INVENTORY MANAGEMENT
(A CASE STUDY OF SALT TRADING CORPORATION LIMITED)

By:
Pramod Prasad Chaudhary
Campus Roll No. 12/2063
T.U. Regd. No: - 7-1-15-540-2000
Thakur Ram Multiple Campus
Birgunj, Parsa

A Thesis submitted to:
Office of the Dean,
Faculty of Management
Tribhuvan University

In partial fulfillment of the requirements for the
Degree of Master of Business Studies (MBS)

Birgunj, Parsa, Nepal
March, 2010

Recommendation

This is to certify that the thesis

Submitted by:-
Pramod Prasad Chaudhary
Entitled
Inventory Management
"A Case Study of Salt Trading Corporation Limited"
has been prepared as approved by this Department in the prescribed format
of the
Faculty of Management.
This thesis is forwarded for examination.

…………………..   …………………………….
Lalan Dwibedi   **Rajeshwar Pd. Acharya**
(Thesis Supervisor)   **(Chairperson, Research Committee)**
Lecturer, T.R.M.Campus, Birgunj   **AssociateProf.T.R.M.Campus,Birgunj**

………………………….

Campus Chief
T.R.M. Campus, Birgunj

Date:-………………………

VIVA-VOCE SHEET

We have conducted the viva-voce examination of the thesis

Submitted by:-
Pramod Prasad Chaudhary

Entitled:-
Inventory Management
"A Case Study of Salt Trading Corporation Limited"
And found the thesis to be original work of the student and written according to the prescribed format. We recommended the thesis to be accepted as partial fulfillment of the requirements for the
Master's Degree in Business Studies (MBS)

<u>Viva- Voce Committee</u>

Head of Research Department ……………………………………

Member (Thesis Supervisor) ……………………………………

Member (External Expert) ……………………………………

Date: - …………………..

ACKNOWLEDGEMENT

Many helpful hands are needed to complete a beautiful work. After completion of the work, immense joy can be experienced. I am extremely grateful with all of them who have helped, guided and supervised to complete this work.

I would like to pay sincere thanks to **Mr.Rajeshwar Pd. Acharya,** Head of Department of Research committee**, Mr. Kripa Sindhu Prasad,** Campus Chief of Thakur Ram Multiple Campus and my thesis supervisor **Mr. Lalan Dwibedi,** Lecturer of Thakur Ram Multiple Campus, Birgunj.

Secondly the credit goes to my respected lectures **Mr.Sanjay Shrestha, Dr.Deepak Shakya, Mr.Indu Shekhar Mishra, Mr.Avinash Singh and Mr. Ganesh Niraula** who helped me by providing significant ideas, encouragement and techniques besides their invaluable time.

I am indebted to my colleagues **Sarmendra Prasad Chaudhary, Sunil Singh Danuwar, Anand Kumar Yadav** for motivating during the course of my thesis.

I must thank my parents who correctly guided and protected me in many ways during the course of my career development.

Thanks also all staffs of Salt Trading Corporation Ltd (Birgunj Branch), specially, **Mr.Shiva Pandey** who helped me, giving necessary data and information during the study. Similarly, all the Librarians of Thakur Ram Multiple Campus**.**

The special thanks go to my brother **Mr. Kamod Prasad Chaudhary and Pradeep Prasad Chaudhary** who accompanied me day and night, for their invaluable contribution to tern this thesis into a grand success.

Date: - …………………….   **Pramod Prasad Chaudhary**

DECLARATION

I hereby declare that the work reported in this thesis entitled **"Inventory Management: A Case Study of Salt Trading Corporation Limited"** submitted to the Office of Dean, Faculty of Management, Tribhuvan University is my original work done in the form of partial fulfillment for the requirements of Master's Degree in Business Studies (MBS) under the supervision of Mr.Lalan Dwibedi, Lecturer of Thakur Ram Multiple Campus, Birgunj.

Date: - …………………………

…………………………....
Pramod Prasad Chaudhary
T.R.M.Campus, Birgunj
Campus Roll No: - 12/2063

<u>Table of Contents</u>   <u>Page No.</u>

CHAPTER-III-RESEARCH METHODOLOGY

CHAPTER-IV-DATA PRESENTATION AND ANALYSIS

LIST OF TABLES

LIST OF FIGURES

Page No.

CHAPTER-1
INTRODUCTION

1.1   Background of the Study

Asian small country is said to be a sand-witched in between two giant and most popular countries of the world, China in the north and India in the east, west and south. Nepal is landlocked country beside this it is the country of Himalayas and mountains.

Inventory is store of goods or materials or stocks of the organization which are frequently occurs in the business houses or trading houses. Inventory can be either raw materials, finished items already available for sale, or goods in the process of being manufactured. So the inventory is recorded as an asset on a company's balance sheet. When the goods are purchased by the Trading houses they have to be stored until they sent to the market. Thus inventory involves higher amount of cost in term of occupying the space and blocking the huge amount of capital. Modern concept of inventory management can be traced from 1915-1922 with several authors like Davis, Clark, Owen and others acting independently. They had developed an economic lot size equation which has minimize sum of holding cost and carrying cost for where the demand has known and constant.

Inventory is form a link between demand of the goods and supply of the goods. The inventory exists anywhere i.e. manufacturing or non manufacturing organization. But, mostly the inventories are appearing manufacturing and trading houses. There are four types of inventories in the manufacturing organization. First one is raw material, those units that have been 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 which has completely manufactured products i.e. 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 is only appears i.e. finished goods and stock in trade.

Inventory management involves planning of the optimal level of inventory and control of inventory cost supported by an organization structure, which is staffed by trained person and directed by top management. It involves both financial dimension as well as

physical dimension and these dimensions are interrelated and can't be looked in isolation (Agrawal, 2000: 68).

Thus inventory management and control system is adequately considered by the top management of the trading houses so as to reduce the cost of store. So, high inventory isn't a good sign because there sis a cost associated with storing the extra inventory of the trading houses. Inventory should be maintained appropriate quantity so as to avoid the risk of both over and under stock situation. 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. Therefore inventory is maintained desired level so as 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 decisions. The area of inventory management covers the following individual 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, and arrange the receipt, disbursement and procurement of goods are in operation. There are also develop the form of reordering the transaction, assign the responsibility for carrying out the inventory control function and provide the necessary report for supervise these overall activities of top management.

1.2   Introduction of Salt Trading Corporation (STC)

Salt Trading Corporation Limited (STC) was established four decades ago through the joint efforts of Nepal Government and the private sector to ensure proper supply and distributions of essential consumer items throughout the country. Its first task was to make edible salt readily available for all. The salt trade then was disordered and unreliable. This success in supply management led to the addition of 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 Udayog Limited, Nepal Vegetable Ghee Udayog Limited, Butwal spinning Mills Limited, Gorkhkali Rubber Udayog Limited, Morang sugar Mills Limited and Gharelu Hastakala Udayog pvt. Limited and shoulders management responsibilities of many more industries. The organization has also been assigned the responsibility of implementing the Nepal – India Goiter Control Project.

The group's turnover exceeds NRs. 3.5 billion and investment in fixed asset is close to NRs. 1.5 billion. Till this day, STC has share capital of Rs. 247.78 million. It trade Rs 2190 billion and it get a net profit Rs 498 million.

The organization was not only able to meet the demand but was also able to maintain quality and, later, was able to provide iodized salt to prevent goiter - a diseases that once plagued the Nepalese society. This success in supply management led to the addition of essential commodities such as sugar, food grains and processed eatables into its distribution network. Profits from trading activities were invested in the production of basic necessities to boost self – sufficiency, accelerate economic growth and gain public and private support.

From it infancy as a trading as a trading house, STC has matured into a diversified conglomerate with unmatched distribution network all over the kingdom. Its twenty branches scattered throughout the country provide the people easy access to imported and locally produced goods and act as major procurement outlets for goods produced in various parts of the country.

The employment opportunities that arise through the activities of the organization are hard to quantify as they also provide plenty of self- employment opportunities. STC has helped develop and boost the Nepalese entrepreneurial abilities. The STCdirectly employees about 400 individuals currently. (www. stcnepal .com)

1.3   Focus of The Study

The case study of the Salt Trading Corporation is that the net profit of the corporation is continuously positive and the researcher want to know that such a trend is effective

inventory management or not. So the researcher chooses this topic for the researcher study. Focus of the study is about inventory management (mainly the Salt) of the Salt Trading Corporation.

1.4   Statement of The Problem

In Nepal, trading houses are accepted to build the infrastructure to stock the goods and supply consumer goods in complement and supplement to the private as well as public sector. They are also expected to generate revenue and contribute the national economy through their operation.

STC was establishment more than four decades ago through the joint efforts of 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 also expected to be financially sound and to contribute surplus capital to the national treasury. This success in supply management led to the addition of essential commodities such as sugar, foods grains and processed eatables into its distribution network throughout the country. Forty years of dedication and service to the nation and her people has today made Salt Trading Corporation Limited (STC) a major catalyst in bringing about the desired economic changes and growth in Nepal. However, the inventory position of the corporation is steady increasing from 2060/2061 with fluctuating probabilities. In addition many previous studies in this area of inventory management indicated that there is poor inventory management practices in Nepalese companies, in order to examine this findings, STC has been selected and tried to answer the following questions.

➢ Is there any relationship between inventory and other factors like net sales, net profit, purchases and assets etc?

➢ Is there any consistency, fluctuate ability of inventory in comparison of others?

➢ Is a systematic and scientific inventory management system followed by STC?

➢ Are finished goods are stored   in warehouse with proper safety programmed or not?

➢ To what extent a scientific analysis is done to minimize the inventory costs?

➢ What types of inventory models are applied and what extent?

➢ Is EOQ model applied in purchasing?

➢ What is the issuing and pricing policy of inventories?

➢ Is quality of inventories are given proper attention?

➢ Is the management of inventories planned or not?

➢ How can link STC inventories with net profit, current year net sales, interest expenses and purchases?

1.5   Objective of The Study

The major objective of the study is to identify the inventory management practice in STC associated with inventory management problems and analyze them for their resolution in such a way that contribute to the profitability to STC. The specific of the study are as follows:-

➢ To examine the practice of inventory management functions (i.e. procurement or acquisition of goods, storing of goods, issuing the goods from stores etc).

➢ To analyze the position of inventory levels and its trend in STC.

➢ To analyze relationship of inventory with net sales, net profits, purchase and interest expenses.

1.6   Significance of The Study

Inventory management of the Trading houses is one the important task. If inventory of the organization are not effectively and efficiently manage the organization can't achieve their pre-determine goal. Proper management of the inventory helps to maximize the profitability and do not block the required stock level. Nepal is an under industrialized country is using still traditional technique in purchasing of inventory. To have a sound achievement the organization should use modern tools and techniques to reduce cost as well as labor.

This study is needed for effective inventory management in STC and to see the impact of the profitability and find out how much money should be invested in inventory. How can improve the inventory management system, what is the present situation of inventory management system are find out from this study.

1.7   Limitation of The Study

This study deals on just inventory management, not on other dimensions of STC. Analysis is concentrated in some managerial, financial, accounting and planning

aspects to which inventory management linkage. Besides that, it does not cover the other areas of STC. The study has certain limitations which are given follows:-

➢ The study will be based on five fiscal years data i.e.2060/2061 to 2064/2065. Data beyond and after the period of study is also used wherever necessary.

➢ The study is more specific in inventory management not on the other functional area.

➢ The data are taken from secondary as well as primary sources so the finding depends on the reliability of the data.

➢ The conclusion derived from the study doesn't applicable for all kinds of trading companies.

➢ Basically, the data be used in the study from factor source and no attempt is done to examine the reliability of the data.

1.8   Organization of The Study

This study is divided into five chapters which are as follows:-

Chapter one:-It includes introduction along with general background of the study, introduction of salt trading corporation limited, statement of the problem, objectives, significance, limitations and organization of the study.

Chapter two: - It deals with "Review of Literature" that includes the fundamental concept, various dimensions of inventory management and relation of inventory management to profit and control. It also deals with review of literature and review of related previous study.

Chapter three: - It deals with "Research Methodology" consisting of introduction, research design, nature and sources of data, data gathering procedure, tools and techniques of data analysis.

Chapter four: - It deals with 'Presentation and Analysis of data' collected from different sources and analyze to them to reach closer to the actual result by using financial and statistical tools and techniques.

Chapter five: - It includes 'Summary, Conclusion and Recommendation' of overall study. At the end an extensive bibliography and annexes are also included.

CHAPTER-II

REVIEW OF LITERATURE

Scientific researches are based on the past knowledge. Past studies of inventory management can not be ignored because they provide the foundation of present studies. Literature review is taking a literature from past studies of one's related field of research.

As many researchers are done on inventory management of trading houses as well as manufacturing firms in the Nepalese public and private organization. At this chapter, a study is concentrate over the review of literature on inventory management. This chapter is divided in two parts. First part present the theoretical/conceptual review and second part present the review of literature in related studies.

2.1 Theoretical/Conceptual Review of Inventory Management

2.1.1 Introduction of Inventory

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 (Goel, 1985:255).

Every business organization they are big or small has to maintain the some quantity level of inventory in the store house. Inventory servers as the cushions at the time of shortages and provides the efficient use of resources as well in the organization. Inventories are requiring any type of organization and careful plan and formulate the best policy keeping in view the best for the organization. Depending upon the nature of the organization, inventory is durable and non durable.

Inventory management involves the optimal level of inventory planning and controlling of the organization 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 is assumed to be maintained the

required level of stock at the lowest level of total cost. The required level of inventory is determined by the demand of the goods and purchasing department of the organization. Their duties are to acquisition, receiving and storing the inventory at safely and identify the surplus then taking action to reduce it.

Inventory management is the integral part of almost all of the organization. So, existence of the inventory management on the Salt Trading Corporation can not 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.

So among the different aspect of management level, inventory management is also one factor for play a significant role in management of raw materials, parts of supplies, work in process and finished goods and then records on the books and store on the goods in rooms for safely. It is 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.

2.1.2 Types of Inventory

The various forms of materials and goods are held to store in the organization for future uses are known as inventory. Inventory is lie in between the bridge of production and sale of product. Inventory is keeps in the various steps of the organization, at first for raw materials, second for work in process, third for finished goods and then fourth for retail store which may strand the huge amount of capital. The various forms in which inventory appear in manufacturing as well as trading houses are raw materials, work in process, finished goods and part of supplies. The inventories which are frequently store in organization are discussed as below:

Raw Materials: - Raw materials are those goods which are basic inputs for the organization. They are converted into the finished goods through the processing process. These inventories are purchased and stored by the organization for future production of finished goods. In traditional concept, materials are classified in two ways i.e. direct materials and indirect materials. Direct materials includes, all materials and parts that are an integral part of finished goods and its contribution can be directly identified into the finished goods are called. As well indirect materials also includes, all

materials which supported and facilitated in production process of the product are called.

Work in Process: - These inventories are semi-finished goods and they needs to work more before they are converted into the finished goods and then to be ready to sale in the market. Some times it is very difficult to know 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 so happen because of the nature of an organization.

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

Supplies: - The stocks of supplies are includes, all those materials which are helping for day to day operation of office activities. They are necessary to maintain by the organization. The stocks of supplies includes stationary, spares parts for cleaning and operation of machinery, soap, brooms, oil, fuel and lights bulbs etc. these materials are not directly entered in production process but they are necessary for production process.

