

## CHAPTER-I

### INTRODUCTION

#### 1.1 Background of the Study

Inventory means all moveable items in store either ready for sale or for consumption in the course of production with a view to convert them into finished stock for sale. Thus, inventory includes stock of raw materials; work in process, finished goods and accessories.

Inventory is the stock of the materials or products, which frequently occurs in the manufacturing organization especially. When the materials are purchased by an organization they have to be stored until they are into the production process. When the production is over the finished product have to be stored again until they are sold. Thus, inventory involves high amount of cost in terms of occupying the space and blocking the capital. However, we cannot avoid inventories, because without inventory it may effect even badly by creating obstacles on continuous production and ultimately on supply requirements. So inventory should be maintained in appropriate quantity so as to avoid both under-stock and overstock situation for this proper inventory management is necessary. It is because the aim of inventory management is to avoid excessive and inadequate level of inventories and to maintain optimum level of inventory for the smooth production and sales operation.

Inventory is store of goods and stocks. Inventories play vital role on the success of organization. Inventory management involves planning of the optimal level of inventory and control of inventory cost supported by an appropriate organization structure. It involves both financial dimension as well as physical dimension those dimension are interrelated and cannot be looked in isolation (Agrawal, 2000: 238).

Thus, inventory management is primarily concerned with minimizing cost of investment in inventory, cost of maintaining desired level of inventory and minimizing total cost of inventory.

Depending upon the nature of industry and firm, inventories may be durable and non-durable. There are different types of inventory available in business firm. They are raw materials, work-in-processed, finished goods, other supplies and spare

parts. The proper handling of these inventories may lead management to be a continuous production of goods and services, which also reduce cost i.e. inventory cost.

Finished goods are those inventories that satisfy the anticipated demand of the customers in the future and the other hand raw material inventory is carried into industry to produce the goods to satisfy the customer's demand. The work-in-process inventories include those materials that have been committed to production process but have not been completed. Work-in-process includes such items as components and subassemblies that are not ready to sell. Other kinds of inventories include spare parts and office and clearing materials, oil, fuel, light etc as supplies.

Inventory should be maintained in appropriate quantity. To avoid both under stock and overstock situation, Inventory management is a must. It is because, the aim of inventory management is to avoid excessive and inadequate level of stock in the industry to run the production process smoothly and so for the sales also. The inventory management is a key to minimize investment of inventory, it reduce total cost of inventory. For managing inventory properly, both physical as well as financial dimension are taken into consideration. To control costs and improve profits, it is necessary to manage actively every asset that own and is particularly true of the management of goods and materials we buy and keep on hand either for our own use or for resale.

Both the physical as well as financial dimensions of inventory should be effectively managed. Thus, real task of top management lies in formulation the plans and policy that will lead to optimal inventory investment for attainment of desired objectives.

The control of inventories deserves special attention as over- investment in inventories results shortage of cash for other purpose like payment of maturing liabilities, carrying of account receivable and expansion of fixed assets. Similarly, the consequences of under investment in inventories are loss of regular customers, as they do not find selection of varieties and burden of unnecessary costs of operations due to shortage of raw materials. So, inventory control involves the devising of inventory decision models to determine the optimum investment in inventory.

Inventories form a link between production and sale of a product. The inventory exists in manufacturing and non-manufacturing organization. In manufacturing organization there are four types of inventories first raw materials, those units that have been purchased and stored for future production. Second work in progress refers semi-manufacturing products. There are present products that need more work before they become finished products for sale. Third finished good inventories are those completely manufactured products which are ready for sale and the fourth is about supplies include office and place cleaning and materials (Soap, broom etc) oil fuel bulbs and the like these materials directly inter production (Pandey, 1994: 755) in case of trading concern inventory will comprises only finished goods and stock in trade owned by if for sale to customers in the normal course of business (Jain & Narang,1993: 142).

### **1.1.1 Introduction of Bottlers Nepal (Terai) Limited (BNTL)**

Bottlers Nepal (Terai) Limited has been in operation from last twenty four years. The company is registered as public limited company and duly listed in Nepse with 90.78% shares being held by Bottlers Nepal Limited and rest being owned by the Nepalese Shareholders. The company currently operates Products under the brand Name of Coca-Cola., Fanta, Sprite, Kinley Club Soda and Minute Maid. It is the subsidiary company of Bottlers Nepal Limited, Balaju, Kathmandu. BNTL was established in 1987 under the Company Act 1964. BNTL is one of the leading figures of Nepalese industrial sector. The company is located in Gondrang of Bharatpur Municipality in Chitwan district, Nepal, occupying the area of 1,65,600 sq feet with the altitude of 1500 ft above mean sea level. It represents the first large-scale multinational manufacturing company of Chitwan, Nepal.

Coca-Cola, imported from India, was first introduced into Nepal in 1973, with local production of Coca-Cola beginning in 1979. Bottlers Nepal Limited (BNL) is the only bottler of Coca-Cola products in Nepal and has two bottling plants, namely Katmandu (Bottlers Nepal Limited (BNL) and Bharatpur (Bottlers Nepal (Terai) Limited,) which is 160 km from Katmandu, its capital. The Bharatpur (Terai) plant has one line of 350 BPM, which has been in operation since 1987. The Company has authorized share capital of Rs 121,000,000 and paid up value per share is Rs. 100. The issued paid up capital is Rs. 121,000,000. Initially local management till 1993 A.

D. ran the company. Frase and Neave, Singapore took responsibility of the company management from 1993 to 2000 A. D. During the year 2000-2004 the company was run by the Coca Cola, Atlanta. At present South Africa Bottling Company, South Africa is taking the responsibility of company management.

The company prepares flavor of the product. They are brought from countries like Singapore, India and Germany. All the spare parts are imported from Germany, Thailand, Switzerland and India also. BNTL covers more than 75% market in Terai region when compared with other brands of the similar product. The company has been able to win the heart of the customers without increasing the price of product since two or three years ago.

The company employing 158 persons has a plant with the capacity of producing 350 bottles per minute. Coke, Sprite, Fanta, Slice (orange, lemon, and soda) are the major product of the company, packed in 2000ml, 1500ml, 1000ml, and 500ml non returnable plastic bottles and 750ml, 250ml, and 175ml returnable glass bottles. The products are marketed all over the country except in Bagmati Zone.

BNTL has continuously increased the production target. The machine operates 3 shifts in peak season and according to the demand of stock season 90% of the operation is carried in full season and 10% of the operation is done in off -season.

For the production of these product certain inputs are pre-requisite i.e. concentrate, crown cock, closure and sugar which are not produced in the country. Therefore these inputs are imported from other countries like Singapore, Iran, Pakistan, Indonesia, German and India.

The company had given prime importance to its quality product for which it had established well-equipped laboratory to assess the quality of raw materials as well as finished product. Similarly the company had also shown its concern to guarantee the safer environment by establishing Effluence Treatment Plant (ETP) in 1999 to refine the wastewater generated in the production process.

## **1.2 Statement of the Problem**

Nepal is rich country of natural resources but the people are poor. In Nepal, the public enterprises are accepted to build the infrastructure to produce and supply important consumer goods in complement and supplement to the private sector and to

operate as a model for efficiency. They are also expected to generate revenue as their contribution to the national treasury. In order to carry out these exceptions successfully, public enterprises must be efficient in utilization of their resources. Most of the Industry in Nepal is in risky position and their performance is poor in terms of productivity and profitability due to lack of resources, Labor dispute and Political instability. Manufacturing enterprises' functions are also not in satisfactory level. Few manufacturing companies are established and they are trying to cover whole function in market, which is impossible. Few of them are trying to distribute its products in the market. So, the inventory management is the key root for their success. Proper inventory management helps for efficient operation of resources. The present Study tries to find out the causes and reasons of following problems:

- What purchasing procedure has been adopted by BNTL?
- Whether the level of inventory and sales are related to each other in BNTL?
- Which inventory control techniques are applied in BNTL?
- How are sales, purchases and closing stock related in BNTL?

