal year 2057/058 and 8.67 Crore in the fiscal year 2063/064. From the above table it can be concluded that inventory level directly affects the cash inflow and outflow.

Figure: 4.13

Cash Flow and Cash Change in Inventory



4.1.11 Correlation and Regression

Correlation may be defined as the degree of linear relationship existing between two or more variables. Correlation coefficient measures the degree of relationship between two or more variables, whereas the regression analysis is used to estimate the likely value of one variable from the known value of the other variable. It is specially used in business and economics to study the relationship between two or more variables that are related causally. Regression analysis is a mathematical measure of the average relationship between two or more variables in terms of original units of the data. The Inventory (Rs) analysis of the relationship of Purchases, inventory, sales, net profit and cash flow are presented below.

4.1.11.1 Regression and Correlation Analysis of Inventory and Net Sales

On the basis of variable derived from the calculation, sales and inventories of foods, agriculture goods, fuel, lubricants or tyres and tubes, machineries, construction goods and others are obtained. For the analysis, inventory is assumed as dependent variable which is denoted by 'Y' and the net sales as independent variable which is denoted by 'X' variable. The regression equation of 'Y' on 'X' which is used to describe the variation in the value of 'Y' for given changes in the value of 'X'.

The regression result+ estimated in this model is based on the observation of the eleven fiscal years from 2055/056 to 2065/066. The regression on current year inventories and net sale produce the following equation $Y=32.48+0.08$ which is shown in appendix VII. The regression represents that there is positive relationship between net sales and closing inventory. The constant value of 32.48 indicates that the value of inventory remains constant irrespective of changes in current year net sales. While, coefficient 0.08 indicates that the changes in Rs.1 of sales results the change in Rs. 0.08 of closing inventory of the corporation.

To analyze the relationship between the net sales and inventory, Karl Pearson's correlation co-efficient is used. The coefficient of correlation and probable error between net sales and inventories are + 0.028 and + 0.20 respectively. The value of correlation 'r' is + 0.028, somehow far to + 1. So, it seems that there is low degree of positive relationship between net sales and inventories of STC. Increased in inventory would increase in sales and vice versa.

But considering probable error, it is found that the calculated value of 'r' is less than Probable Error (PEs). So the value of 'r' is insignificance and there are no evidence of correlation between net sales and inventories. Proportionate increase in sales would not increase in inventory. The detail calculation of co-relation of coefficient, mean, standard deviation, CV and are shown in appendix III.

4.1.11.2 Regression and Correlation Analysis of Inventory and Net Profit

On the basis of various variables, regression and correlation analysis of inventory and net profit are done. Here, in the analysis, inventory is assumed to be dependent variable 'Y' and the net profit is assumed to be independent variable 'X'. The regression equation of Y on X which is used to describe the variation in the value of 'Y' for given changes in the value of 'X'.

The regression result estimated in this model is based on the eleven fiscal years observation from 2055/056 to 2065/066. The regression on current year inventory and net profit produced the following results.

$Y= 0.99+0.6676X$ which is shown on Appendix VIII.

The regression result shows that there is positive relationship between current year net profit and closing inventory. The constant value 0.99 indicates that the value of inventory remains constant irrespective of changes in current year net profit. While, coefficient 0.0076 indicates that the changes in Rs.1 of inventory can change Rs 0.0076 of profit only.

To analyze the relationship between the net sales and inventory, Karl Pearson's correlation co-efficient is used. The coefficient of correlation and probable error between net profit and inventories are + 0.0057 and 0.203 respectively. The value of correlation 'r' is 0.0057 is not near to + 1. So, it seems that there is low degree of positive relationship between net profit and inventory.

But considering probable error, it is found that the calculated value of 'r' is smaller than probable error (PEs). So it can be concluded that the value of 'r' is not significance. The detail calculation of co-relation of coefficient, mean, standard deviation, CV and probable error are shown in appendix IV.

4.1.11.3 Regression and Correlation Analysis of Inventory and Purchase

Regression and correlation analysis of inventory and purchases are calculated in this section. Here, in the analysis, inventory is assumed to be dependent variable denoted by 'Y' and the purchases is assumed to be independent variable denoted by 'X'. The regression equation of 'Y' on 'X' which is used to describe the variation in the value of 'Y' for given changes in the value of 'X'.

The estimated regression result in this model is based on the observation of the eleven fiscal years from 2055/056 to 2065/066. The regression on current year inventory and purchases produced the following results

$$Y = 45.85 + 0.022X$$

The regression equation shows that there is positive relationship between current year purchases and closing inventory. The constant value 45.85 indicates that the value of inventory remains constant irrespective of changes in current year purchases. While, coefficient 0.022 indicates that the changes in Rs.1 of purchases can change only Rs. 0.022 of closing inventory.