2.1.3   Objective of the Inventory Management

The inventory is the most important things to all business houses or Trading houses in this industrial world. So it is necessary to proper manage by the nor Trading houses but also to manage by the manufacturing houses as well. The stock of inventory neither inadequate nor excessive is desirable by the Trading houses because of the cost of the organization is blocked. For example if the excessive stock of inventory is piled the fund of the organization is consumed, which indicate that the capital can't used for another purpose thus the organization may lose another opportunity. The carrying cost such as the cost of insurance, storage, handing, recording and inspection also increases the proportion of volume of inventory. 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. At the result the consumer may shift to competitors and organization lose their permanent customers.

Therefore, 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 is lie in between the two danger points i.e. excessive and inadequate. Any way optimal level of inventory management should be lie as follows:

➢ To ensure regular supply at the time of demand

➢ To maintain the sufficient level of stock at the time of shortages and price changes.

➢ To minimize the carrying cost and ordering cost.

➢ To reduce the lead time.

➢ To control over the investment in inventory and keep in optimal level.

The main objective of the inventory management should be to determine and to maintain the optimal level of the organization. The optimal level of inventory is always and anywhere 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 invest in another purpose. So, the organization may loose another good opportunity. This keeps as well carrying cost and risk of liquidity. The excessive cost directly impacts the profitability of the organization or in other world decreases the profitability. Similarly, the inventory can't possible to sell whenever we want, without demand for the customer. So over investment on the inventory should be cut down by the organization but to maintain the optimal level.

Where as under investment over the inventory is also not good for the trading houses. If the demand of the goods can't meet the organization the customer may shift to competitors and goods will of the organization is also lost. Therefore optimum level of inventory is always maintained on the basis of trade off between the cost and benefit.

Thus the objectives of the inventory management of the organization is to maintain the optimum level of inventory which is neither excessive nor the inadequate.

The various objectives of the inventory management are summarized as follows

➢ To maintain to available all types of inventory at the time of required.

➢ Do not invest over or under amount of capital in the inventory.

➢ To reduce the wastage at the time of store in the godown.

➢ To reduce risk of spoilage and obsolescence of inventory by using the LIFO and FIFO

➢ To communicate up to date information about level of inventory to the top management

2.1.4 Major Functions of Inventory Management

2.1.4.1 Purchase Management

It is a most important function of an every organization in this dynamic world. In narrow sense purchasing means the act of buying the items at a reasonable price. Purchasing is also known as procurement which refers the process by which the organizations acquire raw material components, product, services and other resources from supplies to execute their operations. Similarly, purchasing is an important boundary function that supports operations by acquiring major resources from the conversation process (Weston and Copeland, 1992). The purchasing functions in any organization are concerned with the cost of material purchase, Therefore, purchasing agent has an important role. It is the only department that deals with both the material san cost of material purchase. Therefore, purchasing agent has an important role. It is the only department that deals with both the material and cost should be recognized as the value of the organization.

Objective of Purchasing: - The major objectives of the purchasing are as follows:

➢ To provide and uninterrupted flow of materials, supplies and services required to operate the firm.

➢ To minimize the inventory investment and losses.

➢ To maintain adequate quality standard.

➢ To find or developed competent supplier.

➢ To purchase required items and services as the lowest ultimate price.

➢ To improve the organization competitive position.

➢ To work harmoniously with other department of the organization

Purchase Procedure: The main steps of purchasing procedure are as follows:

Purchasing requisition: The initiation of purchase banging with the formal request form. Among the various sections of department, the purchase department has to order the required goods. The request is made in purchase requisition slips by the purchase department, needs of the goods are authorize to purchase department for procuring the goods as per the specification given in the slip by the purchase department for procuring the goods as per the specification given in the slip by the date mentioned on it.

Decision For purchase: On the receipt of requisition, the purchase department that decided what and how much to buy in taking consideration various limitations and constraints in purchasing the goods. As far as possible, the raw materials should be purchased in sufficient quantity, neither less nor more, to continue the flow of production. For purchasing other materials of plant and equipment, the necessary permission should be obtained from the authorize department and the finance department to release the capital.

2.1.4.2 Study of the market condition and source of supply

Having taking the decision for the purchase, agent should study the market condition based on market reports as to when and what goods should be purchase. And intensive study should also be made concerning the source to supply from where the goods can be procured with the help of catalogues, past record, list of vender and purchase records.

Selection of vender:- Based on the studies of market conditions and source of supplier, the purchasing agent selects the vender keeping in mind that the reliability is price movement history, is delivery record and top service required and his co-operation. Sometimes supply is selected out of the listed suppliers registered with the company for the supply of goods or sometimes quotation of price bids of tenders are invited from the prospective suppliers on the studying of supply and the quality and quantity of goods, vender is selected out of the bidder a tenderizer.

Purchase ordered: - Having selected the vender supplier, purchase order is prepared in the prescribed form by the purchase department and send to the vender authorized to supply specified quantity and quality of materials at the reasonable price at the time and place mentioned therein.

Receiving materials:- When goods are arrived they are taken delivery and the receiving clerk checks materials with the order placed by the purchasing department to other department the requisitioned them. While checking, if any discrepancy is found regards to quality or quantity, it should immediately referred to the purchasing departments so that discrepancy maybe adjusted.

2.1.4.3 Store Keeping

The best method of maintaining materials properly is store keeping in the corporation. The store keeping is a service function in a manufacturing concern, which deals with the physical storage of goods under the custodian of well trained and experienced person termed as storekeeper. The raw materials are usually known as stock and the place where such stocks are kept is known as storeroom. Store keeping is that aspect of inventory control, which concerned, with the physical storage of goods. The responsibilities of store keeping management are to receive materials, to protect them in storage from unauthorized removal, to issue the materials in the right quantities at the time in the right place and provide these services promptly and at least cost'. In the light of the above explanation store can be described as the keeping of materials in stores in a scientific and systematic way.

The main objectives of store keeping are as follows:

➢ Receiving, handling and issuing goods economically and efficiently.
➢ Using the storage available space and labor effectively.
➢ Protection of all goods in stores against all losses from fire, theft and obsolesce.
➢ Minimizing the investment on inventories.
➢ Maintaining regular supply of raw materials at all times when properly authorized.
➢ Minimizing the inventory holding cost.
➢ Facility ordering or required materials.

To achieve the above objectives, a firm generally uses different types of controlling techniques like:-

Bin Card: - A bin card is a record of the receipt and issue of materials to keep for each items of stores carried. The storekeeper maintains these cards and storekeeper is answerable for any differences between the physical stock and balance shown in the bin card. These cards are used for not only recording, receipts and issues stores but also assist the storekeeper to control the stock. For each items of store, minimum quality, maximum quality and ordering quantity are stated in the cark. By seeing the bin card the storekeeper can send the materials requisition for the purchases of materials in time.

Store Ledger: - This ledger is kept in the costing department and is identical with the bin card accepts that receipts issues and balanced are shown along with their money values. This contains an account for every item of stores and makes a record of the receipts, issues and balance, both in quantity and value. Thus, ledger provides the information for pricing of materials issued and the money value at any time of each item of stores (Jain and Narang, 1991).

Issuing and Pricing: - Materials should be issued against materials requisition slip. The prices of the issues can be based on cost price or market price. Storekeeper should always issue the materials under proper authority to avoid the misappropriation of materials. The pricing of the issue can be used on any one of the following methods, depending on the policy of management (Agrawal, 1975).

➤ First in first out (FIFO)
➤ Last in first out (LIFO)
➤ Sample average.
➤ Replacement price and market price.
➤ Standard price.

All the above methods have its advantages and disadvantages. However, the method chosen is significant for efficient inventory management. The weighted average method is use in various enterprises to determine the pricing. It is calculated by using the following formulae:-

Weighted Average $= \dfrac{Total\ Amount\ of\ closing\ inventory}{Total\ Quantity}$

2.1.5 Needs and Importance of Inventory Management

Inventories of any organization are pivotal / crucial role played by it. If the organization is not pay attention about the management of inventories, the organization's efficiency and profitability are severely affected. So, some important sort of role played for the inventories management of the organization is as follows:

➢ Inventory helps the smooth and efficient operation of business organization.

➢ Inventory helps the 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. If there is to maintain the inventory by the organization and may get a price discount at time of bulk purchasing.

➢ Inventory also acts as buffer stock when raw materials are received late and so many orders are likely be rejected.

➢ Inventory also reduces product cost because there is an additional advantage of batching and long smoothes running productions runs.

➢ Inventory helps to maintain the economy by absorbing some of the fluctuations when the demand for an item fluctuates or are seasonal.

➢ There is also needs of pipeline stocks (are also called process and movement inventories) where the significant amount of time is consumed in transshipment of items from one locality to another.

2.1.6 Cost Associated with Inventory

The goal associated inventory management involved to provide the inventories for sustaining operation of organization at the lowest cost if there is possible. The first step of inventory management is to identify the all those cost which are associated at the time of purchasing and maintaining.

Everettesn E. Adam, J.R. Ronald and J.Evert said that inventory costs or cost associated with inventory includes following five types of costs:

➢ Cost of the item or values of the item paid to the supplies or purchase price.

➢ Cost to procedure the item.

➢ Carrying cost of the item.

➢ Cost associated with being out of stock when units are demanded but are unavailable (stock out).

➢ Cost associated with data gathering and control procedure for the inventory.

Above cost items which are associated to the inventory are describing as follows:

Carrying / holding cost: - Those cost which are related to maintaining inventory in a company's warehouse. That cost includes things like rent, utilities, insurance, taxes, employee costs and the opportunity cost of having capital tied up in. Those cost increases the cost of goods and can't complete the product in the market.

Carrying cost is calculated from the following formula:

Carrying cost (cc)= Average inventory $*$ carrying cost per unit

Symbolically (cc) = $\dfrac{Q}{2} * C$

Where Q= quantity order size

For example, if any organization sales S units and if it places equal order N times per year then Q= S/N unit will be purchased with each year. If the inventory is used to evenly over the year and if numbers of safety stock are carried then the average inventory (A) will be: Average inventory (A) = unit per order/ 2

$$= (S/N) = Q/ 2$$

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

Opportunity cost:- This consist of cost of capital i.e. interest on capital 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 in another purpose. Where the opportunity is may miss organization. Capital which associated for inventory is not uses for another purpose so opportunities obtain by the organization can't be fulfilled. For example, if the capital is uses in the alternatives then the organization may earn 10% but here opportunity is misses so the cost of the inventory is 10%.

Handling cost:- Those cost which are associated at the time of goods are keeping here and there. It is determine quality of goods, distance of store houses and many more.

Storage cost:- Those costs are associated which maintain the inventory at the time of store. These cost include the expenditure made over the inventory staff, expenditure made over 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 depending on the quantity of goods.

Spoilage and shortage cost: - This is another type of inventory carrying cost. Many goods are deteriorating at the time of storage. The precise nature of the goods deteriorates from goods but whatever the cause organization lost the assets because of storage in inventory. Some time organization may lose the goods because of shrinkage and pilferage of inventory which also impact the profitability and assets of the organization.

A common type of spoilage cost occurs when stock is left in inventory after the demand for the product has vanished. This can occur with varying degrees of severity. At one extreme the cost is the sum of all further expenses required for carrying the unable items when the demand ceases. A classic example of this situation is the Christmas trees that are still unsold after the holding season, they have virtually no further economic value, and full purchase cost must be written off as a loss. This danger is showed by most firms of perishable inventories. In less extreme cases such as women/s fashions items, the value of inventory may drop substantially at the end of the season but some residual value can be recouped by the selling the item at reduced price.

Another type of spoilage cost occurs when products deteriorate physically at the time of storage. Food products for e.g. spoil when they are stored too long. Consequently, the value of inventory is reduced by the amount of spoilage. Furthermore, since the quantity of available inventory is reduced shortages and possible stock out cost may be occurred. There are many other ways which inventories due to pilferage vary from 2 to 10 percent per year which can be present a significant cost to the firm. Poor record keeping breakage and less also expensive shortage.

Cost of depreciation: - Investment over the machinery and equipments value are decreases on the time. Value are decreases on the time. Thus the organization must maintain from using provision of depreciation.

Insurance and taxes: - The organization needs too bulk of goods in inventory which also required to holding of inventory cost. The tax is levied over the cost of goods and

quantity of goods which also increases the cost of expenditure and it affects the profitability and price of the good as well. There is also high cost to insure the goods if the organization stores the high quantity which will directly impact the profit and price the goods on the market.

Ordering cost:- 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 voucher and paying the bills. The most important features of these costs are one time costs and therefore they may treat as like fixed cost . Moreover, ordering cost which is also called procurement costs tend to have both fixed and variable elements feature. They may vary considerable for different commodities. The large the quantity, the smaller these costs become on per unit cost because the entire expenses of the order are spread over more items (Era, 1997). This economic factor encourages placing large orders rather than many small ones and they receive further encourages by the trade practices of quantity discounts . Firms 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 to the supplier in the firm of lower handing, shipping, clerical or manufacturing costs.

Generally, the carrying costs are variable and they are depend on the average size of inventory but in the case of ordering costs, it is usually fixed and does not change size of the inventory. Ordering cost or procurement cost or acquisition cost is calculating by using the following formulae:

$$\text{Ordering cost} \quad = \quad \frac{Annual\ requirement}{Quantity\ order\ size} * Ordering\ \cos t\ per\ order$$

Symbolically, ordering cost = $\dfrac{A}{Q} * O$

Where,

A= annual requirements

O = ordering cost per order

Q= quantity order size

Stock out cost:- If the stocks of 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. In the stock out cost production process can be ceases with the insufficient supply raw materials. Some firms feel so strongly about avoiding this type of cost that they offer the customer substitutes of greater value than item from a competition themselves and furnish it to the customers at a loss.

Stock out costs is calculating by using the following formulae:

Stock out cost $_=$ Inventory cycles per year * stock out units * probability of a possible stock out * units stock out cost.

$$\text{Inventory cycles per year} = \frac{Annual\ uses}{Quantity\ order\ size}$$

When the raw material is not available to the production department, it may mean that an entire production line must be shut down if this happens, idle labor and machine cost as well as start up and shut down costs will be incurred. Both of these costs are generally easier to calculate than those of a lost sale.

2.1.7   Technical Formulation

It should be always considers such those kind of questions for the business firm which decreases cost of the firm but increases the profit. The most of the common problem is appear to the entire business firm 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. Therefore, the main complex problem has a large number to stock keeping items but it is not possible to answer these entire question, moreover

development in management science and quantitative approach to business decision. It has been possible to answer these varied question or problem faced by the business units.

2.1.8   Inventory control system

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. Thus, the function of inventory control system is to be obtaining the maximum inventory turnover with the sufficient stock to meet all requirements of the firm.

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 .These two approaches seem to be conflicting. Unit control system of inventories ensures stocks for continuity of operation and sales as well. Obviously, the greatest insurance against running out of any item at a crucial movement is maintaining huge supplies of everything stored in the plant. It will increase the cost of handling the inventory and investment. If value control is imposed there is always a risk of running short of materials. 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.

Thus in the words of john L. Burbidge "Inventory control is concerned with control of the quantities and or monetary values of these items at predetermined level or within safe limits.'' Thus the inventory control management includes the following aspects (Varma and Agrawal, 1990).