### **1.3 Objectives of the Study**

The main objective of this study is to evaluate the current practice of inventory management and its effectiveness in BNTL. The other specific objectives are as follows:

- To analyze the purchasing procedure adopted by BNTL.
- To find the relationship between sales and material purchase in BNTL.
- To evaluate the relationship between actual purchase and closing stock in BNTL.
- To analyze the inventory control techniques implemented by BNTL.

### **1.4 Significance of the Study**

Inventory management is one of the important in manufacturing companies without effective and efficient inventory management system no one manufacturing company can achieve their goal. Proper inventory management helps to maximize the profitability and do not block the inventories. A Company should maintain adequate raw material/finished goods. If slightly changes in the cost of materials it will effect in

the profitability so the company should keep adequate stock of inventory by keeping adequate inventory the company able to supply what ever the demand. Most of Nepalese manufacturing organizations are suffering from poor inventory management. Nepal, an under industrialized country, is still using traditional technique in purchasing of inventory. To have a sound achievement the company should apply modern tools and techniques.

This study is needed for effective inventory management in BNTL and to see the impact in profitability and find out how much money should be invested in inventory. And this study tries to point out the major shortcoming of the inventory management system of BNTL that are hindering the efficiency of production system in BNTL and provide the suggestions in order to cope up with the shortcomings, So that the company will run with more efficiently.

### **1.5 Limitations of the Study**

Each and every research has some limitations. Basically, not availability of required data and information would be the major limitations of the study. There are following limitations of the study:

- Basically the data were used in the study from primary and secondary sources the reliability of the secondary data due to depends on the records provided by company and of the primary data depends on opinion.
- Time and resource for the study are the major constraints.
- This study is concentrated on the area of inventory management of BNTL.
- The study considers only BNTL and is based upon annual available reports of the BNTL i.e. based on secondary source of data.
- This study covers only a period of five years (2005/06 to 2009/10).

### **1.6 Organization of the Study**

These study content only five chapters, they are as follows:

#### **Chapter I: Introduction**

This chapter includes the introduction of BNTL and general background, Focus of the study, statement of the problem, objective of the study, importance of the study and limitation of the study.

**Chapter II: Review of Literature**

This chapter will include the review of literature of related studies, conceptual review and major studies related with this research.

**Chapter III: Research Methodology**

This chapter will contain research design, population and sampling of data collection technique, data analysis method, tools research variable and general introduction of tools used in the study.

**Chapter IV: Data Presentation and Analysis**

This chapter will include the presentation of various data related to study and analysis as requirement of objectives as well as major findings of the study.

**Chapter V: Summary, Conclusion and Recommendation**

This chapter will include summary and conclusion of the study and suitable recommendation on the basis of the study.

At the end of the chapters bibliography and appendices has been incorporated.

## **CHAPTER-II**

### **REVIEW OF LITERATURE**

The first chapter has already highlighted the problem and objectives of the study. This chapter deals with review of literature regarding inventory management. Those literatures provide the bases and input for the study. Only limited number of study has been conducted so far in the field of inventory management.

Review of literature means taking knowledge from different sources. In this chapter the researcher has reviewed various published materials. A literature review is essential part of all studies. It is a way to discover what other researchers have covered and left in the area. A critical review of the literature helps the researcher to develop a thorough understanding and insight into previous research works that relates to the present study. It is also a way to avoid investigation problems that have already been definitely answered. Thus a literature review is the process of locating, reading and evaluating the research literature in the area of the students' interest. The purpose of literature review is to find out what research studies have been conducted in one's chosen field of study and what remains to do. The primary purpose of literature review is to learn not to accumulate.

#### **2.1 Conceptual Framework**

##### **2.1.1 Inventory Management**

Inventory management involves planning of optimal level of the materials and cost control of material cost supported by an appropriate organization structures which is staffed by trained person and directed by the top level of management. It involves both financial dimension as well as physical dimension and these dimension are interrelated and can't be looked is isolation. Inventory in the forms of raw materials, work in progress and semi-finished goods are of great significance for the success of an enterprise. These can directly affect the efficiency of the system. It is observed that irrespective of an enterprise. The expenditure of materials is a major item of the budget in money cases materials consumption varies from 25% to 75% of sales turnover. The expenditure made on materials in money invested in inventories cost of storage transportation cost, insurance wastage etc. Because of expenditures

required acquiring on controlling inventory and their impact on profit. A great deal of attention associated with materials (Goyal,1996:270).

The inventory management is assumed to be required to maintain on adequate supply of current materials at the responsibility of determining the material requirement implied by the marketing forecast and leasing with the purchasing department for their acquisition, receiving and storing the material safety and in good condition for its subsequent issue and identifying surplus s stock and taking action to reduce it (Mihkman, et al.,1996:364).

Material management is one of the aspects of production management. Production management is developed and handled by production engineer its specialist handled procurement. Therefore later inventory management became a sported and significant management for the development of industries. Under the inventory management there is not only essential productions approach but also actually inventory management (Chary, 1994:389)

Inventory is working capital and therefore the control of inventories is an important aspect of operation management. The basis questions in the management of inventories are;

#### **I) How much inventory to keep and when?**

Before getting to a mathematical treatment of the about questions of inventory management (Chary, 1994 :120).

- i) There are inventories for normal consumption requirement rates and average lead times for procurement/manufacture for the materials; an inventory is kept at the appropriate time.
- ii) A production processes however continuous it may be is found to have some interruption. It may also have imbalance in the consumption rates of the materials at different stage at the production process this interruption and imbalance make it necessary to kept stocks of inventories between the different stages of the operation.

Every enterprise needs inventory for smooth running of its activities. Its serves as a link between production and distribution process. There is a time lag between the reorganization of a need and its fulfillment. The greater the time lags the higher

requirement for inventory. The unforeseen fluctuation in demand and supply of goods also necessitate the need for inventory. It also provides a cushion for future price fluctuations about 90% part of working capital are invested in inventories, it is necessary for every management to give proper attention to inventory management. A proper planning of purchasing handling storing and accounting should form a part of inventory management.

An efficient system of inventory management will determine.

- i) What to purchase?
- ii) From where to purchase?
- iii) How much to purchase?
- iv) Whom to purchase?
- v) Where to store?

Inventory management is one of the aspects of production management is developed and handled by production engineer procurement is handled by its specialist. Therefore later inventory management becomes a separate and significant management for the development of industries. Under the inventory management there is not only essential production approach but also actually inventory management is purely subject to production management (Pandey, 7<sup>th</sup> Edition:826).

Thus inventory management means not only branch of production management, it is an integrated view of management "Companies devoted a great deal of attention to the efficiency of their materials and inventory management operation " A brief look at the historical evolution of materials function will give us a fuller appreciation of the current situation (Garteet & silver, 1986:357).

Every business operation how ever big or small has to maintain some inventory, inventories serve us cushions to observe the stock of errors in demand forecast and provides more efficient use of the resources. Inventory for any organization is necessary and required careful planning and formulation of policies keeping in view the best interest of the organization. Inventory may be durable and non- durable. The various forms of inventory occur in manufacturing enterprises are as follows:

## **Raw Material**

There are goods that have not yet committed to the production in the manufacturing firm " Raw materials are those basic inputs which are converted into finished products through the manufacturing process raw material inventories are those units which have been purchased and stored for future production (Pandey, 1995:755).

It consists of item that firm purchase for use in its production process it may consist of basic materials and or manufactured goods. Maintaining adequate raw material's inventories provides a firm with advantage in both purchasing and production. Materials used in factory are traditionally classified as direct materials and indirect materials, direct materials are generally defined to include all materials and parts that are integral part of the finished product and their contribution can be directly identified.

Indirect materials are generally defined as material used in manufacturing process as supporting materials. There are following types of raw materials held by these two following type of these too dairy.

- a) General materials
- b) Auxiliary materials
- c) Milk materials
- d) Lubricant materials
- e) Mechanical materials.

## **Work in progress**

Work in process inventories is semi-manufactured products and they represents that need more work before they are converted as finished product for sale. Sometime it becomes very difficult to determine which materials is work-in-process and which are not because the same material may be a raw material. In one industry and the same material may be a work in progress as well as finished goods in other industry. It depends upon the nature of production for milk industry milk is the final product but the sweet industry uses this milk as raw material.