To analyze the relationship between the net sales and inventories, Karl Pearson's correlation co-efficient is used. The coefficient of correlation and probable error between purchases and inventories are 0.0065 and 0.203 respectively. The value of correlation 'r' is + 0.10 which is not equal to + 1. So, it seems that there is low degree of relationship between purchases and inventories of STC, increased in purchases would increase in inventory level and vice versa.

But considering probable error, it is found that the calculated value of 'r' is less than probable error (PEs). So it could be concluded that the value of 'r' is significance. The detail calculation of co-relation of coefficient, mean, standard deviation, CV and probable error in shown in appendix V.

4.1.11.4 Regression and Correlation Analysis of Purchase and Net Sales

On the basis of variable derived from the calculation, sales and purchases of foods, agriculture goods, fuel, lubricants or tyres and tubes, machineries, construction goods and others are obtained. Here, in this analysis purchases is assumed to be dependent variable which is denoted by 'Y' and the net Sales is assumed to be independent variable which is denoted by 'X'. The regression equation of 'Y' on 'X' which is used to describe the variation in the value of 'Y' for given changes in the value of 'X'.

The regression produced in this model is based on eleven fiscal years observation from 2055/056 to 2065/066. The regression on current year purchases and net sales produced the following results

$Y = 37.07 + 14.085X$ which is shown in Appendix X.

The regression result shows that there is positive relationship between current year purchases and net sales. The constant value 37.07 indicates that the value of purchases remains constant irrespective of changes in current year net sales. While, co-efficient 1.085 indicates that the changes in Rs.1 of net sales can change Rs.1.085 of closing purchases of the corporation.

Karl Pearson's correlation co-efficient is used to analyze the relationship between the net sales and inventory. The coefficient of correlation and probable error between net sales and purchases are 0.918 or + 0.92 and 0.031 or 0.03 respectively. The value of correlation 'r' is + 0.92 which is nearly equal to + 1. So, it seems that there is high

degree of positive relationship between net sales and purchases of STC. This represent that the increases in sales would increase in purchases and vice versa. But considering probable error, it is found that the calculated value of 'r' is greater than 6 (PEs). So it concluded that the value of 'r' is significance. The detail calculation of co-relation of coefficient, mean, standard deviation, CV and probable error in shown in appendix VI.

4.1.11.5 Regression and Correlation Analysis of Inventory and Cash Flow

On the basis of information collected of foods, agriculture goods, fuel, lubricants or tyres and tubes, machineries, construction goods and others are obtained. Here, in the analysis cash flow is assumed to be dependent variable, 'Y' and the inventory is assumed to be independent variable, 'X'. The regression equation of 'Y' on 'X' which is used to describe the variation in the value of 'Y' for given changes in the value of 'X'.

The regression result estimated in this model is based on eleven years observation from the fiscal year 2055/056 to 2065/066. The regression on current year inventory and cash flow produced the following results

$Y=0.0179+0.004X$ which is shown in appendix XI.

The regression result shows that there is positive relationship between current year cash flow and closing inventories. The constant value 0.0179 indicates that the value of inventories remains constant irrespective of changes in current year cash flow. While, co-efficient 0.004 indicate that the change in Rs.1 of inventory can change Rs .0.004 of cash flow of the corporation.

To analyze the relationship between the cash flow and inventory, Karl Pearson's correlation co-efficient is used. For the purpose of calculating 'r' cash flow is denoted by 'Y' and inventory is denoted by 'X'. The coefficient of correlation and probable error between cash flow and inventory are 0.0079 and 0.20 respectively. The value of correlation 'r' is + 0.0079 which is not nearly equal to + 1. So, it seems that there is not high degree of positive relationship between cash flow and inventory of STC. But considering probable error, it is found that the calculated value of 'r' is lower than 6 PEs. So, the value of 'r' is insignificance and there are no evidence of correlation. The

detail calculation of co-relation of coefficient, mean, standard deviation, CV and probable error are shown in appendix VII.

4.2 Major Findings

Major findings from the research are explained below.