> ➢ Size of inventory determining maximum and minimum levels establishing time schedules, procedures and lot of sizes for new orders, ascertaining minimum safety levels, coordinating sales productions and inventory policies.

> ➢ Providing proper storage facilities arranging the receipts, disbursements and procurement of materials, developing the forms of recording these transactions.

> ➢ Assigning responsibilities for carrying out inventory control function.

> ➢ Providing for the reports necessary for supervising the over all activity.

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.

2.1.9 Techniques of Inventory control

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

Fixation of the stock level: - The firm carrying of too much and too little of inventories is thinkable. If the inventory is too little in the firm will be faces frequent stock out involving high ordering cost and if the inventory level is too high in the firm, the firm will be face unnecessary tie up of capital. Therefore, an efficient inventory management requires that should maintain the optimum level of inventory where inventory costs are the minimum and at the same time there is no stock out which may result in loss of sale or stoppage of production.

Minimum stock level: - This is the lower limit, below which the stock of any item should not normally be allowed to fall at all times. Carrying of minimum stock avoids a situation of stock out resulting in the stoppage of production. This stock is a buffer stock of safety stock to be used only under abnormal condition or in an emergency. In the determination of minimum stock level, the following points are taken into consideration.

➢ Re-order level.

➢ Average rate of consumption and

➢ Average lead time (the period of time in between ordering and replenishment)/(re-ordered period).

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

Minimum stock level = Re-order level-(Average/normal consumption ∗ Average/ normal lead time (re-order period).

Minimum stock level: - It is a stock level that can be maintained on the basis of requirement. It is the stock level above which stock should not allowed rising. It is an upper level limit beyond which the quality of any item is not normally to rise. Holding of stock more than maximum limit will increases materials and storage cost and tied up working capital unnecessarily. The maximum level of stock is affected by available of financial resources, store spaces, lead time and nature of materials, reasonability of materials and government control. It is fixed considering the following points:

➢ Re-order level.

➢ Minimum consumption rate lead time.

➢ Minimum lead time or re-order and

➢ Re-order quality.

Maximum stock level is determined by the following formulae:

Maximum stock level = Re-order level + Re-order quantity – (minimum consumption ∗ minimum re- order period).

Average stock level:- An average stock level indicates the average stock held by the firm. It is calculated by the following formulae:

Average stock level = minimum level + 1/2 of re-order quality or

$$\frac{Max.stock\,level + Mini.stock\,level}{2}$$

Re-order level: - When the quality of materials reaches in a certain figure then the fresh order is sent to get materials again. The order is placed before the materials reach minimum stock level. The re-order level is fixed between minimum level and maximum level. Re-order level depends upon the lead time, rate of consumption and economic order quality. Maximum quality of materials required on any day is taken into account while fixing re-orders level.

The re-order level is calculated by using the following formulae:

➤ Re-order level = maximum usage * maximum lead time.

➤ Re-order level = minimum level * consumption during lead time.

➤ Re-order level = safety stock + (lead time * daily consumption).

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

➤ Safety stock = (maximum usage rate – average usage rate)* lead time.

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 immediate there is possibility of stoppage of worker.

It is determined by the using following formulae:

Danger level = average consumption * maximum re-order period for emergency purchase.

2.1.10 Economic Order Quantity (EOQ)

2.1.10.1 Introduction

Another important inventory control techniques is economic order quality. This technique is widely used these days in many countries irrespectively of under developed or developing in nature. A decision about how to order has great significance in inventory management. The quantity to be purchased neither should neither be 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. 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 determine 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 assumption of EOQ:

➤ Holding cost per unit per year (period)

- Ordering cost per order.
- Annual requirement or quantity required per period
- Cost per unit.

Assumption of the EOQ model:

- 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.

Under the above assumption, inventory size is shown as below:

Figure: 2.1

Inventory level under EOQ assumption

Approaches To set EOQ:

2.1.10.2 Determine of Economic Order Quantity

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 can not get a good decision. We can illustrate the concept of EOQ with basic mathematical models as follows, EOQ is calculated by using the following formulae:

$$EOQ = \sqrt{(2\ AO/C)}$$

Where,

EOQ= Annual 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, the following examples prove it:

The manufacturing company requires 100000 kg raw materials to produce finished goods annually. The ordering cost per order is Rs. 90 and carrying cost per unit is Rs. 2 or 20% of unit cost. The unit cost of raw materials is Rs.10. The optimal quantity turns out as follows:

$$EOQ = \sqrt{(2AO/C)}$$

$$= \sqrt{(2*100000*90/2)}$$

$$= 3000\ Units$$

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 (Khan and jain-81).

A tabular arrangement of data relating to items of materials may allow the determination of appropriate EOQ. In this approach following points are included:

➢ No. of orders = Increases no. of order decrease order size

➢ Order size = Annual requirement divided by no. of orders

➢ Average inventory = Order size divided by two

➢ Ordering cost = No. of orders * ordering cost per order

➢ Carrying cost = Average inventory * carrying cost per unit per year

➢ Total cost = Ordering cost + carrying cost.

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 illustrate the EOQ function. 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 cost 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 off set by the increase in carrying costs. The EOQ occurs at the point Q where the total cost is minimum. Thus the firms operating profit is maximized at point Q.

<div align="center">

Figure: 2.2

EOQ Determination

</div>

.

<div align="center">

E.O.Q. Determination

</div>

It should be noticed that the total cost of inventory are fairly in sensitive 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 significance, the firm can change EOQ within the range without any loss.

2.1.11 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 re-

order 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 some where 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 (Jain and Narang 1992).

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

As along as delivery is not instantaneous, an order must be placed so that inventory level is not depleted till a new shipment arrives. This required inventory level is term '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:

Transit stock = stock used per time period * transit time.

To conform the validity of these formulae, the following example has been taken:

The company use 400 units per day (based on 250 working days in a year, 100000/250) and that five days are required for delivery of new orders. The order points reached when inventory is to the transit stock level of 2000 units.

Transit stock = 400* 5 days

= 2000 units.

Uncertainty in demand can be accommodated by adding safety stock for the transit stock level. Safety stock refers to extra inventory held as a hedge or protection against the possibility of stock out. Safety stock reduces or eliminates the cost incurred by a stock out but is adds to carrying costs.

The re-order point then is determined by adding transit stock to safety stock level that the company determines to be cost effective. Optimal re-order point = transit stock +

safety stock. If the company decides that a safety stock of 500 units is optimal, it will place a new order for the EOQ of 300 units when inventory falls to 2500 units.

Optimal re- order point = 2000+500 = 2500units

Thus, basically these items of information are needed as 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. 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:

Figure: 2.3

Inventory Level with transit stock and safety stock

2.1.12 Always Better Control (ABC) Analysis

The cost of collection the required data and calculating an inventory policy for each item can extremely high. For some items, the cost of developing the economic policy may be greater than the cost of saving from its use. Therefore companies rarely study every inventory item in the detail necessary to formulate as special inventory policy for each one. Instead inventory items are differ in value and can follow a selective control system. 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 it 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 know as proportional value analysis (Pandey, 1999).

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 materials ……………..B

Low price materials …………………..C

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

Group	% of items	% Of costs
A	10%	70%
B	20%	20%
C	70%	10%

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

Figure: 2.4

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 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 order. Inventories are checked physically once every six months or every year to determine if new order should be placed.

2.1.13 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 sizeable 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 parts in small lot size

➢ Purchase of materials and parts in small lot size

➢ Effective preventive maintenance of equipment

➢ Skilled workers and flexibility in facilities

2.1.14 Inventory System

Basically, there are just two types of inventories system. They have a numerous variation. 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 (Hadley and Whities 1995). The two bin system and application of the fixed order size approach is one 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 are restored to some predetermined optimum level. No running records of daily inventory activities are kept. The status of the inventory is know 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 inventory or instances where the large number of items precludes the updating of each inventory transaction (Hadley and whities 1995).

➢ Periodic system: Physical count of items made at periodic intervals.

- 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.

2.1.15 Safety Stock

The amount of safety stock required in perpetual 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: 2.5

Relationship of Fixed Order size and safety stock

In the above figure, fore e.g. 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 (Hadley and whities 1995).

2.1.16 Perpetual Inventory System

The perpetual inventory system is maintaining of regular stock records is commonly known. It fact, perpetual inventory system implies a complete and up dated of each item of stores both on records and physical good. 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 recodes. The continuous stock taking is an essential future 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 items.

2.1.17 Comparison of the periodic and perpetual 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 control needed and the nature of the source of supply (Hadley and Whities, 1995) .

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 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 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 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 (Hadley a Whities, 1995).

2.2   Review of Related Studies

Above, 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 thee course of study.

Inventory management exports 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" (Agrawal , 1980).

"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 staffs towards materials cost because lack of knowledge and carelessness, which were the responsible of this management of inventory'' (RAO and Rao).

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 to management of stocking of spare parts it hampered for the smooth operation of the enterprises (CEDA, 1973).

Shrestha, Indira (20000) has conducted on study the topic of '**Inventory management of manufacturing industries in Nepal with special reference of Quick Foods'** .The study depicted the same type of problems as the previous related studies. The inputs necessary to produce noodles and cheese balls are found to be estimated by the company. The economic order size, handling charges, maintaining ordering and carrying charges etc are predetermined unscientifically and do not use any type of analytical tools and techniques which are not helping the company in reducing unnecessary cost. The concepts of optimum level help to maintain optimum level of inventory which are not given serious consideration while deciding the size of various raw materials in the factory. The lead time is not also considered.

The main objective of the study was to assess the types of inventory maintained in Thai Foods. To find out the applied techniques used to manage the inventories in these factories. Ta analyze the profit and production cost to suggest proper inventory model to Thai Foods and quick Foods based on the analysis.

The findings of the study are also common. As the company doesn't follows any scientific tools and techniques such as EOQ models, ABC analysis, safety stock etc. There are no records kept properly and if these data will not available, no any tools, techniques and model can ascertain the exact result. It is impossible to determine how much to buy and when to buy etc. It is impossible to determine how much to buy and when to buy etc. From this study, it is found that the inventory management of Thai Foods and Quick Foods Pvt Ltd, it is worse and it is also running under profit even through it requires some improvements.

Pandey (2000) has conducted a thesis on the topic of 'Inventory management, a case study of Gorkhapatra Corporation'

The study has extracted some problems as required inputs are estimated and economic order size, ,market price of inputs and unit price are fixed on the basis of annual requirements and they lead time is not given due consideration.

The main objectives of the study are to collect information which would assist in describing the current position of the Gorkhapatra as a means of mass communication in Nepal, to identify its development massage and to major its effectiveness, to suggest some measure for effectiveness of the Corporation.

The study has pointed out some conclusion based on major finding. As the Corporation is not following any tools, techniques and models to determine optimum level of inventory, these are followed the unnecessary costs involved in ordering and carrying costs can be reduced to a certain level by the use of models, formulae etc. The study has further determined that all the data should be properly recorded otherwise only tools or techniques become worthless in shortage of required data.

The study has recommended for the improvement in the present inventory management in the following manner. The Corporation should apply the EOQ model and re-order point formulae to determine when to order. All the required inputs should be classified according to ABC analysis. Local purchase should be launched. The scrap materials should be recycled. Record keeping system should be scientifically used. Professionally qualified person should be recruited in their respective field of job.

Dhakal (2006) has conducted a research on the topic 'A study on Inventory Management and Control of Royal Drug Ltd'. The study has find out some problems as quantity requirement of various inputs are procured on the basis of estimation. The economic order size, price of the inputs, handling charges, maintaining ordering charges etc are determined unscientifically and do not use any analytical tools and techniques to reduce unnecessary cost. The concept of optimum level of inventory is totally ignored, they are re- order level, safety stock, maximum stock, minimum stock are not taken into consideration .It is lie in between two danger point I.e. excessive and inadequate point. While deciding the size and level of various inputs in the corporation, lead time or gap between the placing and receiving a new order not proper inventory model.

The main objective of this study is to find out what types of tools and techniques has been applied by the RDL to manage the inventory. It also to identify the problems which are underlying the inventory management and control system along with its specific objectives are to assets the types of inventory maintained, to examine the techniques employed by it and to give good suggestion for proper inventory model.

The studies some major finding pointed out on analysis work are when and how much to order are estimated haphazardly and order quantity year to year, the RDL has 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. At this moment , the study also to depicted there are inadequate level of finished goods, there are no attention for packaging materials managed efficiently, stock items were not classified properly and the RDL does not use ABC analysis but they all are pay equal attention for all the inventory held in the store.

On the basis of the study, the following suggestions have been recommended. The RDL should its goals and objectives clearly. The company should follow the quantitative models and techniques such as EOQ modal and ABC analysis modal so that the total cost is reduced. ABC analysis is not adopting till this date so the study recommend adopting this tools which is most suitable for the company. The ledge cards can also be used to manage inventory in a simple way. General Manager should be professional one and he should not be change frequently due to the political interference.

Gurgain (2006) has studies on the thesis on a topic in 'Inventory Management (A comparative study of DDC and SGML)'. The study is focus for both side net profit figure because both corporation's profit figure has remained continuously negative for the period of fiscal year 20061/0062 to fiscal year 20064/20065. DDC and SGML were established for supplying quality milk at reasonable price along with financially sound as due to the application of unscientific planning and control tools and techniques so the corporation is bound to bear unnecessary inventory holding and procurement cost.

The objectives of study were to examine present inventory management and control system of DDC and SGML and their impact towards the companies' profitability. The studies also to examine the inventory management system as practiced by the both companies and to suggest some models for effectiveness of the companies;. The major findings of this were that the DDC and GSML have lack of study on blocked in the inventory. There is no proper and timely improvement in inventory management in DDC and SGML. The economic order quantity modal have not followed whole the purchasing inventory by both companies. Both companies have 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 is not recorded separately which are recorded in total as a whole. There is no consistency using principle of inventory management in closing stock of both companies. They have made re-order after stock is finished. The inventory turnover ratio of the companies was not satisfactory and its sales and profit are fluctuating. The amount of sales increased but amount of profit is not positive its suffering negative so there is no significant relationship between inventory and profit of both companies. The DDC and SGML's efficiency in inventory is poor therefore both are not changing their inventory into receivable/ cash through sales.

Miyan (2006) has conducted a thesis on 'Inventory management: A case study of Gorkhapatra Corporation.' The study has extracted some problems that the corporation is not following any scientific tools and techniques to control to manage inventory systematically still the corporation is running at profit. The corporation has required inputs are estimated and economic order size, market price of inputs and unit are fixed on the basis of annual requirements. It has also required materials are to control for lack of planning and unsystematic methods of recording cost. Lead time is not consideration till this date.

The main objectives of studies are to collect the information underlying constraints in existing management and control system of inventory and their impact towards the corporation's profitability. Corporation is running at profit accept in a few years. The studies also to examine the existing inventory management system applied corporation, to analyze the relationship between inventory/ material cost and profit, and to suggest for some effectiveness tools and techniques for corporation.

The study has pointed out some conclusion based on major findings. As the corporation is not following any tools, techniques and models to determine optimum level of inventory, these are followed the unnecessary costs involved in ordering and carrying cost can be reduced to a certain level by the use of models, formulae etc. The study has further determined that all the data should be properly recorded otherwise only tools or techniques become worthless in shortage of required data. The study has also depicted some major findings they are, while purchasing raw materials no scientific inventory model i.e. EOQ is used by the corporation. The corporation follows

the just in time purchase and fixed order quantity in no systematic in ordering size, lead time and safety stock. The purchase decision is made by the purchase manager, there is no purchase committee. The process of purchasing system in the publication is done by the both quotation and tender.