## **Finished product**

These inventories are those completely manufacturing product which are ready for sales stocks of raw material and work in progress facilities production while stock of finished goods is require for smooth marketing operation. Therefore finished goods are completed goods a waiting save in a manufacturing concern they are the final output of production process (Pandey, 1999: 885).

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 as well as 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 De, P 350).

Generally inventory management covers the function of:

- i. Purchasing
- ii. Store keeping
- iii. Issuing and pricing

### **I. Purchasing**

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 manufacturing i.e. quality, quantity, efficiency, economy, prompt delivery, volume of production etc. It is the scientific purchasing that can save much money, time and efforts of the management.

In manufacturing organization, purchasing is the procuring of materials, supplies, machines, tools and services required for the equipment maintenance and operation of the business. Purchasing must be of the right quality in proper quantity delivering at the right time at the most favorable price from outside organization.

In the words of industrial matter purchasing is the procurement by purchase of Alfred and Beauty. Principles of industrial the proper materials, machinery, equipment and supplies of stores used in the manufacture of a product adopted to

marketing in proper quantity and quality at the proper time and the lowest price consistently with the quality desired.

In 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 Purchasing**

The major objectives of scientific purchasing may be stated as follows.

- i. Procurement of required quality and quantity of materials at the best price not necessarily at the lowest price.
- ii. Procurement of materials, which best suit the product and the purposes for which they are intended.
- iii. Maintaining continuous supply to ensure production schedule at a minimum investment.
- iv. Buying the quality, which is neither too much that involves belonging of the capital nor too little that holds up the regular supply for production.
- v. Purchasing for time utility by schedule, sufficiently in advance of the demands of the production department so that the production work shall not suffer due to lack of raw materials.
- vi. Avoidance of duplication of materials, leading to waste of materials and equipment.
- vii. Improvement of the product with reference to quality and distribution by means of selection of adequate materials.
- viii. Developing fullest co-operation and co-ordination maintaining internal relationship among various departments of the company.
- ix. Creation of goodwill for the company through dealings with suppliers.
- x. Maintenance of company's competitive position in the market by having company's quality standards in accordance with the demands of the consumers.

### **B) Purchasing Procedures**

The main steps in purchasing procedure may be listed as follows.

- i. **Purchase Requisition:** The initiation of purchase begins with the formal request from the various sections or departments to the purchase department or order goods. The request is made in purchase requisition slips to the purchase department by the departments needing the goods authorizing the purchase department for purchasing the goods as per specification given in the slip by mentioning date on it.
- ii. **Decision of Purchase:** On receipt of the purchase requisition, the purchase department then decides what and how much to buy taking into consideration of various limitations and constraints in purchasing the goods. As far as possible the raw materials should be purchased in sufficient quantity, neither less nor more, to continue the flow of production. For purchasing other materials or plant and equipment, the necessary permission should be taken from the authority concerned and the finance department to release the fund.
- iii. **Study of Market Condition and Sources of Supply:** Having taking the decision for the purchase of materials, the purchasing agent should study the market condition on the basis of market reports as to when and what goods should be purchased. An intensive study should also be 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 vendors and purchase records etc.
- iv. **Selection 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. Sometimes supplier is selected out of the 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. Through the study of the supply and the quality and quantity of goods, a vender is selected out of.
- v. **Purchase Order:** After selecting the vendor or supplier, a purchase order is prepared in the prescribed form by the purchase department and sent to the vendor authorizing him to supply specified quantity and quality of materials at the stipulated terms at the time and place mentioned there in. It forms a formal contract between the purchaser and the vendor.

- vi. Receiving Materials: When goods arrive they are taken delivery and the receiving clerk checks material with the order placed by the purchasing department to the vendor. After proper checking goods should be delivered to the store department or to other department that requisitioned them. On checking if any discrepancy is found as regards to quality and quantity, it should immediately be referred to the purchasing department so that discrepancy may be adjusted.

## **II. Storekeeping**

Materials are a high percentage of the cost of production of product. It is therefore necessary to have a close which in the proper use of the materials. The best method of maintaining materials properly is storekeeping. Storekeeping is a service function in a manufacturing concern, which deals with the physical storage of goods under the custodian of well-trained and experienced person termed as storekeeper. Raw materials are usually known as stores and the place here such stores are kept is known as storeroom. Storekeeping is that aspect of inventory management, which is concerned, with the physical storage of goods. The responsibility of storekeeping management are to receives materials to protect them in storage from the materials in the right quantities at the right time to the right place and provide these services promptly and at the least cost.

The importance of storekeeping has not been properly recognized by the manufacturing organization so far. Storekeeping should be given due place in the organization otherwise the manhandling will add to the cost of production. Many organizations spend lavishly on machines and wages while storekeeping is ignored and stores are housed in camped quarters, ill-equipped and ill- ventilated. Storekeepers are also ill paid in comparison to others in similar status. All these caused are responsible for wrong or short issue. Loss of stock of raw materials, unexpectedly running out of stock and preparation or incorrect vouchers all these lead to theft and pilferage of stock and delay in production.

In the light of the above explanations, storekeeping can be described as the keeping of materials in stores in a scientific and systematic way.

## **Objectives of Storekeeping**

- i. Minimizing the inventory holding cost and investment on inventories.
- ii. Receiving, handling and issuing goods economically and efficiently.
- iii. Using the storage available space and labour effectively
- iv. Maintaining regular supply of raw materials at all times when properly authorized.
- v. Protection of all goods in stores against all losses from fires, thefts and obsolescence.
- vi. Facilitating ordering of required materials.
- vii. 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 balances 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 balances, 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 and Narang, 1999: 237-239).

### **ii) Bin Cards**

A bin card makes a record of the receipts and issue of materials and is kept for each item 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 in time.

## **III. Issuing and Pricing**

Material should be issued against material requisition slip. The prices of the issues can be determined on the basis of cost price or market price.

### **2.1.2 Motives of Holding Inventories**

The question of managing inventories arises only when the company holds inventories. Manufacturing inventories involved tying of the company funds and incurrance 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).

#### **i. Transaction Motives**

An important reason for maintaining inventory levels is the transaction motive. This refers to the need of maintaining inventory to facilitate smooth production and sales operations. The transaction motive for holding inventory is to satisfy expected level of operations in the firm.

#### **b) Precautionary Motive**

Precautionary Motive for holding inventory is to provide a safeguard or cushion in case the actual level of activity is different than anticipated. This inventory serves as a reserve when there is an unpredictable change in the demand and supply forces, e.g. it may be that due to some unforeseen circumstances government may restrict import of some important basic raw material or here may be unexpected big order received from a customer to supply a large quantity of finished goods.

#### **c) Speculative Motive**

It refers to the desire of a firm to take advantage of opportunities of rising prices which present themselves at unexpected moments and which are typically outside the normal course of business. While precautionary motive is defensive in nature in that firms keep inventory to meet unexpected contingent situations the Speculative Motive represents an aggressive approach to exploit profitable opportunities. Advance purchase of raw materials in inflationary times is one form of speculative behavior.

### **2.1.3 Need and Importance of Inventory Management**

Inventory in any organization are of pivotal role. A time lag exists between demand for materials and its supply. Also, there exists uncertainty in procuring raw materials in time at many occasions. The procurement of materials may be delayed because of such factors as strike, transport, disruption, short supply etc. Therefore, the

form should maintain sufficient stock of raw materials at a given time to streamline the production. Other factors, which may necessitate to purchase and hold raw material inventories are quantity discount and anticipated price increase.

The stock of finished goods has to be held because production and sale are not instantaneous. A firm cannot produce 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 demands from customers. In case the firm's sales are seasonal nature, substantial finished goods inventories should be kept to meet the peak demand.

The work in process inventory builds up because of the production cycle. Production cycle is the time span between the introduction of raw material into production and the emergence of finished product at the completion of production cycle.

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 raw materials extending through all the manufacturing operation and into finished goods. Storage and continuing to warehouse and retail stores" (E.S. Buffa, 1995:478).

