CHAPTER - I

INTRODUCTION

1.1 Background of the Study

Now days with the introduction of globalization, many industries have established both in private and government sectors. Every industry is established with a view of earn profit from their product either goods or services. Industrialization is an important factor for achieving the basic objective of a country's economic and social progress. It can play a vital role in the economic development of a country. The industry which produce product such as beer, soft drinks, Soap, Sweet, Noodles etc. are called manufacturing industries and the industry that provides services such as Hotel, Consultancy, Parlor etc. are called Service Industry. For both types of industries "Inventory Management" plays a vital role to achieve their goal of profit maximization through the efficient management of both inputs and output as well.

The world is being industrialized due to the industrial revolution and continuous struggle of people of developing countries for maintain the living standard. But the history of industrial development in Nepal is not so long. It is a comparatively new phenomenon in Nepal. The Biratnagar Jute Mills, set up in 1936, under company act 1936, was the first industry of Nepal. In years that followed, industrial growth was accelerated. Industries like Cotton, Sugar, Jute, Matches, Plywood and a few others were established to cash in the opportunities created by the second world war due to extreme shortage of essential consumer goods in the world market, the promoters of these industries could reap windfall profits within a very short period of time. Within a period of 10 years, as many as 63 industrial units were opened in the country with a total capital investment of Rs. 72 million Industrial development in Nepal. However, started getting regular attention of the government aegis of development plans after the down of democracy in 1951. Several industries were established in the public sector mostly with the financial and technical assistance of the USSR and China. By this a large number of manufacturing companies were seen in existence in the public sector also. But the financial position is not growing as the growth of the numbers.

The public sector in Nepal is a post democracy phenomenon. In Nepal, at present public sector cover a wide range of activities including key and basic industries to the commercially oriented being significantly engaged in manufacturing, Service and whole trade there has been a vast expansion of public understanding in the forms of manufacturing, trading, banking, insurance transport, communication, electric power systems and other. Many of these enterprises in the initial years of their establishment recorded very satisfactory performance. They contributed significantly to the nation's economic activities both in national product and employment terms after realizing the profitability of industrialization the government of Nepal also commenced on establishment of public enterprise has a number of expectation. Among them the socio-economic revolution of the country is the most important more specially, public enterprises are supposed to help in providing more employment, in generating more revenue and fulfilling the people requirement.

Basically, the materials that are required to operate any sorts of organization especially in manufacturing concerns are termed as inventory. Inventory, the basic items maintained by the organizations or firms to overcome any circumstances plays a crucial role on success of every sorts of organization. It is the store of goods and stocks of pre-requisites for the operation. Though, traditional concept of inventory evolved from very beginning, modern concept of inventory management can be traced out on 1915-1922AD. made by various scholars, acting independently, developed a lot size equation that tries to minimize the cost of holding and carrying inventory, for the equation an assumption has been made where the annual requirement of stock for a fiscal year remains constant.

Inventory management involves planning of the optimal level of inventory and control of inventory cost supported by an appropriate organization structure which is staffed by trained person and directed by top level management. It involves both financial dimensions as well as physical dimensions and these dimensions are inter-related & can't be looked in isolation *(Agrawal; 2000:238).*

Inventories link production and sales of product. Inventory exists in both manufacturing and non-manufacturing organization. Manufacturing organization's inventory consist of raw material, work in progress (WIP), finished goods and various

supplies that are required to run the operation smoothly. These materials don't enter production process but helps, assist to overcome the production process effectively and efficiently. Non-manufacturing concerns inventory will comprise only finished goods and stocks in trade owned by if for sale to customers in the normal case of business operation.

Management either in manufacturing or non-manufacturing should pay adequate attention to the inventory management to reduce the cost of manufacturing in manufacturing and sales in non-manufacturing concern and working capital requirement. It is maintained to avoid the stock out and over stock situation that adversely affects to the production process and sales operation of organization.

Inventory management relating to Nepalese organization seems to face problems due to lack of proper policies and the lack of knowledge of scientific control of inventory.

Inventory management covers the following phases determining the size of inventory table carried establishing time schedules. Procedures and a lot of sizes for new order, determining safety stock level and co-ordination of sale production and inventory policies for providing proper storage facilities arranging the receipt disbursement and procurement of materials developing the forms of recording these transactions assigning responsibilities for carrying and the inventory function providing the reports necessary for super casing these coverall activities.

1.1.1 Brief Introduction of BPPNL

Bhrikuti Pulp and Paper Nepal Ltd. is one of the leading manufacturing company of Nepal. It is situated on the bank of Narayani River at Gaindakot, Nawalparasi district of Lumbini Zone. It was set up as public enterprise by HMGN in 2039 B.S. This company is a product of mutual co-operation between his Majesty's Government of Nepal and the Govt. of people's republic of China. The objective of the first mechanized integrated paper mill of Nepal is to produce and sell writing and typographic printing paper from agricultural as well as forest water, viz. wheat, straw, rice, straw, grass etc.

It is one kilometer away from the famous city Narayanghat. It was transferred into private sector in 2049 B.S. under the privatization policy of Nepal. Nowadays it produces writing and printing paper, pulp and exercise books.

It has authorized capital of one billion two hundred fifteen million and one hundred thousand (i.e. 1,215,100,000). It has two mills, which are named pm1 and pm2. The first paper mill has the capacity of 18 metric ton of pulp. The second paper mill has capacity of 70 metric ton of paper, 60 metric ton of pulp and 50 metric ton of recycling of waste paper in a day. At present it has employed 545 workers directly and so many people indirectly it as a company. It sells its products to its local market, India and Japan. In the latest year exercise books are exports to India to a large amount. It exports pulp to Japan. It has established effluent treatment plant with the help of Danish Government which is known as environment sector programme support (FSPS) for minimizing the pollution.

The company has good relation with its employees. Employees are trained and experienced. The company has organized various seminar and workshop for the improvement of skill and ability of workers. Now a days it has applied mixed inventory system.

1.2 Statement of the Problem

Inventory is one of the most important assets to the organization. Large percentage of the total capital is invested on inventory. Inventory is the vital element of the firm that served as determinant to achieve desired sales level. Production oriented enterprises should hold a large size of inventories to manage each and very situation of the market, to fulfill customer demand etc. Management control the inventory but the managing of inventory itself is a problem. Many sophisticated mathematical techniques are available to handle inventory management problems. Such techniques are part of production management. Although inventory management usually is not the direct operation responsibility of the financial management so the financial manager should control inventories effectively to allocate capital efficiently with the view of maximizing wealth managing assets of all kinds is basically an inventory problem. Although various techniques have developed most of the firms are found not

handling inventories effectively. Hence this study is more concerned with the management of inventories.

In the context of inventory management Agrawal quoted that "Inventory management in Nepal is probably the weakest aspect of management. The tools and techniques for controlling physical as well as financial dimension".

BPPNL is a manufacturing enterprise so it is not free from inventory management problem. The present study tries to find out the causes and reasons of following problems.

⟩ What is the size of investment of BPPNL on inventory?
⟩ What is the inventory management system of BPPNL?
⟩ Is EOQ model applied by the organization for procurement process?
⟩ What types of inventory model are applied and to what extent?
⟩ Can factory control its high inventory cost?
⟩ What would be the impact of inventory on the profitability of the company?

1.3 Objectives of the Study

The general aim of the study is to find out the inventory management system exercised by the factory. The specific objectives are as follows:

⟩ To see the Purchasing Procedure in BPPNL
⟩ To see the Store Control Practice of BPPNL
⟩ To see the Inventory Networking
⟩ To see the Inventory Turnover
⟩ To see the Trend of sales and inventory
⟩ To See the relationship between total sales and total purchase of raw material
⟩ To see the relationship between annual consumption and inventory

1.4 Focus of the Study

Inventory management is one of the important functions in any organization. Without inventory management no one organizational can achieve its goal proper inventory management helps to maximize the profit of the firm. The slight change in the cost of materials or work-in-progress will bring a great change in the firm profitability. To

each high profit, it is necessary to run the company more efficiently as well as economically.

BPPNL is a manufacturing company, that's why investment and cost of carrying inventory is required to reduce the total operating cost. The main objective of inventory management is to put the inventory at an appropriate level so that inventory cost can be minimized. This study was focused in the inventory management of BPPNL.

1.5 Limitation of the Study

This study is being conducted for partial fulfillment of the requirement for Master's Degree in Business Studies. There are following limitations of the study.

- The data have been based of five fiscal years.
- The study is limited to the area of inventory management of BPPNL.
- This study is based on secondary as well as primary data.
- The study will consider only BPPNL and will be based upon annual available reports of the BPPNL.
- Time and resources for the study are the major constraints.
- This study concerns with the company and ignored other managerial functions.
- The study will be highly dependent in the data given by the concern persons of the company.

1.6 Significance of the Study

Since the study aims to analyze the inventory management system, a determining factor of profit for any industry. Inventory is the major element of manufacturing company. Without effective and efficient inventory management, no organization can achieve its goals. Proper inventory management helps to increase the profit of an organization. A slight change in the cost of inventories will bring a great change in the firm's profitability. Most of the Nepalese manufacturing organizations are suffering from poor inventory management.

This study is needed for effective inventory management in BPPNL and to see the impact in profitability and find out how much money should be invested in inventory.

The study will try to point out the major shortcoming of the inventory management system of BPPNL that are hindering the efficiency of production system of BPPNL and provide the suggestions in order to cope with the shortcoming, so that the company will run with more efficiency.

1.7 Organization of the Study

This study has been divided into five chapters, which are as follows:

The first chapter is the introduction which deals with the background of the study, introduction of the company, statement of the problem, objectives of the study, focus of the study, limitations of the study and significance of the study.

The second chapter deals with the review of the literature and is further divided into two parts. The first part is concerned with review of the concept, theory of inventory management and framework from various books, journals and articles. The second part reviews previous related studies on inventory management.

The third chapter discusses the research methodology used in this study. It include research design population and sampling procedure, sources of data and their collection methods and also the procedure and statistical tools applied.

The fourth chapter is the main part of this study by presenting the date and analyzing them with the help of various financial and statistical tools followed by methodology. At the last part of this chapter an explanation of the interview and the major finding of the whole study have been presented.

At last chapter i.e. fifth chapter, the summary of the study has been presented, and is followed by the basic conclusions of the study based on facts and analysis presented in the fourth chapter. On the basis of their conclusion a number of recommendations have also been presented for consideration. The fifth chapter is the followed by bibliography and appendix.

CHAPTER - II
LITERATURE REVIEW

Review of literature means taking knowledge from different sources. In this chapter the researcher has reviewed various published and unpublished materials. Similarly past researchers thesis are reviewed and also books, articles, newspapers are reviewed. The previous study should be reviewed because they provide the foundation to the present study. The review of literature provides the foundation for developing a comprehensive theoretical framework from which hypothesis can be develop for testing. "The purpose of reviewing the literature is to develop some expertise in ones area, to see what new contributions can be made, and to receive some ideas for developing a research design" *(Wolff and Pant;1999: 30).*

There are many researchers made in the field of Nepalese manufacturing enterprise. Only limited numbers of studies have been conducted in the field of inventory management. This chapter is divided into two sub section. Conceptual framework (Theoretical concept of inventory management) is presented in first section and review of related studies has been presented in the second section.

2.1 Conceptual Review

2.1.1 Meaning of Inventory Management

The term inventory refers to the stockpile of a firm is offering for sale and the components that make up the product. In other words, "Inventory is composed of assets that will be sold in future in the normal course of business operation" *(Khan & Jain; 2003: 203).* Inventory may defined as the goods held for eventual resale by the firm. As such inventories are vital elements in the efforts of the firm desired sales level. The dictionary meaning of inventory is stock of goods or a list which is useable and has value. The idle resource may be man, money, materials, plan equipment *(Ahuja;1993: 310).* Inventory is an item of current assets, which is the most important for the successful run of any enterprise whether it is commercial or manufacturing. Mainly raw materials, semi-finished goods, finished products and parts and supplies are the forms of inventory.

Raw materials inventory provides flexibility in the purchasing of raw materials. It is necessary to buy raw materials in line with its production schedule. Conversely, raw materials inventory may be bloated temporarily because the purchasing department may take the advantage of quality discount. The level of raw materials inventories will be influenced by anticipated production, seasonality of production reliability of sources of supply and the efficiency of the scheduling purchase and production operations. For example raw material for Bread Company is flour and milk for industries.

The inventory management assumed to be required to maintain an adequate supply of correct materials at the lower total cost. A manufacturing company must maintain a certain amount of inventory during the production, the inventory known as work- in-process inventory is strongly influenced by the length of production period, which is the time between placing the raw materials in production process and obtaining the finished product. Decreasing the production period can increase inventory turnover. Finished good inventory allow the firm flexibility inventory its production scheduling and its marketing. The level of finished goods inventory is a matter of co-ordination of production and sales. The financial manager can stimulate sales by changing credit terms or by granting credit to marginal risk. But whether the goods remains on the books as inventories or as receivables, the financial has to finance them.

Any sort of item that a firm kept in meeting the future requirement of production and sales is called inventory *(Jain and Narang; 1994:109).* The basic reason for holding inventory is to keep a production activities unhampered. It is neither physically possible nor economically justifiable to wait for the stocks to arrive at the time when they are actually required. Therefore, keeping of inventory is must for the efficient working of business unit.

Management is an art, which is devoted for planning, coordination and controlling different activities to achieve the predefined goal. Thus inventory management can be defined as the planning, directing, co-ordination and controlling of various activities which are concerned with inventory management.

The term "inventory management" is composed of two different words "inventory and management". Inventory is the stock of materials hold by a firm to meet its future

requirement of production and sale. In other words, inventory refers to any stock hold by a company for smooth running of production and market operation. It is a kind of current assets inventory which huge part of working capital is invested. Therefore, inventory is essential for smooth running of manufacturing as well as trading firms. Lack of inventory affects not only the continuous production of goods but also affects smooth supply of finished goods. A manufacturing company generally holds four kinds of inventories namely, raw materials, work-inventory-process, finished goods and spare part and supplies. The need of inventories is for the transaction motives, precautionary motive and speculative motive.

Inventory management is to manage several types of inventories in such away that it ensures smooth operation of production and sales, minimizes ordering and carrying costs apply appropriate safety programmes to reduce physical loss and pilferage of and goods at the time when required without any delay, it covers all the functions of purchasing store keeping and issuing and pricing (Bose) inventory management applies several tools and techniques for inventory control since the time of order of purchase until they are stored and issued or sold. It tries to maintain close relationship between sales and production which helps to reduce inventory level and skill meet production need and customer demand. Ultimately it aims to contribution to profitability of a firm by reduced inventory cost and smooth operation.

Therefore, inventory management is mainly concerned with minimizing investment on inventory on one hand and minimizing cost of inventory management on other hand. Both physical and financial dimensions of inventory should be managed effectively. The main duty of top-level management is formulating plan and policies that will be helpful to maintain optimum level of inventory for achievement of desired goal *(Bose;1997: 350).*

2.1.2 Types of Inventory
Manufacturing firms generally hold four types of inventories *(Van Horn;1984:112).* Which are as follows?

1. Raw Materials Inventory
Raw materials inventory are those basis input which are converted in to finished goods thought the different process. Raw materials purchased and stored for future

production. Raw materials inventories are held by manufacturing firm for smooth running of production operation. Materials used in factory are traditionally classified as direct and indirect materials. Direct material is generally classified to include all materials and parts that are integral part of finished product and their contribution can be directly identified. Indirect material is generally defined as the material used in the manufacturing process which can not be identified. They are only the supporting material of the products *(Welsh, Hilton and Gardon; 1991:82).* The level of raw material inventories is influenced by intimated production reasonable of production reliability of sources of supply and the efficiency of scheduling punching and production operation. *(Cope and Thomas;1982:99).*

BPPNL is a manufacturing company so for the production of paper, different kinds of materials is used in the production process.

2. Work-in-Process Inventories
Work-in-process inventory represent the semi-finished goods. They include these materials that have gone committed to the production process but have not been converted in to fully finished goods yet. It is very difficult to separate which materials are work in process. And which are not because the same materials may be a work-in-process as well as finished goods in other industry. It depends on the nature of production. The level of work-in-process inventories are strongly influenced by the length of production period or production cycle.

3. Finished Goods Inventories
Finished goods inventories are those completely manufactured products, which are ready for sale. Inventory a manufacturing firm; they are the final output of the production process. Manufacturing and non manufacturing company stock of finished goods for market operation holds *(Hampton; 1930: 228).*

Bhrikuti Pulps and Paper Nepal Limited product different types of papers and holds inventory of different types papers for smooth market operation and sales.

4. Spare Parts and Supplies Inventories

Spare parts are those materials, which are used in maintenance and repairing functions and supplies are those materials, which are used in operating functions. Bolts, wheels oil, lubricant, grease etc represent the spare parts and supplies.

2.1.3 Function of Inventory Management

Generally inventory management covers the function of:

- ﹚ Purchasing
- ﹚ Storekeeping
- ﹚ Issuing and Pricing

1. Purchase Management

Purchase management is one of the major functions of inventory management without purchasing function, no one manufacturing company can do their further activities. So purchasing plays important role in manufacturing company because it has its own bearing on every vital factor concerning to the manufacture i.e. quantity, quality, efficiency, economy, prompt delivery, volume of production etc. It is the scientific purchasing that can save much money time and efforts of the management. Inventory manufacturing organization purchasing is the procuring of materials, supplies, machines, tools and service required for the for equipment maintenance and operation of the business. Purchasing must be the right quality in proper quality delivering at the right time at the most favorable from outside organization.

Inventory the words of industrial matter purchasing is the procurement by purchase of Alfred and Beauty. Principle of industrial the proper materials, machinery, equipment and supplies of stores used inventory the manufacture of a product adopted to marketing inventory proper quantity and quality at the proper time and the lowest price consistently with the quality desired.

Inventory simple words the task of purchasing is related to going the open market finding the desired materials at the lowest possible price and selecting the supplier who offers it at that price taking the quality of the materials in mind.

A) Objectives of Purchase

- Procurement of required quality and quantity of raw materials at the best price not necessary the lowest price.
- Maintaining continue supply to ensure production schedule at a minimum investment.
- Procurement of materials that best suits the products and the propose of which they are intended,
- Buying the quality, which neither too much that involves belonging of the capital nor too little that holds up the regular supply for production.
- Creation of goodwill for the company through dealing with supplies.
- Improvement of the product with reference to quality and distribution by means of selection of adequate materials.
- Procuring for the utility by a schedule sufficiently in advance demand of the production work shall not suffer due to tack of material.
- Maintained of company's competitive position i.e. the market by having company's quality standards in accordance with the demand of the customers.
- Avoidance of duplication of materials, leading to waste of materials and equipments.

B) Purchasing Procedures

Purchasing is the base of concern's operation, whether it be a manufacturing of non-manufacturing. No concern can run without purchasing. Purchasing needs huge amount of cost and substantial time and efforts. If purchasing is effectives, it influenced organizational effectiveness and profitability. To perform such an important function of purchasing firms should have no follow a purchasing procedure and system designed as per company rules and regulation. Purchasing procedure may be slightly different from one firm to another but each firm certainly uses a purchasing procedure. A general purchasing procedure is described below.