- Corporation applied ABC and EOQ techniques of inventory management; however it is applied ineffectively and unsystematically
- The value of correlation and probable error between sales and inventory is +0.028 and is + 0.20. It seems that there is low degree of positive relationship.
- Mean of inventory to current assets ratio is 33.45%. It indicates that the company had not been adopting appropriate inventory policy.
- Over the study period current ratio of STC is not satisfactory. From the fiscal year 2055/056 to the fiscal year 2060/061, the current ratio is more than standard ratio and it is less than standard ratio in the remaining fiscal year.
- Quick ratio of the STC from the fiscal year 2055/056 to the fiscal year 2060/061 is higher than the standard quick ratio 1:1, whereas remaining year shows lower ratio than standard.
- General 16 to 30 % range of inventory form than total Assets considered as good from the study. It has been shown inventory to total assets is good position.
- Net profit of the organization is not satisfactory. Company faced the loss amounted Rs. 1.25 crore and Rs. 10.37 crore in the fiscal year 2057/058 and 2064/065 respectively.
- Inventory turnover ratio is fluctuating severally over the study period. Comparing with ITR of 6.72 in the fiscal year 2055/056, the ITR is decreasing to 1.43 times from the fiscal year 2057/058 to 2063/064.
- Mean IHD is 108.66. Highest IHD is 254.95 in the fiscal year 2063/064 and lowest IHD is 44.85 in the fiscal year 2056/057.
- The net sales and purchase are more uniformity and consistency. And variability of purchase is higher than net sales.
- In case of net profit mean and S.D. are 1.36 and 4.39% which are lower than mean and S.D of inventory. Where as co-efficient of variation of net profit is 321.89 very higher than CV of inventory. So, the uniformity and consistency of net profit is lower.

- Cash flow from operating activities after adjusting inventory shows the negative cash balance by Rs.5.95, Rs. 29.91 and Rs.1.88 in the fiscal year 2055/056, 2060/061 and 2062/063. Cash balance is started to increased from Rs.6.25 to Rs.21.22 crore in the fiscal year 2065/066 due to decrease in inventory to Rs. 10.28 crore in the fiscal year 2065/066.
- Coefficient of correlation between net profit and inventory were 0.0057 which is far from +1. So, there was low degree of positive relationship between net profit and inventory.

CHAPTER-V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

Inventory management is one of the most important functions in any organization. Without effective and efficient inventory management no organization can achieve its goal. Success of any enterprises basically depends on the efficiency and effectiveness of systematic management. Inventory management is the most important part of trading company. The Company used to invest in inventory. A firm cannot achieve its goal unless inventories are controlled effectively. Inventory constitutes most significant part of current assets.

The basic objective of this study is to examine the inventory management system practiced by the company. Inventory management system of STC is neither effective nor scientific. Therefore, all these activities lead to increase total cost of the company.

The specific objectives of the study are to examine the practice of inventory management (i.e. procurement or acquisition of goods, storing of goods, issuing the goods from stores etc), to analyze the inventory levels and its trend in STC and to analyze relationship of inventory with net sales, net profit, and purchases.

This study is one of the new studies, it attempted to know the inventory management and its" affects on cash flow of STC. Secondary data from annual report of STC were collected to meet the objectives. The statistical tools like mean, standard deviation, coefficient of variation, correlation, regression, probable error and trend analysis with table and figure as required are used to analyze the available data. Similarly, the financial tools and techniques like financial ratio, inventory turnover ratio and inventory holding days are used.

5.2 Conclusions

On the basis of analysis of data and information collection from Salt Trading Corporation, the following conclusions have been drawn.

- The main objectives of the study to analyze the condition of inventory management and its relationship with variables like net sales, net profit, purchase and the affects of inventory in cash flow of STC. To fulfill the objectives of the study the necessary data are collected from secondary sources.
- STC applied EOQ technique of inventory management; however it is implemented unsystematically and ineffectively. Quick ratio and current ratio of the corporation is not satisfactory because the ratios are below standard. Most of the current assets cover the inventory. So, the liquidity of the organization is very low and cash is blocked by investing in the inventory.
- Likewise the inventory to total assets ratio are not consistent over the study period and ITR is fluctuating severally over the study period. Those ratios are represented unfavorable and inefficient in inventory management. But in last two years the ITR is increasing slowly and efficiency of inventory management is increasing. Net sales and purchases are more uniformity and consistency than that of inventory because the CV of inventory is higher than net sales and purchase. But the lower CV of net profit represents the lower uniformity and consistency.
- Correlation between net sales and inventory show lower degree of positive relationship. Proportionate changed in sales would not changed in inventory. There are lower correlation between net profit and inventory but the correlation between sales and purchase is higher. The proportionate change in sales results the proportionate change in purchase spontaneously. From the regression analysis, it is found that there is positive relation between inventories and net sales, net profit, cash flow and purchases. There is also positive relationship between net sales and purchase.
- Trend of net sales, purchase and inventories are fluctuating in the same pattern while the coefficient of variance of inventories is higher than the co-efficient of variance of net sales and purchase. But the coefficient of the net profit is higher than of inventory. And mean and standard deviation of profit is lower. There are no evidence of correlation between cash flow and inventory also. Change in inventory directly affect on the cash flow from operating activities. Increases in inventory cause decreases in cash inflow and decreases in inventory causes increases in cash flow.

5.3 Recommendations

The efficient management is essential to achieve the objectives of STC. The management of inventory in STC is not only necessary but compulsory for the better performance of the organization. On the basis of study, the following recommended were made for the betterment of the organization.