Importance of inventory management can be written as follows:

- (i) Inventory provide service to the customers immediately or at a short notice.
- (ii) Inventory also acts as buffer stock when raw materials are received late and so many sales orders are likely to be rejected.
- (iii) Inventory helps in smooth and efficient running of business.
- (iv) Inventory helps in maintaining the economy by absorbing some of the fluctuations when the demand for an item fluctuates or is seasonal.

#### **2.1.4 Objectives of the Inventory Management**

A fundamental objective of a good system of inventory control is to be able to place an order at the right time from the right source to acquire the right quantity at

right price and of right quality. James Lundy has suggested following objectives of inventory control:

- (1) **To Ensure Adequate Stock:** An endeavor is made by inventory control to see that any department will get the raw materials or other necessary item as and when required. Hence an effective system of purchasing, storage and maintenance is effectively arranged so that enough stock is available on hand.
- (2) **To Minimize Inventories on Hand:** The next objective of inventory control is to minimize inventories on hand. It has to be ensured that excessive stock is not kept and unnecessary capital is not locked up. But it must be consistent with adequate stock, so that production is not disrupted.
- (3) **To Maintain Continuity in Production:** The supplies of materials spare parts, consumable stores etc. must be stocked to the optimum level, so that continuity of operations is maintained. The inventory control system should ensure that production is completed as per schedule.
- (4) **Minimize the Cost of Purchasing and Storage:** It is essential that there is economy in cost of purchasing, cost of receiving and inspection, storage and issue of materials etc. The expenses to be reduced to minimum are interest on capital locked, insurance, maintenance, and inspection and transportation costs.
- (5) **To Minimize the Wastage and Loss:** In every manufacturing organisation, there is a risk of wastage and theft of stores, wastage and losses are likely to occur during movements and during the production processes. Inventory control ensures that the risk of theft, wastage and losses are minimized.
- (6) **To Reduce the Risk of Deterioration:** If a considerable time elapses in the storage of goods, there arise two types of risks (i) the deterioration of goods stored and (ii) the goods becoming obsolete and out dated. Hence, inventory control ensures that such risk is minimized.
- (7) **Effective Use of Available Capital:** Various levels like maximum level, minimum level, reordering level etc. are fixed in a system of inventory control, which ensures that unnecessary capital is not locked up in inventory. Order is placed at right time and in right quantity, taking into account the re-ordering level. This will make efficient purchasing possible.

- (8) **To be Helpful in Efficient Purchasing:** Maintenance of optimum stock is closely connected with a system of inventory control. One of the major objectives of inventory control is to assist in efficient purchasing.
- (9) **To Give Maximum Satisfaction to Customers:** The customer satisfaction is a sign of a progressive enterprise. Inventory control assists in supplying goods at proper price and at right time. Inventory control leads to economical purchase, makes possible continuity of production and maintaining enough stock. All these leads to consumer satisfaction.
- (10) **To Minimize Loss Due to Price Decline:** When considerable investment is made in inventory, the price decrease on a large scale may involve the firm in considerable loss. This is reduced to a great extent by proper inventory control.
- (11) **Maximum Use of Storage Capacity:** One of the objectives of inventory control is to make maximum use of storage capacity available. This will reduce storage costs.
- (12) **Proper Storage of Materials:** Inventory control function includes supervision and control of storage of materials, tools etc. Where thousands of items are stored, it is necessary that material of a particular type required is immediately available. Efficient storage is made possible due to inventory control.

### **2.1.5 Classification of Cost**

Inventory procurement, storage and management is associated with huge costs associated with each these functions.

Inventory costs are basically categorized into three headings:

1. Ordering Cost
2. Carrying Cost
3. Shortage or stock out Cost & Cost of Replenishment
  - a. Cost of Loss, pilferage, shrinkage and obsolescence etc.
  - b. Cost of Logistics
  - c. Sales Discounts, Volume discounts and other related costs.

### 2.1.5.1 Carrying Cost or Holding Costs:

Inventory storage and maintenance involves various types of costs namely:

- ) Inventory Storage Cost
- ) Cost of Capital

Inventory carrying cost involves Inventory storage and management either using in house facilities or external warehouses owned and managed by third party vendors. In both cases, inventory management and process involves extensive use of Building, Material Handling Equipment, IT Software applications and Hardware Equipment coupled managed by Operations and Management Staff resources.

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.

- a. Capital or opportunity cost
- b. Insurance and taxes
- c. Warehousing cost
- d. Handling cost
- e. Clerical and staff and
- f. Deterioration and obsolesce

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

$$\text{Total Carrying cost (TCC)} = (C \%) \times (P) \times (AI)$$

Here,

C% = Percentage of cost of carrying inventory which is calculated by adding the cost of capital tied up, storage, insurance and taxes etc and dividing 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. i.e.  $(AI = Q/2 + S)$

Q = Order Quantity,

S = Safety stock, Assuming a constant rate of consumption of inventory.

### **2.1.5.2 Ordering Cost**

Cost of procurement and inbound logistics costs form a part of Ordering Cost. Ordering Cost is dependent and varies based on two factors - The cost of ordering excess and the Cost of ordering too less. Both these factors move in opposite directions to each other. Ordering excess quantity will result in carrying cost of inventory. Where as ordering less will result in increase of replenishment cost and ordering costs. These two above costs together are called Total Stocking Cost. If you plot the order quantity vs the TSC, you will see the graph declining gradually until a certain point after which with every increase in quantity the TSC will proportionately show an increase. This functional analysis and cost implications form the basis of determining the Inventory Procurement decision by answering the two basic fundamental questions - How Much to Order and When to Order. How much to order is determined by arriving at the Economic Order Quantity or EOQ.

Ordering cost consist of order costs, set up 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 p161).

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

- Requisitioning
- Order placing
- Transportation

- 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 clerical 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 other 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:

- a) Cost of placing an order
- b) Requisitioning cost
- c) Transportation/shipping cost
- d) Receiving, inspecting and storage cost
- e) Sales tax, customs etc
- f) Clearing and forwarding cost
- g) Insurance of raw-materials
- h) Stationery cost
- i) Bank commission/LC charges etc
- j) Telephone/Fax/Postage expenses to follow up
- k) Cost incurred when raw materials are in transit.

Ordering cost increases with the number of orders, thus more frequency in Inventory acquired, higher the firms ordering cost. On the other hands, if the firm

maintains large inventories level, there will be a few orders placed and ordering cost will be relatively small. Thus ordering costs decrease with the inventory size of inventory. The fixed costs associated with ordering inventories as 'O' and we placed 'n'.

Ordering per year, the total ordering cost is given as

$$\begin{aligned} \text{Total ordering cost (TOC)} &= (O) \times (N) \\ &= (O) \times (R/Q) \end{aligned}$$

Where,

- TOC = Total ordering cost
- O = Fixed cost per order
- N = Number of orders placed per year
- Q = Inventory quantity for each order

### 2.1.5.3 Stock out Costs

The stock out cost is incurred by a firm when a company faces stock out which results in the loss of sales revenue. In the stock out cost, the company is unable to meet the demand or the orders of the customers, which results in the lost contribution margin. The stock out cost is calculated as loss of sales revenue plus the loss of customer goodwill. The depletion in stock results in loss in sales or back order costs. When the sales are lost due to stock out, the firm loses 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 is 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, p 142).

Stock out cost computed from following formula:

$$\text{Stock out cost} = \text{Inventory cycles per year} - \text{Output units} \mid \text{Probability of possible stock out} \mid \text{unit stock out cost}$$

$$\text{Inventory cycles per year} = \frac{\text{Annual Usages}}{\text{Quantity Order Size}}$$

### **2.1.6 Techniques of Inventory Management (Control)**

Inventory management can be one of the most expensive aspects of running a [business](#), but with proper techniques, you can reduce the inventory burden on your bottom line. Inventory management includes all aspects of your inventory, from warehousing manufacturing materials to delivering goods to your customers. Adequate inventories facilities smooth production activities and help to provide off shelf delivery to customers. On the other hand excessive inventory is idle resource of the firm and can prove costly because it ties up working capital unnecessarily which could have been better used had it been utilized for some other purpose. According to Alton N. Smith “Inventory is (money) on which a company pays interest rather than collect interest. It is money always in danger of deviation. Non controlled inventory is an industrial danger”. The major 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.