1) Purchase Requisition

A purchase requisition in a firm used as formal request to the purchasing department to purchase material/goods *(Jain and Narang;1990:89).* It is prepared by the store keeper for regular stock material/goods when inventory level falls to re-ordering level

and by the department head for special material/goods not stocked as regular items. So purchase requisition may be regular or special. The requisition is approved by the authorized executives. Purchase requisition notified purchase officer about the quantity and time of needed materials/goods in the organization. Generally three copies of the requisition is prepared. Original copy is sent to the purchasing department, second copy is kept by the store keeper or the department which initiates the requisition and third copy is sent to the authorized executive.

2) Decision of Purchase

On receipt of the purchase requisition the purchase department then decides what and how much to buy taking in to consideration of various limitation and constraints in purchasing the goods. As far as possible, the raw materials should be purchase in sufficient quantity, neither less nor more to continue the flow of production. For purchasing other materials or plant and equipment, the necessary permission should be taken from the authority concerned and the finance department to release the fund.

3) Study of Market Condition and Sources of Supply

Having taking the decision for the purchase of materials, the purchasing agent should study me market condition on the basis of market reports as to when and what goods should e purchased. An intensive study should also be made in regard to the source of supply from where the goods can be procured with the help of catalogues, directories, old records, pricelists of vendor and purchase records etc.

4) Selective of Vendors

On the basis of the studies of market conditions and sources of supplier the purchasing agent selects the vendor keeping in mind the reliability, his price movement history, his delivery record and other service required and his past co-operation. Sometime supplier is selected out of me list of suppliers registered with the company for the supply of goods or sometimes quotations or price bids or tenders are invited from the prospective suppliers.

5) Preparation and Issuance of Purchase order

When the supplier is selected, purchase department prepared a purchase order for supply of stores. It is the written authorization to the supplier to supply

materials/goods. It is the evidential document by which the supplier is bound to supply material/goods as per the terms and condition of purchase order and the purchaser is required to accept delivery of and make payment for material/goods as agreed upon. Generally 3 to 5 copies of purchase order is prepared depending upon the size of the organization. If 5 copies are prepared, the possible used may be

- ∫ The original copy to the supplier
- ∫ One copy to receiving department
- ∫ One copy to the persons who initiate the purchase equitation.
- ∫ One copy to accounts department and
- ∫ Last copy is retained by purchase department/unit for furniture reference. Regular follow-up of purchase order should be done to ensure smooth purchase of material/goods and safe guard against the suit down of factory/office due to non-receipt of material/goods.

6) Receiving and Inspecting Materials

The responsibility of receiving and inspecting is given to a separate receipt and inspection department independent of stocking locations in large concerns. But in small concerns, it may be entrusted to the shopkeeper. Receiving and inspecting function include maintenance of purchase order files, receiving unloading and unpacking the materials/goods delivered by the supplier under consignment papers, gives receipt proof to the supplier, checking quantity and physical condition of material/goods received by comparing purchase order with consignment papers and notifying any shortage or breakage to the supplier, checking the quality of material/goods received by specialized personal to ensure the quality is as per the purchase order then submitting inspection report and goods received notes as to the quality and quantity if some material/goods are reject the reason there of. Five copies of goods received note are prepared. One copy is retained by the receiving department/persons and four copies along with the materials/goods will be sent to the storekeeper. The storekeeper will again examine the quality of materials/goods and compared it with the quantity given on the notes and sign all the four copies indicating remarks if need be, then one copy note is kept by him the other three copies will be sent to the purchasing department, accounts department, department which initiated the equitation. Thus on the basis of goods received note, purchases are

vendered and payment is made to the supplier and it may serve as a proof in filling any claim for short suppliers.

7. Checking and Passing of Bills for Payment

On receipts of invoice form the supplier, it is sent to the stores accounting section to examine both authenticity as well as arithmetic accuracy. Invoice quantity, price and their arithmetical accuracy is verified and checked on the basis of goods received note and the purchase order. After the invoice is thus verified in all respects, the stores accounting section certifies in all respects, the stores accounting section certifies and passes the invoices for payment and on this basis, the account section/cashier can make the payment.

2. Storekeeping

Storekeeping is an aspect of inventory control that is concerned with the physical storage of goods, Storekeeping function receives materials/goods, protects them from misappropriation, damage, deterioration, evaporation and carelessness. Science the investment in material/goods constitutes major portion of current assets there should be separated stores department *(Maynard; 1997).* If it is not possible, a small stores unit is required for stores keeping functions. Whether it is stores department **or** a stores unit, it should be efficient and well equipped.

A) Objectives of Storekeeping
- Using the available storage space and labour efficiently
- Receiving handling and issuing goods economically and efficiently.
- Minimizing the inventory holding costs,
- Protection of all goods against all cases like fire, thief etc.
- Facilitating ordering of required materials/goods.
- Maintaining regular supply of raw materials at all times when properly authorized.

To achieve the above said objectives a firm generally uses different types of controlling devices.

i) Store Ledger

This ledger is kept in the costing department and is identical with bin card except 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 the balance, both in quantity and value. Thus, this ledger provides the information for the pricing of materials issued and the money value of any time of each item of stores *(Jain & Narang; 1999:237-239).*

ii) Bin Cards

A bin cards makes a record of the receipts and issue of materials and is kept for each items of stores carried. The storekeepers maintain these cards and he himself is responsible for any difference between the physical stock and the balance shown in the bin card. These cards are used not only for recording receipts and issues of stores but also assist the storekeeper to control the stock. For each item of store, minimum quantity, maximum quantity and ordering quantity are stated on the card. by seeing the bin card the storekeeper can send the material requisition for the purchase of material/goods in time.

in) Issuing and Pricing

Materials/products in stock/store should be issued only against requisition slip since authorized person and the quantities issued and the balanced should be correctly recorded in the Bin cards. Stores ledger and Job ledger. The requisitions received are serially numbered by the storekeeper so that he requisition may be left out in accounting. It is very crucial to request for requisition form the purchasing department when the stock of material/products reaches the re-order level. Price of the issue can be determined on other inventory valuation method depending upon the firm's policy.

2.1.4 Motives of Holding Inventories

The question of managing inventories arises only when the company holds inventories. Manufacturing inventories involved trying of the company funds and incurrence of storage and holding cost, if it is expensive to maintain inventories, why do companies hold inventories? There are three motives for holding inventories *(Marti & Miller;1962:256).*

a) Transaction Motives

It emphasis need to maintain inventories to facilitate smooth production and sales operation. A company should maintain adequate stock of materials for supply to the

factory for continuous production. It is not possible for a company to procure raw materials however it is needed. A time lag exists between demand for materials and its supply. There also exists uncertainty in processing in time at many occasions. The procurement of raw materials may be delayed because of such factor as strike, transportation disruption or short supply. Therefore, the firm should maintain sufficient stock of raw materials at a given time to stream live production.

b) Precautionary Motive

In necessitates holding of inventories to guard against the risk of unpredictable change in demand and supply forces and other factors. Stock of finished goods has to be holding because production end sales are not instantaneous. A firm cannot produce immediately when customers demand goods. Therefore, to supply finished goods on a regular basis their stock has to be maintained. Stock of finished goods has also to be maintained for sudden demand from customers. In case the firms sales are seasonal in nature substantial finished goods inventories should be kept to meet the peak demand. Failure to supply products to customers, when demanded would mean loss of the firms' sales to competition. "The level of finished goods, inventories would depend upon the co-ordination between sales and production as well as on production time *(Pandey; 2002: 84).* WIP inventory builds up because of production cycle. Is the time span between introduction of raw materials into production and emergence of finished product at completion of production cycle. Full production cycle complete stock of WIP has to be maintained. Efficient firms constantly try to make production cycle smaller by improving their production techniques.

c) Speculative Motive

It influences the decision to increase or reduce inventory levels to take advantage of price fluctuations. Different factors which may necessitate, purchasing and holding of raw materials inventories quantity discount and anticipated price rise. The firm may purchase large quantities of raw materials that needed for desired production and sales level to obtain quality discounts of bulk purchasing.

2.1.5 Need and Importance of Inventory Management

Inventory in any organizations are of pivotal role. If the organization is not paying attention to inventory management, it will affect the efficiency and profitability of the

organization. Buffa observes a "Inventories serve the vital function of developing. The various operation in sequence beginning with the materials extending through all the manufacturing operations and into finished goods. Storage is continuing to warehouse and retail stores *(Buffa;1994: 474).*

Importance of inventory management can be written as follows:

Due to absence of stock, the company may have to pay high prices because of piece wise purchasing maintaining of inventory may earn price discount because of bulk purchasing.

)   Inventory helps in smooth and efficient running of business.

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

)   Inventory also reduced product cost because there is an additional advantage of batching and long smooth running production runs.

)   Inventory also acts as buffer stock when raw materials are received late and so many sales others are likely to be rejected.

)   Inventory helps in maintaining the economy by absorbing some of the fluctuations when the demand for an item fluctuates or is seasonal.

)   Pipeline stocks (also called process and movement inventories) are also necessary where the significant amount of time is consumed in trans-shipment of items from on localities to another *(Nair, Banarjee and Agrawal;1998: 218).*

2.1.6 Objectives of the Inventory Management

Inventory is the most important to all manufacturing organization in today's industrial world. So it is necessary to manage it properly because both situations of inventories i.e. either excessive or inadequate are not desirable to the industry. The excessive level of inventories consumer's funds of the firm that cannot be used for another purpose and thus it involve an opportunity cost. The carrying cost such as the cost of storage, handling, insurance, recording and inspection also increase in proportion of volume of inventory. These costs will impair the firm's profitability further.

On the other hand maintaining an inadequate level of inventory is also dangerous. Inadequate level of inventory means under investment of industry inadequate raw materials and work-in-process inventories will result in frequent production

interruption. Similarly, if finished goods inventories are not sufficient to meet the demand of consumer regularly. Consumers may shift to competitors, which will amount to permanent loss to the firm. Therefore to maintain the proper inventory or optimal level of inventory in industry is quite significant. But, it is difficult task the management because the optimal level of inventory always between two points of excessive and inadequate inventories.

The major objectives of inventory management are as listed below *(Starr and Miller; 1962:233)*.

) Maintain sufficient finished good inventory for smooth sales operation and efficient customer service.

) Minimizes cost of production.

) Maintain sufficient stock of raw materials in periods of short supply and anticipated price changes.

) Maximizes profitability with minimum wastage risk of spoilage and obsolescence of inventories must be avoided.

) Effective use of invested capital.

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

2.1.7 Cost Associated with Inventory

Cost is significant factor in purchasing and maintaining inventories, the critical factor are when to purchase and how much to purchase at a time? Systematic and scientific inventory management system includes various cost factors for using mathematical technique. In order to get optimum and ideal inventory management. If there lacks adequate knowledge of these factors, no proper inventory management can be maintained.

2.1.7.1 Carrying Cost or Holding Costs

Total carrying generally increase in direct production to the average amount of inventory carried in turn depended upon the frequency with which orders are placed. The cost-associated with having inventories which includes storage cost, insurance cost of typing up fund, depreciation cost and so on. These costs generally increase in production to the average amount of inventory held; carrying cost varies with

inventory size. This behavior is contrary to that ordering cost which decline with increase in inventory size. The carrying cost includes the cost incurred in the following activities

) Capital or opportunity cost

) Insurance and taxes

) Warehousing cost

) Handling cost

) Clerical and staff

) Deterioration and obsolesce

Carrying cost is the first category management cost which is generally associated proportionally with the average value of inventory *(Solemen Fzra;1989: 181).* The total carrying cost is calculated as follows.

Total Carrying Cost (TCC) = (C %)×(P) ×(AI)

Where,

C% = Percentage of cost of carrying inventory which Is calculated by adding the cost of capital tied up, storage, insurance and taxes etc and divided it by the average inventory value.

P = Price per unit of inventory.

AI = Average inventory in units i.e. order quantity (EOQ/Q) divided by two plus safety stock(S) if any, assuming a constant rate of consumption of inventory

2.1.7.2 Ordering Cost

Ordering cost consist of order costs, setup costs or both ordering cost could include preparing and processing the order request, selecting a supplier, checking the stock, preparing the payment and receiving inventory levels. Set up costs refers to modifying the manufacturing process to make different goods. They include personal costs as well as capital equipment costs. Many firms use blanket orders to reduce order costs *(Bloomberg & Hanna; 2002:161).*

The term ordering cost is used is in case of raw materials (or supplies) and includes the entire cost of raw materials. They include cost incurred in the following activities.

- Requisitioning
- Transportation
- Order Placing
- Receiving, Inspecting and storing
- Clerical and staff.

Ordering cost increase in proportion to the numbers of orders placed. The clerical and staff costs, however do not have to vary in proportion to the numbers of ordered placed and one view is that so long as they are committed costs, they need not be reckoned in computing ordering cost. Alternatively, it may be argued that, as the number of the number of orders is increase. The electrical and staffed costs tend to increase. If the number of orders are drastically reduced, the clerical and staff force released now can be used in order departments. Thus, these costs may be included in the ordering costs. It is more appropriate to include clerical and staff costs on a pro-rata basis. Ordering cost increase with the number of orders, thus the more frequently inventory is acquired, the higher the firms ordering costs. On the other hand, "If the firm maintains large inventory levels, there will be few orders placed and ordering cost will be relatively small. Thus ordering cost decrease with increasing size of inventory" *(Pandey;1994: 894).*

Furthermore, ordering cost is the cost involved in placing & receiving an order or purchased items. The expenses involved in this cost are:

- Requisitioning cost
- Cost of placing an order
- Receiving, inspecting and storage cost
- Transportation cost
- Sales tax, customs etc
- Stationery cost
- Telephone/Fax/Postage expenses to follow up
- Clearing and forwarding cost
- Cost incurred when raw materials are in transit

Ordering Per Year, the total ordering cost is calculated as follows:

Total Ordering Cost (TOC)= (O) × (N)

$$=(O) \times (R/Q)$$

Where,

TOC = Total Ordering Cost

O = Ordering Cost

N = Number of Orders Placed Per Year

Q = Inventory Quantity for Each Order.

2.1.7.3 Purchase Price

Purchase price is incurred on purchasing materials goods. Organization try to minimize it without compromise specification of materials good through purchase management as already discussed in purchase management section.

2.1.7.4 Stock out Costs

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

Stock out cost computed from following formula:

Stock Out Cost= Inventory Cycles Per Year-Output Unit × Probability of Possible

Stock Out × Unit Stock Out Cost

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

2.1.8 Techniques of Inventory Management

In managing inventories the firm's objective should bin consonance with the wealth maximization principle. Adequate inventories facilities smooth production activities and help to provide off shelf delivery to customer on the other hand excessive inventory is idle resources of the firm can prove costly because it tries up working

capital unnecessarily which could have been better used had it been utilized for some other purpose. According to Alton N. Smith, "Inventory is (money) on which a company pays interest rather than collect interest. It money always in danger of deviation. Non controlled inventory is an industrial danger". The major problem of inventory management is mention here. It should be to arrive at an optimum balance between too much inventory and too little inventory. So that there may be no stock out problem and cost of inventory should be minimum.

Following are the inventory control technique in below.

A. Economic Order Quantity (EOQ)

These techniques attempts to establish the more economic balance between the acquisition cost and carrying cost by determining quantities which to be ordered. The most economic quantity is ascertained at this point.

Haris (1915) development the famous economic order quantity (EOQ) formula later through the consultant named Wilson, this formula gained wide use in industrial area. Later on Haris developed this formula. The EOQ is still widely used in inventory for independent demand. The EOQ model is an inventory management technique used to find the optimal order included order quantity that minimizes the total cost which includes ordered and carrying cost. John's. Hampton defined economic order quantity "The order size that will result in the lowest total of order and carrying costs for items of inventory. Further the more he states the importance of economic order quantity as if a firm places unnecessary orders t will insure unneeded order costs if it places to few orders, it must maintain large stock of goods and will have excessive carrying costs by calculating an economic order quantity, the firm identifies the numbers of units to order that results in the lowest total of these costs *(Hampton;1989:223).*

It refers to the order size that will results in the lowest total cost (total ordering cost + total currying cost) for an item of inventory it a firm places many orders it will insure unneeded ordering costs. If it places too few orders, it will have excessive carrying cost. By EOQ model we can identity the number of units to orders that results in the lowest total costs. EOQ seeks that how much units of inventory should purchase at an order, which minimizes the total cost. When we are going to calculate EOQ one thing should keep in mind. To calculate the cost involve in the carrying and ordering .A

fairly large error say 21% in determine the carrying and ordering costs will introduce a much smaller error(10%) in the determination of EOQ *(Buchan;1970: 362).*

We can compute EOQ with the help of forecasting usage, ordering and carrying costs, in EOQ calculating we must use marginal cost only, don't include fixed costs.

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

Here,

      A= Annual demand

      O= Ordering cost per order

      C= Carrying cost per unit

Carrying cost per period "represent the cost of inventory storage, handing and insurance together with the required rate of return on the investment in inventory, these costs are assumed to be constant per unit of inventory of a time. Thus, the total carrying cost for a period is the average number of units of inventory multiples by the carrying cost per unit.

If the usage of an inventory item is perfectly steady over a period of time question of safety stock does not arise. Average inventory (in units) can be expressed as

$$\text{Average Inventory} \; X \frac{Q}{2} \dots\dots\dots\dots(1)$$

Where, Q is the quantity (in units) ordered and is assumed to be constant for the period as illustrated in figure 2.1

Figure No. 2.1
Economic Order Quantity
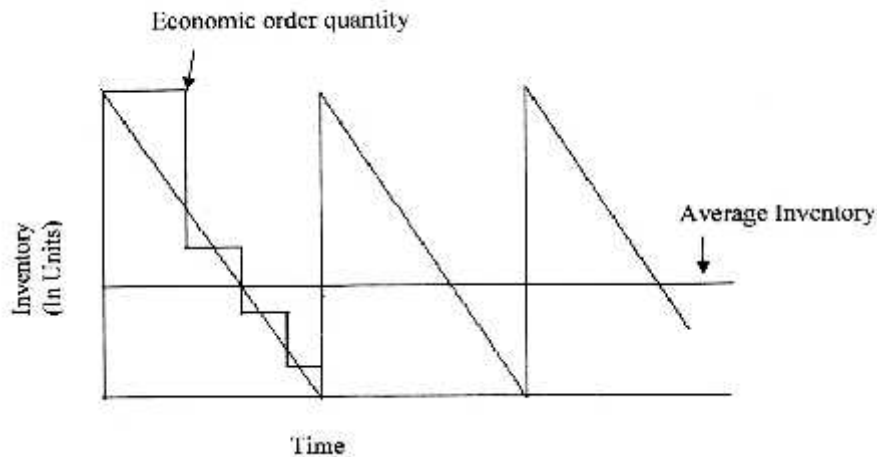
Assumption of Economic Order Quantity

The concept of EOQ is the based on following assumption.

⟩ The demand rate is constant recurring and known for example, demand (or usage) is 100 units a day with no random variation and demand is assume to continue into the definite future.

⟩ Material is orders or produced in a lot or batch and lot is placed into inventory all at one time.

⟩ The lead - time is constants and knows. The lead - time for order placement to order delivery is therefore always a fixed number of days, no stock outs are allowed, since demand and lead- time are constant one can determine exactly when to order material to avoid stock out,

⟩ The item is single product these is no interaction with other products.