- Purchasing plan should be prepared with the proper co-operation and coordination among the planning, purchase, store, marketing and sales department to avoid excessive investment on inventory.
- STC should give more attention to the inventory management. The company should manage the inventory according to the sales.
- The corporation should apply scientific and effective inventory management system.
- The corporation should use EOQ model to determine order size, which minimize cost of organization and increase the profitability.
- The purchase and sales are done unsystematically. So, the corporation should follow the effective purchase and sales policy.
- After adjusting inventory to cash flow, it shows negative balance. So company should apply appropriate inventory policy to manage cash flow.
- The company should apply technique inventory management effectively and systematically.
- The company should manage its correlation co-efficiency between sales and inventory to make high degree of positive relationship.
- The company should manage its overall profitability.

APPENDICES

Appendix I

Computation of Cost of Goods Sold

Fiscal Year	Opening Inventory	Purchase	Closing Inventory	Cost of Goods Sold
2055/056	22.45	144.07	25.5	141.02
2056/057	25.5	144.48	16.55	153.43
2057/058	16.55	137.93	28.99	125.49
2058/059	28.99	133.16	19.99	142.16
2059/060	19.99	154.08	37.07	137
2060/061	37.07	213.81	68.81	182.07
2061/062	68.81	298.25	47.07	319.99
2062/063	47.07	179.84	78.99	147.92
2063/064	78.99	127.97	87.66	119.3
2064/065	87.66	100.83	71.45	117.04
2065/066	71.45	131.73	61.17	142.01

Note: Cost of Goods Sold = Opening Inventory + Purchase – Closing Inventory

Appendix- II

Computation of Average Inventory and Inventory Holding Ratio

Fiscal Year	Opening Inventory	Closing Inventory	Cost of Goods Sold	Average Inventory	Inventory Holding Ratio
2055/056	22.45	25.5	141.02	23.975	5.88196
2056/057	25.5	16.55	153.43	21.025	7.297503
2057/058	16.55	28.99	125.49	22.77	5.511199
2058/059	28.99	19.99	142.16	24.49	5.804818
2059/060	19.99	37.07	137	28.53	4.801963
2060/061	37.07	68.81	182.07	52.94	3.439176
2061/062	68.81	47.07	319.99	57.94	5.522782
2062/063	47.07	78.99	147.92	63.03	2.346819
2063/064	78.99	87.66	119.3	83.325	1.431743
2064/065	87.66	71.45	117.04	79.555	1.471183
2065/066	71.45	61.17	142.01	66.31	2.141608

Note: Average Inventory = (Opening Inventory + Closing Inventory)/2 Inventory Holding

Ratio = COGS/Average Inventory

Appendix- III

Calculation of Mean, Standard Deviation and Coefficient of correlation of Net Sales and inventory

Fiscal Year	Sales (Y)	Inventory (X)	X ²	Y ²	XY
2055/056	173.85	25.5	650.25	30223.82	4433.175
2056/057	184.24	16.55	273.9025	33944.38	3049.172
2057/058	158.05	28.99	840.4201	24979.8	4581.87
2058/059	174.32	19.99	399.6001	30387.46	3484.657
2059/060	187.59	37.07	1374.185	35190.01	6953.961
2060/061	246.1	68.81	4734.816	60565.21	16934.14
2061/062	389.89	47.07	2215.585	152014.2	18352.12
2062/063	219.39	78.99	6239.42	48131.97	17329.62
2063/064	185.06	87.66	7684.276	34247.2	16222.36
2064/065	191.62	71.45	5105.103	36718.22	13691.25
2065/066	213.9	61.17	3741.769	45753.21	13084.26
Total	ΣY= 2324.01	ΣX= 543.25	ΣX ² = 33259.33	ΣY ² = 532155.5	ΣXY= 118116.6

$$\text{Mean of sales} = \frac{\Sigma y}{n} = \frac{2324.01}{11} = 211.27$$

$$\text{Mean of Inventory} = \frac{\Sigma x}{n} = \frac{543.25}{11} = 49.20$$

$$\text{S.D. of Inventory} = \sqrt{\left\{ \frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n} \right)^2 \right\}} = \sqrt{\left\{ \frac{33259.33}{11} - \left(\frac{543.25}{11} \right)^2 \right\}} = 61.17$$

$$\text{S.D. of Sales} = \sqrt{\left\{ \frac{\Sigma y^2}{n} - \left(\frac{\Sigma y}{n} \right)^2 \right\}} = \sqrt{\left\{ \frac{52155.5}{11} - \left(\frac{2324.01}{11} \right)^2 \right\}} = 24.18$$

$$\text{Coefficient of Variation of sales (C.V.)} = \frac{\text{S.D. of sales}}{\text{Mean of sales}} \times 100 = \frac{24.18}{211.27} = 28.95\%$$

$$\text{Coefficient of variation of inventory (C.V.)} = \frac{\text{S.D. of inventory}}{\text{Mean of inventory}} \times 100 = \frac{61.17}{49.20} = 48.15\%$$