#### **2.1.6.1 Economic Order Quantity (EOQ)**

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

In 1915 F.W. Haris, development the famous economic order quantity (EOQ) formula. Letter, through the consultant named Wilson, this formula gained wise use in industrial area. Later on this formula was developed by Haris. The EOQ is still widely used in inventory for independent demand. The EOQ model is an inventory management techniques used to find the optimal order included order quantity that minimizes the total cost which includes ordered and carrying cost. John J. Hamption defined economic order quantity as "the order size that will result in the lowest total of order and carrying costs for an item of inventory. Further more be states the importance of economic order quantity as if a firm places unnecessary orders it will incur unneeded order costs if it places to few orders, it must maintain large stock of

goods and will have excessive carrying costs by cumulating economic order quantity, the firm identifies the number of these costs (Hampton, 1986, p-223).

It refers to the order size that will result in the lowest total cost (total ordering cost + total carrying cost) for an item of an inventory. If a firm places many orders it will incur unneeded ordering costs. If it places too few orders, it will have excessive carrying cost. By EOQ model we can identify the number of units to order 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 determining the carrying and ordering costs will introduce much smaller error (10%) in the determination of EOQ (Buchan, 1970: 362).

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

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

Where,

- A = Annual Demand
- O = Ordering Cost per Order
- C = Carrying Cost per Unit

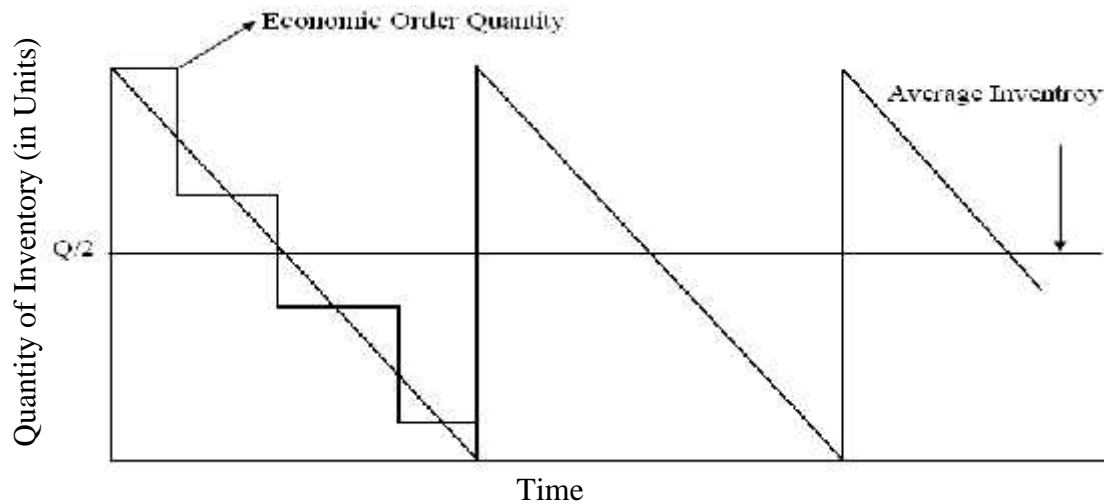
Carrying cost per period 'C' represent the cost of inventory storage, handling and insurance together with the required rate of return on the investment in inventory. These costs are assumed to be constant per unit of inventory of a time. Thus, the total carrying cost for a period is the average number of units of inventory multiplies 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

$$\text{Average inventory} = \frac{Q}{2} \dots\dots\dots (1.1)$$

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

**Figure 2.1**  
**Economic Order**



### **Assumption of Economic Order Quantity**

The concept of EOQ is based on the following assumptions:

- i. 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 assumed to continue into the indefinite future.
- ii. The lead-time is constant and known. 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.
- iii. Material is ordered or produced in a lot or batch and lot is placed into inventory all at one time.
- iv. A specific cost structure is used as followed the unit cost is constant and no discounts are given for large purchase. The carrying costs depend linearly on the average inventory level; there is a fixed ordering or set up costs of each lot which is independent of the number of items in the lots.
- v. The item is a single product there is no interaction with other products.

## Approaches to set EOQ

The EOQ model can be illustrate by

- a) Mathematical (short- cut) formula method
- b) Graphical approach

They are explained below,

### a) Mathematical (short – cut)/ Formula Method

Mathematical models are also available to calculate economic order quantity. There are numbers models exist, as the field of inventory management and can be studies in college programs such as operation research and production management. Even many mathematical model exists the main objective of these model is to reduce minimizes the inventory cost / Total costs.

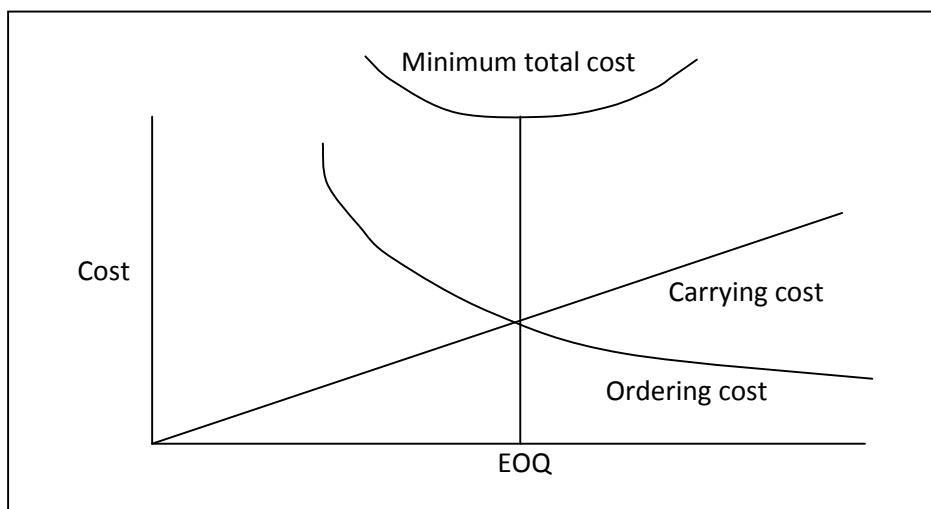
Without getting into highly refined decision models the concepts of EOQ can be illustrated with a basis mathematical model. EOQ can be calculated by using the following formula.

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

### b) The Graphic Approach

The Economic Order Quantity can also be found graphically. The following figure illustrates the EOQ functions.

**Figure 2.2**  
**Graphical Presentation of EOQ**



In figure carrying, ordering and carrying 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 behaviors of total cost line is noticeable since it is a sum of two types of cost that behave differently with order size. The total cost decline in the first stage but they start rising when the increase in carrying cost. The economic order quantity occurs at the point Q where the total is minimum if the order size increase carrying cost exceeds ordering cost that are saved. Thus the firm operation profit is maximized at Q.

### 2.1.6.2 ABC Analysis

Manufacturing organization finds it useful to divided material into three categories for the purpose of exercising selective control on materials. An smaller percentage (%) of items of materials in the store may contribute to a large % of the value of consumption and on the other hand a large percentage of items may represent a smaller percentage of the value of items consumed between these two extremes will fall those items the percentage number of which is more of less equal to their value of consumption item falling in the first category are treated as 'A' items of second category as 'B' items and items of the third category are taken as 'C' items. Such as analysis of material is known as ABC analysis.

This technique of stock control is also known as stock control according to the value method or analysis better control method or proportional parts value analysis method. Thus, under this technique of material controls materials are listed in 'A' 'B' and 'C' categories in descending order based on money value of consumption. ABC Analysis measures the cost significant of each item of material. It concentrates on important items. So it also known as "Control by importance and exception". (CIE).