EOQ can be determined by three Methods

⟩ Formula / mathematical method

⟩ Trial and error method (table method)

⟩ Graphic method.

a. Mathematical / Formula Method

Mathematical model are also available to calculate economic order quantity, these are number models exist, as studies in college programs such as operation research and production management. Even many mathematical model exists the main objectives of these model is to reduce minimizes the inventory cost / total costs. Without getting into highly refined decision models we can illustrate the concepts of EOQ with a basis mathematical model .we can calculate EOQ by using the following formula:

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

b. Trial and Error / Table Method

This is another type of calculate economic order quantity. A firm has different alternatives purchase policy of its inventory. It can purchased its entire requirement own one single lot alternatively, the firm can purchase its inventory is small lots periodically say weekly, monthly, six monthly, and so as its means more than one time the firm can place and order to purchases inventory . Low inventory holding are associated with high ordering cost and low carrying cost. This approach for the determination of EOQ uses different permutation and combination of total costs.

In the other words, according to this approach the carrying cost and ordering cost for a different sizes of order to purchase Inventory computed and the other size with the lowest total cost/ ordering plus carrying of inventory is the economic order quantity.

c. The Graphic Approach

The Economic order quantity can also be found graphically. The following figure illustrates the EOQ functions.

Figure No. 2.2

Graphical Presentation of EOQ
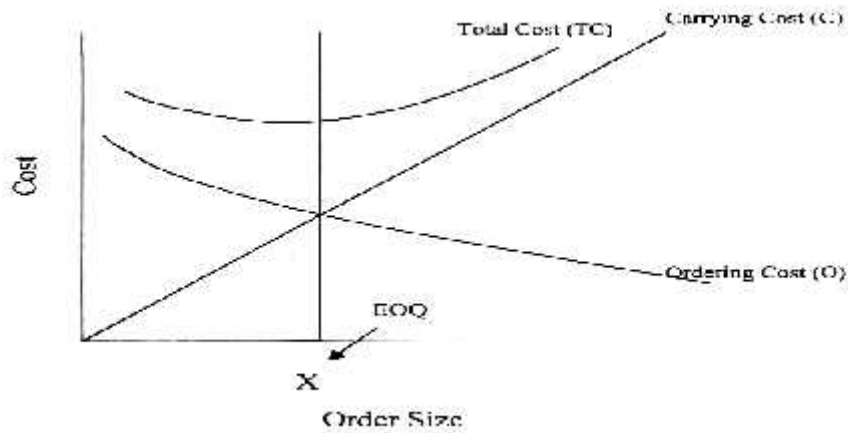
In figure carrying, ordering and total costs are plotted on vertical horizontal axis, horizontal axis used to represent the order sizes. Total carrying cost increases as the order size increase because on an average a large inventory level will be maintained and ordering cost decline with increase in order size the behavior of total cost line is noticeable since it is a sum of two types of costs that behave differently with order size. The total cost decline in the first stage but they start rising when the decrease in average ordering cost is more than offset by the increase in carrying cost. The economic order quantity occurs at the point 'Q' where the total cost is minimum if the order size increases carrying cost exceeds ordering cost that are saved. Thus, the firm operation profit is maximized at 'Q'.

B. ABC Analysis

ABC analysis is a mechanism for controlling inventories in an organization having multi product stores / stock. A firm should categories its inventory for controlling purpose it is natural phenomenon that each kind of inventory control does not deserve equal importance .for some item, the cost of developing inventory police may is greater than the cost of saving from its misuse. So it not desirable to maintain some degree of control on all tile items -the firm should advert more to those items whole value is he high therefore the ABC technique helps the firm to classify inventory to identify the items which should receive maximum attention of the management group "A" includes items group "C" of low value.

Figure No. 2.3

The Typical Breakdown is Shown Below
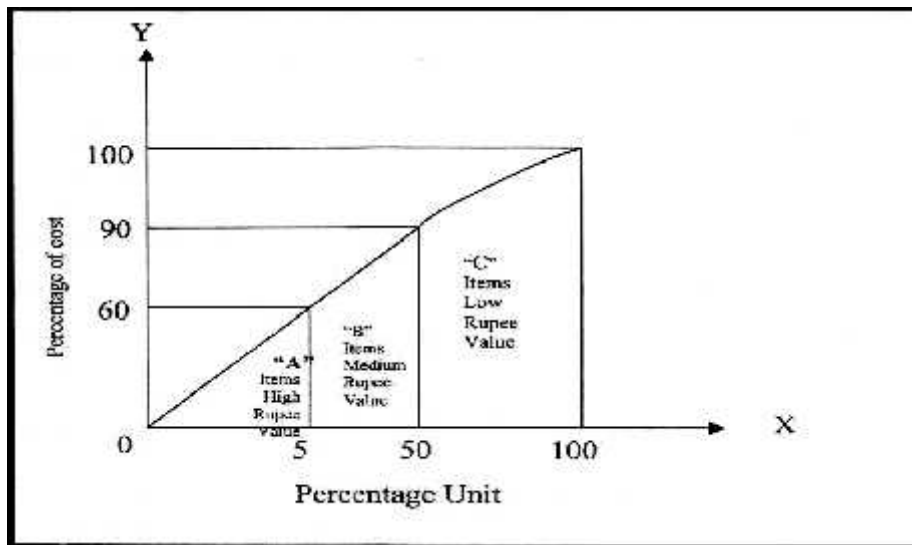
Source: Pandey, Financial Management

Class "A" items which represent only 25 percent of the total value of items accounts for over 75 percent of the total rupee value. The opposite relationship holds for class "C" where 50 percent of the total number of items accounts for only about 5 percent of the total rupees value. From the above description it is clear that more attention should be given to the "A" items than to the others. The information necessary to porches a selective "ABC" inventory policy is easy to obtain. High rupees values are treated first and most carefully, an example of the treatment that would be given the three divisions is

"A" items Economic order quantities are carefully calculation for each item. The usage rate and the procurement costs are reviewed continuously with each other. Tight inventory control is maintained.

"B" items Economics order quantities are developed and reviewed periodically normal inventory control is exercised.

"C" items Specific ordered quantity calculation is not made rough tables are used or quantities that will suffice for long period a year or more ordered. Inventoried are

checked physically once every six month or every year to determined if new ordered should be placed *(Richardmond;1669:265).*

1. Advantage of ABC Analysis
-) Due the classification it reduces the storing cost.
-) It facilitates the investment on materials and utilizes the optimum level of capital.
-) It makes easy to handle the limited valuable materials.
-) It helps in the decision making of investment on raw materials.
-) It saves the time and labors.
-) It helps in the decision making of investment on the materials.
-) There is possibility of maximum use of materials.

C. Stock Level Sub-System

Carrying of too much and too little of inventories is deterring mental to the firms. If the inventory is too little, the firm will face frequent stock cuts involving high reordering cost and it the inventory level is to high, it will be necessaries of capital. Therefore, an efficient inventory management requires that a firm should maintain the optimum level of inventory where inventory cost the minimum and at the same time there is no stock out which may result in loss of sale or stoppage of production. Various stock levels are *(Nair, Banerjee, Agrawall;1998:220).*

a) Minimum Level

It represents the minimum quantity of inventory, which must be maintained in hand at any time. This quantity is fixed so that production as sales may not be held up to shortage of inventory. In this level, the following factors are taken into consideration.
-) Lead- time i.e. time lag between in denting and receiving inventory.
-) Rate of consumption of the inventory during the lead-time.
-) Nature of inventory, minimum is not requires in case of special inventory, which is required against customer specific orders.
-) Formula for the calculation of

Minimum Level = Re-ordering Level-(Normal Consumption ×

Normal Re-order Period.

b) Maximum Level

Maximum level represents the maximum quantity of item of inventory that can be hold in stock any time that stock should not exceed this quantity. The quantity is fixed so that there may be no over stocking. The maximum stock level is fixed by taking into account the following factors.

- Amount of capital available for maintaining stores.
- Golden space available.
- Maximum requirement of the stores for production purpose at any point of time.
- The time lag between indenting and receiving of inventory.
- Possibility of loss in stores by deterioration, evaporation etc.
- Rate of consumption of the material during the lead-time.
- Fluctuation in price.
- The seasonal nature of supply of inventory some items of inventory goods are available only during specific periods, of the year, so these have to be stocked heavily during these periods.
- Possibility of change in fashion and habit, which will necessitate change in requirements of materials.

Formula of Maximum Stock Level = Re-order Level +Re-ordering Quantity - (Minimum Consumption × Minimum Reordering Period)

c) Re-ordering Level

An important question in any inventory management system is "when an order for the purchase of an item should be placed, so that the concern does not run out of goods". The re-order level provides the answer to this question. It is the point at which if stock to material in store approaches the stock-keeper should initiate the purchase requisition for fresh supplier of material. This level is fixed some where between the maximum and minimum level in such a way that the different of quantity of the materials between the re-ordering level and the maximum level will be sufficient to meet the requirement of production up to the time the fresh supply to the materials

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received. "Re-order point sub system answers the important question in ant organizations inventory management". The question is "when an order should be placed so that the firm does not run out of stock".

"The re-order point is the level of inventory at which the firm places order in the amount of the economic order quantity. If the firm place the order when the inventory reaches the re-order point, the new goods will arrived before the firm runs out of goods to sell". So determine the reorder point under certainty. There are three information are needed.

I) Usage Role

This is the rate per day at which the item is consumed in production. It is expressed in units.

II) Lead Time

It refers the time normally between placing an order and receiving the delivery of inventory. Lead time covers the time span from the point when a decision to place an order for the procurement of inventory is made to the actual receipt of the inventory by the firm. It is also called procurement time of inventory. It is expressed in days, week and months.

III) Safety Stock Level

The minimum level of inventory may be expressed in days, this level can be computed by multiplying the usages rate, times and the numbers of days that the firms want to hold as a protection against shortage.

Re-order Level = Maximum Consumption× Maximum Re-Order Point

IV) Average Stock Level

Average stock is calculated as follows:
Average Stock Level= Minimum Stock Level + ½ of Re-Order Quantity

V) Danger Level

This is a level where normal issue of the material is stopped and issued are made only specific instructions. The firms will make special arrangement to get materially,

which reach at their danger level so that me production may not stop due to shortage of materials. Danger Level = Average Consumption x Maximum Re-order Period

2.1.9 Inventory Valuation

In any firm different goods are purchased at different time at different price rate. But the problems to assign value to those goods, emerged to identify the position of current assets of the firm. Balance sheets of the firm should show true and fair view of the financial position of the firm. For these purpose assets including inventory should be properly to exhibit a true and fair view. True profits can not be calculated assets are properly values.

The false valuation of the inventory directly affects the profit. If inventory is values at a lower than actual, the profit will decrease and as result shareholders would get less dividend. On the other hand, if inventory is values more than actual value the profit would be increased and the shareholders will receive more dividends, a port of which would than be paid out of capital to be insolvent. Moreover under or over valuation of inventory will not only affect the appearing result and financial position but will also affect these for the next period because closing stock of the current period will become opening the next period.

Valuation of inventories affects profit of the year. Therefore, method of valuation of inventory should not be changed year to year enable in the comparison of profit of different years.

Various methods of valuation of the inventory is as follows:

2.1.9.1 Specific Identification Method

The specific identification method requires that each unit in inventory be identified with the particular time is purchased. In these methods, the items have serial numbers or are distinguishable by model, colors or size to identify the particular items but specific items separate at first and recorded in stock book. This method is more suitable to low volume, high cost item such as automobiles. It is not very practical when the firm purchase large quantities of identical units of various times and prices.

2.1.9.2 Weighted Average Cost of Capital Method (WACC)

This method assumes that goods are removed form the beginning inventory and purchase group in proportion to the number of units in these groups. This method is widely used by organization that holds items in inventory for long period of time. The price is obtained by the total quantity of item in hand.

2.1.9.3 First-In-First-Out (FIFO) Method

FIFO method assumes that the oldest items on hand are sold first. Each sale is made out of the oldest goods in stock, the ending inventory therefore consists of the most recently acquired goods. During the period of rising price, these methods will result in an inventory then would be assigned under the average cost method. FIFO is the most commonly used method for valuing inventory. It is simple to sue and appear to coincide with established merchandising principle of selling the oldest item first.

2.1.9.4 Last-In-First-Out (LIFO) Method

This method assumes cost flow is exactly the opposite of FIFO method. The title of this method assumed that the recent items purchased.

Consequently, the ending inventory consists of the oldest unit in hand cost of the latest purchased materials will be the cost assigned to the first material issued, until they are exhausted then the price of the proceeding lot is used and so on. Materials are issued at cost approximating current market prices but inventories trend to be valued at the oldest lots on hand giving price, which is out of date with current invoice prices. This method has become popular since the procedure becomes as acceptable method for use in determining the income taxes. Unlike weighted average in the inventory is less than the beginning inventory. In such a case, the firm must be able to identify the oldest remaining items for inventory valuation purposes.

2.1.9.5 Higher in First out Method (HIFO)

This method is based on the assumption that closing stock of items always remains at the minimum value. So lots of the higher cost of materials purchased or goods manufactured are exhausted first. As this method always under values the stock it is not popular. It is used in the monopoly products and cost plus product as well.

2.1.9.6 Market Price Method

Market price either is the replacement price or the realizable price. The replacement price is used in case of items that are held in stock for use in production.

2.1.10 Just-In-Time Inventory

JIT is disciplined approach to improve manufacturing quality, flexibility and productivity through the elimination of waste and the total improvement of people. JIT is not simply reducing inventory rather its overall objective is increased quality. There are there components to JIT. First is JIT purchasing which ensures that the materials arrive so that production can immediately use them? Next is JIT manufacturing which production finished goods for immediate shipment, sub assemblies for immediate assembly, and fabricate parts for immediate use in sub assemblies. Last is JIT delivery which transports goods to meet the tighter transit times and reliability standards of JIT operations. All there JIT components must work together for a company to benefit from them.

JTT reduces costs primarily through the application of experience curve and economic of scale. Economics of scale mean making more of the same product with same sources. This reduces the permit cost by spreading fixed cost over more units.

According to Shingeo Shingo, a JIT authoring and engineer at Toyota Motor Company identifies seven wastes, as target of continuous improvement in product process. The seven wastes are,

⟩ Waste of over production
⟩ Waste of waiting
⟩ Waste of transportation
⟩ Waste of processing itself
⟩ Waste of stocks
⟩ Waste of motions
⟩ Waste of making defective products.

2.2 Related Studies on Inventory Management

2.2.1 Review of Journals

As the output of the study conducted by Bajracharya (1983), on "*Management Problems in Public Sector Manufacture Enterprises in Nepal*", he concluded that inventory management suffer from lack of planning, high carrying cost, poor recording and stores management and virtual absence of controlling system.

Agrawal (1980), on "*Nepalese Public Enterprises*" management expert of Nepal, claims that inventory management in Nepal is probably the weakest aspect of management. The tool and techniques for controlling inventory has not been applies in Nepalese enterprises for controlling their physical as financial dimensions.

The study conducted by Rao and Rao (1981), on *"The Efficient Management of Inventory."* recommended the need for tackling human element in the third world country like Nepal manage the inventory efficiency. They had suggested the need of orientation on the altitude of the staffs towards materials cost because of lack of knowledge and carelessness, which were the important factors responsible for inventory management. Similarly, Janam Jaya Banjade identified the lack of quality and adequate materials as well structural deficiency and dishonesty of the management as the main problem of Nepalese enterprises mat were adversely affecting Nepalese corporation (Banajade).

2.2.2 Review of Unpublished Thesis

Inventory management is one of the important aspects of general management in any organization. Without effective and efficient inventory management, no manufacturing organization can achieve its goal. But no one pays attention in this field. There are developments more inventory management technique and has been realized but also many problem and difficulties haven been faced bye the manufacturing organization. In Nepal there are numbers of public enterprise have been established and analysis had been made but only the aspect of financial analysis and performance. A few researches made the researches in the field of inventory management of manufacturing organization. Some of the important studies done so

far. In me field of inventory management in Nepal have been carefully reviewed and their finding have been listed as under.

Risal (1997), regarding "*Inventory Management of Agriculture Input Corporation (AIC)*". He recorded that inventory management was not based on scientific method. Used of scientific method of inventory management in this organization seemed difficult due to the non-uniform inventory consumption pattern frequent fluctuations in the exchange rate of imported inventory components.

Basnet (2003), on topic "*A Case Study of Inventory Management of Himal Cement Co. Ltd.*" in his degree thesis expressed his view that in reality Himal Cement Company Limited (HCCL) is not applying the different method of techniques of inventory managements. His major findings were that HCCL is not applying the different method or technique of inventory. To manage its inventory effectively a firm should use different tools and techniques like EOQ, ABC analysis, Reorder level etc in inventory management, which minimizes the inventory cost, consequently will result in to positive profitability. There is now proper and up to date improvement in inventory management of punching, production. Sales and financial dimensions by which HCCL will run in the future.

Pandey (2000), has done a thesis on topic "*Inventory Management, A Case Study of Gorkhapatra Corporation*" expressed the need of good inventory system to maintain a suitable level of inventory in order to meet corporation's requirement on time. Time rules for maintaining proper stock on inputs are necessary to know the answer about how much to buy and when to buy. The models, examples and formulas are necessary for every business to reduce unnecessary cot incurred on ordering and carrying cost of the inventory. Moreover, me unnecessary costs involved in ordering and carrying can be reduced to a certain level by the use of models, formulas etc.

Sigdel (2002), on "*Inventory Management A Case Study of agriculture inputs co-operation*" regarding. Chemical fertilizes reveals that AIC is not using scientific models inventory management. Although they don't calculate EOQ for the easy supply of chemical fertilizer. They order in lots of 1000 to 2000, this is a positive aspect of inventory management. There is no evidence of talking trade discount by

AIC, Lead-time is also not calculated properly, generally, it takes 3 to 6 months to receive an order after the order placement, re-order point is also not fixed. Regarding buffer stock, although AIC has capacious warehouse though out the country, it remains out of stock in season and overstock in out of season. AIC is not using ABC analysis also.

Shrestha (2005), entitled "*A Case Study of Inventory Management of Bottlers Nepal Ltd.*" had studied about the inventory problem of Bottlers Nepal (Terai) Limited (BEBTL) to find the present inventory position and problem in managing inventory. After her studies she revealed that there is no proper system of material purchase in the Factory. And the price and Quantity of collected materials are fluctuating from year to year. The company is not adopted appropriate EOQ model in purchasing decision.

Shrestha (2005) on "*Inventory Management of N.D.L.*" to finds out that the effective management of inventory is essential. If N.D.L. applied the scientific techniques of inventory management certainly it will cope it's very successfully. He further suggest that purchase plan should he prepared for different type of raw material with the proper co-operation among the planning, purchase storing, production, marketing and selling department to avoids the excessive investment on inventory. Again the recommended those, the company plan for purchasing various types of inventory management technique and to minimize the total inventory cost. i.e. carrying and holding cost.

Research Gap

As we know that research means to carry out the real problem on the particular field on a particular topic. The purpose of research is to develop some expertise in one's area, to see what new contribution can be made and to receive some ideas, knowledge and suggestions in inventory management of BPPNL.

It will try to bridge the gap between the literature exploring to appraise the present practices of the organization's comprehensive inventory management. It will be concise, practical, usable and valuable to the major parties interested in inventory management and also be useful and beneficial to BPPNL management and other interested parties of BPPNL.