The study has recommended for the improvement in the present inventory, management in the following manner. The corporation should define its goals and objectives clearly. It should follow all the scientific tools and techniques i.e. purchasing order, EOQ, safety stock, re-order point, ABC analysis etc. The company consider for storing is essential to improve. The ledger card can be used for record keeping system and its scrap material should be recycled. The corporation should procure a color machine for this competitive world.

2.3   Research Gap

There are various studies done in the topic of inventory management of public as well as private enterprises. But this study is based on primary as well as secondary data regarding the public enterprises. The study used five fiscal years observation i.e. 2060/ 2061 to 2064/ 2065. So this study is little bit different from others studies. The relation of inventory with various aspects that is purchases, net sales, net profit and interest expenses has been studies.

CHAPTER – III

RESEARCH MRTHODOLOGY

3.1   Introduction

It is a systematic path or way to solve about the arising research problem. It is the process of solution the arising problem through the planned and systematic dealing with the collection of data, analysis of data and interpretation of data for fact and figure. The basic objective of the study is identifying the present position of the Inventory management of salt Trading Corporation and its impact on profitability. To achieve the objectives, the study needs appropriate research methodology in systematic and scientific manner.

The study is try to focus how the effective inventory management system is implemented in systematically and scientifically so the organization easier to control the inventory and easy to minimize the cost of inventory. For the purpose of achieving the objectives, the organization uses the following research methodology which is research design, nature and sources of data, data collection and techniques of analysis.

3.2   Research Design

The research design of this study is descriptive as well as analytical. This study is an examination and evaluation of inventory management practices within the operation of STC. This information and data are 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 are explained in words, wherever necessary.

It is a plan, structure and strategy of investigation so as to obtain answer of question and to control variance. To achieve the goal of study, the study has used the data from secondary as well as primary sources so the result is depending upon the reliability of data. It conclude the all process of collection, verify and evaluate the past evidence systematically and objectively to reach in conclusion. Some financial and statistical tools are used to examine in fact and figure in the study.

3.3   Sources of Data

For the reliability and effectiveness of research work, true and fact information's are necessary because information's are the blood for any research work. This study has been used main sources from secondary data but primary data is also used through the questionnaire of related employees. Information collected through personal observations and questionnaires with the officials of salt trading corporation (see in appendix VIII). The secondary data are collected from annual reports, balance sheet, profit/loss account of salt Trading Corporation.

3.4   Data Gathering Procedure

The primary data are collected through a structural questionnaire which is given to the accounting department of the corporation to collect its information regarding existing inventory management system and the secondary data were directly obtained from various sources like annual reports, balance sheet, profit/loss account and their web site as well.

3.5   Method of Data Analysis and Presentation

The collected data from various are managed, analyzed, and present in proper table. Various tools are used for analyzing and interpreting those collected data such as financial and statistical. To analyze effectiveness of inventory management the following types of tools are implemented:

3.5.1   Ratio Analysis

Ratio analysis isn't just comparing different numbers from the balance sheet, income statement, and cash flow statement. It's comparing the number against previous years, other companies, the industry, or even the economy in general. Ratios look at 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. In mathematic ratio is the relationship between two quantitative figures.

For example current assets alone don't tell us a whole lot, but when we divide them by current liabilities we are able to determine whether the company has enough money to strength an weakness are measured by relating two accounting data, following ratios will be used to analyze data:

➢ Inventories to total Assets Ratio $= \dfrac{\text{Inventories}}{\text{Total Assets}}$

➢ Inventories to Net sales Ratio $= \dfrac{\text{Inventories}}{\text{Net sales}}$

➢ Investment to Current Assets Ratio $= \dfrac{\text{Inventories}}{\text{Total Current Assets}}$

➢ Inventories to Net Profit Ratio $= \dfrac{\text{Inventories}}{\text{Net Profit}}$

3.5.2 Inventories Turnover Ratio

It measures the efficiency on inventory management and how quick inventory is sold. It indicates the relationship between the cost of goods sold and the inventory level. In general, high turnover ratio is better than the low ratio. High turnover ratio indicates good inventory management i.e. finished goods are quickly selling over a period of time and farmable to earn profit by it.

The Inventory Turnover is an equation that equals the goods sold divided by the average inventory. Average inventory equals beginning inventory plus ending inventory divided by 2. A low turnover rate may point to overstocking, obsolescence, or deficiencies in the product line or marketing effort. However, in some instances a low rate may by appropriate, such as where higher inventory levels occur in anticipation of rapidly rising prices or shortages. A high turnover rate may indicate inadequate inventory levels, which may lead to a loss in business.

➢ Inventory Turnover Ratio $= \dfrac{Cost\ of\ Good\ Sold\ (COGS)}{Average\ Inventory}$

The formula for average inventory:

➢ Average Inventory $= \dfrac{Begninging\ Inventory + Ending\ Inventory}{2}$

A ratio showing how many times a company's inventory is sold replaced over a period. Generally calculated as:

$= \dfrac{Sale}{Inventory}$ However, it may also calculate $= \dfrac{Cost\ of\ Goods\ Sold}{Average\ Inventory}$

Although the first calculation is more frequently used, COGS (Cost of goods sold) may be substituted because sales are recorded at market value, while inventories are usually recorded at cost. Also, average inventory may be used instead of the ending inventory level to minimize seasonal factors.

This ratio should be compared against industry averages. A low turnover implies poor sale and, therefore, excess inventory. A high ratio implies either strong sales or ineffective buying. High inventory levels are unhealthy because they represent as investment with a rate of return of zero. It also opens the company up to trouble should prices begin to fall.

3.5.3 Inventories Holding Days (IHD)

An inventory to holding days represents the how many days the corporations hold the inventories in the factory or warehouse without any work year by year. Low IHD represents or indicates good inventories management i.e. finished goods are quickly selling over a period of time and firm able to earn profit by it. At other ways, high IHD represents or indicates danger for corporation. High inventories holding days shows corporation has more stock of finished goods for sale. Due to these inventories involves

cost in terms of interest of blocked amount, rental of warehouse, damage/deterioration and also so on and Firm not able to earn profit by it.

Inventories holding days represent how many days corporation holds the average inventories. The formulae to calculate IHD is as follows:

$$\text{Inventories Holding Days} = \frac{\text{Average Inventories}}{\text{Cost of Goods Sold}} \times 365$$

OR

$$\text{Inventories Holding Days} = \frac{\text{Closing Stock}}{\text{Sales}} \times 365$$

Note: If cost of goods sold is not available, in this time we have to use second formula.

3.6   Trend Analysis

In this study, collected data from various sources is managed, analyzed and presented in proper tabular formats and diagrams are interpreted and explained as per needed. The techniques hare include are statistical and inventory management techniques such as graph, time series analysis, Karl Pearson's coefficient of correlation, mean, standard deviation and coefficient of variance have been used per need. The trend analysis is used for different variable which are as follows:

➢ Trend Analysis of Net Sales and Inventories.
➢ Trend Analysis of Net Profit and Inventories.
➢ Trend Analysis of Interest Expenses and Inventories.
➢ Trend Analysis of Purchases and Inventories.
➢ Trend Analysis of Net sales and purchases.

3.7   Correlation Coefficient and Regression Analysis:

In Statistics, regression analysis is used to model relationships between variables and determine the magnitude of those relationships. The models can be used to make

predictions of the unknown 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 variable that are related casually. Regression analysis is a mathematical measure of the average relationship between two or more variable in terms of original units of the data.

In this analysis, regression equation x and y is used. Regression analysis models the relationship between one or more <u>response variable</u> (also called <u>dependent variables, explained variables, predicted variables,</u> or <u>regressands</u>) (usually named Y), and the <u>predictors</u> (also called <u>independent variables, explanatory variables, control variables,</u> or <u>regressors,</u> usually named $X_1, ……..X_p$).

$$Y = a + bx$$

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 percent change in X) or the regression of y on x, which is denoted by b_{xy} or coefficient.

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

y=na+b x

xy=a x+b x2

Where,

n=the number of pair observation.

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

➢ Purchase of inventory and sales, where net sales are the independent variable X and purchase of inventory is the dependent variable Y.

➢ Inventory and net profit, where net profit is the independent variable X and inventory is the dependent variable Y.

➤ Inventory and interest expenses, where an interest expense is the independent variable X and inventory is the dependent variable Y.

➤ Inventory and purchases, where purchases are the independent variable X and inventory is the dependent variable Y.

➤ Net sales and purchases, where net sales are the independent variable X and purchases is the dependent variable Y.

There are two variables are said to be 'correlation' when they are related that the changes in the value of one variable is 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 only helps in determining the extent to which the two variables are correlated but it does not tell us about cause and effect relationship. Karl Pearson's correlation coefficient is denoted by r_{xy} or simply r. Karl Pearson's correlation coefficient can be calculated by following formula:

$$r = \frac{xy}{n. \; x \; y}$$

Where,

x = Standard deviation of X

y = Standard deviation of Y

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

n = number of pair of observations.

Mean of X = Dependent variables of X

Mean of Y = Independent variable of Y

Coefficient of Variance (CV)

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<P.E. It is insignificant or not significant. So, there is no evidence of correlation.

If, r>P.E. It is significant. In other cases, nothing can be concluded.

CHAPTER- IV

DATA PRESENTATION AND ANALYSIS

In this chapter efforts have been made to process the obtained data analyzed and interpret them. The available data are presenter in table and graph and they are analyzed with the help of statistical, mathematical, and inventory management tools and techniques and finally interpreted to explore the facts. This chapter is divided into three sections. Section one presents and analyzed the secondary data while primary data is displayed in section two and Section three explains major findings of the study.

4.1   Analysis of Secondary Data

4.1.1   Ratio Analysis

Financial analysis is an evaluation of firm's financial performance and its prospects for the future. Financial statement analysis statement analysis involves the calculation of various ratios. In mathematics a ratio is the relationship between two quantities figures. The ratio analysis is the financial tool by which the financial strength and weakness are measured by relating two accounting data.

4.1.1.1 Inventories to Total Assets Ratio

Here, inventories means closing inventories i.e. salt, sugar, oil, rice, cement, etc and equipments and constructing machinery and spare parts. The total assets are include the total fixed assets after deducting the depreciation and total assets after deducting the current liabilities. Low inventories to total assets ratio is preferred as efficient inventory management. The low ratio means, the portion of inventories indicated total assets is lower.

Table: 4.1

Inventories to Total Assets Ratio

(In Crore Rs)

Fiscal Year	Inventories	Total Assets	Inventories to Total assets Ratio
2060/2061	47.07	164.12	28.68
2061/2062	78.99	149.20	52.94
2062/2063	87.66	139.89	62.66
2063/2064	71.44	144.75	49.35
2064/2065	61.16	143.08	42.75

(Sources: STC annual reports)

In table 4.1, the minimum inventory to total assets ratio is 28.68 in fiscal year 2060/2061. Similarly, the maximum inventory to total assets 62.66 in fiscal year 2062/2063. Assuming 2060/2061 as base year, inventories ratio in fiscal year 2060/2061, 2063/2064, and 2064/2065 are formed satisfactory while inventories ratio of 2061/2062, 2062/2063 are formed high and unusual. This table concludes those inventories ratios are not consistent over the study period.

4.1.1.2 Inventories to Net Sales Ratio

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

Table: 4.2

Inventories to Net Sales Ratio

(In Crore Rs)

Fiscal Year	Inventories	Net sale (Rs)	Inventories to Net Sales Ratio
2060/2061	47.07	389.89	12.07 %
2061/2062	78.99	219.39	36.00 %
2062/2063	87.66	185.06	47.37 %
2063/2064	71.44	191.62	37.28 %
2064/2065	61.16	213.90	28.59

(Sources: STC annual reports)

Table 4.2 shows the inventories to sales ratio for the five years. The lower ratio is 12.07 % in 2060/2061 while higher ratio is 43.37 % in 2062/2063. Taking ratio 12.07 % as basic, ratio of 2061/2062, 2062/2063, 2063/2064, 2064/2065 are formed higher than the basic year and not satisfactory. The ratios of the last four years have been increased because of decrease in net sales.

4.1.1.3 Inventories to Current Assets Ratio

Current assets includes debtors, inventories, prepaid or advance expenses, deposits, staff loan and advance, different revenue expenses, cash in hand and cash at bank. If the corporation's inventories to current assets ratio are high, it means the company's hold more inventories against as current assets. The corporation is unable to mobilize the inventory, which have blocked inventories and they can not sale it immediately. So, it direct affects the profitability of the company. The blocked amount in inventories, company's can not reinvest in other areas. So, the company looses the return of that blocked amount of inventories. Therefore, low ratio in between the inventories to current assets is efficient management.

Table: 4.3

Inventories to Current Assets Ratio

(In crore Rs.)

Fiscal Year	Inventories	Current Assets (Rs.)	Inventories to current Assets Ratio
2060/2061	47.07	159.76	29.46 %
2061/2062	78.99	175.29	45.06 %
2062/2063	87.66	188.42	46.52 %
2063/2064	71.44	189.19	37.76 %
2064/2065	61.16	187.75	32.58 %

(Sources: STC annual reports)

Table 4.3 shows, inventories to current assets , it's clean that the highest and lowest ratio of STC are 46.52 % and 29.46 % respectively In fiscal year 2062/2063 and 2060/2061. Taking ratio 29.46 % as basic ratios of 2061/2062, 2062/2063 , 2063/2064 , 2064/2065 are formed high and not satisfactory But in fiscal year 2063/2064 and 2064/2065 the ratio are comparatively less and satisfactory than the preceding the years. The ratios of the last four years Rave been increased because of increases in current assets in less proportion than increase in inventories.

4.1.1.4 Inventories to Net Profit Ratio

This ratio tells how much inventories is needed to create a good profit of the corporation.

STC's   accounting figures of net profit pattern for five years study period presented in the following table.

<div align="center">

Table: 4.4

Inventories to Net profit Ratio

</div>

<div align="right">

(In Crore Rs.)

</div>

Fiscal Year	Inventories	Net profit (Rs.)	Inventories to Net profit Ratio (In times)
2060/2061	47.07	7.30	6.45
2061/2062	78.99	4.98	15.86
2062/2063	87.66	2.91	30.12
2063/2064	71.44	10.37	6.89
2064/2065	61.16	1.30	47.05

(Sources: STC annual reports)

Table 4.4 shows that its net profit is in fluctuating trend up to 2064/2065. In fiscal year 2063/2064 the net profit is the maximum and in fiscal year 2064/2065 the net profit is the minimum.

4.1.1.5 Inventories Turnover Ratio (ITR)

A ratio which is use to measure the efficiency of sales of an organization is termed as inventory turnover ratio. Some time it is also called 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 corporation. Detail calculation of cost of goods sold (COGS) and average inventories of the STC are shown in appendix 1and 2.