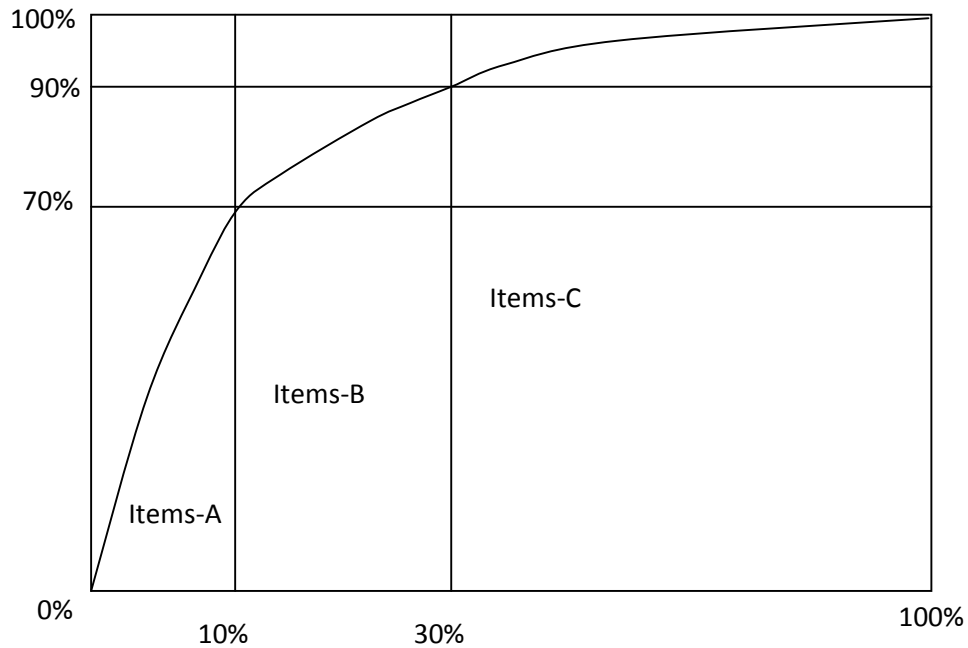
The report of Indian productivity term on report of stores and inventory control in U.S.A. Japan and west Germany gives the following example of ABC Analysis.

<b>Group</b>	<b>Percentage of items</b>	<b>Percentage of costs</b>
A	8%	75%
B	25%	20%
C	67%	5%

The significance of this analysis is that a very close control is exercised over the items of 'A' group which account for a high percentage of costs while less stringent control is adequate for categories 'B' and very little control would significant for categories 'C' item.

The graphical representation of ABC analysis may be as given below.

**Figure 2.3: % of Number of items**



### **Procedure**

The step commuting ABC analyses are as:

- a) First we calculate annual usage, multiplying the quantity (number of the units) of the item consume in one year by its unit price.
- b) Average all inventory items first items will show maximum annual usage in rupees, the second item the maximum. The third item maximum and so on. After having done this total of annual usage in rupees is put at the bottom of the list.
- c) Inventory item is categorized on the basis of annual usage and its prices, which item has more annual usage and higher its prices there item is categories as 'A' item which contribute lesser then categories this should be

kept in categories 'B' and the rest contribution of the total percentage of annual usage is called 'C' categories.

- d) Placing of the orders on the basis the classified.

### **2.1.6.3 Re-order level**

The problem, how much to order, is solved by determining the economic order quantity. Yet the answer should be sought to the second problem, “when to order”. This is the problem of determining the re-order point. If re-order point is the inventory level at which an order should be placed to replenish the inventory. In other words the choice of appropriate point at which an order to replenish the inventory is of great significance. The level of inventory at which re-order should be placed is known as re-order level or re-order point. [Goel, B.S. 1992]

To determine the re-order point under certainty, we should know:

- a) Lead time
- b) Average time
- c) Economic Order Quantity

Lead time the time normally taken is replenishing inventory after the order has been placed. By certainty we mean that usage and lead time do not fluctuate. Under such situation, re-order point is simply that inventory level which will be maintained for consumption during the lead time. i.e.

Re-order point (under uncertainty) = Lead time × Average usage

“The re-order point is the level of inventory at which the firm places an order in the amount of the economic order quantity. If the firm places the order when the inventory reaches the re-order point, the new goods will arrive before the firm runs out of goods to sell”. To determine the re-order point under certainty, there are three information/assumptions needed.

#### **i) Usage Rate**

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 places

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, weeks, and months.

### **iii) Safety Stock Level**

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

$$\text{Re-order level} = \text{Maximum consumption} \mid \text{Maximum Re-order Point}$$

### **d) Average Stock Level**

Average stock is calculated as

$$\text{Average Stock Level} = \text{Minimum stock level} + \frac{1}{2} \text{ of Re-order Quantity}$$

### **e) Danger Level**

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

$$\text{Danger Level} = \text{Average Consumption} \mid \text{Maximum Re-order Period}$$

## **2.1.6.4 Stock Level**

If the inventory is too little, the firm will face frequent stock outs involving high reordering cost and if the inventory level is too high, it will be necessary of capital. Therefore, an efficient inventory management requires that a firm should maintain the optimum level of inventory where inventory costs are the minimum and at the same time there is no stock out which may result in loss of sale or stoppage of production. Various stock levels are (Nair, Banerjee, Agrawal, 1998, p-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 due to shortage of inventory. In this level, the following factors are taken into consideration.

- i. Lead-time i.e. time lag between indenting and receiving of the inventory.

- ii. Rate of consumption of the inventory during the lead-time.
- iii. Nature of inventory, minimum level is not requires in case of special inventory, which is required against customer specific orders.

Formula 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.

- ii. Amount of capital available for maintaining stores.
- iii. Golden space available.
- iv. Maximum requirement of the stores for production purpose at any point of time.
- v. Rate of consumption of the material during the lead-time.
- vi. The time lag between indenting and receiving of the inventory.
- vii. Possibility of loss in stores by deteriorations, evaporation etc.
- viii. Fluctuation in price.
- ix. The seasonal nature of supply of inventory of some items of inventory goods are available only during specific periods of the year, so these have to be stocked heavily during these periods.
- x. Restriction imposed by Government of local authority in required to material in which there are inherent risks, e. g, fire and explosion.
- xi. 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 Re-ordering Period)

### **2.1.7 Inventory Valuation**

In any firm different goods are purchased at different time at different price rate. But the problem 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 valued to exhibit a true and fair view. True profits cannot be calculated unless assets are properly values.

The false valuation of the inventory directly affects the profit. If inventory is values at a lower then actual, the profit will decrease and as result shareholders would get less divided. On the other hand, if inventory is valued more than actual value, the profit would be increased 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 comparison of profit of different years.

Various method of valuation of the inventory is as follows:

#### **2.1.7.1 Specific Identification Method**

The specific identification method requires that each unit in inventory be identified with the particular time it was 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 & 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.

### **2.1.7.2 Weighted Average Cost of Capital Method (WACC)**

This method assumes that goods are removed from 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.

### **2.1.7.3 First-In-First out (FIFO) Method**

FIFO, which stands for "first-in-first-out," is an inventory costing method which assumes that the first items placed in inventory are the first sold. Thus, the inventory at the end of a year consists of the goods most recently placed in inventory. FIFO is one method used to determine Cost of Goods Sold for a business.

### **2.1.7.4 Last-In-First Out (LIFO) Method**

The last-in-first-out (LIFO) method is method of costing materials issued is based on the premise that materials units issued should carry the cost of the most recent purchase, although the physical flow may actually be different. The method assumes that the most recent cost (the approximate cost to replace the consumed units) is most significant in matching cost with revenue in the income determination procedure.

### **2.1.7.5 Higher in First out Method (HIFO)**

Under HIFO, the most expensive shares purchased are considered the first shares sold. Because these are the highest-priced shares, this method usually results in a lower gain. A lower gain means lower taxes. HIFO is less commonly used by investors than LIFO or FIFO.

### **2.1.7.6 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 while.

### **2.1.8 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 three 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 good 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 the JIT components must work together for a company to benefit from them.

JIT 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 per unit cost by spreading fixed cost over more units.

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

## **2.2 Related Studies on Inventory Management**

### **2.2.1 Review of Journals**

Some studies have been made in the subject of inventory management. We can review some studies and articles below:

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), 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 (Agrawal, 1980).