Appendix- IV
Calculation of Mean, Standard Deviation and Coefficient
of correlation of Net Profit and inventory

Fiscal Year	Sales (Y)	Inventory (X)	X ²	Y ²	XY
2056/057	0.79	16.55	273.9025	0.6241	13.0745
2057/058	-1.23	28.99	840.4201	1.5129	-35.6577
2058/059	1.06	19.99	399.6001	1.1236	21.1894
2059/060	2.67	37.07	1374.185	7.1289	98.9769
2060/061	5.03	68.81	4734.816	25.3009	346.1143
2061/062	7.3	47.07	2215.585	53.29	343.611
2062/063	4.98	78.99	6239.42	24.8004	393.3702
2063/064	2.91	87.66	7684.276	8.4681	255.0906
2064/065	-10.37	71.45	5105.103	107.5369	-740.937
2065/066	1.31	61.17	3741.769	1.7161	80.1327
Total	ΣY = 14.98	ΣX = 543.25	ΣX ² = 33259.33	ΣY ² = 231.7828	ΣXY = 788.4804

$$\text{Mean of Net profit} = \frac{\sum y}{n} = \frac{14.98}{11} = 1.36$$

$$\text{Mean of Inventory} = \frac{\sum x}{n} = \frac{543.25}{11} = 49.20$$

S.D. of Inventory =

$$\sqrt{\left\{ \frac{\sum x^2}{n} - \left(\frac{\sum x}{n} \right)^2 \right\}} = \sqrt{\left\{ \frac{33259.33}{11} - \left(\frac{543.25}{11} \right)^2 \right\}} = 61.17$$

$$\text{S.D. of Net profit} = \sqrt{\left\{ \frac{\sum y^2}{n} - \left(\frac{\sum y}{n} \right)^2 \right\}} = \sqrt{\left\{ \frac{231.78}{11} - \left(\frac{14.98}{11} \right)^2 \right\}} = 4.39$$

Coefficient of variation of Net profit (C.V)

$$= \frac{\text{S.D. of net profit}}{\text{Mean of net profit}} \times 100 = \frac{4.39}{1.36} \times 100 = 321.89\%$$

Coefficient of variation of inventory (C.V)

$$= \frac{\text{S.D. of inventory}}{\text{Mean of inventory}} \times 100 = \frac{61.17}{49.20} \times 100 = 48.15\%$$

Appendix V

**Calculation of Mean, Standard Deviation and Coefficient
of correlation of Purchase and inventory**

Fiscal Year	Sales (Y)	Inventory (X)	X ²	Y ²	XY
2055/056	144.07	25.5	650.25	20756.16	3673.785
2056/057	144.48	16.55	273.9025	20874.47	2391.144
2057/058	137.93	28.99	840.4201	19024.68	3998.591
2058/059	133.16	19.99	399.6001	17731.59	2661.868
2059/060	154.08	37.07	1374.185	23740.65	5711.746
2060/061	213.81	68.81	4734.816	45714.72	14712.27
2061/062	298.25	47.07	2215.585	88953.06	14038.63
2062/063	179.84	78.99	6239.42	32342.43	14205.56
2063/064	127.97	87.66	7684.276	16376.32	11217.85
2064/065	100.83	71.45	5105.103	10166.69	7204.304
2065/066	131.73	61.17	3741.769	17352.79	8057.924
Total	ΣY = 1766.15	ΣX = 543.25	ΣX ² = 33259.33	ΣY ² = 313033.6	ΣXY = 87873.67

$$\text{Mean of Purchase} = \frac{\sum y}{n} = \frac{1766.15}{11} = 160.56$$

$$\text{Mean of Inventory} = \frac{\sum x}{n} = \frac{543.25}{11} = 49.20$$

S.D. of Inventory =

$$\sqrt{\left\{ \frac{\sum x^2}{n} - \left(\frac{\sum x}{n} \right)^2 \right\}} = \sqrt{\left\{ \frac{33259.33}{11} - \left(\frac{543.25}{11} \right)^2 \right\}} = 61.17$$

S.D. of Purchase =

$$\sqrt{\left\{ \frac{\sum y^2}{n} - \left(\frac{\sum y}{n} \right)^2 \right\}} = \sqrt{\left\{ \frac{313033.6}{11} - \left(\frac{1766.15}{11} \right)^2 \right\}} = 51.75$$

Coefficient of variation of Purchase (C.V) =

$$\frac{\text{S.D. of net profit}}{\text{Mean of net profit}} \times 100 = \frac{51.75}{160.56} \times 100 = 32.23\%$$