CHAPTER - III
RESEARCH METHODOLOGY

3.1 Introduction

Research methodology is the way to solve systematically about the research problem's that the present study has its objective to analysis examine and interpret the application of the inventory management techniques used in the process of minimization of the cost and contribution to the effectiveness of the enterprises with the help of various analysis statistical tools and financial subject matters. The research methodology which will be followed to archive the basis objective of this research work is as stated below.

3.2 Research Design

The research design is plan structure and, the strategy for investigation research design for this study will be more analyzing in the sense that it will concentrate on analyzing the management of inventory item wise separately, to precise its causes and effects in other areas. In other words, a research design is the plan structure and strategy for investigation of effects in other to arrive at conclusion. The plan is the overall scheme of program of research. It includes and outlines of what the investigation will do from writing the hypothesis and their operational implication to the financial analysis of data *(Wolf and Pant;1993: 130).*

The study will also focus on the quantities aspects of effectiveness of inventory management and theoretical prescription are elaborated, whenever necessary. In this respect, the present study has followed the descriptive as well as analytical, approach to achieve the objectives. This study entitles 'Inventory Management of BPPNL deals with procurement, sales and distribution procedure, trends of inventory management of BPPNL, which were the variables under the study, so the analytical and descriptive research have been applied as research design.

3.3 Population and Sample Size

The population for the study is the whole paper industry in the country, among whole paper industry Bhrikuti Pulps and Paper Nepal Limited is selected for study concern it is a case study of inventory management of BPPNL.

3.4 Data Gathering Procedures

Data gathering is very difficult activity of the whole research process but it is most important part of the research. Data gathering consists of obtaining information from somebody's hand. The secondary data are directly obtained from various sources mentioned above for the purpose of data analysis are taken from official records, published and unpublished documents, books, articles, magazine. The researcher has made frequent visits to BPPNL office in order to collect the required data from officials.

For primary information, with a view of collecting the additional information, informal interviews with the officials have been taken.

3.5 Nature and Sources of Data

Information is the lifeblood of any research. Both primary and secondary information have been used in this study. To achieve the objectives of this study, both primary as well as secondary data have been used. Primary data are used on questionnaire, informal interview as well as unstructured dialogues and discussions with staffs of BPPNL. While secondary data were collected from the following sources.

〕 Studying and analyzing the annual reports of BPPNL

〕 Books, articles, magazine and official records of BPPNL

〕 Published and unpublished documents related to BPPNL

3.6 Methods of Analysis

Inventory management involves determining how many inventories to hold? When to place order? How many units to order at a time? In order to achieve the organizations goal there is a need of effective inventory management system. In this study, data collected from various sources were managed, analyzed and presented in proper way including tables, figures and graphs with proper interpretation and explanation. The

inventory management techniques applied in this study is Economics Order Quantity (EOQ), Re-order level. Inventory turnover ratio and ABC analysis that are the part of financial analysis. However the statistical techniques included in the study are mean, standard deviation, coefficient of variation, Kari-Pearson's coefficient of correlation and trend analysis.

3.6.1 Description Analysis

Descriptive analysis consists the purchase practice, store control device and process of issuing materials in BPPNL.

3.6.2 Inventory Management Tools

Inventory management tools are used to analyze the inventory management aspects of BPPNL. The inventory management tools applied in the study are as follows.

A) Economic Order Quantity (EOQ)

An EOQ technique is the most important of inventory management. It attempts to establish me most economic balance between the carrying costs and ordering costs determining the quantities to be ordered. The economic order quantity is that inventory level, which minimizes the total of ordering and carrying costs. The relationship between the ordering costs and carrying costs are called cost factor. EOQ is calculated in Rupees due to the unavailability of data in quantity.

EOQ can be Determined by Following Way
) Formula method
) Table method
) Graph method

i. Formula Method

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

Where,

EOQ=Economic Order Quantity

A=Annual requirement

O=Ordering cost

C= Carrying cost

Thus, EOQ mainly depends on two types of costs.

a) Ordering Cost

Ordering costs are also termed as preparation costs. These are those types costs, which incurred in connection with ordering and procurement. They are primarily fixed cost relating to the starting of production or the writing of an order for purchase and don't vary with the number of items in the lot. In BPPNL ordering costs included.

- Set up cost of machine and finished goods inventory
- Clerical costs
- L/C charge

b) Carrying Cost

Inventory carrying costs are also known as stock holding costs or what is called as inventory holding costs. These costs vary directly with the number of items involved. BPPN carrying costs are:

) Interest on capital investment

) Clerical and staffs

) Insurance

) Loss due to oil

ii. Table Method

$$\text{Order Size X} \frac{\text{Annual Requirement}}{\text{Number of Order}}$$

$$\text{Average Inventory X} \frac{\text{Order Size}}{2}$$

Total Carrying cost = Carrying Cost Per Unit × Average Inventory Total Ordering Cost = Total Cost of an Order × Number of Order

B) Inventory to Total Assets (ITA)

This ratio indicates the percentage of total assets invested in the form of inventories. It is calculated as:

$$\text{ITA X} \frac{\text{Inventories}}{\text{Total Assets}} \mid 100$$

The increase in the ratio indicates liberal inventory policy of blocking of materials in stock.

C) Inventory Conversion Period (ICF)

The inventory conversion period is calculated by dividing inventory by the cost of goods sold per day. It is computed as

$$ICP\ X \frac{\dfrac{Inventory}{Cost\ of\ Goods\ Sold}}{360}$$

The inventory conversion period is the average length of time required to convert materials into finished goods and then to sell these goods? It is the amount of time the product remains in inventory in various stages of completion.

D) Payable Deferred Period (FDP)

It is calculated by dividing account payable by the daily credit purchase. Mathematically it can be expressed as

$$PDP\ X \frac{\dfrac{Account\ Payable}{Cost\ of\ Goods\ Sold}}{360}$$

The payable deferred period is the average length of time between purchase of raw materials and labor and the payment of cash for them.

E) Inventory Turnover

Inventory turnover is calculated to show the rate of turn over of stock. This will show how many times the stock has turned over, when the figure of number of times is going on increasing, indicating a trend that the stock is fast moving from reference point of view. This ratio should be 7 to 18 times. This ratio is worked out by dividing the COGs with the average inventory. We can write this as:

$$IT\ X \frac{COGs}{Average\ Inventory}$$

This measures the efficiency on inventory management and how quickly inventory can be sold. It indicates the relationship between the cost of goods and the inventory level.

As we know that higher "ITR" is better than low ratio. High turnover ratio indicates that a firm has good inventory management system and it is able to earn profit selling quickly over a period of time. Likewise, low turnover ratio indicates that a firm has poor inventory management system and firm has more stock of finished goods for sales.

F) Inventory to Current Assets (ICA)

This ratio shown the percentage of inventories to current asset and it is calculated as:

$$ICA \; X \frac{Inventories}{Current \; Assets} \mid 100$$

The increase in the ratio is an indication of liberal inventory policy followed by the company.

3.6.3 Statistical Tools

Some important statistical tools are used to achieve the objective of this study. In this study, statistical tools such as Karl Pearson's Correlation Coefficient, Time series/ Trend analysis and Probable error. The brief descriptions of each of these are made below.

A) Karl Pearson's Correlation Coefficient and Probable Error (PE)

This method popularly known as Pearson's coefficient of correlation is widely in practice. This is a mathematical method of measuring the degree of association between two variable say x and y. In this study, the correlation analysis is used to test the relationship between the following variables.

- Annual required and annual purchase
- Sales and closing stock
- Purchase and closing stock
- Sales and purchase

According to the Karl Pearson correlation coefficient is calculated as follows.

$$r = \frac{n \sum d_x d_y - (\sum d_x)(\sum d_y)}{\sqrt{[n \sum d_x^2 - (\sum d_x)^2][n \sum d_x^2 - (\sum d_y)^2]}}$$

Where,

X = The first variable

Y= The next variable

n= Number of years (Observation)

d_x= Deviation of the first variables from its assumed mean

d_y= Deviation of the next variables from its assumed mean

Probable error is an old measure of ascertaining the reliability of the value of Pearson's coefficient of correlations. If 'r' is the calculated correlation coefficient in a sample of 'n' pairs of observations then its standard error usually denoted by P.E. (r) is given by

$$P.E. (r) = \frac{1 - r^2}{\sqrt{n}}$$

Probable error of the coefficient of correlation can also be calculated from S.E. of the coefficient of correlation by the following formula. P.E.(r)= 0.6745 × S.E. (r)

$$= 0.6745 \left| \frac{1 - r^2}{\sqrt{n}} \right.$$

Significance of r is measured by the value obtained from 6* PE (r). When the value Karl Pearson's Correlation Coefficient (r) is much greater than the value of obtained from 6*PE (r) value of 'r' is highly significant.

B) Time Series (Trend Analysis)

The trend lines describe the average relationship between the two series. In fact, there is no difference between the lines of best fit and the regression lines. The term line of the best fit is generally used, when X-series related to time and Y-series related to the value of the variable. If both X and Y series are variables, the line of best fit is known

as line of regression. The equation describing the regression lines is called regression equation.

$$Y = a + bx$$

Where,

  Y= the estimated value of Y for given value of x obtained from the line of regression of Yon x

  A =Intercept or mean value of Y

  B = Scope of trend lines/ rate of change

  X =Time (in time series analysis)

$$a \text{ X} \frac{y}{N}$$

$$b \text{ X} \frac{xy}{x^2}$$

Where,

  a = Regression constant

  b = Regression coefficient of change.

  xy = Total value of the product of items in the two series

  x^2 =Total value of the sum of the times in X series

Here, the trend analysis of purchase, sales, inventory, raw materials, work-in-process, finished goods, purchase of raw materials, cost of goods sold and net profit are calculated to find out the future trend by the past data.

CHAPTER - IV
PRESENTATION AND ANALYSIS OF DATA

4.1 Introduction

The basic objectives of this study have already been mentioned in the first chapter. The inventory management aspects have been discussed in the review of literature, in the research methodology, necessary analytical tools and techniques have been employed for the accomplishment of prescribed objectives. In this chapter, efforts have made to process the obtained dates, analysis and interpret them. The available data are presented in table and graphs and they are analyzed with the help of statistical, mathematical, financial tools and descriptive analysis is made, finally interpreted to explore the facts. In this study, it will be exclaimed of inventory of input and supplies and their usage and finished goods production, stock of inputs and supplies and finished goods.

4.2 Descriptive Analysis

Purchase procedure, store control device and issuing materials of BPPNL are the descriptive analysis made in this study.

4.2.1 Purchasing Procedure in BPPNL

BPPNL is a manufacturing company so purchasing is the first important function of inventory management. Manufacturing company requires different types of raw materials. BPPNL needs regular supply of different type of raw materials for the continuous production operation. In purchasing procedure, a purchasing manager does different types of activities which are important in production. By using specified purchasing procedure required raw materials for the factory are purchased. BPPNL has made materials purchase from two sources.

i) **Domestic Purchase** Agro-based material from different parts of the country. (Chitwan, Kapilvastu, Sarlahi, Nawalparasi, Bara and Parsa)

ii) **Foreign Purchase** Chemical, Part and Equipment (India, Korea, Japan, Taiwan, Bangladesh)

Figure No. 4.1

Purchasing Procedure of Essentials in BPPNL

```
                        ┌─────────┐
                        │  Start  │
                        └─────────┘
                             │
                             ▼
              ┌──────────────────────────────┐
      ┌───────│ Purchase Requisition Approved │────────┐
      │       └──────────────────────────────┘        │
      │                                                 │
      ▼                                                 ▼
┌──────────────────┐                         ┌────────────────────┐
│ Foreign Purchase │                         │ Domestic Purchase  │
└──────────────────┘                         └────────────────────┘
                                                         │
┌──────────────────────────┐                            │
│ Open Letter of Credit (LC)│                           │
└──────────────────────────┘                            │
              │                                          │
              │          ┌─────────────────┐            │
              └─────────▶│  Call Quotation │◀───────────┘
                         └─────────────────┘
                                  │
                                  ▼
                         ┌─────────────────────┐
                         │ Incoming Inspection │
                         └─────────────────────┘
                                  │
                                  ▼
                         ┌─────────────────┐
                         │  Good Received  │
                         └─────────────────┘
                                  │
                                  ▼
                         ┌─────────────────┐
                         │ GRN Preparation │
                         └─────────────────┘
                                  │
                                  ▼
                         ┌─────────────────┐
                         │ Material Issue  │
                         └─────────────────┘
                                  │
                                  ▼
                         ┌─────────────────┐
                         │       End       │
                         └─────────────────┘
```
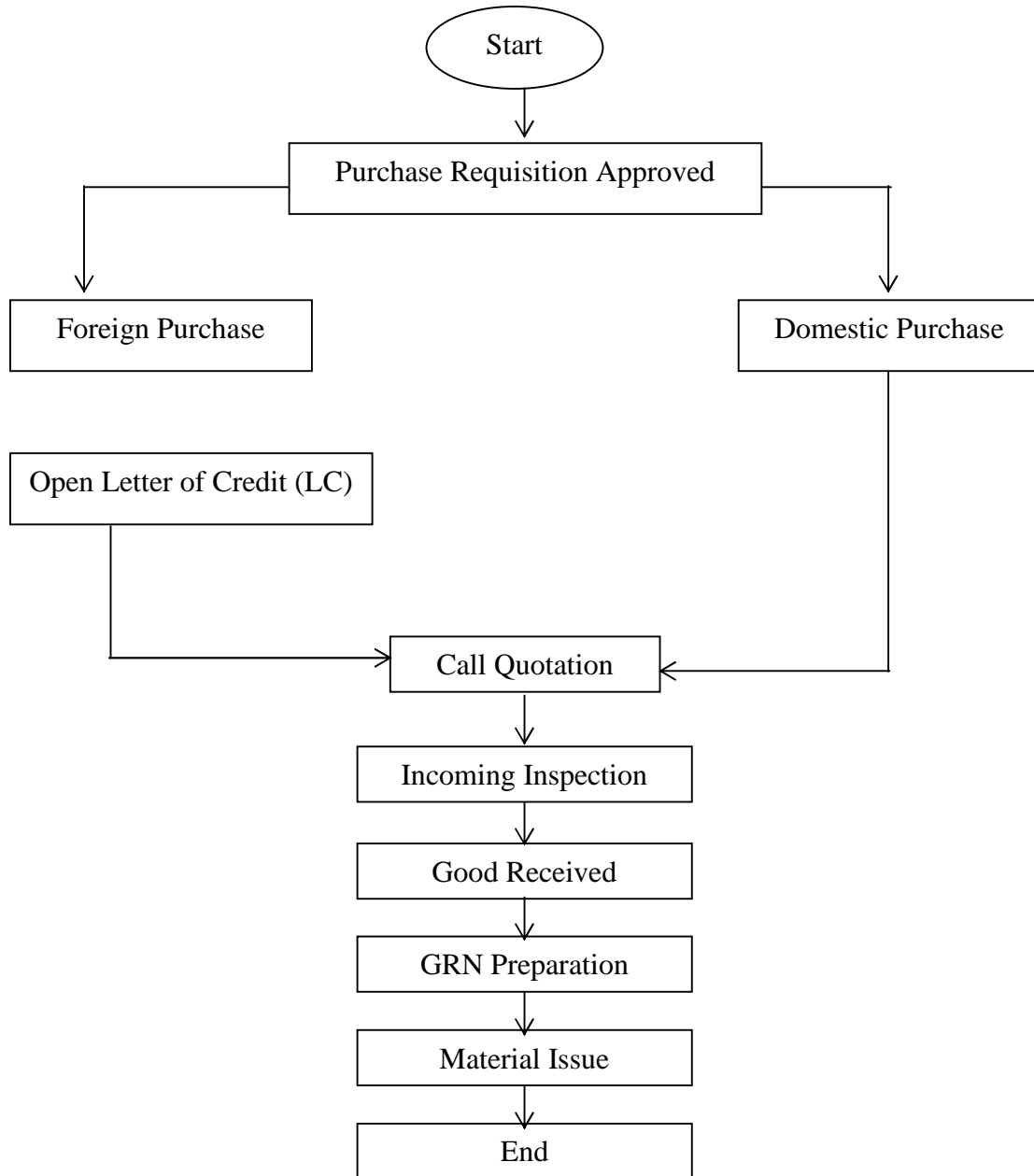
Each of the steps in the purchasing procedure also follows the strict systematic sequence, which is described briefly hereunder.

4.2.1.1 Collection of Purchase Requisition

Purchase starts when requisitions are collected from store, production department, maintenance for the supply.

4.2.1.2 Approval of Purchase Requisition

When the purchase Requisition is received by the various department, then purchasing manager decides what when and how much to buy.

Once the concerned department experiences the deficit of raw materials, It fills the purchase requisition from. Store department checks the availability of that raw material in store. If it is available m sufficient quantity at the store than the process in cancelled at this stage. But if not it will be further proceed to finance department and then to general manager for its approval. Finally purchase department will be prepared for purchase of the goods.

Figure No. 4.2

Approval of Purchase Requisition of BPPNL

```
                    ┌─────────┐
                    │  Start  │
                    └────┬────┘
                         │
                         ▼
        ┌────────────────────────────┐
        │    Purchase Requisition     │──────────┐
        └────────────────────────────┘          │
                                                 ▼
                                          ┌────────────┐
                                          │   Cancel   │
                                          └────────────┘
                                                 ▲
                 ◇─────────────────◇             │
            ◇  Store Check    ◇───Yes───────────┘
                 ◇─────────────────◇
                         │
                         ▼
              ┌────────────────────┐
              │      Forward        │
              └────────────────────┘
                         │
                         ▼
              ┌────────────────────┐
              │  Finance Budget Ok  │
              └────────────────────┘
                         │
                         ▼
              ┌────────────────────────┐
              │ General Manager Approved│
              └────────────────────────┘
                         │
                         ▼
              ┌────────────────────┐
              │ Purchase Department │
              └────────────────────┘
                         │
                         ▼
              ┌────────────────────┐
              │        End          │
              └────────────────────┘
```
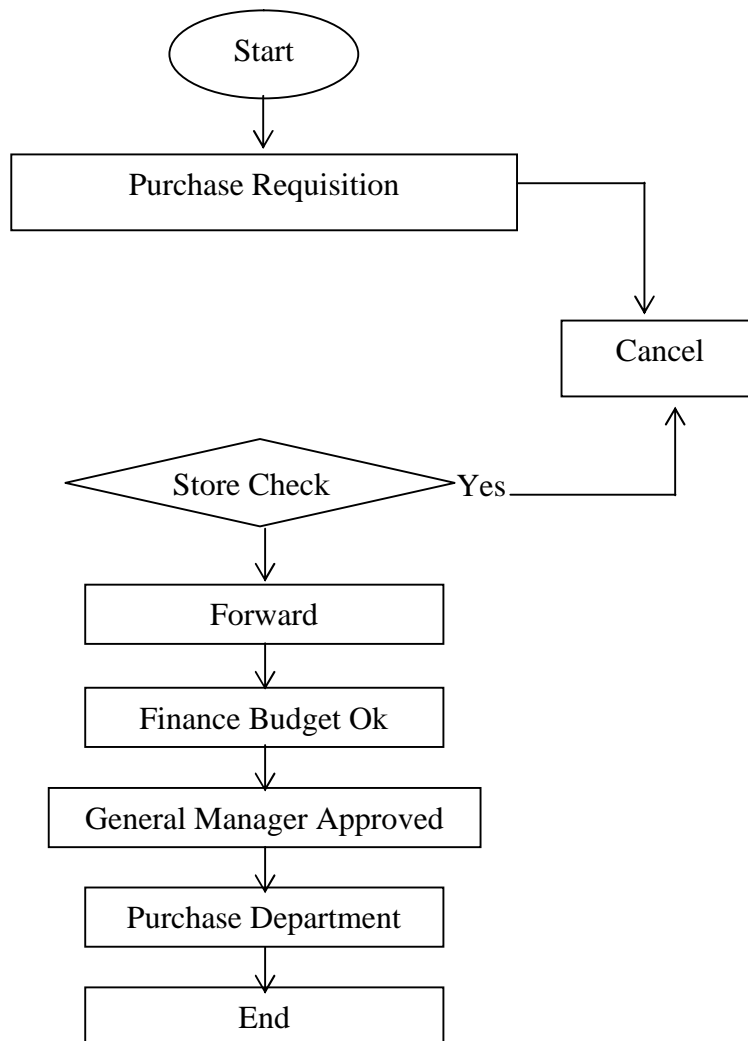
4.2.1.3 Opening of Letter of Credit (LC)

It is generally applicable for import of materials from foreign countries. Opening of LC starts with the request for per forma invoice to the bank. After receiving such perform invoice it will submitted to concern bank along with LC opening form. At the end the bank provides LC approval. Figure 4.3 show the steps of opening LC.