<div align="center">

Table: 4.5
Inventories Turnover Ratio

</div>

<div align="right">

(In Crore Rs)

</div>

Fiscal Year	Cost of Goods sold (COGS) (Rs)	Average Inventories (Rs)	Inventories Turnover Ratio (Times)
2060/2061	319.99	57.94	5.52
2061/2062	147.92	63.03	2.35
2062/2063	119.30	83.33	1.43
2063/2064	117.05	79.55	1.47
2064/2065	142	66.30	2.14

(Sources: STC annual reports)

From table 4.5 it is clean that inventory turnovers ratio is decreasing. In fiscal years 2062/2063 and 2063/2064. Turnover ratios are very low i.e. 1.43 and 1.47 while maximum is 5.52 in fiscal year 2060/2061. It means move inventories are kept in the stock unnecessary investment tied up on it. However the inventories turnover Ratio of the study period seems satisfactory.

4.1.1.6 Inventories Holding Days (IHD)

It represents the how many days the corporation holds the average inventories. The detail calculations of IHD of STC are as below:

Table: 4.6
Inventories Holding Days

(In Crore Rs)

Fiscal Year	Cost of goods sold (COGS) (Rs)	Average Inventories	Inventories holding Days
2060/2061	319.99	57.94	66.09
2061/2062	147.92	63.03	155.53
2062/2063	119.30	83.33	254.95
2063/2064	117.05	79.55	248.06
2064/2065	142	66.30	170.42
Mean			179.61

(Sources: STC annual reports)

From the 4.6 table inventories holding days of STC from 2060/2061 To 2064/20635 fiscal year being represents the mean of inventories holding days 179.01. In other words, the corporation holds average inventories 179.01 days in regards of mean in five fiscal years. In 2062/2063 and 2063/2064 fiscal years IHD had crossed the mean whenever the rest of the minimum holding days period is 66.09 days in 2060/2061 and maximum holding days is 254.95 in 2062/2063 which is nearly twice of average holding period 179.61.

4.1.2 Trend Analysis

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

4.1.2.1 Trend Analysis of Net sales and Inventories

The following table shows that the net sales and inventories of STC through 2060/2061 to 2064/2065.

Table: 4.7

Net Sales and Inventories

(In crore Rs.)

Fiscal year	Net sales (Rs.)	Inventories (Rs.)
2060/2061	389.89	47.07
2061/2062	219.39	78.99
2062/2063	185.06	87.66
2063/2064	191.62	71.44
2064/2065	213.90	61.16

(Sources: STC annual reports)

Table 4.7 shows that the level of total net sales and inventories of different fiscal years. Both of them are changing oven in the same pattern.Net sales are decreasing severely and increased in fiscal year 2064/2065. The table duplicated Net sales are down ward up to 2063/2064 But the after into increased. On the other hand, an inventory is slightly increased up to 2062/2063 but again it is decline. So it is in fluctuating trend. Both of them are shown in figure 4.1 in more clearly.

Figure: 4.1

Total Net Sales and Inventories

In order to find the variability of net sales and inventories of different fiscal years, the statistical tools like means, standard deviation and co- variance are calculated. The detail calculation is shown in appendix III. It can be presented in the table 4.8 table.

Table: 4.8

Relationship between Net sales and Inventories

(In crore Rs.)

Statistical tools	Net sales (Rs)	Inventories (Rs)
Mean	239.97	69.26
Standard deviation	76.07	14.11
Coefficient of Variance(CV)	31.70	20.37

Table 4.8 shows mean, standard deviation and co-efficient of variation of net sales and inventories. Mean of net sales and inventories in five fiscal are 239.97 and 69.26 standard deviation are 76.07 and 14.11 and co-efficient of variance are 31.70 % and 20.97 % respectively. The co-efficient of variance of inventories is lower i.e. 20.37 than the co-efficient of variance of net sales i.e. 31.70 so, the variability of inventories is lower than the net sales.

4.1.2.2 Trend Analysis of Net profit and Inventories

The following table shows that the net profit and Inventories of STC through 2060/2061 to 2064/2065.

Table: 4.9

Net profit and Inventories

Fiscal year	Net profit (Rs.)	Inventories (Rs.)
2060/2061	7.30	47.07
2061/2062	4.98	78.99
2062/2063	2.91	87.66
2063/2064	10.37	71.44
2064/2065	1.30	61.16

(Sources: STC annual reports)

The Table 4.9 shows that Net profit is decreasing up to fiscal year 2062/2063 but there after net profit is increased in fiscal year 2063/2064 and then after net profit is again decreased in 2064/2065. Severely on the other side, inventories are slightly increases up to 2062/2063. But again it is decline. So it is in fluctuating trend. Both of them are shown in figure 4.2 in more clearly.

Figure: 4.2

In order to find the variability of net profit and Inventories of different fiscal years, the statistical tools like mean, standard deviation, co-variance and co-efficient of correlation are calculated. The detail calculation is shown in appendix 4. It can be presented in the 4.10 table.

Table: 4.10

Relationship between Net profit and Inventories

(In Crore Rs)

Statistical tools	Net profit (Rs)	Inventories (Rs)
Mean	5.37	69.26
Standard deviation	3.21	14.11
Coefficient of Variance (CV)	59.78 %	20.37 %

Table 4.10 shows mean, standard deviation and co-efficient of variation of net profit and inventories. Mean of net profit and inventories in five fiscal years are 5.37

and 69.26 standard deviation are 3.21 and 14.11 and co-efficient of variance are 98.78 and 20.37 % respectively. The co-efficient of variance of net profit is higher i.e. 59.78 % than the co- efficient of variance of inventories i.e. 20.37 % so, the variability of net profit is higher than the inventories.

4.1.2.3 Trend Analysis of Interest Expenses and Inventories

The following table shows that the interest expenses and inventories of STC through 2060/2061 to 2064/2065.

Table: 4.11

Interest Expenses and Inventories

(In crore Rs)

Fiscal year	Interest expenses (Rs)	Inventories (Rs.)
2060/2061	11.57	47.07
2061/2062	11.99	78.99
2062/2063	15.40	87.66
2063/2064	16.12	71.44
2064/2065	15.30	61.16

(Sources: STC annual reports)

The 4.11 table shows that an interest expenses is increases year after year except fiscal year 2064/2065. In fiscal year 2060/2061 and 2061/2062 interest expenses seem to be similar and increased in fiscal year 2062/2063 and 2063/2064 but again decreased in fiscal year 2064/2065. The figure 4.3 shows the trend of interest expenses and inventories for last five years.

Figure 4.3

Interest Expenses and Inventories

(In Crore Rs)

In order to find the variability of interest expenses and Inventories of different fiscal year, the statistical tools like mean, standard deviation, co-variance and co-efficient of correlation are calculated. The detail calculated is shown in appendix V. It can be presented in the table 4.12.

Table: 4.12

Relationship between Interest Expenses and Inventories

(In Crore Rs)

Statistical tools	Interest Expenses (Rs)	Inventories (Rs)
Mean	14.08	69.26
Standard deviation	1.9	14.11
Coefficient of Variance(CV)	13.49 %	20.37 %

Table 4.12 shows means, standard deviation and co-efficient of variation of interest expenses and inventories. Mean of interest expenses and inventories in five fiscal years are 14.08 and 69.29 standard deviation 1.9 and 14.11 and co-efficient of variance are 13.49 % and 20.37 % respectively. The co-efficient of variance of

inventories i.e. 20.37 % is higher than the co-efficient of variance of interest expenses i.e. 13.49 % so, the variability of inventories is higher than the interest expenses.

4.1.2.4 Trend Analysis of Purchases and Inventories

The following table shows that the purchases and inventories of STC through 2060/2061 to 2064/2065.

Table: 4.13

Purchases and Inventories

(In Crore Rs)

Fiscal year	Purchases (Rs)	Inventories (Rs.)
2060/2061	298.25	47.07
2061/2062	179.84	78.99
2062/2063	127.97	87.66
2063/2064	100.83	71.44
2064/2065	131.73	61.16

(Sources: STC annual reports)

From the 4.13 table, it can be analyzed that the procurement trend of STC is decreasing except fiscal year 2064/2065. After the fiscal year 2060/2061, the purchases is decreasing to fiscal year 2063/2064, Then increases in the fiscal year 2064/2065. Where as inventories are slightly increases up to 2062/2063 but again it is decline. So it is in fluctuating trend which are more classify in 4.4 diagram.

Figure: 4.4

Total Purchase and Inventories

(In Crore Rs)

In order to find the variability of purchases and Investment of different fiscal year the statistical tools like mean, standard deviation, co- efficient of correlation are calculated. The detail calculation is shown in appendix 6. It can be presented in 4.14 table.

Table: 4.14

Relationship between Purchases and Inventories

(In Crore Rs)

Statistical tools	Purchases (Rs)	Inventories (Rs)
Mean	167.72	69.26
Standard deviation	70.05	14.11
Coefficient of Variance(CV)	41.77 %	20.37 %

Table 4.14 shows mean, standard deviation and co-efficient of variation of purchases and inventories Mean of purchases and inventories in five years are 167.72 and 69.26. Standard deviations are 70.05 and 14.11 and co-efficient of variance are 41.77 % and 20.37 % respectively. The co- efficient variance of inventories i.e. 20.37

% lower than the co-efficient of variance of purchases i.e. 41.77 % so, the variability of inventories is lower than the purchases.

4.1.2.5 Trend Analysis of Net Sales and Purchases

The following table shows that the net sales and purchases of STC through 2060/2061 to 2064/2065.

Table: 4.15

Net Sales and Purchases

(In Crore Rs.)

Fiscal year	Net Sales (Rs.)	Purchases (Rs.)
2060/2061	389.89	298.25
2061/2062	219.39	179.84
2062/2063	185.06	127.97
2063/2064	191.62	100.83
2064/2065	213.90	131.73

(Sources: STC annual reports)

Table4.15 shows that the net sales goes down year by year till the fiscal year 2062/2063 with higher rate. But after the fiscal year2063/2064 it starts to increase its net sales value. Similarly, the purchases are declining year by year except the fiscal year 2064/2065 with fast rate. Their trends are shown in figure 4.5 more clearly.

Figure: 4.5
Total Purchases and Net Sales
(In Crore Rs.)

In order to the variability of net sales and purchases of different fiscal year the statistical tools like mean, standard deviation, co-variance and co-efficient of correlation are calculated. The detail calculation is shown in appendix 7. It can be presented in 4.16 table.

Table: 4.16

Relationship between Net Sales and Purchases

(In Crore Rs.)

Statistical tools	Net Sales (Rs.)	Purchases (Rs.)
Mean	239.97	167.72
Standard deviation	76.07	70.05
Co-efficient of variance (CV)	31.70	41.77

Table 4.16 shows mean, standard deviation and co-efficient of variation of purchases and net sales. Mean of net sales and purchases in five fiscal years are 239.97 and 167.72, standard deviation are 76.07 and 70.05 and co-efficient of variance are 31.70 % and 41.77 % respectively. The co-efficient of variance of net sales i.e. 31.70 % is lower than the co-efficient of purchases i.e.41.77 % so, the variability of net sales is lower than the purchases.

4.1.3 Correlation and Regression Analysis

Regression analysis in the general sense means the estimation or prediction of the unknown 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.

This topic is related with the analysis of the relationship between Purchases of inventory and sales, Inventory and last year sales, inventory and gross profit, Inventory and net profit and Inventory and interest.

4.1.3.1 Regression and correlation Analysis of Inventories and 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. Here, in the analysis inventories is assumed to be depend variable which is denoted by Y and the net sales is assumed to be 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.

Table: 4.17

Calculation of Regression on Inventories and Sales

(In crore Rs.)

Fiscal Year	Inventories	Net Sales	Y^2	X^2	XY
2060/2061	47.07	389.89	2215.58	152014.21	18352.12
2061/2062	78.99	219.39	6239.42	48131.97	17329.62
2062/2063	87.66	185.06	7684.28	34247.20	16222.36
2063/2064	71.44	191.62	5103.67	36718.22	13689.33
2064/2065	61.16	213.90	3740.55	45753.21	13.82.12
Total	$\sum Y = 346.32$	X=1199.86	Y^2 =24983.5	X^2 =316864.81	XY=78675.55

Let Regression equation Y on X be, Y = a + bX ....(i).

Then two normal equations

$\quad$ y $\,$ = na + b $\,$ x ……………………………(ii).

And $\quad$ xy $\,$ = a $\,$ x $\,$ + b $\,$ x^2 ....(iii).

Putting the above calculating value in equation no (ii) and (iii)

Or, 346.32 = 5a + b1198.86 …………………………………..(iv).

Or, 78675.55 1199.86a +b316864.81 ………………………(v).

Now multiplying equation no (iv) by 239.97 and then subtracting to equation (v).

83106.41 = 1199.86a +287930.40b

78675.55 = 1199.86a +316864.81b

-	-	-

4430.86 = -28934.41b

Or, b = -$\dfrac{4430.86}{28934.41}$

=   -0.15.

Putting the value of b in equation no, (iv).

346.32 = 5a +1198.86*-0.15

Or, 346.32 =5a – 179.83

Or, -5a = -179.83- 346.32

Or, +5a = +526.15

Or, a = $\dfrac{526.15}{5}$

=105.23

According to this calculation the following results to be obtained:

   a = 105.23, and b = -0.15

  Substituting the values of a and b in equation (1) then the regression line is

  Y = 105.23 + (-0.15) X

The above regression result shows that there is negative relationship between current year net sales and closing inventories. The constant value 105.23 indicates that the value of inventories remains constant irrespective of change in current year net sales. While co- efficient -0.15 indicates that the changes in Re 1 of sales can change only -0.15 rupees of closing inventories of the corporation.

     To analyze the relationship between the net sales and inventories, Karl Person's co- relation co-efficient is used. For the purpose of calculating 'r' net sales is denoted by X and inventories is denoted by Y.

     Hence the coefficient of correlation and probable error between net sales and inventories are 0.832009 respectively. The value of correlation 'r' is + 083 is some how

near to + 1. So, it seems that there is high degree of positive relationship between net sales and inventories of STC.

But considering probable error, it is found that the calculated value of 'r' is more than (PEs). So it can concluded that the value of 'r' is significance and there may be correlation between net sales and inventories i.e. proportionate increase in sales will proportionate to the increase in inventories.

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

4.1.3.2 Regression and Correlation Analysis of Inventories and Net Profit

On the basis of variable derived from the calculation, sales and inventories of foods, agriculture goods, fuel, lubricants or types and tubes, machineries, construction goods and others are obtained. Here, in the analysis inventories is assumed to be dependent variable which is denoted by the net profit is assumed to be 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.

Table: 4.18

Calculation of Regression on Inventories and Net profit

(In crore Rs.)

Fiscal Year	Inventories(Y)	Net profit (X)	Y^2	X^2	XY
2060/2061	47.07	7.30	2215.58	53.29	343.61
2061/2062	78.99	4.98	6239.42	24.80	393.37
2062/2063	87.66	2.91	7684.28	8.47	255.09
2063/2064	71.44	10.37	5103.67	107.54	740.83
2064/2065	61.16	1.30	3740.55	1.69	79.51
Total	$\sum Y = 346.32$	X=26.86	Y^2 =24983.5	X^2=195.79	XY=1812.41

Let Regression equation Y on X be, Y = a + bX ....(i).

Then two normal equations

$\qquad$ y = na + b x …………………………(ii).

And $xy = a\ x + b\ x^2$ ························(iii).