Rao and Rao (1981) recommended the need for tackling human element in the third world country like Nepal to 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 (Rao and Rao, 1981).

Similarly, Janam Jaya Banjade identified the lack of quality and adequate materials as well as structural deficiency and dishonesty of the management as the main problem of Nepalese enterprises that were adversely affecting Nepalese corporation (Banajade, 2000).

The study conducted by CEDA in 1973 related to the various aspects on Nepal Transportation Corporation come out with the conclusion that stocking of spare parts had hampered the smooth operation of the enterprises even though the inventory management was simple (CEDA. 1973. T. U. Kirtipur).

Ratnaman Dangol, His Study suggested that if the top management should introduce the best policy regarding the inventory control which helps to reduce the lead time regulate usage and maintain safety stock, ultimately the firm achieves its goal to reduce inventory investment and increases the firms future prospects by making more profit (Dangol and Porbha, Vol. II)

Inventory management is to discover and maintain the optimal level of inventory investment and minimizing the cost of inventory so the physical and financial dimension of inventory should be effectively managed. If the top management can't be managed effectively, these will be an adverse effect upon profits, which is main goal for maximizing the profit of modern company (Pradhan, 1985)

A study of Gandaki noodles Pvt. Ltd Its made study of Baral shown that the factory is following neither EOQ model in its purchasing division nor ABC Analysis in Inventory management (Baral, 1998)

### **2.2.2 Review of Theses**

Some studies have been made in the subject of inventory management, few among which are reviewed for this study in this chapter.

Basnet (1998) in his degree thesis expressed his view that, in reality Himal Cement Company Limited (HCCL) is not applying the different method or techniques of inventory management. To manage its inventory effectively, a firm should use different tools and techniques lies EOQ, ABC analysis, reorder level etc. in inventory

management, which minimizes in the inventory, cost consequently will result into positive profitability. There is no proper and up to date improvement in inventory management system in HCCL. So it is better to pay attention by top- level management to overall management of purchasing, production, sales and financial dimensions by which HCCL, will run in profit in future.

Pandey (2000) 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 of 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 cost incurred on ordering and carrying cost of the inventory. Moreover, the unnecessary costs involved in ordering and carrying can be reduced to a certain level by the use of models, formulas etc.

Sigdel (2002) reported the Agriculture Input Corporation (AIC) procures through inviting global tender, negotiations, aid/assistance from donor agencies and countries, and negotiation/agreement between two governments. However, AIC prefers procurement through inviting global tender as other procedures are less reliable and costly compared to this. AIC is not applying the scientific models of inventory management. They are ordering chemical fertilizers in lots of 1000 to 2000 M. Ton without considering EOQ that ease the supply. There is also no evidence of taking trade discount by AIC, lead time was also not calculated properly taking generally 3 to 6 months to receive as order after the order placement, reorder point was also not fixed. Regarding buffer stock, although the AIC have capacious warehouses throughout the country, it remains out of stock in season and over stock in off-season. AIC was also not using ABC analysis.

The main objective of AIC is to increase production and productivity in agriculture sector by providing quality agricultural inputs at reasonable price at right time at right quantity to the farmers. However, due to stark poverty on the part of majority of farmers, they were not able to apply high cost inputs like fertilizer and improved seeds. Realizing this Government has been providing subsidy in price and transportation cost to encourage farmers to use chemical fertilizer. Consequently, the demand of chemical fertilizers has been increasing in Nepal since 1960.

The concept of inventory management is almost avoiding in AIC. They were not applying the scientific techniques of inventory management, which are the short

sightedness, unskilled, inexperience, inability and negligence of inventory management aspect. Certainly there are external and internal obstacles to adopt these techniques but the situation is not absolute making unconditional to use the techniques for the efficient management of agricultural inputs. Again Rawal in his study suggested that AIC should attempt to use the scientific models like EOQ, reorder point, ABC analysis etc. So that inventory problems whether it is overstock, under stock, out of stock will be solved. As a result AIC can deliver the regular supply of chemical fertilizers at the right quantity at reasonable price at the right time (Kshetry, 1998).

Shrestha (2005) had studied about the Inventory Problem of Bottlers Nepal (Terai) Limited (BNTL) 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.

Adhikari (2007), has conducted a thesis entitled “Inventory management and its impact on profitability of Unilever Nepal Limited”. The major objectives of this study was to study and analyze the existing problem underlying in inventory management of Unilever Nepal Ltd. and its impact on profitability in order to meet the main objective the following specific objectives were as follows.

- (i) To identify the present inventory position of Unilever Nepal Ltd.
- (ii) To know the relationship of sales and inventories.
- (iii) To identify the problem faced by the Unilever Nepal Ltd. in the management of Inventory.
- (iv) To suggest for the better practice of inventory management.
- (v) To assess the inventories and their consequences on profitability of Unilever Nepal Ltd.

Major findings of the study were listed below:

- (i) Inventory management and control system is followed by the manufacturing companies.
- (ii) There were various problems facing by the manufacturing companies regarding the management of inventories.

- (iii) The companies have not followed and type of inventory policies.
- (iv) The fluctuation of raw material in stock during the period was very high.
- (v) EOQ was not similar during the study period.

Sigdel, (2009) has conducted the research work regarding "Inventory Management of Agriculture Input Corporation." His objectives was to analyze the relationship among purchase, sales and inventories, to analysis ordering system of the company and to suggest proper inventory model to RDL bases on analysis.

His major findings were as follows:

- ) Agriculture input corporation was not using scientific model of inventory management. Although they don't calculate EOQ for the supply of chemical fertilizer, they order lots of 1000 to 2000 metric tons.
- ) They were ignoring discount while purchasing and lead-time is not al;so calculated properly.
- ) ABC technique was used by Agriculture input corporation.

Acharya (2010) has conducted the research work on the topic of "Inventory Management of Nepal Food Corporation". His main objectives were to analyze the relationship among sales and inventories, to analysis ordering system of the company and to suggest proper inventory model to RDL bases on analysis.

From the study, his major findings were as follows:

- ) AIC is not using scientific model of inventory management. Although they don't calculate EOQ for the supply of chemical fertilizer, they order lots of 1000 to 2000 M.ton.
- ) There is no evidence of taking discount by AIC. Lead-time is not calculated properly.
- ) AIC was using ABC analysis also.

### **2. 3 Research Gap**

Up to now various studies have been conducted on inventory management of Nepalese manufacturing and non-manufacturing organization. But the fact is that whatever was found and recommended from the study lacking the clarity in its matter. They found organization profitability and cost better, worse and average but they recommend vaguely (not exact). They found there is lack of proper planning but didn't recommend the way by which planning system can be made properly on inventory management. So this study will be more concerned to avoid these drawbacks and give more clear vision to the related organizations.

## **CHAPTER-III**

### **RESEARCH METHODOLOGY**

In the previous chapters the introduction, related literatures were reviewed for the purpose of this study in this chapter, the research methodology presents the plan, procedure and tools used to analyze and interpret the available data.

Research methodology is the way to solve systematically about the research problem. It is the process of aiming at the solution of problem through the planned and systematically dealing with collection, analysis and interpretation of fact and figures. The objectives of this study are to analyze the inventory management of Bottlers Nepal (Terai) Limited.

For the purpose of achieving the objectives, the following methodology has been adopted which included research design, population and sample, nature of data, data gathering procedure and presentation and analysis techniques.

#### **3.1 Research Design**

The research design is plan structure and the strategy for investigation. To achieve the primary and goal of the study, the study has used the available data from the primary and secondary source. Analytical as well as descriptive research design has been adopted to clarify the situation through presentation and analysis of various data. And, explanatory research design also has been used to provide the meaning of items. Used in the analytical and other parts and to show the cause the effect relationship between the variables.

#### **3.2 Population and Sample**

There are large numbers of manufacturing companies in Nepal. Considering all manufacturing companies in Nepal as population of the study, only one company Bottlers Nepal Terai Limited has been selected for this study purpose.

### **3.3 Nature and Sources of Data**

To achieve the objectives of this study only secondary data have been used which were collected from the following sources.