Coefficient of variation of inventory (C.V) =

$$\frac{\text{S.D. of inventory}}{\text{Mean of inventory}} \times 100 = \frac{61.17}{49.20} \times 100 = 48.15\%$$

Appendix VI

Calculation of Mean, Standard Deviation and Coefficient of Correlation of Purchase and Net Sales

Fiscal Year	Sales (Y)	Inventory (X)	X ²	Y ²	XY
2055/056	144.07	173.85	30223.82	20756.16	25046.57
2056/057	144.48	184.24	33944.38	20874.47	26619
2057/058	137.93	158.05	24979.8	19024.68	21799.84
2058/059	133.16	174.32	30387.46	17731.59	23212.45
2059/060	154.08	187.59	35190.01	23740.65	28903.87
2060/061	213.81	246.1	60565.21	45714.72	52618.64
2061/062	298.25	389.89	152014.2	88953.06	116284.7
2062/063	179.84	219.39	48131.97	32342.43	39455.1
2063/064	127.97	185.06	34247.2	16376.32	23682.13
2064/065	100.83	191.62	36718.22	10166.69	19321.04
2065/066	131.73	213.9	45753.21	17352.79	28177.05
Total	ΣY = 1766.15	ΣX = 2324.01	ΣY ² = 532155.5	ΣX ² = 313033.6	ΣXY = 405120.4

$$\text{Mean of Sales} = \frac{\sum y}{n} = \frac{2324.01}{11} = 211.27$$

$$\text{S.D. of Sales} = \sqrt{\left\{ \frac{\sum x^2}{n} - \left(\frac{\sum x}{n} \right)^2 \right\}} = \sqrt{\left\{ \frac{532155.5}{11} - \left(\frac{2324.01}{11} \right)^2 \right\}} = 24.18$$

Coefficient of variation of Sales (C.V) =

$$\frac{\text{S.D. of net profit}}{\text{Mean of net profit}} \times 100 = \frac{24.18}{211.27} \times 100 = 28.95\%$$

$$\text{Mean of Purchase} = \frac{\sum x}{n} = \frac{1766.15}{11} = 160.56$$

S.D. of Purchase =

$$\sqrt{\left\{\frac{\sum y^2}{n} - \left(\frac{\sum y}{n}\right)^2\right\}} = \sqrt{\left\{\frac{313033.6}{11} - \left(\frac{1766.15}{11}\right)^2\right\}} = 51.75$$

Coefficient of variation of inventory (C.V) =

$$\frac{\text{S.D. of inventory}}{\text{Mean of inventory}} \times 100 = \frac{51.75}{160.56} \times 100 = 32.23\%$$

Appendix VII

Calculation of Regression on Inventory and Sales

(In Crore Rs)

Fiscal Year	Inventory (Y)	Net Sales(X)	Y ²	X ²	XY
2055/056	25.50	173.85	650.25	30223.82	4433.18
2056/057	16.55	184.24	273.90	33944.38	3049.17
2057/058	28.99	158.05	840.42	24979.80	4581.87
2058/059	19.99	174.32	399.60	30387.46	3484.66
2059/060	37.07	187.59	1374.16	35190.01	6953.96
2060/061	68.81	246.10	4734.82	60565.21	16934.14
2061/062	47.07	389.89	2215.56	152014.2	18352.12
2062/063	78.99	219.39	6239.42	48131.97	17329.62
2063/064	87.66	185.06	7684.28	34247.20	16222.36
2064/065	71.45	191.62	5105.11	36718.22	13691.25
2065/066	61.17	213.90	3741.77	45753.21	13084.26
Total	ΣY= 543.25	ΣX =2324.01	ΣY²=33259.33	ΣX²=532155.5	ΣXY = 118116.6

Let Regression equation Y on X be $Y = a + bX$ (I)

Then two normal equations

$$\Sigma Y = na + b \Sigma X \dots\dots\dots (II)$$

$$\text{And, } \Sigma XY = a \Sigma X + b \Sigma X^2 \dots\dots\dots (III)$$

Substituting the above calculated value in equation number (II) and (III)

$$543.25 = 11a + b2324.01 \dots\dots\dots (IV)$$

$$118116.6 = a2324.01 + b532155.5 \dots\dots\dots (V)$$

Now, multiplying equation no (IV) by 211.28 and then subtracting to equation no (V)

$$1147777.86 = a2324.01 + b491016.83$$

$$118116.6 = a2324.01 + b532155.5$$

$$(-3338.64 = b41138.67)$$

$$\text{Or, } b = \frac{-3338.64}{-41138.67}$$

$$\text{Or, } b = 0.08$$

Substituting the value of 'b' in equation no (IV)

$$543.25 = a11 + 0.08 \times 2324.01$$

$$\text{Or, } 11a = 543.25 - 185.92$$

$$\text{Or, } a = \frac{357.33}{11} = 32.48$$

According to this calculation the following results to be obtained:

$$A = 32.48, \text{ and } b = 0.08$$

Substituting the values of 'a' and 'b' in equation (I) then the regression line is

$$Y = 32.48 + 0.08X$$

Appendix VIII

Calculation of Regression on Inventories and Net Profit

(In Crore Rs)