Putting the above calculating value in equation no (ii) and (iii)

Or, 346.32 = 5a + 26.86b…………….. (iv).

Or, 1812.41 = 26.86a + 195.79 …………(v).

Now, multiplying equation no. (iv) by 5.37 and then subtracting to equation no, (iv).

1859.74   = 26.86a + 144.24b

1812.41   = 26.86a +195.79b

-             -   -

47.33   = -51.55b

Or, b = $\dfrac{-47.33}{51.55}$

Or, b = -0.92

Putting the value of b in equation no, (iv).

346.32=5a+0.92*26.86

Or, 346.32 =5a-24.71

Or,-5a = -24.71-346.32

Or,+5a = +371.03

Or, a = $+\dfrac{371.03}{5}$

= 74.21

Substituting the values of a and b in equations (i) then the regression line is

Y   = 74.21+- 0.92X

The regression result estimated in this model is based on five years observation from 2064/2065. The regression on current year inventories and net profit produced the following results.

Y = 74.21 – 0.92X.

The above regression result shows that there is negative relationship between current year net sales and closing inventories. The constant value 74.2 indicates that the value of inventories remains constant irrespective of change in current year net sales. While co- efficient -0.92 Inventories that the changes in Re 1 of sales can change only -0.92 rupees of closing inventories the corporation.

To analyze the relationship between the net sales and inventories, Karl Person's co-relation co-efficient is used. For the purpose of calculating 'r' net sales is denoted by X and inventories is denoted by Y.

Hence the coefficient of correlation and probable error between net sales and inventories are 0.21 and 0.29. The value of correlation 'r' is +0.21 some how near to + 1. So, it seems that there is low degree of positive relationship between net profit and inventories of STC.

But considering probable error, it is found that the calculated value of 'r' is less than (PEs). So it can concluded that the value of 'r' is significance and there may be correlation between net sales and inventories i.e. proportionate increase in sales will proportionate to the increase in inventories.

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

4.1.3.3 Regression and Correlation Analysis of Inventories and Interest Expenses

On the basis of variable derived from the calculation, sales and inventories of foods, agriculture goods, fuel, lubricants or types and tubes, machineries, construction goods and others are obtained. Here, in the analysis inventories is assumed to be dependent variable which is denoted by Y and then interest expenses is assumed to be 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.

Calculation of Regression on Inventories and Interest Expenses

In(Cror Rs.)

Fiscal Year	Inventories(Y)	Interest Expenses(X)	Y^2	X^2	XY
2060/2061	47.07	11.57	2215.58	133.86	544.60
2061/2062	78.99	11.99	6239.42	143.76	947.09
2062/2063	87.66	15.40	7684.28	237.16	1349.96
2063/2064	71.44	16.12	5103.67	259.85	1151.61
2064/2065	61.16	15.30	3740.55	234.09	935.75
Total	$\sum Y = 346.32$	X=70.38	Y^2 =24983.5	X^2 =1008.72	XY=4929.01

Let Regression equation Y on X be, Y = a + bX ....(i).

Then two normal equations

$\quad\quad$ y = na + b $\quad$ x ……………………………(ii).

$\quad$ And $\quad$ xy = a $\quad$ x + b $\quad$ x^2 ……………………………………… (iii).

Putting the above calculating value in equation no.(ii) and (iii).

346.32 $\quad\quad$ = 5a +70.38b …………………………. (iv)

4929.01 $\quad\quad$ = 70.38a + 1008.72b ………………….. (v).

Now, multiplying equation no. (iv) by 14.08 and then subtracting to equation no. (v).

4876.19 $\quad\quad$ = 70.38a + 990.95b

4929.01 $\quad\quad$ = 70.38a +1008.72b

\-$\quad\quad\quad\quad$ - $\quad\quad$ -

52.82 $\quad\quad$ = 17.77b

Or, b $= \dfrac{52.82}{17.77}$

$= 2.97$

Putting the value of in equation no, (iv).

346.32 $= 5a + 70.38 \text{ X } 2.97$

Or, 5a $= 346.32 - 209.03$

Or, a $= \dfrac{137.29}{5}$

$= 27.46$

Substituting the values of estimated in this model is based regression line is

Y $= 27.46 + 2.97 \text{ X}$

The regression result estimated in this model is based on five years observation from 2064/2065. The regression on current year inventories and Interest Expenses produced the following results.

Y $= 27.46 + 2.97X$

The above regression result shows that there is negative relationship between current year Interest Expenses and closing inventories. The constant value 27.46 indicates that the value of inventories remains constant irrespective of change in current year net sales. While co- efficient 2.97 indicates that the changes in Re 1 of sales can change only 2.97 Rupees of closing inventories the corporation.

To analyze the relationship between the net sales and inventories, Karl Pearson's co- relation co-efficient is used. For the purpose of calculating 'r' Interest is denoted by X and inventories are denoted by Y.

Hence the coefficient of correlation and probable error between interest expenses and inventories are 0.40 and 0.26 respectively. The value of correlation 'r' is + low. Some, how near to + 1. So, it seems that there is low degree of positive relationship between net profit and inventories of STC.

But considering probable error, it is found that the calculated value of 'r' is greater than (PEs). So it can concluded that the value of 'r' is significance and there may be correlation between net sales and inventories i.e. proportionate increase in sales will proportionate to the increase in inventories.

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

4.1.3.4 Regression and Correlation Analysis of Inventories and purchases

On the basis of variable derived from the calculation, sales and inventories of foods, agriculture goods, fuel, lubricants or types and tubes, machineries, construction goods and others are obtained. Here, in the analysis inventories is assumed to be dependent variable which is denoted by Y and the purchases is assumed to be 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.

Table: 4.20

Calculation of Regression on Inventories and Purchases

In(Cror Rs.)

Fiscal Year	Inventories(Y)	Purchases (X)	Y^2	X^2	XY
2060/2061	47.07	298.25	2215.58	88953.06	14038.63
2061/2062	78.99	179.84	6239.42	32342.43	14205.56
2062/2063	87.66	127.97	7684.28	7684.2816376.32	11217.85
2063/2064	71.44	100.83	5103.67	10166.69	7203.30
2064/2065	61.16	131.73	3740.55	17352.79	8056.61
Total	$\sum Y = 346.32$	X=838.62	Y^2 =24983.5	X^2 =165191.29	XY=54721.95

Let Regression equation Y on X be, Y = a + bX............................ (i).

Then two normal equations

$\quad\quad$ y = na + b $\quad$ x ……………………………… (ii).

$\quad$ And $\quad$ xy = a $\quad$ x + b $\quad$ x^2 ……………………………………(iii).

Putting the above calculating value in equation no, (ii) and (iii).

346.32 $\quad\quad$ = 5a +838.62b…………………………. (iv)

54721.95 $\quad$ =838.62a+165191.29b………………….. (v).

Now, multiplying equation no, (iv) by 67.72 and then subtracting to equation no. (v).

$\quad$ 58084.79 $\quad\quad$ = 838.62a +140653.35b

54721.95 $\quad\quad$ = 838.62a +165191.29b

-$\quad\quad\quad\quad$ - $\quad\quad\quad$ -

3362.87 $\quad\quad$ = -24537.94b

Or, b $\quad$ = -3362.87

$\quad\quad\quad$ 24537.94

$\quad\quad$ = - 014

Putting the value of equation no, (iv).

346.32   = 5a +838.62X-0.14

Or, 5a   = 346.32 +117.41

Or, a $= \dfrac{463.73}{5}$

          = 92.75

Substituting the values of estimated in this model is based regression line is

Y   = 92.75-0.14X

The regression result estimated in this model is based on five years observation from 2060/2061 and 2064/2065. The regression on current year inventories and Interest Expenses produced the following results.

        Y = 92.75-0.14X

The above regression result shows that there is negative relationship between current years

Purchases and closing inventories. The constant value 92.75 indicates that the value of inventories remains constant irrespective of change in current year purchases. While co-efficient-014 indicates that the changes in Re 1 of sales can change only-0.14 rupees of closing inventories the corporation.

To analyze the relationship between the net sales and inventories, Karl Pearson's co- relation co-efficient is used. For the purpose of calculating 'r' Purchases is denoted by X and inventories is denoted by Y.

Hence the coefficient of correlation and probable error between Purchases and inventories are 0.68 and 0.16 respectively. The value of correlation 'r' is +0.68 which is equal to + 1. So, it seems that there is low degree of positive relationship between Purchases will increases in inventories of STC. I.e. increases will increases in inventories are denoted and vice versa.

But considering probable error, it is found that the calculated value of 'r' is more than (PEs). So it can conclude that the value of 'r' is in significance.

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

4.1.3.5 Regression and Correlation Analysis of Net Sales and purchases

On the basis of variable derived from the calculation, sales and inventories of foods, agriculture goods, fuel, lubricants or types and tubes, machineries, construction goods and others are obtained. Here, in the 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 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.

Table: 4.21

Calculation of Regression on Net sales and Purchases

In(Cror Rs.)

Fiscal Year	Net sales(X)	Purchases (Y)	X^2	Y^2	XY
2060/2061	389.89	298.25	152014.21	88953.06	116284.69
2061/2062	219.39	179.84	48131.97	32342.43	39455.10
2062/2063	185.06	127.97	34247.20	7684.2816376.32	23682.13
2063/2064	191.62	100.83	36718.22	10166.69	19321.04
2064/2065	213.90	131.73	45753.21	17352.79	28177.05
Total	X=1199.86	Y=838.62	X^2 =316864.81	Y^2=165191.29	XY=226920.01

Let Regression equation Y on X be, Y = a + bX............................. (i).

Then two normal equations

$$y = na + b \quad x \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{(ii)}.$$

And $xy = a \quad x + b \quad x^2$ .... (iii).

Putting the above calculating value in equation no.(ii) and (iii).

838.62   = 5a +1199.86b……………………(iv)

226920.01   = 1199.86a+ 316864.81b ……………… (v)

Now, multiplying equation no, (iv) by 167.72and then subtracting to equation no. (v).

201243.64   = 1199.86a + 287930.40b

226920.01   = 119986a + 316864.81b

-_____-_____-_____

-25676.37   = -28934.41b

Or, b   = -25676.37

         -28934.41

       = +0.89

Putting the value of in equation no, (iv).

838.62   = 5a + 1199.86 * 0.89

Or, 5a   = 838.62 – 1067.88

Or, a   = 229.26

             5

       = -45.85

Substituting the values of estimated in this model is based regression line is

Y   = -45.85+0.89X

The regression result estimated in this model is based on five years observation from 2060/2061 and 2064/2065. The regression on current year Purchases and Net sales produced the following results.

       Y = -45.85+0.89X

The above regression result shows that there is negative relationship between current years Purchases and Net sales. The constant value-45.85 indicates that the value of Purchases remains constant irrespective of change in current year net sales. While co- efficient 0.89 indicates that the changes in Re 1 of sales can change only.0.89 rupees of closing Purchases the corporation.

To analyze the relationship between the net sales and inventories, Karl Pearson's co- relation co-efficient is used. For the purpose of calculating 'r' Net sales is denoted by X and Purchases is denoted by Y.

Hence the coefficient of correlation and probable error between net sales and purchases are 0.96 and 0.03 respectively. The value of correlation 'r' is +0.96 which is nearly equal to + 1. So, it seems that there is high degree of positive relationship between net sales and purchase of STC. I.e. increases will increases in purchases and vice versa.

But considering probable error, Now, 6 P.E. = 6*0.03 = 0.18.it is found that the calculated value of 'r' is Greater than 6 (PEs). So it can conclude that the value of 'r' is in significance.

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

4.2   Analysis of Primary Data

The primary data gives the accurate information of the corporation. The data are collected through questions with the account department (accounting officer). The following are the major observation found from discussion and data collected from questionnaire (appendix VIII).

➢ Basically inventory management and controlled system used by the salt trading corporation is ABC analysis and perpetual inventory management system. However, they are not systematically and effectively applied in STC.

➢ Regarding reason behind keeping the inventory in the corporation. They responded two objectives: to maintain the independence smooth operations and to meet the variation in product demands/ buffer stocks. The level of inventory is generally determined by procurement / business department of the Corporation.

➢ The corporations have a more than 21 warehouses and they are used in full capacity. The methods of inventory valuation apply by the company is FIFO as well as average cost rate.

➢ According to the respondents, STC holds the inventory on the basis of purchase and purchase is made on the basis of demand of the goods.

➢ The Corporation is the basis of demand of goods so they used to EOQ and others modal for purchasing goods in national and international.

As per them the problem faced by the company while managing the inventory is Nepal Bandha, strikes, lockout as well as unexpected changes in the price of goods. The STC, mainly the salt of goods is an inventory is store than the others.

4.3   Major Findings

In this section, the major findings are pointed out after analysis of primary and secondary data. The major findings of study are summarized as follows:

➢ Corporation is applying techniques of inventory management like ABC analysis and EOQ analysis, however it is found ineffectively and unsystematically applied.

➢ Inventories to total assets ratio are not consistent over the study period (Table 4.1).

➢ The inventories to net sales ratios of the last four years have been increased because of decreases in net sales (Table 4.2).

➢ The inventories to current assets ratios of the last four years have been increased because of decreases in net sales (Table 4.3).

➢ The ratio in between inventories and net profit are fluctuating trend but the ratio (In Times) is more increases in fiscal year 2064/2065.

➢ It is clear that inventories turnover ratio is decreasing in fiscal year 2062/2063 and 2064/2065. The inventories turnover ratio of the study period seems satisfactory (Table 4.5).

➢ Inventories holding days of STC from 2060/2061 To 2064/20635 fiscal years being represents the mean of inventories holding days 179.01. In other words , the corporation holds average inventories 179.01 days in regards of mean in five fiscal years. In 2062/2063 and 2063/2064 fiscal years IHD had crossed the mean whenever the rest of the minimum holding days period is 66.09 days in 2060/2061 and maximum holding days is 254.95 in 2062/2063 which is nearly twice of average holding period 179.61 (Table 4.6)

➢ Trend of net sales and inventories are changing over in the same pattern. Net sales are decreasing severely and increased in fiscal year 2064/2065. The table duplicated Net sales are down ward up to 2063/2064 But the after into increased. On the other hand, inventories are slightly increased up to 2062/2063 but again it is decline. So it is in fluctuating trend. The co-efficient of variance of inventories is lower i.e. 20.37 than the co-efficient of variance of net sales i.e. 31.70 so, The variability of inventories is lower than the net sales (Table 4.8).

➢ Trend of net profit and inventories shows that Net profit is decreasing up to fiscal year 2062/2063 But there after net profit is increased in fiscal year 2063/2064 and

then after net profit is again decreased in 2064/2065. Severely on the other side, inventories are slightly increases up to 2062/2063. But again it is decline. So it is in fluctuating trend. The co-efficient of variance of net profit is higher i.e. 59.78 % than the co- efficient of variance of inventories i.e. 20.37 % so, the variability of net profit is higher than the inventories.

➤ Trend of interest expenses and inventories shows that an interest expenses is increases year after year except fiscal year 2064/2065. In fiscal year 2060/2061 and 2061/2062 interest expenses seem to be similar and increased in fiscal year 2062/2063 and 2063/2064 but again decreased in fiscal year 2064/2065. The figure 4.3 shows the trend of interest expenses and inventories for last five years. The co-efficient of variance of inventories i.e. 20.37 % is higher than the co-efficient of variance of interest expenses i.e. 13.49 % so, the variability of inventories is higher than the interest expenses (Table 4.12).