Figure No. 4.3

Opening of Letter of Credit (LC) of BPPNL

```
            ┌─────────────┐
           (    Start    )
            └──────┬──────┘
                   ▼
    ┌──────────────────────────────┐
    │  Request for Perfoma Invoice  │
    └──────────────┬───────────────┘
                   ▼
    ┌──────────────────────────────┐
    │    Request Perfoma Invoice    │
    └──────────────┬───────────────┘
                   ▼
 ┌───────────────────────────────────────────┐
 │ Submit Invoice to Bank along with LC        │
 │            Opening Form                     │
 └──────────────────┬──────────────────────────┘
                    ▼
    ┌──────────────────────────────┐
    │      Receive LC Approval       │
    └──────────────┬───────────────┘
                   ▼
    ┌──────────────────────────────┐
    │             End                │
    └──────────────────────────────┘
```
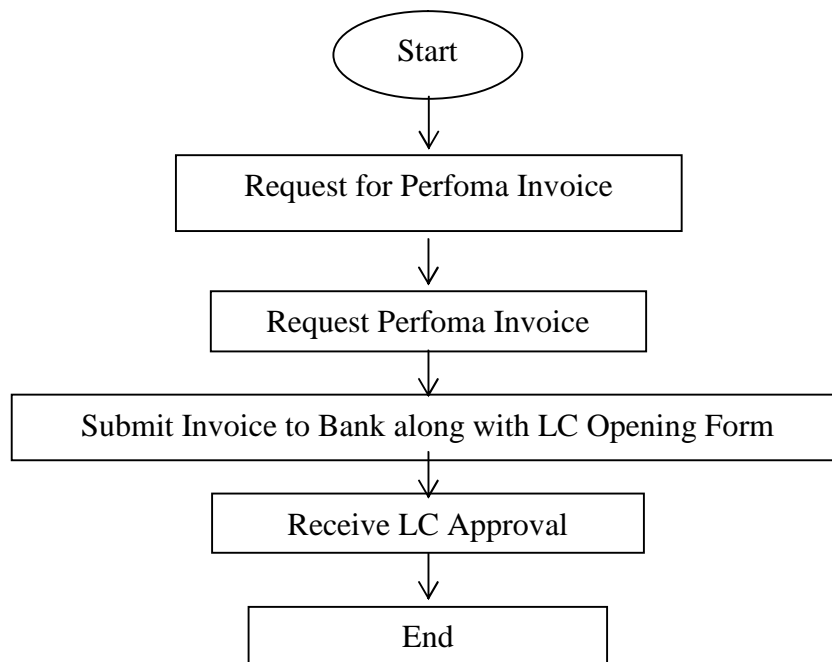
4.2.1.4 Purchase Procedure

Purchasing is the first important function of inventory management in any manufacturing company. So BPPNL also requires different types of raw materials. BPPNL needs regular supply of different types of raw materials and WIP materials for the continuous production operation. Approval of purchase requisition new leads to call for quotation so that the given quality and quantity of materials could be supplied at the minimum possible cost. If any dissatisfaction arise during verifying and checking for specification of goods quotation will be re-called otherwise purchase order will be issued to qualified suppliers specifying the delivery time and then store will be informed for data and quantity of good arrival.

Figure No. 4.4

Purchase Procedure of BPPNL

```
                          ┌─────────┐
                          │  Start  │
                          └────┬────┘
                               ↓
        ┌──────────────────────────────────────────┐
        │    Received Approval Purchase Requisition  │
        └──────────────────────┬─────────────────────┘
                               ↓
             ┌──────────────────────┐
             │    Call Quotation     ├──────────────┐
             └──────────┬───────────┘               ↓
                        │              ┌──────────────────────┐
                        │              │   Corrective Action   │
                        ↓              └──────────┬───────────┘
              ╱────────────────────╲             ↑
             ╱    Verify & Check     ╲    No──────┘
             ╲   for Specification   ╱
              ╲────────────────────╱
                        ↓
             ┌──────────────────────┐
             │         Yes          │
             └──────────┬───────────┘
                        ↓
        ┌──────────────────────────────────────────┐
        │  Purchase Order Issued to Qualified Vendors │
        └──────────────────────┬─────────────────────┘
                               ↓
             ┌──────────────────────┐
             │  Confirm Delivery Time ├─────────────┐
             └──────────┬───────────┘               ↓
                        │              ┌──────────────────────┐
                        │              │   Corrective Action   │
                        ↓              └──────────┬───────────┘
              ╱────────────────────╲             ↑
             ╱      Reconfirm        ╲    No──────┘
             ╲    Delivery Time      ╱
              ╲────────────────────╱
                        ↓
             ┌──────────────────────┐
             │         Yes          │
             └──────────┬───────────┘
                        ↓
             ┌──────────────────────┐
             │    Inform to Store    │
             └──────────┬───────────┘
                        ↓
             ┌──────────────────────┐
             │         End          │
             └──────────────────────┘
```
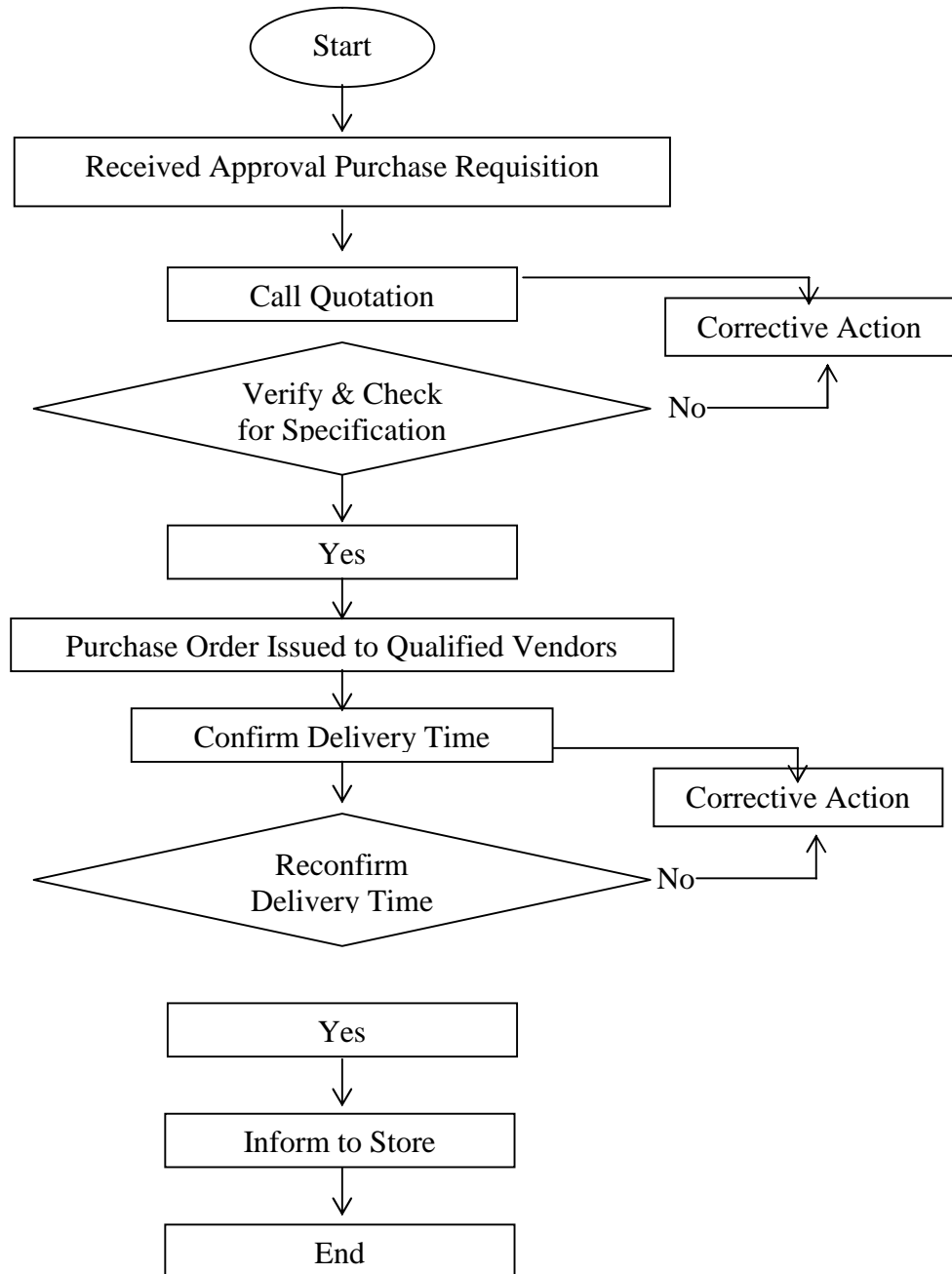
4.2.1.5 Incoming Inspection

Once the incoming material is received along with the bills by the store, the concerned department has to be informed for quantity inspection. The responsibility of veryfing the weight, count or measurement is that of the receiving deportment, but the responsibility to see whether that goods have been received according to purcahse order specifications, is that of the inspection department. Therefore, the concerned department then checks the incoming materials, which must have to be taken to

ensure the correct material of specified quality at correct material of specified quality at correct amount. It shows in figure 4.5

Figure No. 4.5

Incoming Inspection of BPPNL

```
                    ┌─────────┐
                    │  Start  │
                    └────┬────┘
                         ▼
      ┌──────────────────────────────────────────┐
      │ Received Incoming Material Along with Bill by Store │
      └────────────────────┬─────────────────────┘
                           ▼
      ┌──────────────────────────────────────────┐
      │ Inform Concern Department for Quantity Inspection │
      └────────────────────┬─────────────────────┘
                           ▼
      ┌──────────────────────────────────────────┐
      │ Submit Invoice to Bank along with LC Opening Form │──────┐
      └────────────────────┬─────────────────────┘             ▼
                           ▼                          ┌──────────────────┐
                        ◇ OK ◇                        │ Corrective Action │
                           │                          └──────────────────┘
                          Yes
                           ▼
                 ┌──────────────────┐
                 │ Store the Material │
                 └─────────┬────────┘
                           ▼
                      ┌─────────┐
                      │   End   │
                      └─────────┘
```
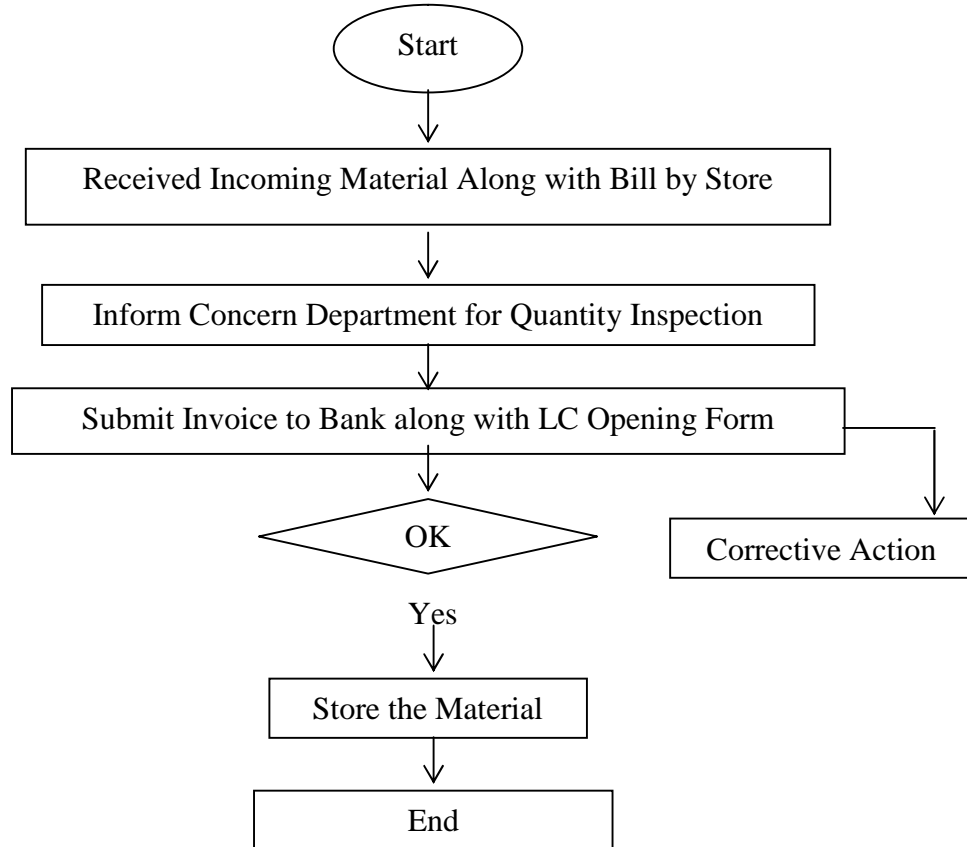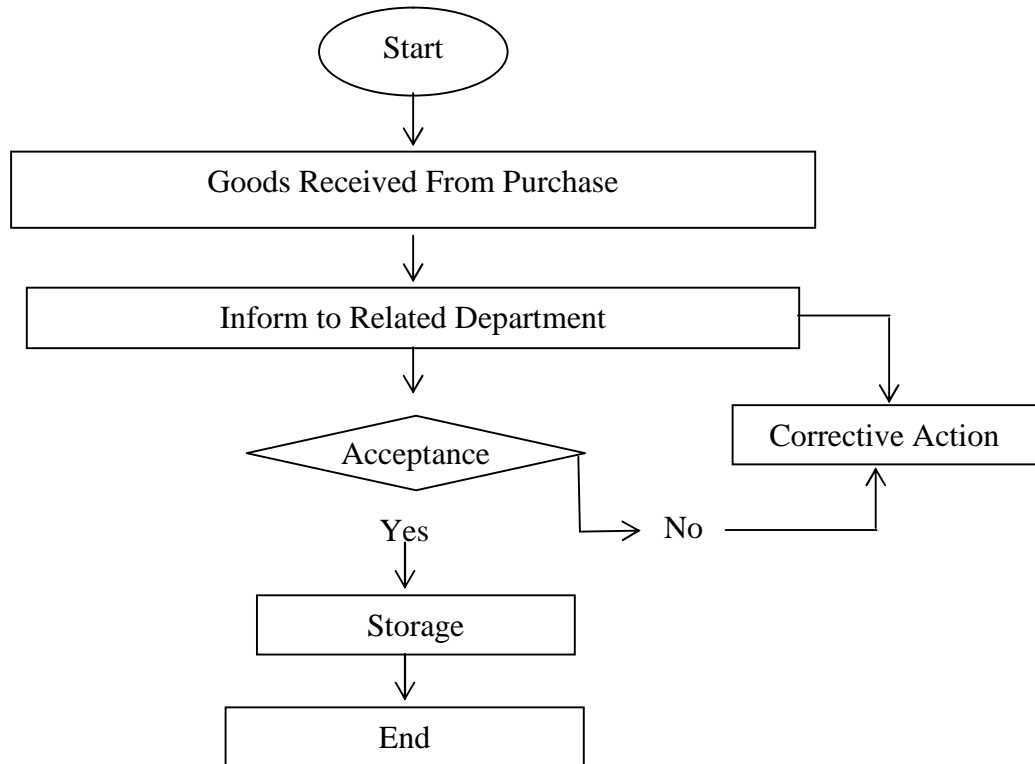
4.2.1.6 Goods Receiving Process

Once the incoming goods are accepted after inspection for its quality and quantity, they are received. After receiving the goods from purchase the related departments have to be informed for its acceptance. Than if finally will goes to storage from where the concerned department acquire as per its needs. Figure 4.6 shows the picture of the goods receiving process.
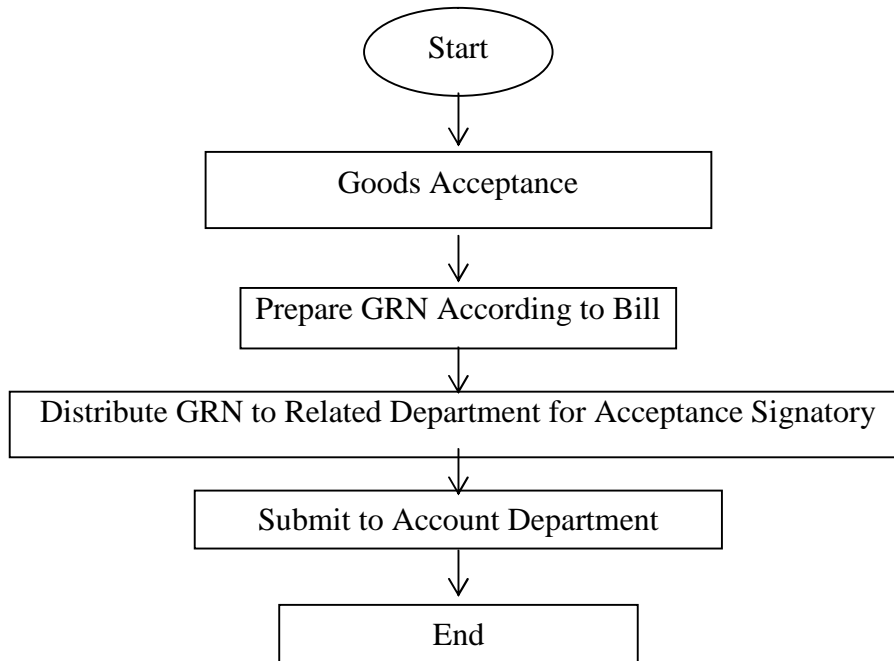
Figure No. 4.6

Goods Receiving Process of BPPNL

```
                        ┌─────────┐
                        │  Start  │
                        └─────────┘
                             │
                             ▼
        ┌──────────────────────────────────────────┐
        │        Goods Received From Purchase        │
        └──────────────────────────────────────────┘
                             │
                             ▼
        ┌──────────────────────────────────────────┐
        │          Inform to Related Department       │──────┐
        └──────────────────────────────────────────┘      │
                             │                              ▼
                             ▼                   ┌─────────────────────┐
                      ╱──────────────╲           │  Corrective Action  │
                     ╱   Acceptance    ╲          └─────────────────────┘
                      ╲──────────────╱                      ▲
                             │                              │
                    Yes              ──────► No  ───────────┘
                             │
                             ▼
                    ┌────────────────┐
                    │    Storage      │
                    └────────────────┘
                             │
                             ▼
                    ┌────────────────┐
                    │      End        │
                    └────────────────┘
```

4.2.1.7 GRN Preparation

GRN should have to be prepared by purchase department. GRN is an important document and necessary so that the supplier's invoice can be verified and passed for payment be verified and passed for payment by purchase department. The GRN process followed by BPPNL is presented as follows:

Figure No. 4.7

GRN Preparation on BPPNL

```
                        ┌─────────┐
                        │  Start  │
                        └────┬────┘
                             │
                             ▼
            ┌────────────────────────────────┐
            │        Goods Acceptance         │
            └────────────────┬───────────────┘
                             │
                             ▼
            ┌────────────────────────────────┐
            │   Prepare GRN According to Bill │
            └────────────────┬───────────────┘
                             │
                             ▼
   ┌──────────────────────────────────────────────────────┐
   │ Distribute GRN to Related Department for Acceptance   │
   │                    Signatory                          │
   └──────────────────────────┬───────────────────────────┘
                             │
                             ▼
            ┌────────────────────────────────┐
            │    Submit to Account Department │
            └────────────────┬───────────────┘
                             │
                             ▼
               ┌─────────────────────────┐
               │           End           │
               └─────────────────────────┘
```

4.2.2 Store Control Device Practice

Store keeping function includes the function of keeping the materials in the store and keeping their movement. The cost of materials holding in the store directly affects the total cost associated with holding inventories. To minimize the cost of holding material ion the store all company generally use different types of controlling device. Some of the store control device adopted by BPPNL is Bin Cards, Store Ledger and ABC analysis. The brief descriptions of these are presented as follows:

4.2.2.1 Bin Cards

Bin cards is used by store keeper to keep quantitative record of all items of inflow and outflow of inventory and goods in store. The storekeepers maintain these cards and he himself is responsible for any different between the physical stock and the balance shown in the bin card. These cards are used not only for recording receipts and issues of stores but also assist the storekeeper to control the stock. BPPNL is using the bin cards

in the form of loose sheets to keep the complete records of the receipts and issues of each item of material in terms of quantity as well as balance quality. For each item of

store, minimum quantity, maximum quantity and ordering quantity are stated on the cards. By seeing the bin card the storekeeper can send the material requisition for the purchase of material in time.