Fiscal Year	Inventory (X)	Net Profit (Y)	Y ²	X ²	XY
2055/056	25.50	0.53	0.28	650.25	13.52
2056/057	16.55	0.79	0.62	273.90	13.07
2057/058	28.99	-1.23	1.51	840.42	-35.66
2058/059	19.99	1.06	1.12	399.60	21.19
2059/060	37.07	2.67	7.13	1374.19	98.98
2060/061	68.81	5.03	25.30	4734.82	346.11
2061/062	47.07	7.30	53.29	2215.59	343.61
2062/063	78.99	4.98	24.80	6239.42	393.37
2063/064	87.66	2.91	8.47	7684.28	255.09
2064/065	71.45	-10.37	107.54	5105.10	-740.93
2065/066	61.17	1.31	1.72	3741.77	80.13
Total	ΣX= 543.25	ΣY= 14.98	ΣY ² = 231.78	ΣX ² = 33259.33	ΣXY= 788.48

Let, Regression equation Y on X is, $Y = a + bx$ (I)

Then two normal equations

$$\Sigma Y = na + b \Sigma X \dots\dots\dots (II)$$

$$\text{Andy } \Sigma XY = a \Sigma X + b \Sigma X^2 \dots\dots\dots (III)$$

By substituting the above calculated value in equation number (II) and (III), the following equations are derived.

$$14.98 = 11a + b543.28 \dots\dots\dots (IV)$$

$$788.48 = a543.28 + b33259.33 \dots\dots\dots (V)$$

Now multiplying equation no (IV) by 49.3863 and then subtracting from equation no (V)

$$739.81 = a543.25 + b26829.11$$

$$788.48 = a543.25 + b33259.33$$

$$-48.67 = - b6430.22$$

$$\text{Or, } b = \frac{-48.67}{-6430.22} = 0.0076$$

Substituting the value of 'b' in equation no (IV)

$$14.98 = 11a + b543.28$$

$$\text{Or, } 11a = 14.98 - 4.13$$

$$\text{Or, } a = \frac{-10.85}{11} = 0.99$$

Substituting the values of 'a' and 'b' in equation (I) then the regression line is

$$Y = 0.99 + 0.6676X.$$

Appendix- IX

Calculation of Regression on Inventories and Purchases

(In Crore Rs)

Fiscal Year	Inventory (Y)	Purchases (X)	X ²	Y ²	XY
2055/056	25.50	144.07	20756.16	650.25	3673.79
2056/057	16.55	144.48	20874.47	273.90	2391.14
2057/058	28.99	137.93	19024.68	840.42	3998.59
2058/059	19.99	133.16	17731.59	399.60	2661.87
2059/060	37.07	154.08	23740.65	1374.19	5711.75
2060/061	68.81	213.81	45714.72	4734.82	14712.27
2061/062	47.07	298.25	88953.06	2215.59	14038.63
2062/063	78.99	179.84	32342.43	6239.42	14205.56
2063/064	87.66	127.97	16376.32	7684.28	11217.85
2064/065	71.45	100.83	10166.69	5105.10	7204.30
2065/066	61.17	131.73	17352.79	3741.77	8057.92
Total	ΣY = 543.25	ΣX = 1766.15	ΣX ² = 313033.6	ΣY ² = 33259.33	ΣXY = 87873.67

Let, Regression equation Y on X is, $Y = a + bx$ (I)

Then two normal equations

$$\Sigma Y = na + b \Sigma X \dots\dots\dots (II)$$

$$\text{And } \Sigma XY = a \Sigma X + b \Sigma X^2 \dots\dots\dots (III)$$

Substitute the above calculated value in equation number (II) and (III).

$$543.25 = 11a + b1766.15 \dots\dots\dots (IV)$$

$$87873.67 = a1766.15 + b313033.60 \dots\dots\dots (V)$$

Now, multiplying equation (IV) by 160.56 and then subtracting to equation no. (V)

$$87224.22 = a1766.15 + b283573.04$$

$$87873.67 = a1766.15 + b313033.60$$

$$- 649.35 = - b29460.56$$

$$\text{Or } b = \frac{-29460.56}{-649.45} = 0.022$$

Substituting the value of 'b' in equation no (IV)

$$543.25 = 11a + 0.022 + 1766.15$$

$$\text{Or, } 11a = 543.25 + 38.86$$

$$\text{Or, } a = \frac{504.39}{11} = 45.85$$

Substituting the values of 'a' and 'b' in equation (I) then the regression line is

$$Y = 45.85 + 0.022X$$

Appendix- X

Calculation of Regression on Net Sales and Purchases

(In Crore Rs)