➤ Trend of purchases and inventories are displayed in more clearly in table 4.13 and figure 4.4, it can be analyzed that the procurement trend of STC is decreasing except fiscal year 2064/2065. After the fiscal year 2060/2061. The purchases is decreasing to fiscal year 2063/2064, Then increases in the fiscal year 2064/2065. Where as inventories are slightly increases up to 2062/2063 but again it is decline. So it is in fluctuating trend. The co- efficient variance of inventories i.e. 20.37 % lower than the co-efficient of variance of purchases i.e. 41.77 % so, the variability of inventories is lower than the purchases (Table 4.14).

➤ Trend of net sales and purchases in table 4.15 and figure 4.5 shows that the net sales goes down year by year till the fiscal year 2062/2063 with higher rate. But after the fiscal year2063/2064 it starts to increase its net sales value. Similarly, the purchases are declining year by year except the fiscal year 2064/2065 with fast rate. The co-efficient of variance of net sales i.e. 31.70 % is lower than the co-efficient of purchases i.e.41.77 % so, the variability of net sales is lower than the purchases (Table 4.16).

➤ The regression result estimated in this model is based on five years observation of inventories and net sales produced the Y = 105.23 – 0.15X. The above regression result shows that there is negative relationship between current year net sales and

closing inventories (Table 4.17).The coefficient of correlation and probable error between net sales and inventories are 0.83 and 0.09 respectively. The value of correlation 'r' is 0.83 is some how near to + 1. So, it seems that there is high degree of positive relationship between net sales and inventories of STC. But considering probable error, it is found that the calculated value of 'r' is more than (PEs). So it can be concluded that the value of 'r' is significance. (Appendix III).

➢ The regression result estimated in this model is based on seven years observation of current year inventories and net profit produced the Y = 74.21 – 0.92X. The above regression result shows that there is negative relationship between current year net profit and closing inventories (Table 4.18). The coefficient of correlation and probable error between net profit and inventories are 0.21 and 0.29 respectively. The value of correlation 'r' is 0.21 is some how near to +1.So, it seems that there is low degree of positive relationship between net profit and inventories. But considering probable error, it is found that the calculated value of 'r' is less than (PEs). So, it can be concluded that the value of 'r' is insignificance (Appendix IV).

➢ The regression result estimated in this model is based on five observation of current year inventories and interest expenses produced the Y = 27.46 + 2.97. The above regression result shows that there is positive relationship between current year interest expenses and closing inventories expenses and inventories are 0.4 and 0.26 respectively. The value of correlation 'r' is 8.40 which is nearly equal to +1. So, it seems that there is low degree of positive relationship between interest expenses and inventories of STC. But considering probable error, it is found that the calculated value of 'r' is greater than (PEs). So, it can be concluded that the value of 'r' is significance (Appendix V).

➢ The regression result estimated in this model is based on seven years observation of current year inventories and purchases produced the Y = 92.75 – 014X. The above regression result shows that there is negative relationship between current year purchases and closing inventories (Table 4.20). The coefficient of correlation and probable error between purchases and inventories are 0.68 and 0.16 respectively. The value of correlation 'r' is 068 which is equal to +1. So, it seems that there is high degree of relationship between purchases and inventories of STC. But considering

probable error, it is found that the calculated value of 'r' is more than (PEs). So, it can be concluded that the value of 'r' is insignificance (Appendix VI).

➢ The regression result estimated in this model is based on seven years observation of current year purchase and net sales produced the $Y = -45.85 + 0.89X$. The above regression result shows that there is positive relationship between current year purchases and net sales and purchases are 0.96 and 0.03 respectively. The value of correlation 'r' is 0.96 which is nearly equal to + 1. So, it seems that there is high degree of positive relationship between net sales and purchases of STC. But considering probable error, Now, 6 P.E. = 6* 0.03 = 0.18 , it is found that the calculated value of 'r' is greater than 6 (PE s). So, it can be concluded that the value of 'r' is significance (Appendix VII).

CHAPTER-V

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1   Summary

Public enterprises play crucial role in Nepalese economy. One can feel the presence of public enterprises in almost all the key sectors, particularly in trade sector of the economy as well. STC is merchandising enterprise, its main objectives is maintaining high quality consumer goods at reasonable price, easily available system in Kingdom throughout the year and preventing the dealings of the goods affecting public health is the characteristics and commitment of Salt Trading Corporation.

Salt Trading Corporation Limited (STC) was established four decades age through the joint efforts of Nepal Government and the private sector to ensure proper supply and distribution of essential consumer items throughout the country. Its first was to make edible salt readily available. The salt trade then was discovered and unreliable. This success in supply management led to the addition of essential commodities such as sugar, food grains and processed eatables into its distribution network. The irregularities in the distribution had to be corrected through organized supply and delivery system. The organization was not only able to meet the demand but was able to maintain quality and later, was able to provide iodized salt to prevent goiter- a diseases that once plagued the Nepalese society.

Inventory management is of the most import assets to most of the organization. There are large percentage of total capital is invested is invested in inventory. The inventory is vital element in the efforts of the firm's to achieve desires sales. A firm can not achieve its goal unless inventories are controlled effectively and capital is allocated efficiently.

The major objective of the study is identify the inventory management practice in STC associated with inventory management problems and analyze them for their resolution in such a way that contribute to the profitability to STC. The specific objectives of the study are to examine the practice of inventory management functions (i.e. procurement or acquisition of goods, storing of goods, issuing the goods from stores etc), to analyze the position of inventory levels and its trend in STC and to

analyze relationship of inventory with net sales, net profit, purchased and interest expenses.

Both primary and secondary data have been collected to meet the objectives. The statistical tools like mean, standard deviation, coefficient of variation, correlation, regression and probable error and trend analysis are used to analyze the data. Similarly, the financial tools like ratio, inventory turnover ratio and inventory holding days have also been used.

5.2   Conclusions

After analyzing the present practice of inventory management of Salt Trading Corporation, the major conclusions are as follows:

➢ Inventories to total assets, net sales and current ratio are increased for four years but decreased in last two years.

➢ Initially the inventories to net profit ratio is less thereafter it is continuously increasing trend of ratio except fiscal year 2063/2064 where their net profit is so high but last year its ratio is severely declines.

➢ Inventories turnover ratio is decreasing trend through out the study period.

➢ Mean of inventories holding days in five fiscal years 2062/2063 and2063/2064 are so high.

➢ Trend of net sales and inventories are fluctuated in the same pattern except fiscal year 2061/2062 and 2064/2065 while the co-efficient of variance of inventories of inventories is lower than the co-efficient of variance of net sales.

➢ Trend of net profit remained fluctuating and the co-efficient of variance of net profit is higher than co-efficient of variance of inventories.

➢ Trend of interest expenses is continuously increased in variable rate, there is high fluctuations of inventories. Co-efficient of variance of inventories is higher than the co-efficient of variance of interest expenses.

➢ Purchases are found slightly decreased while inventory is drastically increased and again decreased in fiscal year 2064/2065. Co-efficient of variance of inventories is lower than the co-efficient variance of purchases.

- Net sales exceeds purchases, therefore there is same trend of net sales and purchases in the end of period. Co-efficient of variance of net sales is slightly less than co-efficient of variance of purchases.
- From regression result, it is found that there is negative relation of inventory with net sales, net profit, and purchases except interest expenses. The highest correlation is found between net sales and inventories (r = 0.83) while lowest correlation is net profit and inventories (r = 0.2).
- The regression result, it is found that there is negative relation between inventories and net sales, net profit, purchases except interest expense.

5.3   Recommendation

The study suggests the following points for better inventory management:

- This study used simple regression analysis however, it can be use multiple regression analysis to determine regression model of inventory level.
- Inventories are increasing while net sales, net profit and purchases are found fluctuated over the study period. Thus, there is no proper coordination of inventory with net sales, net profit and purchases transactions.
- Management is strongly recommended to apply inventory management system effectively and efficiently.
- There is no proper coordination of inventory level with net sales and purchases. Thus, average holding period of inventory is high, to keep optimal inventory level, there should be better coordination of inventory with net sales, purchases etc.
- To improve the inventory management of corporation there will be better inventory turnover ratio, better strong holding and delivery system based on practical FIFO system, by using better tool and techniques, review of re- order level and market demand at regular interval etc.
- Future studies can be enhanced by increasing number of observations, firms and data's etc.

Bibliography

Acharya, Hari Prasad (2005). *Inventory Management: A case study of Nepal Liver Limited.* An unpublished Master's Degree Thesis, Kathmandu: Central Department of Management, T.U.

Adam, Everest and Ebert, JR Ronald J. (1999) *Production and Operating Models and Behavior,* New Delhi: Prentice- Hall fifth Edition.

Agrawal, Dr. G.R. (1994**).** *Dynamics of Human Resources Management in Nepal.* Kathmandu: M.K. Publishers and Distributionrs.

Agrawal, Dr. G.R. (2000).*Marketing in Nepal, Fundamental Management and Strategy.* Kathmandu: Education Enterprises Private Ltd.

Bajrachariya, Pusker (1993**).** *Management Problem in Public Manufacturing in Nepal,* CEDA. Kathmandu: T. U.

Balika, Radha Kumari (1996). *Inventory Management A case study of Hetauda industries Limited.* An unpublished Master's Degree Thesis, Kathmandu: central Department of Management of Management, T. U.

Copland Thomas E and Weston Fred, (1992*). Managerial Finance.*

Dhakal. Govinda Prasad (2006). *A study on Inventory management and control of Royal Drugs Limited.* An unpublished Master's Degree Thesis, Kathmandu: Central Department of Management of Management, T.U.

Dhital, L (1996). *Inventory Management: A case study of Nepal Food Corporation.* An unpublished Master's Degree Thesis, Kathmandu: Central Department of Management, T.U.

Guragain, Puapa Prasad (2006). *Inventory Management: A comparative study of DDC and SGML.* An unpublished Master's Degree Thesis, Kathmandu: Central Department of Management of Management, T.U.

Joshi, P.R. (2001)**.** *Research Management, Kathmandu :* Buddha Academic publishers and Distributors Pvt. Ltd.

Miyan, Sarphuddin (2006). *Inventory Management: A case study of Gorkhapatra Corporation.* An unpublished Master's Degree Thesis, Kathmandu: Central Department of Management, T.U.

Munakurmi, Shiva Prasad (2003). *Cost and Management Accounting,* Kathmandu: Educational Publishing House.

Pandey, Laxmi (2000).*Inventory Management: A Case study of Gorkhapatra Corporation*. An unpublished Master's Degree Thesis, Kathmandu : Central Department of Management, T.U.

Panta, P.R. (2005). *Business Environment in Nepal,* Kathmandu: Buddha Academic Publishers and Distributors Pvt. Ltd.

Pradhan, Prof. Dr. Radhe S. (2003). *Research in Nepalese Finance,* Kathmandu: Buddha Academy.

Pradhan, Surendra (1992) *Financial Management, Education Enterprises,* Kathmandu Valley publishers.

Sherstha, Indira (2000). *Inventory Management of Manufacturing Industries in Nepal with special reference to Quick Foods.* An unpublished Master's Degree Thesis, Kathmandu: Central Department of Management, T.U.

Singh, Prof. Mrigendra Lal (2003). *Statistical Methods,* Kathamandu: National Book centre.

Thapaliya, kala (2007). *Inventory Management: A case study of National Trading Limited.* An unpublished Master's Degree Thesis, Kathmandu: Central Department of Management of Management, T.U.

Wolf, H.K and Pant P.R. (2005). *A Hand Book for Social Science Research and Thesis Writing,* Kathmandu: Buddha Academy.

Appendix – I

Calculation of cost of Goods Sold (COGS)

(In Crore Rs)

Fiscal year	Particulars	Amount
2060/2061	Opening stock	68.81
	Purchases	298.25
	Closing stock	(47.07)
	COGS	319.99
2061/2062	Opening stock	47.07
	Purchases	179.84
	Closing stock	(78.99)
	COGS	147.92
2062/2063	Opening stock	78.99
	Purchases	127.97
	Closing stock	(87.66
	COGS	119.30
2063/2064	Opening stock	87.66
	Purchases	100.83
	Closing stock	(71.44)
	COGS	117.05
2064/2065	Opening stock	71.44
	Purchases	131.72
	Closing stock	(61.16)
	COGS	142.00

Cost of Goods sold (COGS) = opening stock+ purchases- closing stock.

Appendix – II

Calculation of Average Inventories

(In crore Rs.)

Fiscal year	Opening stock	Closing stock	Average inventory
2060/2061	68.81	47.07	57.94
2061/2062	47.07	78.99	63.03
2062/2063	78.99	87.66	83.03
2063/2064	87.66	71.44	79.55
2064/2065	71.44	61.16	66.30

$$\text{Average inventories} = \frac{\text{opening stock} + \text{closing stock}}{2}$$

Appendix -III

Calculation of Mean, Standard deviation and coefficient of variance and correlation of sales and inventories.

(In crore Rs.)

Fiscal year	X (sales)	Y (inventories)	X^2	Y^2	XY	$\dfrac{(X-\overline{X})^2}{n}$	$\dfrac{(Y-\overline{Y})^2}{n}$
2060/2061	389.89	47.07	152014.21	2215.58	18352.12	4495.20	98.48
2061/2062	219.39	78.99	48131.97	6239.42	17329.62	84.71	18.93
2062/2063	185.06	87.66	34247.20	7684.28	16222.36	603.02	67.71
2063/2064	191.62	71.44	36718.22	5103.67	13689.33	467.54	0.95
2064/2065	213.90	61.16	45753.21	3740.55	13082.12	135.93	13.12
Total	X =1199.86	Y =346.32	X^2 =316864.81	Y^2 =24983.5	XY =78675.55	$\dfrac{(X-\overline{X})^2}{n}=$ 5786.4	$\dfrac{(Y-\overline{Y})^2}{n}$ =199.19

Arithmetic mean of Sales,

$$\overline{X} = \frac{x}{N} = \frac{1199.86}{5} = 239.97$$

Arithmetic mean of Inventories,

$$\overline{Y} = \frac{y}{N} = \frac{346.32}{5} = 69.26$$

Standard Deviation

$$\dagger_x = \frac{\sqrt{\sum(X-\overline{X})2}}{N} = \sqrt{5786.40} = 76.07$$

$$\dagger_y = \frac{\sqrt{\sum(Y-\overline{Y})2}}{N} = \sqrt{199.19} = 14.11$$

Coefficient of variance (CV)

$$CV(x) = \frac{\dagger x}{\overline{X}} * 100 \quad = \frac{76.07}{239.97} * 100 \quad = 31.70 \%$$

$$CV(y) = \frac{\dagger y}{\overline{Y}} * 100 = \frac{14.11}{69.26} * 100 = 20.37\%$$

Co-efficient of Correlation

$$r = = \frac{N.\sum XY - \sum X \sum Y}{\sqrt{N.\sum X2 - (\sum X)2} \sqrt{N \sum Y2 - (\sum Y)2}}$$

$$= \frac{5*78675.55 - 1199.86*346.32}{\sqrt{5*316864.81 - (1199.86)2} \sqrt{5*24983.50 - (346.32)2}}$$

=0.83

Standard Error

$$S.E(r) = \frac{1 - r2}{\sqrt{n}} = \frac{1 - (0.83)2}{\sqrt{5}} = 0.14$$

Probable Error

P.E. (r) = 0.6745*S.E. (r) = 0.6745*0.14 =0.09

Appendix - IV

Calculation of mean, standard deviation and coefficient of variance and Correlation of Net profit and Inventories.