4.2.2.2 Store Ledger

This ledger is kept in the costing department and is identical with the bin card except that receipt 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 the balance, both in quality and value. Thus, this ledger provides the information for the pricing of materials issued and the money value of any time of each item of store *(Jain and Narang; 1991:170).*

4.2.2.3 ABC Analysis

ABC analysis is a widely used classification technique to identify various items of inventory for the purchase of inventory control. This analysis is important that a firm shouldn't exercise the small degree of control on all types of inventory. We have to classify of all types of raw materials on the basis of nature and involve the investment and importance of it. Manufacturing organization finds it useful to divide materials in to three categories for the purpose of exercising selective control on materials. ABC analysis measures may contribute to a large percentage of the value of consumption and on the other hand a large percentage of items may represent a smaller percentage of the value items consumed. Between these to extremes will fall those items the percentage is more or less equal to their value of consumption. Thus, items falling in the first category are treated as 'A' second category as 'B' and third category is taken as 'C'.

Such analysis of material is known as ABC analysis. BPPNL has not classified the material in different groups for control purpose. It is seen that company has given equal attention to high value and critical materials as well as less value and non-critical materials. This altitude leads to increase the holding cost of inventory and investment on inventory.

4.2.3 Issuing Material

After receiving material requisition from the related department store check the registered goods in stock. The stock verification will be made. It is goes negatively; corrective action has to be taken. Otherwise, material will be issued to be related department as per requisition. Material issuing process is presented in figure 4.8.

Figure No. 4.8
Issuing Material From Store in BPPNL
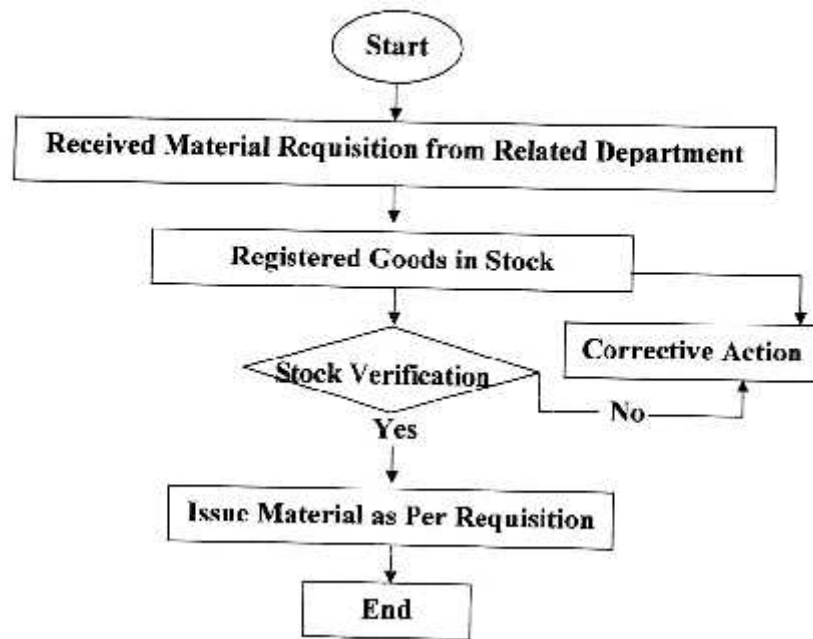
4.3 Inventory Management Analysis

Under this section different analytical tools of inventory management and other statistical method of analysis are used as that are stated in the previous chapter under methodology.

4.3.1 Annual Requirement and Annual Purchase of Raw Materials

Table No. 4.1 shows the annual requirement and annual purchase of raw materials made by the company on different years. Here, there is an erratic rise and fall in both annual requirement and annual purchase of raw materials for the given year. The annual requirement of raw material of whole five years shown that there is fluctuation similarly annual purchase of raw material has also shown that there is fluctuation.

Table No. 4.1

Annual Requirement and Annual Purchase of Raw Material

(Rs. In Million)

Year	Annual Requirement (AR)	Annual Purchase (AP)	% of A.R on A.P.
2061/062	306.23	468.28	65
2062/063	281.12	417.71	67
2063/064	333.07	382.85	87
2064/065	320.89	453.52	71
2065/066	368.82	434.48	85
Average	322.05	431.37	
S.D.	29.1	29.67	
C.V.	9.04	6.88	

Source: Annual Report of BPPNL & Appendix 1

Above table, we compared between annual requirement of raw materials and annual purchase of raw materials, we can see annual purchase of raw material is always exceeded than annual requirement of raw material over the period for all. Annual purchases of raw materials was always exceeded than annual requirement of raw materials. In FY 2061/062, 2062/063, 2063/064, 2064/065 and 2065/066 annual purchase of raw material exceeded 65%, 67%, 87%, 71% and 85% respectively.

Mean, standard deviation and coefficient of variation are calculated to analyze the nature of variability of annual requirement and annual purchase. The average annual requirement of BPPNL for five years was 322.05 million and other annual purchase was 431.37 million, which is more compare between requirement and purchase. Standard deviation for annual requirement and annual purchase of raw material was found 29.1 and 29.67 respectively. The value of C.V. was 9.04 for annual requirement and 6.88 for annual purchase. In shore we concluded that annual purchase is more reliable than annual requirement.

4.3.2 Relationship between Total Sales and Total Purchase of Raw Materials

Table No. 4.2

Total Sales and Total Purchase of Raw Materials

(Rs. in Million)

Year	Total Sales	Total Purchase
2061/062	701.48	468.28
2062/063	611.66	417.71
2063/064	618.66	382.85
2064/065	633.27	453.52
2065/066	737.45	434.48
Average	660.5	431.37
S.D.	49.96	29.68
C.V.	7.56	6.88
Correlation Coefficient	0.5188	
Probable Error	0.2204	

Source: Annual Report of BPPNL & Appendix 2

The above table indicates that there is fluctuation in both total sales and total purchase. FY 2061/062 to 2062/063 total sales are decrease but total purchase of raw material are decrease in FY 2061/062 to 2063/064. For the period of 2063/064 to 2065/066 total sales of raw material was increase, but total purchase of raw material was fluctuation.

The average total sales of raw materials of BPPNL for five years was 660.5 million and other purchase of raw material was 431.37 million. Standard deviation for total sales and total purchased of raw material was found 49.96 and 29.68 respectively. The value of C.V. was found 7.56 for total sales and 6.88 for total purchase of raw material. To this the value of +0.5188 shows the high degree of positive relationship between these two variables.

Probable error was also measured to ascertain the reliability of the value of Pearson's coefficient of Correlation and Conclude whether simple correlation coefficient is significant. Here r < 6.P.E. i.e. 1.3224, its shows that coefficient of correlation is no significant relationship between total sales and total purchase it means increase in total purchase has no relationship with the total sales. calculation of mean, standard deviation, coefficient of variation, correlation coefficient and probable error of total purchase and total sales of raw material is presented in table 4.2.

4.3.3 Relationship between Annual Consumption and Stock

The following table shows the annual consumption and closing stock statistics of various input and supplies of BPPNL through fiscal years 2061/062 to 2065/066.

Table No. 4.3

Relationship between Annual Consumption and Stock

(Rs. in Million)

Year	Annual Consumption	Closing Stock (AP)	% of Closing Stock on A.C.
2061/062	306.23	64.09	21
2062/063	281.12	37.56	13
2063/064	333.06	33.26	10
2064/065	320.89	67.35	21
2065/066	368.82	39.08	11
Average	322.04	48.27	
S.D.	29.1	14.41	
C.V.	9.037%	29-86%	
Coefficient of Correlation	-0.2026		
Probable Error	0.2892		

Source: Annual Report of BPPNL and Appendix- 3

The above table shows that both annual consumption and closing stock was fluctuation over the study period from FY 2061/062 to 2065/066.

From above table closing stock is always less than annual consumption. In FY 2061/062 to 2065/066 closing stock is less than annual consumption by 21%, 13%, 10%, 21% and 11% respectively.

Mean, standard deviation, coefficient of variation, correlation and probable error are calculated to analyze the nature of variability of annual consumption of BPPNL for five years was 322.04 million and other closing stock was 48.27 million respectively. Standard deviation for annual consumption and closing stock was found 29.1 and 14.41 respectively. We can also found the value of coefficient of variation for consumption and closing stock was 9.037% and 29.86% respectively. The value of c.v. for consumption is less than closing stock. Coefficient of correlation 0.02026

shows the negative relationship between two variable i.e. Probable error > coefficient of correlation. it shows that there is no significant relationship between annual consumption and closing stock.

4.3.4 EOQ Purchase

EOQ purchase is a convenient tool used to determines the quantity to purchase at a time. It can be computed by :

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

Where,   A= Annual Usage / Requirement

                O= Ordering Cost pre order

                C= Carrying cost per unit.

BPPNL has made purchase of number of inventory items needed to seasonably, i.e. straw and grasses ate bought according to their seasonally. Same other inventory items are imported from the international market which consist high risk factor. Holding cost and ordering cost of no of different items of inventory market it difficult to apply. Due to which BPPNL calls quotation and gives order for supply to the quality bidder for the whole year. But same extend, BPNL can purchase some specific material like chemical by considering economic purchase model.

Although, BPPNL has not applied EOQ model, researcher has tried to calculate EOQ in the cash of chemical which is presented here with the table below.

Table No. 4.4

EOQ of Chemical

Fiscal Year	Actual Lot size	Actual No. of order	EOQ order size	EOQ no of order
2061/062	438.94	4	292.23	4
2062/063	454.03	4	313.3	6
2063/064	534.25	4	316.58	7
2064/065	549.34	4	335.68	5
2065/066	564.43	4	354.78	6
Average				5.6

Sources: Annual Report of BPPNL

BPPNL has quarterly chemical purchase policy, during the year. It has actual no of order is 4 times a year during the whole study period of last five years. The table shows that the company should order average 5 times a year and actual order size is larger then the EOQ order size and actual order size is also more inconsistence comparing to EOQ size. This is why the company is not applying EOQ model for chemical due to its adhoc consumption plan but here in the study it has been calculated only for the corporation.

4.3.5 Inventory to Current Assets Ratio

Inventory to current assets ratio indicate the inventory proportion to current assets, Generally, it constitutes 60% of current assets of Public limited company of India and around 50% in manufacturing public corporation in Nepal.

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

Here, Inventory includes closing inventory of direct and indirect along with work in progress and finished stock and working capital consists of inventories debtors advance, prepaid, cash and bank balance.

Table No. 4.5

Inventory to Current Assets Ratio

(Rs. in million)

Fiscal Year	Inventory	Current Assets	Ratio (%)
2061/062	182.69	286.7	63.72
2062/063	149.31	247.18	60.40
2063/064	159.8	278.49	57.38
2064/065	203.81	298.34	68.31
2065/066	177.15	277.13	63.92
Average			62.74

Source: Annual Report of BPPNL

By observing the above table, inventory to current assets ratio, in the year 2064/65 is highest and 2065/66 is lowest of all other years. In general, the ratio in every year exceeds 50% of current assets. The large fraction of investment in current assets is covered by inventory value, so it is crucial to BPPNL and the company should take it seriously.

4.3.6 Inventory to Net Working Capital Ratio

This ratio explains the relationship between inventory and working capital. It measures how much the inventory is in working capital. If working capital consists high inventory value the liquid capital would be low and low inventory value indicates the quick liquidity assets. It means larger the inventory the position of working capital would be blocked and resource of working capital would be blocked,

$$\text{Inventory to Net Working Capital Ratio} = \frac{\text{Closing Inventory}}{\text{Working Capital}}$$

Here, closing inventory consists of direct and indirect material, working progress and finished goods inventory,

$$\text{Working Capital} = \text{C.A.-C.L.}$$

Current assets includes inventories, sundry debtor and other receivable, prepaid, advance loan and deposit and cash & bank balance. Current liability means payable during the year or short maturity Generally the ideal turnover ratio is 85% or working capital inventory,

Table No. 4.6

Inventory to Working Capital Ratio

(Rs. in million)

Fiscal Year	Closing Stock	Working Capital	Ratio (%)
2061/062	182.69	242.04	75
2062/063	149.31	313.34	48
2063/064	159.8	234.95	68
2064/065	203.81	319.12	64
2065/066	177.15	219.74	81
Average			67

Source: Annual Report of BPPNL

4.3.7 Inventory Turnover Ratio

Inventory turnover measures the activity or liquidity of firm's inventory, The company should maintain optimum level of inventory for the production and sales activity. A high inventory turnover is indication of good inventory management of low inventory turnover implies excessive inventory levels then warranted by production and sales

activities or slow moving or absolutes inventory. It can be calculated by the following formula.

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

Table No. 4.7

Inventory Turnover Ratio in Terms of Value in million

Fiscal Year	Cost of Goods Sold	Average Inventory	Turnover Ratio %
2061/062	560.11	49.08	11.41
2062/063	541.73	52.08	10,40
2063/064	537.15	55.19	9,73
2064/065	539.11	68.1	7.92
2065/066	632.64	81.71	7.74
Average			9.44

Source: Annual Report of BPPNL

The above table 4.7 shows the annual finished stock turnover from 2061/062 to 2065/066, which was 11.41, 10.40, 9.73, 7.92 and 7.74, We can found the inventory turnover ratio was decreasing order of all the study period- Cost of goods sold was fluctuation. The maximum turnover ratio is 11.41 in. FY 2061/062 which means the company should hold its finished stock in warehouse for (360/11.41), 35 days higher. Inventory turnover ratio is the cause of decrease in finished stock or increase in sales.

4.3.8 Inventory Conversion Period

Inventory conversion period measures the length of time to convert it into cash through sales during the year. Inventory conversion factor is calculated as follows:

$$\text{Inventory Conversion Period} = \frac{360}{\text{COGS}} \mid \text{Average Inventory}$$

The following table (4.8) shows the inventory conversion period of BPPNL for the study period of five years (2061/062 to 2065/066).

Table No. 4.8

Inventory Conversion Period of BPPNL

(Rs in Million)

Fiscal Year	Cost of Good Sold	Average Inventory	Days in Year	ICP (Days)
2061/062	560.11	49.08	360	32
2062/063	541.73	52.08	360	35
2063/064	537.15	55.19	360	37
2064/065	539.11	68.1	360	45
2065/066	632.64	81.71	360	46
Average	562.15	61.23		39

Source: Annual Report of BPPNL

The above table shows that the inventory conversion period is maximum up to 46 days which means the finished stock has remained in warehouse only for maximum 46 days. Inventory conversion period found increasing order for the study period. The average inventory conversion period for the study period is 39 days.

4.3.9 Payable Deferral Period

The payable deferral period show the length of time between the purchase of raw material and labour and payment of cash for them. The following table shows the payable deferral period during the study periods.

Table No. 4.9

Payable Deferral Period of BPPNL

Rs. in million

Fiscal Year	Account Payable	COGS	Days in Year	PDP (Days)
2061/062	191.86	560.11	360	123
2062/063	185.92	541.73	360	124
2063/064	203.45	537.15	360	136
2064/065	268.25	539.11	360	179
2065/066	233.33	632.64	360	133
Average	216.56	562.15		
S.D	30.57	36.18		
CV.	14.12	6.44		

Source: Annual Report of BPPNL

Table 4.9 gives the payable deferral period in days. In fy 2061/62 payable deferral period is 123 days. In FY 2062/63 the period was rise to 124 days. In FY 2063/64 and 2064/65 the period was increasing order which was 136 and 179 respectively. But FY 2065/66 the payable deferral period was decrease to 133 days. In FY 2064/65, the payable deferral period is 179 days, which is the highest payable deferral period during the study period. The average payable deferral period for the study period was 139 days. Payable deferral period for a year was calculated as following formula.