Fiscal Year	Net Sales (Y)	Purchases (X)	X ²	Y ²	XY
2055/056	173.85	144.07	20756.16	30223.82	25046.57
2056/057	184.24	144.48	20874.47	33944.38	26619
2057/058	158.05	137.93	19024.68	24979.8	21799.84
2058/059	174.32	133.16	17731.59	30387.46	23212.45
2059/060	187.59	154.08	23740.65	35190.01	28903.87
2060/061	246.10	213.81	45714.72	60565.21	52618.64
2061/062	389.89	298.25	88953.06	152014.2	116284.7
2062/063	219.39	179.84	32342.43	48131.97	39455.1
2063/064	185.06	127.97	16376.32	34247.2	23682.13
2064/065	191.62	100.83	10166.69	36718.22	19321.04
2065/066	213.90	131.73	17352.79	45753.21	28177.05
Total	ΣY =2324.01	ΣX = 1766.15	ΣX ² = 313033.6	ΣY ² = 532155.5	ΣXY = 405120.4

Let, Regression equation Y on X is, $Y = a + bx$ (I)

Then two normal equations

$$\Sigma Y = na + b \Sigma X \dots\dots\dots (II)$$

$$\text{And } \Sigma XY = a \Sigma X + b \Sigma X^2 \dots\dots\dots (III)$$

Substitute the above calculated value in equation no (II) and (III)

$$2324.01 = 11a + b1766.15 \dots\dots\dots (IV)$$

$$405120.4 = a1766.15 + b313033.6 \dots\dots (V)$$

Now, multiplying equation number (IV) by 160.559 and then subtracting to equation no. (V)

$$\begin{aligned} 37314.72 &= a1766.14 + b283571.28 \\ \underline{405120.40} &= \underline{a1766.14 + b313033.60} \\ -31979.68 &= -b29462.32 \end{aligned}$$

$$\text{Or, } a = \frac{-31979.68}{-29462.32} = 1.085$$

By substituting the value of 'b' in equation no (IV), the following equation are derived.

$$2324.01 = 11a + 1.085 \times 1766.15$$

$$\text{Or, } a = \frac{-407.74}{-11} = 37.07$$

Substituting the values of 'a' and 'b' in equation (I) then the regression line is
 $Y = 37.07 + 14.085X$

Appendix- XI

Calculation of Regression on Inventory and Cash flow

(In Crore Rs)

Fiscal Year	Inventory (X)	Net Profit (Y)	Y ²	X ²	XY
2055/056	25.50	-0.35	0.1225	650.25	-8.925
2056/057	16.55	-0.08	0.0064	273.9025	-1.324
2057/058	28.99	2.81	7.8961	840.4201	81.4619
2058/059	19.99	-0.93	0.8649	399.6001	-18.5907
2059/060	37.07	-1.53	2.3409	1374.185	-56.7171
2060/061	68.81	2.03	4.1209	4734.816	139.6843
2061/062	47.07	1.78	3.1684	2215.585	83.7846
2062/063	78.99	-2.49	6.2001	6239.42	-196.685
2063/064	87.66	1.34	1.7956	7684.276	117.4644
2064/065	71.45	1.53	2.3409	5105.103	109.3185
2065/066	61.17	-1.74	3.0276	3741.769	-106.436
Total	ΣX =543.25	ΣY = 2.37	ΣY ² = 31.8843	ΣX ² = 33259.33	ΣXY = 143.036

Let, Regression equation Y on X is, $Y = a + bx$ (I)

Then two normal equations

$$\Sigma Y = na + b \Sigma X \dots\dots\dots (II)$$

$$\text{Andy } \Sigma XY = a \Sigma X + b \Sigma X^2 \dots\dots\dots (III)$$

Putting the above calculating value in equation no (II) and (III)

$$2.37 = 11a + b543.25 \dots\dots\dots (IV)$$

$$143.04 = a543.25 + b33259.33 \dots\dots (V)$$

Now multiplying equation no (IV) by 49.3863 and then subtracting to equation no (V)

$$117.045 = a543.25 + b26829.11$$

$$143.036 = a543.25 + b33259.33$$

$$-25.9 = -b6430.22$$

$$\text{Or, } a = \frac{-25.99}{-64.30.22} = 0.004$$

Plotting the value of 'b' in equation no (IV)

$$2.37 = 11a + 0.004 \times 543.25$$

$$\text{Or, } 11a = 2.37 - 2.17$$

$$\text{Or, } a = 2.37 - 2.17$$

$$\text{Or, } a = 0.197/11 = 0.0179$$

Substituting the values of 'a' and 'b' in equation (I) then the regression line is

$$Y = 0.0179 + 0.004X$$

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