(In crore Rs.)

Fiscal year	Y (Profit)	X (Inventories)	Y^2	X^2	XY	$\dfrac{\left(X-\overline{X}\right)^2}{n}$	$\dfrac{\left(Y-\overline{Y}\right)^2}{n}$
2060/2061	7.30	47.07	53.29	2215.58	343.61	98.48	0.74
2061/2062	4.98	78.99	24.80	6239.42	393.37	18.93	0.03
2062/2063	2.91	87.66	8.47	7684.28	255.09	67.71	1.2
2063/2064	10.37	71.44	107.54	5103.67	740.83	0.95	5.00
2064/2065	1.30	61.16	1.69	3740.55	79.51	13.12	3.31
Total	Y =26.86	X =346.32	Y^2 =195.79	X^2 =24983.5	XY =1812.41	$\dfrac{\left(X-\overline{X}\right)^2}{n}=$ 199.19	$\dfrac{\left(Y-\overline{Y}\right)^2}{n}$ =10.29

Arithmetic mean of Inventories,

$$\overline{X} = \frac{x}{N} = \frac{346.32}{5} = 69.26$$

Arithmetic mean of Profit,

$$\overline{Y} = \frac{y}{N} = \frac{26.86}{5} = 5.37$$

Standard deviation

$$†_x = \frac{\sqrt{\sum(X-\overline{X})2}}{N} = \sqrt{199.19} = 14.11$$

$$†_y = \frac{\sqrt{\sum(Y-\overline{Y})2}}{N} = \sqrt{10.29} = 3.21$$

Coefficient of variance(CV)

$$CV(x) = \frac{†x}{\overline{X}}*100 = \frac{14.11}{69.26}*100 = 20.37\%$$

$$CV(y) = \frac{\dagger y}{\overline{Y}} *100 \;=\; \frac{3.21}{5.37} *100 = 59.78\%$$

Co-efficient of Correlation

$$r = \;=\; \frac{N.\sum XY - \sum X \sum Y}{\sqrt{N.\sum X2 - (\sum X)2}\;\sqrt{N\sum Y2 - (\sum Y)2}}$$

$$= \frac{5*1812.41 - 346.32*26.86}{\sqrt{5*24983.50 - (346.32)2}\;\sqrt{5*195.79 - (26.86)2}} = 0.21$$

Standard Error

$$S.E(r) = \frac{1-r2}{\sqrt{n}} = \frac{1-(0.21)2}{\sqrt{5}} = 0.43$$

Probable Error

P.E. (r) = 0.6745*S.E. (r) = 0.6745*0.43 = 0.29

Appendix-v
Calculation of Mean, Standard deviation and Coefficient of variance and Correlation of Interest expenses and Inventories

(In Crore Rs.)

Fiscal Year	X(Interest)	Y(Inventory)	X^2	Y^2	XY	$\dfrac{\left(X-\overline{X}\right)^2}{n}$	$\dfrac{\left(Y-\overline{Y}\right)^2}{n}$
2060/2061	11.57	47.07	133.86	2215.86	544.60	1.26	98.48
2061/2062	11.99	78.99	143.76	6239.42	947.09	0.87	18.93
2062/2063	15.40	87.66	237.16	7684.28	1349.96	0.35	67.71
2063/2064	16.12	71.44	259.85	5103.67	1151.61	0.83	0.95
2064/2065	15.30	61.16	234.09	3740.55	935.75	0.30	13.12
Total	$\sum X$ =70.38	$\sum Y$ =346.32	$\sum X^2$ =1008.72	$\sum Y^2$ =24983.5	$\sum XY$ =4929.01	$\sum\dfrac{\left(X-\overline{X}\right)^2}{n}$ =3.61	$\sum\dfrac{\left(Y-\overline{Y}\right)^2}{n}$ =199.19

Arithmetic mean of Inventories,

$$\overline{Y} = \frac{\sum Y}{N} = \frac{346.32}{5} = 69.26$$

Arithmetic mean of Interest,

$$\overline{X} = \frac{x}{N} = \frac{70.38}{5} = 14.08$$

Standard deviation

$$\dagger_x = \frac{\sqrt{\sum(X-\overline{X})2}}{N} = \sqrt{3.61} = 1.9$$

$$\dagger_y = \frac{\sqrt{\sum(Y-\overline{Y})2}}{N} = \sqrt{199.19} = 14.11$$

Coefficient of variance(CV)

$$CV(x) = \frac{\dagger x}{\overline{X}} * 100 = \frac{1.9}{14.08} * 100 = 13.49\%$$

$$CV(y) = \frac{\dagger y}{\overline{Y}} *100 = \frac{14.11}{69.26} *100 = 20.37\%$$

Co-efficient of Correlation

$$r = \quad = \frac{N.\sum XY - \sum X \sum Y}{\sqrt{N.\sum X2 - (\sum X)2} \ \sqrt{N\sum Y2 - (\sum Y)2}}$$

$$= \frac{5*4929.01 - 70.38*346.32}{\sqrt{5*1008.72 - (70.38)2} \ \sqrt{5*24983.50 - (346.32)2}}$$

$$= 0.40$$

Standard Error

$$S.E(r) = \frac{1 - r2}{\sqrt{n}} = \frac{1 - (0.40)2}{\sqrt{5}}$$

$$= 0.38$$

Probable Error

P.E. (r) = 0.6745*S.E. (r) = 0.6745*0.38 = 0.26

Appendix - VI

Calculation of means, standard deviation and coefficient of variance and Correlation of purchase and inventories.

(In Crore Rs.)

Fiscal year	X (purchase)	Y (inventory)	X^2	Y^2	XY	$\dfrac{\left(X-\overline{X}\right)^2}{n}$	$\dfrac{\left(Y-\overline{Y}\right)^2}{n}$
2060/2061	298.25	47.07	88953.06	2215.58	14038.63	3407.62	98.48
2061/2062	179.84	78.99	32342.43	6239.42	14205.56	29.38	18.93
2062/2063	127.97	87.66	16376.32	7684.28	11217.85	316.01	67.71
2063/2064	100.83	71.44	10166.69	5103.67	7203.30	894.85	0.95
2064/2065	131.73	61.16	17352.79	3740.55	8056.61	259.06	13.12
Total	x = 838.62	y = 346.32	$X^2 =$ 165191.29	$Y^2=$ 24983.5	XY = 54721.95	$\ddot{y}\dfrac{\left(X-\overline{X}\right)^2}{n}$ =4906.92	$\ddot{y}\dfrac{\left(Y-\overline{Y}\right)^2}{n}$ =199.19

Arithmetic mean of Purchases,

$$\overline{X} = \frac{X}{N} = \frac{838.62}{5} = 167.72$$

Arithmetic mean of Inventories,

$$\overline{Y} = \frac{\sum Y}{N} = \frac{346.32}{5} = 69.26$$

Standard deviation

$$\dagger_x = \frac{\sqrt{\sum (X - \overline{X})2}}{N} = \sqrt{4906.92} = 70.05$$

$$\dagger_y = \frac{\sqrt{\sum (Y - \overline{Y})2}}{N} = \sqrt{199.19} = 14.11$$

Coefficient of variance (CV)

$$\text{CV(x)} = \frac{\dagger x}{\overline{X}} * 100 = \frac{70.05}{167.72} * 100 = 41.77\%$$

$$\text{CV(y)} = \frac{\dagger y}{\overline{Y}} * 100 = \frac{14.11}{69.26} * 100 = 20.37\%$$

Co-efficient of Correlation

$$r = \quad = \frac{N.\sum XY - \sum X \sum Y}{\sqrt{N.\sum X2 - (\sum X)2} \ \sqrt{N \sum Y2 - (\sum Y)2}}$$

$$= \frac{5 * 54721.95 - 838.62 * 346.32}{\sqrt{5 * 165191.29 - (838.62)2} \ \sqrt{5 * 24983.5 - (346.32)2}}$$

$$= 0.68$$

Standard Error

$$\text{S.E(r)} = \frac{1 - r2}{\sqrt{n}} = \frac{1 - (0.68)2}{\sqrt{5}} = 0.24$$

Probable Error

P.E. (r) = 0.6745*S.E. (r) = 0.6745*0.24 =0.16

Appendix -VII

Calculation of mean, standard deviation and coefficient of variance and Correlation of sales and purchase.

(In Crore Rs.)

Fiscal year	X (sales)	Y (inventories)	X^2	Y^2	XY	$\dfrac{\left(X-\overline{X}\right)^2}{n}$	$\dfrac{\left(Y-\overline{Y}\right)^2}{n}$
2060/2061	389.89	298.25	152014.21	88953.06	116284.69	4495.20	3407.62
2061/2062	219.39	179.84	48131.97	32342.43	89455.10	8471	29.38
2062/2063	185.06	127.97	34247.20	16376.32	23682.13	603.02	316.01
2063/2064	191.62	100.83	36718.22	10166.69	19321.04	467.54	894.85
2064/2065	213.90	131.73	45753.21	17352.79	28177.05	135.93	259.06
Total	X =1199.86	Y = 838.62	X^2 = 316864.81	Y^2 = 165191.29	XY = 226920.01	$\Sigma\dfrac{\left(X-\overline{X}\right)^2}{n}$ =786.4	$\Sigma\dfrac{\left(Y-\overline{Y}\right)^2}{n}$ =4906.92

Arithmetic mean of Sales,

$$\overline{X} = \frac{x}{N} = \frac{1199.86}{5} = 239.97$$

Arithmetic mean of Inventories,

$$\overline{Y} = \frac{\sum Y}{N} = \frac{346.32}{5} = 69.26$$

Standard Deviation

$$\dagger_x = \frac{\sqrt{\sum(X - \overline{X})2}}{N} \qquad = \quad \sqrt{5786.40} \qquad = 76.07$$

$$\dagger_y = \frac{\sqrt{\sum(Y - \overline{Y})2}}{N} = \sqrt{199.19} = 14.11$$

Coefficient of variance(CV)

$$CV(x) = \frac{\dagger x}{\overline{X}} *100 \qquad = \frac{76.07}{239.97}*100 \qquad =31.70\ \%$$

$$CV(y) = \frac{\dagger y}{\overline{Y}} *100 = \frac{14.11}{69.26}*100 = 20.37\%$$

Co-efficient of Correlation

$$r= \quad = \quad \frac{N.\sum XY - \sum X \sum Y}{\sqrt{N.\sum X2 - (\sum X)2}\ \sqrt{N\sum Y2 - (\sum Y)2}}$$

$$= \frac{5*226920.01 - 1199.86*838.62}{\sqrt{5*316864.81 - (1199.86)2}\ \sqrt{5*165191.29 - (838.62)2}}$$

$$= 0.96$$

Standard Error

$$S.E(r) = \frac{1 - r2}{\sqrt{n}} = \frac{1 - (0.96)2}{\sqrt{5}} = 0.04$$

Probable Error

P.E. (r) = 0.6745*S.E. (r) = 0.6745*0.04=0.03

Appendix -VIII

Questionnaire

Dear respondents: I have been writing thesis on inventory management of STC as the partial fulfillment of the requirement of the Master of Business Studies (MBS). This questionnaire is intended to get the answer about the inventory management of STC. Following are the some of the questions regarding inventory management. Your kind cooperation in this context will be highly appreciated. So, please spare few precious minutes to answer following questions.

1) What are the basic reasons for keeping inventory in the corporation?

a) To maintain the independence smooth operation   [   ]

b) To meet the variation in product demand/ buffer stock   [   ]

c) To provide the safeguard against variation in merchandise supply   [   ]

2) Who determine the inventory in the corporation?

a) Procurement department   [   ]   b) Account department   [   ]

c) Sales department   [   ]

3) Does the corporation face any types of problem in inventory management?

a) Yes   [   ]   b) No   [   ]

4) If yes, what types of problem faced by the corporation?

a) Determining the size of inventory   [   ]

b) Disbursement and procurement of materials   [   ]

c) Proper storage facility   [   ]

d) Inventory policy   [   ]

5)Please specify the problems faced by STC while managing the inventory ?

a) Nepal babdha, strike, lockout   [   ]   b) Unexpected change in price   [   ]

c) Geographical problems   [   ]

6) Do the transportation and other strike affect the inventory management?a) Yes [   ]   b) No   [   ]

7) Which types of inventory do you maintain in your corporation?

a) Raw materials   [   ]   b) Work in process   [   ]

c) Finished goods   [   ]   d) All types   [   ]

8) What types of inventory management technique followed by the corporation?

a) Perpetual inventory management   [   ] b) Just in time purchase   [   ]

c) Fixed period inventory system   [   ]   d) fixed quantifies inventory system   [   ]

e) Others (please specify)

9) Has the corporation applied EOQ model?

a) Yes   [   ]   b) No   [   ]

10) if no, what are the limitations of applying EOQ and ABC analysis ?

a) Lack of practice   [   ]   b) Lack of knowledge   [   ]

c) Nature of materials   [   ]

11) Does the STC have the system of ABC analysis?

a) Yes   [   ]   b) No   [   ]

12) What is the method of inventory valuation applied by the corporation?

a) FIFO method   [   ]   b) LIFO method   [   ]

c) Average cost rate   [   ]   d) others (please specify)   [   ]

13) Does the corporation calculate cost of inventory?

a) Yes   [   ]   b) No   [   ]

14) What do you think, is the relationship between cost of inventory and profit?

a) Positive   [   ]   b) Negative   [   ]

c) No relationship   [   ]

15) Do you think inventory play crucial role in STC's profitability?

a) Yes   [   ]   b) No   [   ]

16) What impact do you feel of inventory on profitability?

a) Reduce profit   [   ]   b) Increase profit   [   ]

c) Others (please specify)   [   ]

17) Does the corporation maintain desirable safety stock?

a) Yes   [   ]   b) No   [   ]

18) Do you think STC can deliver the sufficient goods as per the customer demanded?

a) Yes   [   ]   b) No   [   ]

19) Do you think number of warehouse of STC is enough to store the various types of merchandise?

a) Yes   [   ]   b) No   [   ]

20) Please specify average size of inventories in rupees?

………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………

21) Why should the STC keep the inventory?

………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………

22) What types of inventories are store by the STC?

………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………

23) Which department determines the required inventories of the corporation?

………………………………………………………………………………………………
………………………………………………………………………………………………
………………………………………………………………………………

24) What types of problems are frequently faced by STC while managing inventory?

………
………
………………………………………………………………………………………

25) What types of inventory management techniques applied by the STC?

………
………
………………………………………………………………………………………

26) Has the STC used to EOQ and ABC analysis is model for inventory management?

………
………
………………………………………………………………………………………

27) What is ROL and Lead time? Is it considered at the time of purchases?

………
………
………………………………………………………………………………………

28) What is safety stock? Is it applied by corporation?

………
………
………………………………………………………………………………………

29) Which method is use to calculate for 'inventory valuation' of the corporation?

………
………
………………………………………………………………………………………

30) Any suggestion to improve the inventory management to STC? Please specify.

………
………
………………………………………………………………………………………....