Payable Deferral Period$= \dfrac{360}{COGS} \mid Accountpayable$

4.3.10 Trend Analysis

Trend analysis was made in order to analyze the growth rate of various aspects related to inventory management. This was basically done with the help of the past data and used to forecast the further, different aspects of inventory management for which trend analysis were made are presented as follows:

4.3.10.1 Trend Analysis of Inventory

Inventory is all the possession of industry inventory constitutes the important parts of current assets. Thus, the shortage of required inventory may result into irregular production, high manufacturing cost and unfavorable labour variation. Therefore, the inventory must be in optimum position,

Table No. 4.10

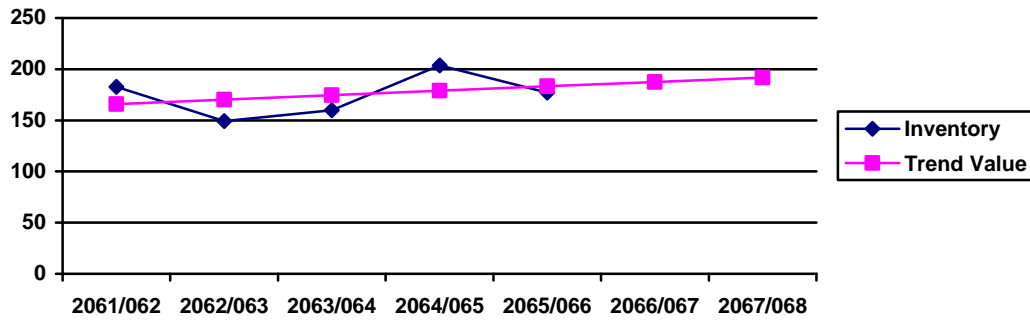**Trend Analysis of Inventory**

(Rs. in million)

Fiscal Year	Inventory	Trend Value
2061/062	182.78	165.88
2062/063	149.31	170.22
2063/064	159.81	174.56
2064/065	203.81	178.89
2065/066	177.16	183.23
2066/067		187.55
2067/068		191.88

Source: Annual Report of BPPNL and Appendix -4

Figure No. 4.9

Trend Analysis of Inventory

Source: Table No. 4.10

Inventory of BPPNL has been fluctuation for the year 2061/062 to 2065/066. But the other hand trend value shows increasing order for the study period of 2061/062 to 2067/068. The table 4.10 and figure 4.9 shows the trend value and actual value of inventory for the study period.

4.3.10.2 Trend Analysis of Sales

Ultimate goal of any manufacturing industry is to produce the product and make it available in market or sale. Thus, sales are always associated with the manufacturing industries, which ensure the inflow of money to industry.

Table No. 4.11

Trend Analysis of Sales

Fiscal Year	Sales (Rs. in Million)	Trend Value
2061/062	701.488	641.81
2062/063	611.664	651.15
2063/064	618.666	660.51
2064/065	633.271	669.86
2065/066	737.454	679.22
2066/ 067		688.56
2067/068		967.91

Source: Annual report of BPNL and appendix-5.

From above table 4.11 shows that sales was fluctuation in the study period of all. But trend value was increasing order all the period. In FY 2061/62 and 2065/66, actual sales were greater than the trend value. But in FY 2062/063, 2063/064 and 2064/065 the trend value was greater than the actual sales.

Figure No. 4.10

Trend Analysis of Sales
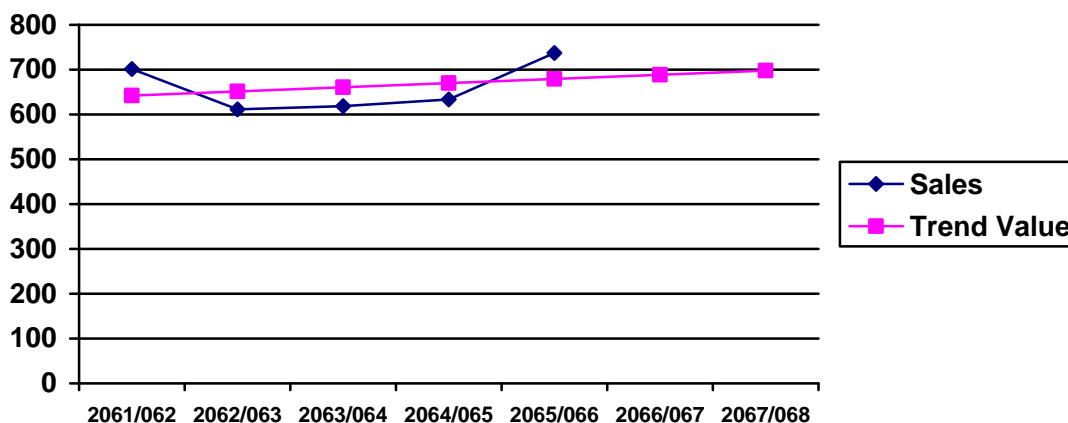
Source: Table No. 4.11

4.3.10.3 Trend Analysis of Raw Material

Raw materials in this cash signifies the stock of raw materials in go down to meet the unforeseen future demand, so that the industry will level faces the raw material shortage in the period of adverse natural and manmade circumstances.
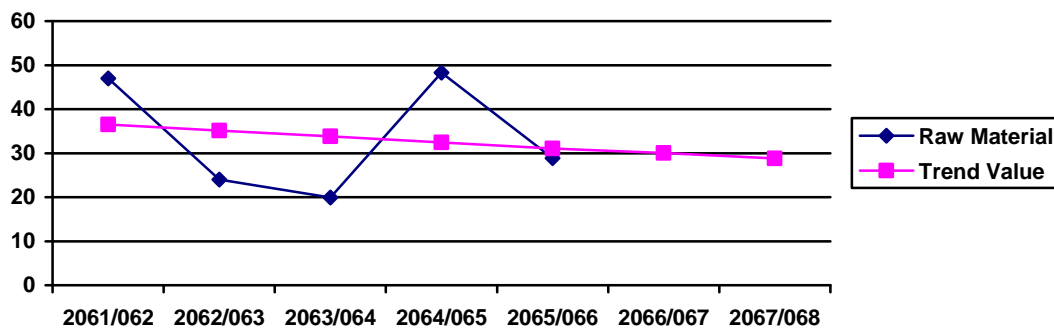
Table No. 4.12

Trend Analysis of Sales

(Rs. in million)

Fiscal Year	Raw Materials Million)	Trend Value
2061/062	47	36.54
2062/063	24.008	35.16
2063/064	19.912	33.79
2064/065	48.299	32.42
2065/066	28.859	31.04
2066/067		30.02
2067/068		28.82

Source: Annual report of BPPNL and appendix-6.

Figure No. 4.11

Trend Analysis of Raw Materials

Source: Table No. 4.12

Above table we can see difference between trend value and raw materials. From fy 2061/62 to 2065/066, raw material was fluctuation. But trend value was decreasing order. First when two line started at FY 2061/062, the trend value is less than raw materials but after then next two years trend value is high than raw materials for 2063/064. Again in FY 2064/065 raw material is above trend value. In FY 2065/066 trend value is above than raw materials. So in overall we can say that the line was material in very high fluctuation situation. For the period with its maximum for the year 2064/065 and its minimum for the year 2063/064.
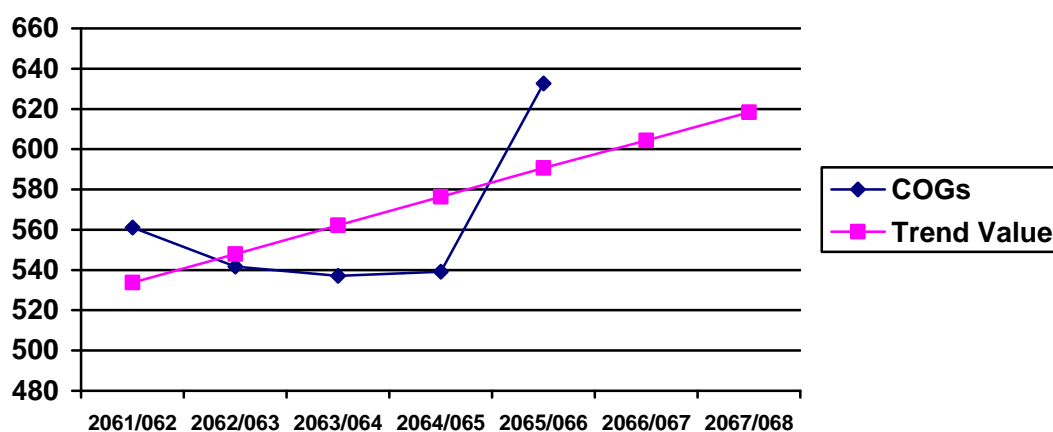
4.3.10.4 Trend Analysis of COGs

Table No. 4.13

Trend Analysis of Cost of Goods Sold (COGs)

Fiscal Year	COGs (in Million)	Trend Value
2061/062	561.117	533.67
2062/063	541.731	547.91
2063/064	537.154	562.15
2064/065	539.113	576.39
2065/066	632.648	590.64
2066/067		604.28
2067/068		618.22

Source: Annual report of BPPNL and appendix-7.

Figure No. 4.12

Trend Analysis of Cost of Goods Sold (COGs)

Source: Table No. 4.13

From above table 4.13 we can see difference between trend value and cost of goods sold. In FY 2061/62 to 2063/064 cost of goods sold was decreasing order but in FY 2065/066 cost of goods sold was increase other hand in FY 2061/062 to 2065/066 trend value was increasing order. We can also found the highest cost of goods and the highest trend value which is 618.33 was also in FY 2067/068.
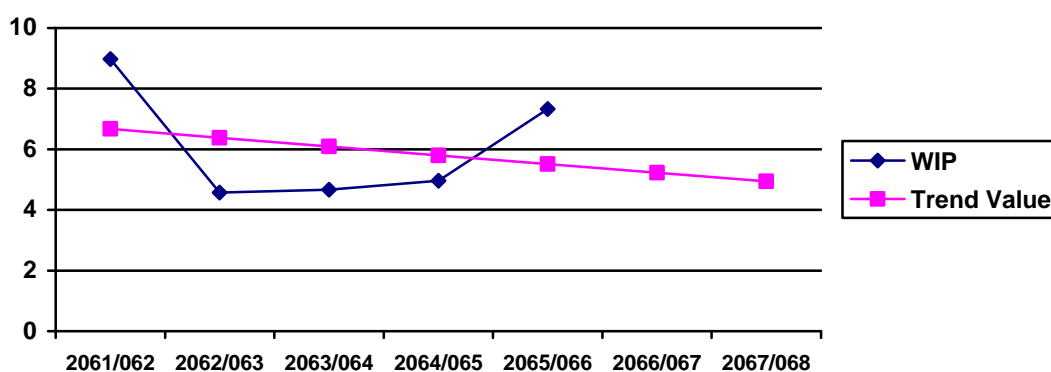
Trend Analysis of Work-in-Progress

Fiscal Year	Work-in-process (in Million)	Trend Value
2061/062	8.975	6.67
2062/063	4.568	6.38
2063/064	4.67	6.09
2064/065	4.963	5.80
2065/066	7.326	5.51
2066/067		5.23
2067/068		4.94

Source: Annual Report of BPPNL and appendix-8.

Figure No. 4.13

Trend Analysis of Work-in-Progress

Source: Table No. 4.13

Above table and figure we can found work-in-process was continuously decreasing order in FY 2062/63 to 2064/065. Then it was increase in FY 2065/066. Trend value was also decreasing order for the period of 2061/062 to 2067/068. Work-in-progress was higher than trend value for the period of 2061/062 and 2065/066. The highest work-in-progress and highest trend value was same FY 2061/062. The trend value was higher than work-in-progress for the period of 2062/063 to 2064/065. Table 4.14 and figure 4.13 gives the picture of actual work-in-progress and its trend value.

4.3.10.5 Trend Analysis of Finished Goods

Finished goods inventory those completely manufacturing products, which are ready for sales. In a manufacturing firm they are final output of the production process.

Manufacturing and non manufacturing company stock of finished goods for market operation holds.

Table No. 4.15

Trend Analysis of Finished Goods

Fiscal Year	Finished Goods (in Million)	Trend Value
2061/062	47.140	45.65
2062/063	57.032	54.92
2063/064	53.351	64.19
2064/065	82.865	73.46
2065/066	80.574	82.73
2066/067		92.002
2067/068		101.27

Source: Annual Report of BPPNL and Appendix-9.

Figure No. 4.14

Trend Analysis of Finished Goods
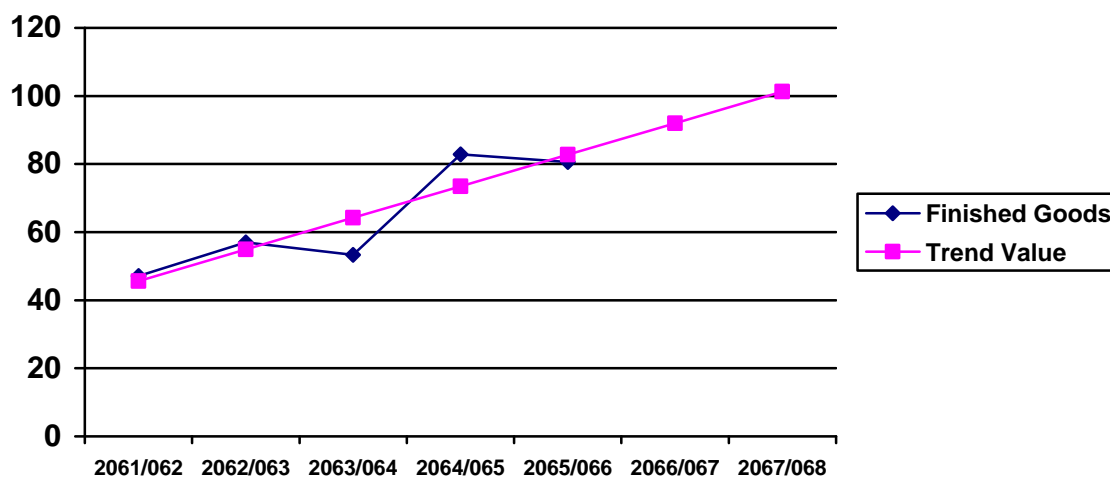
Source: Table No. 4.15

From above table and figure finished goods were highly fluctuation in the given period. At the beginning FY 2061/062 it was increasing gradually to the year 2062/063. Then it was sharply increased and reached at peak point after than it was dramatically decreased to the FY 2063/064. The trend values were increasing order for the period of 2061/062 to 2067/068.

4.4 Major Finding

Inventory management planning and control are highly complicated task since it affects the profitability of manufacturing industries. On the basis of the data presentation and their financial and statistical analysis of BPPNL, the major findings related to this study have been presented below.

) Letter of credit is used to import raw materials from foreign countries.

) In purchase procedure, purchase manager should maintain all the necessary records keeping in mind the most important objectives of the purchase department i.e. purchasing light quality and quantity of materials at the cheapest rate at proper time to help smooth running of the production function.

) Goods receiving process is a document on the basis of which purchases are verified and payment is made to the supplies. It is also helpful in filling any claim for short supplies. It provides a complete record of all materials received-

) Bin card: In context BPPNL with its help the storekeeper can sent material requisition for the purchase of material m time.

) Store ledger: The store ledger is systematically maintained by BPPNL- This ledger provides the information for the pricing of material issued and the money value at any time for each item maintained in store.

) Issuing material: Material once received by the store is issued by the concerned department as per the quantity demanded in the requisition from previously provided to the store department.

) In average there is more or less balance between the annual requirement and purchase by coefficient of variation, the annual requirement is inconsistent. I.e. annual requirement is more inconsistent then the annual purchase Inconsistent requirement this is the symbol of poor estimation of annual purchase,

) There is not cost classification system so there is difficult to determine the ordering and carrying cost.

) The company was not following scientific inventory management techniques i.e. economic order quantity model for purchasing different types of raw materials.

- In an average total sale is straight greater than the total purchase. Value of both S.D and CV signifies the consistent nature of total purchase compared to total sales,

- The relationship between annual consumption and closing stock as calculated by Karl Pearson's coefficient correlation 'r' is -0.2026 two variable. Probable error > coefficient of correlation.

- Inventory to current assets ratio in every year exceeds 50% of current assets. The large fraction of investment in current assets is covered by inventory value, so it is crucial to BPPNL and the company should take it seriously.

- The situation of working capital is very poor. The negative working capita need. The company has been suffering from working capital shortage from the beginning of the study period 2061/62.

- Inventory turnover ratio is on indicator of the efficiency of management. The inventory turnover for the study period was decreasing order- Cost of goods sold was fluctuation. The maximum turnover ratio is 11.41 in FY 2061/62 which means the company should hold its finished stock in warehouse for (360/11.41), 35 days higher- Inventory turnover ratio is the cause of decrease in finished stock or increase in sales.

- The inventory conversion period is maximum up to 46 days. This means the finished stock has remained in warehouse only. For maximum 46 days. Inventory conversion period found increasing order for the study period. The average inventory conversion period for the study period was 39 days.

- The average payable deferral period for the study period was 139 days. In FY 2064/65- the payable deferral period is 179 days which is the highest payable deferral period during the study period,

- BPPNL has been selling its products locally and international] even in India, which covers paper of BPPNL but sales could not be raised as expected so il should initiate market study in the world market and need 10 watch keenly in local market too. The reason for not achieving The increasing sales may be the unrest situation of the country and open boarder with India.

- BPPNL has been producing pulp and paper from the plain and production sales and consumption of material are taken in to both plants which mean accounts of inventory for both plants has not been maintained separately.

) The cost of production has been simultaneously increased every year which make the products expensive in the market where as India papers are available at low price. It is found that BPPNL has not made regular attempts to cost reduction of the products and cost to the society regarding union mental protection mechanizing,

) In conclusion, BPPNL is not applying scientific tools and techniques of inventory management, which is most crucial point is BPPNL despite it there are several internal and external causes not to use scientific technique but BPPNL has been neglecting completely this is the matter and issue of the study.

CHAPTER-V
SUMMARY, CONCLUSION AND RECOMMENDATION

Inventory management is one of the most important functions in any organization, without effective and efficient inventory management; no one organization can achieve its goal. Inventory management is the most important part for manufacturing company. The company has invested the most of amount for inventory, where the functions are associated as purchasing, storing, selling, distribution etc. The details about inventory management and introduction of the study have been already been presented In the first chapter. The second chapter describes about framework and review of literature. Similarly, the research methodology of the study is described in the third chapter. All the available data related to inventory decision stored out by issues of inventory management of BPPNL are presented, analyzed and the major findings of the study has been also presented in the chapter four.

5.1 Summary

Inventory management is the most important part for manufacturing company, A firm cannot achieve its goal unless inventories are controlled effectively and capital is allocated efficiently. Inventory functions are associated with production, marketing, finance and administration etc. Inventory constitutes most significant pan of current assets. It should therefore be managed efficiently to avoid unnecessary investment.

Bhrikuti Pulp and Paper Nepal Ltd. is one of the largest manufacturing industries which was established in 2039 B.S. as a public enterprise with technical and financial assistance of the government of Peoples of Republic of China which was privatized in 2049 B.S. It has been producing wide used pulp and paper for different consumers, since its establishment and play a vital role in the economy by using local material, exporting its product and providing employment opportunity.

Most of the manufacturing and trading companies invest a huge amount of capital in the form inventory. BPPNL also invest a huge amount of capital in inventory. The concept of inventory management is almost avoided in BPPNL, They are not applying the scientific techniques of Inventory management, which is short sight, inexperience, inability and unknown manner of management aspect.

The basic problem of the study is examined the inventory management system that is exercised by BPPNL. The main objective of the study is to know the present situation and to identify the problem of inventory management faced by BPPNL and provides suggestion based on study. For this purpose, the researcher interviewed with officials and observed the inventory system personally,

All the collected data and facts are analyzed based in inventory management theory and with the help of statistical tools, Irene analysis, Karl Pearson's correlation coefficient. Probable error, ABC analysis and inventory turnover ratio and variance analysis.

This study is based on the inventory management of BPPNL. It is done with a view to solve the problem arises on achieving the objective of the BPPNL. Here the main objective of the study are to be analyzed the inventory management practices and to analyze the inventory management system followed by BPPNL. To make this study, the related literatures have been reviewed. Review of literature gives the concept of inventory management and frameworks from various books, journals and articles, The relationship between total sales and total purchase has positive relationship but the relationship between annual consumption and stock has negative relationship. The average value of current assets ratio is 62-74 in the study period- The general, the ratio in every year exceeds 50% of current assets. The large fraction of investment in current assets is covered by inventory value, so it is crucial to BPPNL and the company should take it seriously. The average inventory conversion period is 39 days and the company has not fixed policy > In average inventory turnover ratio is low, It indicates that the company has maintained the higher level of inventory.

5.2 Conclusion

The study stresses the need for a good inventory system to maintain a suitable level of inventory so as to able to fulfill the company's requirement on time. The growing number of corporations in Nepal is facing problems of inventory. Due to lack of proper inventory policies, there are many corporations where large amount of capital has been blocked up and very little measures have been taken to manage the inventories on the basis of inventory decision models and techniques that have so far

developed- The main objectives of this study are to analyze the inventory management practices of BPPNL and problem laced by BPPNL in the management of inventory. For the purpose of this study the data and the necessary information were collected from the records and annual reports provided by the company.

BPPNL has applied only bin cards and store ledger as the inventory control techniques, but not applied the ABC analysis. The company does not classify the inventory cost into the carrying cost and ordering cost. By the analysis, the average inventory conversion period is 39 days but the payable deferral period is 139 days. The average inventory turnover ratio is 9.44, which indicates that BPPNL has maintained higher level of inventory as compared to the total cost of goods sold. By turnover analysis, it can be concluded that BPPNL purchase various inventory component from local resource and abroad. Purchase from abroad is made through LC. Safety stock maintain by BPPNL is sufficient for average 45 days. The company has scientific purchase system but it has poor management of material. EOQ purchase has not been followed although bin card system and store lager were maintained there was not appropriate categorization of material by ABC technique. The company has not maintained different stock level. The company has large amount investment in raw material purchase. So the company can't get success for me better performance.

5.3 Recommendation

This study is a small part of the partial requirement of dissertation of master degree. Analyzing available data some findings it may appropriate to make some suggestion. Although these suggestions may not be adequate and could very easily give negative reflection but it is hoped that these suggestions will help improving to suggestions to management of BPPNL and other concerned official, other similar institution researchers and individuals,

) The objective of inventory management is to control the inventory so that capital shouldn't be tied up by keeping huge inventory and production process shouldn't be broken Gown due to stock out position. Inventory management is crucial for every organization. BPPNL should neither stock so that there would be neither stock out position or over stock position.

) BPPNL should attempt to use scientific model like economic order quantity, ABC analysis technique, reorder level etc. which help to solve inventory problem such as over stock and under stock or stock out will be solved. As a result BPPNL should not face the shortage of fund and can give smoothness of its purchase and production activity and able to supply regular delivery of material and finished goods.

) Sales forecast and sales plan are also crucial to the management Sales forecast and sales plan influence the overall activity of the organization including inventory management. Sales plan and actual sales of BPPNL vary every year, which may be the cause of over stock or stock out position. BPPNL should attempt to prepare realistic sales plans by using scientific tools and techniques of budgeting.

) Store ledgers should show the real picture of ail components There should be separate store ledger for every plant, which may assist inventory management,

) Purchase plan should be prepared for different types of raw materials with the proper co-operation and co-ordination among the planning, purchasing, storing, production, marketing and sales department 10 avoid the excessive investment on inventory.

) In the conies: of BPPNL. There is no fixed policy of inventory conversion period so the company should make plan to maintain the fixed inventory conversion period.

) It is the largest paper manufacturing industry in Nepal that is bounded for small paper market open border with India and task policy of the government may persists its sales internal market, since it has been exporting its products. It should make frequent talks with government about for relevant issues,

) In recent years, environmental issues have been raising the voice of people and frequent attempts on the issue have been initiated. On the matter, BPPNL cannot be put in isolation. Though it has carefully evaluated the environmental impact and installed efficient treatment plants. People around it, have always complained about the air pollution and voice has been raising against it everyday. So attempts should be made on this issue and consider the social cost in account of such voice which is significant lo the quality of life not only for them, but also for the nation and for the whole universe.

) Effective management is essential to give regular training on inventory management. For the changing environment the training and seminars play a vital role to develop the employee's efficiency. Consequently managerial forecasting ability of the concerned staffs will be enhanced.

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Appendix 1

Rs in Million

FY	Annual Requirement (x)	Annual Purchase (y)	% of A.R. on A.P.	$x - \bar{x}$	$(x - \bar{x})^2$	$y - \bar{y}$	$(y - \bar{y})^2$
2061/062	306.23	468.29	65	-15.81	249.96	36.92	1363.06
2062/063	281.13	417.71	67	-40.91	1673.63	-13.66	186.59
2063/064	333.07	382.85	87	11.03	121.67	-48.52	2354.19
2064/065	320.89	453.52	71	-1.15	1.32	22.15	490.62
2065/066	368.82	434.48	85	46.78	2188.37	3.11	9.67
Total	$x = $ 1610.14	$y = $ 2156.85			$(x - \bar{x})^2 = $ 4234.94		$(y - \bar{y})^2 = $ 4404.15
Mean	322.04						

Percentage of Annual requirement (AR)

On Annual Purchase (AP)

in 2061/062 $\qquad = \dfrac{x}{y} \mid 100$

$$= \frac{306.23}{468.29} \mid 100 \quad = 65\%$$

Mean,

$$\bar{x} = \frac{x}{N} = \frac{1610.14}{5} \times 322.04$$

$$\bar{y} = \frac{y}{N} \times \frac{2156.85}{5} \times 431.37$$

Standard Deviation

$$\sigma_x = \sqrt{\frac{1}{N}\sum fx(x - \bar{x})^2} \qquad = \sqrt{\frac{1}{5} \times 4234.94} \qquad = 29.1$$

$$\sigma_y = \sqrt{\frac{1}{n}\sum fy(y - \bar{y})^2} \qquad = \sqrt{\frac{1}{5} \times 4404.15} \qquad = 29.67$$

Co-efficient of variation (CV)

$$x \qquad = \frac{\sigma_x}{\bar{x}} \qquad = \frac{29.1}{322.04} \times 100 \quad X9.03$$

$$y \qquad = \frac{\sigma_y}{\bar{y}} \qquad = \frac{29.67}{431.37} \times 100 \quad X6.87$$

Appendix 2

Rs in Million

FY	Total Sales (x)	Total Purchase (y)	$x-\bar{x}$	$y-\bar{y}$	$(x-\bar{x})^2$	$(y-\bar{y})^2$	$(x-\bar{x})(y-\bar{y})$
2061/062	701.49	468.29	40.99	36.22	1680.92	1363.08	1513.35
2062/063	611.66	417.71	-48.84	-13.66	2385.34	186.59	667.15
2063/064	618.67	382.85	-41.83	-48.52	1749.75	2354.14	2029.59
2064/065	633.27	453.52	-27.23	22.15	741.47	490.62	-603.14
2065/066	737.45	434.48	76.95	3.11	5921.3	9.67	239.31
Total	$x=$ 3302.54	$y=$ 2156.85			$\sum(x-\bar{x})^2=$ 12478.04	$\sum(y-\bar{y})^2=$ 4404.15	$(x-\bar{x})(y-\bar{y})=$ 3846.24

Mean

$$\bar{x} = \frac{x}{N} = \frac{3302.54}{5} = 660.5$$

$$\bar{y} = \frac{y}{N} = \frac{2156.85}{5} = 431.37$$

Standard Deviation (S.D)

$$\sigma_x = \sqrt{\frac{1}{n}\sum(x-\bar{x})^2} = \sqrt{\frac{1}{5}|12478.04} = 49.96$$

$$\sigma_y = \sqrt{\frac{1}{n}\sum(y-\bar{y})^2} = \sqrt{\frac{1}{5}|4404.15} = 29.68$$

Co-efficient of variation (CV)

$$x = \frac{\sigma_x}{\bar{x}} = \frac{49.63}{660.5}|100 \quad X7.56$$

$$y = \frac{\sigma_y}{\bar{y}} = \frac{29.68}{431.37}|100 \quad X6.88$$

Correlation Co-efficient (r)

$$r = \frac{\sum x z \bar{x} \sum y z \bar{y}}{\sqrt{\sum x z \bar{x}}\sqrt{\sum y z \bar{y}}}$$

$$= \frac{3846.24}{\sqrt{12748.4} \mid \sqrt{4404.15}}$$

$$= 0.5188$$

Probable error $= \dfrac{0.6745 \sum 1 z r^2}{\sqrt{n}}$

$$= \frac{0.6745 \sum z \sum 0.5188}{\sqrt{5}}$$

$$= 0.2204$$

6 X P.E= 6 X0.2204

$\qquad$ =1.3224

Appendix 3

Rs in Million

FY	Annual Consumption (x)	Closing stock (y)	$x - \bar{x}$	$y - \bar{y}$	$(x - \bar{x})^2$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
2061/062	306.23	64.09	-15.81	15.82	249.96	250.27	-250.11
2062/063	281.12	37.56	-40.91	-10.71	1673.63	114.7	438.15
2063/064	333.07	33.26	11.03	-15.01	121.66	225.3	-165.56
2064/065	320.89	67.35	-1.15	19.08	1.32	364.05	-21.94
2065/066	368.82	39.08	46.75	-9.19	2188.37	84.46	-429.91
Total	$x =$ 1610.14	$y =$ 241.36			$\sum(x-\bar{x})^2 =$ 4234.94	$\sum(y-\bar{y})^2 =$ 1038.78	$(x-\bar{x})(y-\bar{y}) =$ 429.37

Mean,

$$\bar{x} = \frac{x}{N} = \frac{1610.14}{5} = 322.04$$

$$\bar{y} = \frac{y}{N} = \frac{241.36}{5} = 48.27$$

Standard Deviation (S.D)

$$\sigma_x = \sqrt{\frac{1}{n}\sum(x-\bar{x})^2} = \sqrt{\frac{1}{5} \mid 4234.94} = 29.1$$

$$\sigma_y = \sqrt{\frac{1}{n}\sum(y-\bar{y})^2} = \sqrt{\frac{1}{5} \mid 1038.78} = 14.41$$

Co-efficient of variation (CV)

$$x = \frac{\sigma_x}{\bar{x}} = \frac{29.1}{322.04} \mid 100 \quad X9.037$$

$$y = \frac{\sigma_y}{\bar{y}} = \frac{14.41}{48.27} \mid 100 \quad X29.8$$

Correlation Co-efficient (r)

$$r = \frac{\sum(x-\bar{x})(y-\bar{y})}{\sqrt{\sum(x-\bar{x})^2}\sqrt{\sum(y-\bar{y})^2}}$$

$$= \frac{\text{Z}429.37}{\sqrt{4234.944} \mid \sqrt{1038078}}$$

$$= -0.2026$$

Probable error $= \dfrac{0.6745 \int \text{Z} \, r^2 \, A}{\sqrt{n}}$

$$= \frac{0.6745 \P \text{Z} \textit{f} \text{Z} 0.2026 \text{\AA}'}{\sqrt{5}}$$

$$= 0.2892$$

Percentage of Closing Stock on Annual consumption in 2061/062

$$= \frac{\text{Closing Stock}}{\text{Annual Consumption}} \mid 100$$

$$= \frac{64.09}{306.23} \mid 100$$

$$= \quad 21\%$$

Appendix 4

Trend Analysis of Inventory

Rs. in Million

FY	Inventory (y)	x	x^2	xy
2061/062	182.78	-2	4	-365.56
2062/063	149.31	-1	1	-149.31
2063/064	159.81	0	0	0
2064/065	203.81	1	1	203.81
2065/066	177.16	2	4	354.32
Total	y = 872.87	x = 0	x^2 = 10	xy = 43.26

Assumed base year FY 2063/064

Least Square trend $(Y_c) = A + bx$

$$a = \frac{y}{N} \qquad = \frac{872.87}{5} \qquad = 174.574$$

$$b = \frac{xy}{x^2} \qquad = \frac{43.26}{10} \qquad = 4.326$$

Trend Value in FY 2061/062		= 174.574 + 4.326 × -2
		= 165.88
	FY 2062/063	= 174.574 + 4.326 × -1
		= 170.22
	FY 2063/064	= 174.574 + 4.326 × 0
		= 174.56
	FY 2064/065	= 174.574 + 4.326 × 1
		= 178.89
	FY 2065/066	= 174.574 + 4.326 × 2
		= 183.23
	FY 2066/067	= 174.574 + 4.326 × 4
		= 191.88

Appendix 5

Trend Analysis of Sales

Rs in Million

FY	Sales (y)	x	x^2	xy
2061/062	701.488	-2	4	-1402.97
2062/063	611.664	-1	1	-611.664
2063/064	618.666	0	0	0
2064/065	633.271	1	1	633.271
2065/066	737.454	2	4	1474.91
Total	y = 3302.54	x = 0	x^2 = 10	xy = 93.54

Assumed base year FY 2063/064

Least Square trend (Yc) = A + bx

$a = \dfrac{y}{N} \qquad = \dfrac{3302.54}{5} \qquad\qquad = 660.51$

$b = \dfrac{xy}{x^2} \qquad = \dfrac{93.54}{10} \qquad\qquad = 9.35$

Trend Value in FY 2061/062 $\qquad = 660.51 + 9.35 \times \text{-}2$

$\qquad\qquad\qquad\qquad\qquad\qquad = 641.80$

FY 2062/063 $\qquad = 660.51 + 9.35 \times \text{-}1$

$\qquad\qquad\qquad\qquad\qquad\qquad = 651.15$

FY 2063/064 $\qquad = 660.51 + 9.35 \times 0$

$\qquad\qquad\qquad\qquad\qquad\qquad = 660.51$

FY 2064/065 $\qquad = 660.51 + 9.35 \times 1$

$\qquad\qquad\qquad\qquad\qquad\qquad = 669.86$

FY 2065/066 $\qquad = 660.51 + 9.35 \times 2$

$\qquad\qquad\qquad\qquad\qquad\qquad = 679.22$

FY 2066/067 $\qquad = 660.51 + 9.35 \times 4$

$\qquad\qquad\qquad\qquad\qquad\qquad = 697.91$

Appendix 6
Trend Analysis of Raw Material

Rs. in Million

FY	Raw Material (y)	x	x^2	xy
2061/062	47	-2	4	-94
2062/063	24.008	-1	1	-24.008
2063/064	19.912	0	0	0
2064/065	48.299	1	1	48.299
2065/066	28.859	2	4	57.72
Total	y = 168.078	x = 0	x^2 = 10	xy = -11.991

Assumed base year FY 2063/064

Least Square trend (Yc) = A + bx

$$a = \frac{y}{N} \qquad = \frac{468.078}{5} \qquad = 33.62$$

$$b = \frac{xy}{x^2} \qquad = \frac{Z11.991}{10} \qquad = -1.20$$

Trend Value in FY 2061/062		= 33.62 -1.2 × -2
		= 36.54
	FY 2062/063	= 33.62 -1.2 × -1
		= 35.16
	FY 2063/064	= 33.62 -1.2 × 0
		= 33.79
	FY 2064/065	= 33.62 -1.2 × 1
		= 32.42
	FY 2065/066	= 33.62 -1.2× 2
		= 31.04
	FY 2066/067	= 33.62 -1.2× 3
		= 30.02
	3067/068	= 33.62 -1.2 x 4
		= 28.82

Appendix 7

Trend Analysis of Cost of Good Sold (COGS)

Rs. in Million

FY	COGs (y)	x	x^2	xy
2061/062	561.117	-2	4	-1122.23
2062/063	541.731	-1	1	-541.73
2063/064	537.154	0	0	0
2064/065	539.113	1	1	539.113
2065/066	632.648	2	4	1265.296
Total	y = 2811.76	x = 0	x^2 = 10	xy = 140.449

Assumed base year FY 2063/064

Least Square trend (Yc) = A + bx

$$a = \frac{y}{N} \qquad = \frac{2811.76}{5} \qquad = 562.15$$

$$b = \frac{xy}{x^2} \qquad = \frac{140.449}{10} \qquad = \text{-}14.0449$$

Trend Value of FY 2061/062	= 562.15 + 14.0449 × -2
	= 533.67
Trend Value of FY 2066/067	= 562.15 + 14.0449 × 3
	= 604.28
Trend Value of FY 2067/068	= 562.15 + 14.0449 × 4
	=618.33

Appendix 8

Trend Analysis of Work in Progress

Rs. in Million

FY	WIP (y)	x	x^2	xy
2061/062	8.975	-2	4	-17.95
2062/063	4.568	-1	1	-4.568
2063/064	4.67	0	0	0
2064/065	4.963	1	1	4.963
2065/066	7.326	2	4	14.852
Total	y = 30.502	x = 0	x^2 = 10	xy = 2.903

Assumed base year FY 2063/064

Least Square trend (Yc) = A + bx

$a = \dfrac{y}{N}$ $\quad = \dfrac{30.502}{5}$ $\quad = 6.1$

$b = \dfrac{xy}{x^2}$ $\quad = \dfrac{2.903}{10}$ $\quad = -0.29$

Trend Value of FY 2061/062	= 6.1- 0.29 × -2
	= 6.67
Trend Value of FY 2066/067	= 6.1 - 0.29 × 3
	= 5.23
Trend Value of FY 2067/068	= 6.1 - 0.29 × 4
	=4.94

Appendix 9

Trend Analysis of Finished Goods

Rs. in Million

FY	Finished good (y)	x	x^2	xy
2061/062	47.14	-2	4	-94.28
2062/063	57.032	-1	1	-57.032
2063/064	53.351	0	0	0
2064/065	82.865	1	1	82.865
2065/066	80.574	2	4	161.15
Total	y = 320.96	x = 0	x^2 = 10	xy =92.701

Assumed base year FY 2063/064

Least Square trend (Yc) = A + bx

$$a = \frac{y}{N} \qquad = \frac{320.96}{5} \qquad\qquad = 64.192$$

$$b = \frac{xy}{x^2} \qquad = \frac{92.701}{10} \qquad\qquad = 9.27$$

Trend Value of FY 2061/062   = 64.192 + 9.27 × -2

     = 45.65

Trend Value of FY 2066/067   = 64.192 + 9.27 × 3

     = 92.002

Trend Value of FY 2067/068   = 64.192 + 9.27 × 4

     =101.27

Appendix- 10

Compiled Data of BPPNL Related to Inventory

Particulars	Years				
	2061/062	**2062/063**	**2063/064**	**2064/065**	**2065/066**
Sales	701487796	611663693	618666163	633270597	737454134
COGs	560117503	541734227	537153685	539112703	632647654
Purchase of Raw Material	468286812	41771791	382852350	453522351	434483667
Inventory	182698888	149312556	159806005	203811868	177158819
Average Inventory	49081281	52086276	55191451	58107943	81719883
Raw Material	47871922	24008595	19912069	48299099	28859404
Finished Goods	47140327	57032225	53350677	82865208	80574558
Work-inn-process	8975209	4568952	4637784	4963529	7326520
Raw Material Consumption	306233153	281126057	333066730	320991990	368823515
Current Assets	286704312	247185940	278490904	298348172	277130393