- Studying and analyzing the annual reports of BNTL
- Books, articles, magazine and official records of BNTL
- Published and unpublished documents related to BNTL
- Internet and other electronic media.

### **3.4 Data Gathering Procedures**

Data gathering is most important part and very difficult activity of the whole research process. It consists of obtaining information from different sources. The researcher has to make frequent visits to BNTL office in order to collect the required data from officials.

The secondary data are directly obtained from various sources mentioned above for the purpose of data an analysis are taken from official records, published and unpublished documents, books, articles, magazines. For primary information, with a view of collecting the additional information, informal interviews with the officials have been taken.

### **3.5 Methods of Analysis**

Data collected from various sources are managed, analyzed and present in proper table and formats. Interpretations and explanations are made where necessary. To analyze the collected data, financial and statistical tools are used to analyze the effectiveness of inventory management wherever necessary for this. 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, co-efficient of variation, trend analysis and Karl- Pearson's coefficient of correlation.

### 3.5.1 Descriptive Analysis

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

### 3.5.2 Inventory Management Tools

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

#### 3.5.2.1 Economic Order Quantity (EOQ)

An EOQ is the quantity of the goods to be ordered which minimized the total annual cost of the inventory which includes holding costs and ordering costs. In other words EOQ is that size of the order which gives maximum economy in purchasing any material and ultimately contributes towards maintaining the materials at the optimum level and at the minimum cost.

The quantity to order at a given time must be determined by balancing two factors: (1) the cost of possessing or carrying materials and (2) the cost of acquiring or ordering materials. Purchasing larger quantities may decrease the unit cost of acquisition, but this saving may not be more than offset by the cost of carrying materials in stock for a longer period of time.

EOQ can be determined by following way.

#### i. Formula Method

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

Where,

A = Annual usage in units

O = Ordering cost

C = Carrying cost per unit

Graphic and analytical (or trial and error) approaches are also used in computation of EOQ. Complexities can be introduced by introducing

The concept of constant cost and quantity discounts. The basic objectives of this technique; however is to determine the optimal size of order to be placed on the basis of usage, ordering costs and carrying costs.

**a) Ordering Cost**

Ordering cost is purchase cost or set up cost, this is the sum of the fixed costs that are incurred each time an item is ordered. In BNTL ordering costs included.

- Set up cost of machine and finished goods inventory
- Clerical costs
- LC charge

**b) Carrying Cost**

Carrying cost also called Holding cost, it is the cost associated with having inventory on hand. These costs vary directly with the number of items involved.

BNTL carrying costs are:

- Interest on capital investment
- Clerical and staffs
- Insurance
- Loss due to oil

**ii. Table Method**

Year	Average Inventory
Number of order (N)	Total carrying cost
Annual requirement (A)	Total ordering cost
Order size (Q)	

Where,

$$\text{Order size} = \frac{\text{Annual requirement}}{\text{Number of order}}$$

$$\text{Average inventory} = \frac{\text{Order Size}}{2}$$

$$\text{Total Carrying cost} = \text{Carrying cost per unit} \mid \text{Average inventory}$$

$$\text{Total Ordering cost} = \text{Total cost of an order} \mid \text{Number of order}$$

### 3.5.2.2 Inventory to Total Assets (ITA):

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

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

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

### 3.5.2.3 Inventory Conversion Period (ICP)

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

$$\text{ICP} = \frac{\text{Inventory}}{\frac{\text{Cost of Goods Sold}}{360}}$$

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.

### 3.5.2.4 Payable Deferred Period (PDP)

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

$$\text{PDP} = \frac{\text{Account Payable}}{\frac{\text{Cost of Goods Sold}}{360}}$$

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

### 3.5.2.5 Inventory Turnover (IT)

Inventory turnover is a ratio showing how many times a company's inventory is sold and replaced over a period. This ratio should be 7 to 18 times. This ratio is worked out by dividing the COGS with the average inventory. It can be written as:

$$\text{Inventory Turnover} = \frac{\text{COGS}}{\text{Average Inventory}}$$

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 it is known 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.

### 3.5.2.6 Inventory to Current Assets (ICA)

This ratio shows the percentage of inventories to current asset and it is calculated as,

$$\text{ICA} = \frac{\text{Inventories}}{\text{Current Assets}} \times 100\%$$

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

### 3.5.3 Statistical Tools

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

### 3.5.3.1 Standard Deviation (S.D.)

The standard deviation measures the absolute dispersion (or variability) of distribution. The greater the amount of dispersion (or variability) the greater the standard deviation, and the greater will be magnitude of deviations of the values from their mean. A small standard deviation means a high degree of uniformity of the observation as well as homogeneity of a series; standard deviation means just the opposite. Standard deviation is extremely useful in judging the representatives of the mean. In this study standard deviation of ratios of both the public Enterprises has been calculated to analyze the dispersion of BNTL Standard deviation (S.D.) is defined as the positive square root of the mean of the square of the deviations taken from the arithmetic mean. It is denoted by  $\sigma$ .

$$\text{S.D. } \sigma = \sqrt{\frac{\sum (X - \bar{X})^2}{N}}$$

Where,

$X$  = Value of observation.

$\bar{X}$  = Mean of observations

$N$  = No. of observations

### 3.5.3.2 Coefficient of Variation (C.V.)

The standard deviation as stated above is an absolute measure of dispersion; the corresponding relative measure is known as the coefficient of variation. It is used in such problems where we want to compare the variability of two or more two series. The series for which the coefficient of variation is greater is said to be more variable or conversely less consistent, less uniform, less stable or less homogeneous and vice versa. Since the present study is related with the two series of ratios of corresponding manufacturing public enterprises, coefficient of variation has been calculated to compare the variability of the series of ratios. The formula used for determining the coefficient of variation is as follows:

$$\begin{aligned} \text{Coefficient of Variation (C.V.)} &= \frac{\text{S.D.}}{\text{Mean}} \times 100 \% \\ &= \frac{\sigma}{\bar{X}} \end{aligned}$$

Where,

† = Standard deviation of the observations.

$\bar{X}$  = Mean of observations.

It is independent of unit. So, two distributions can bitterly be compared with the help of C.V., more will be uniformity, consistency etc and vice versa.

### 3.5.3.3 Karl Pearson's Correlation Coefficient

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 variables 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.

$$r = \frac{xy}{\sqrt{x^2} \sqrt{y^2}}$$

Where,

$$x = X - \bar{X}$$

$$y = Y - \bar{Y}$$

X = the first variable

Y = the second variable

### 3.5.3.4 Probable Error (P.E.)

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 S.E. (r) is given by

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

Probable error of the coefficient of correlation can also be calculated from S.E. of the coefficient of correlation by the following formula.

$$\begin{aligned} \text{P.E. (r)} &= 0.6745 \mid \text{S. E (r)} \\ &= 0.6745 \mid \frac{1Zr^2}{\sqrt{n}} \end{aligned}$$

Significance of r is measured by the value obtained from  $6 \epsilon \text{ PE (r)}$ . When the value Karl Pearson's Correlation Coefficient (r) is much greater than the value of obtained from  $6 \epsilon \text{ PE (r)}$  value of 'r' is highly significant.

### 3.5.3.5 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

$$Y = b_0 + b_1t$$

Where,

Y = the variable

$b_0$  = intercept of the trend line i.e. y-intercept

$b_1$  = slope of trend lines/ rate of change

t = Time variable

N = No. of observation

$$b_0 = \frac{Y}{N}$$

$$b_1 = \frac{tY}{t^2}$$

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**

The presentation of data is the organization and classification of the data analysis. The basic objectives of this study are to analysis present practice of inventory management system in BNTL. To fulfill the stated objectives, collected information is analyzed in this section. To achieve the fruitful result it is tried to divide the analysis part in two sections. 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. To fulfill the said objectives, collected information is analyzed in this section. To achieve the fruitful result, it is tried to divide the analysis part in two sections as the first part is analysis of inventory management and second part is analysis of its effect on the present position of inventory management by using different statistical, mathematical tools.

#### **4.1 Descriptive Analysis**

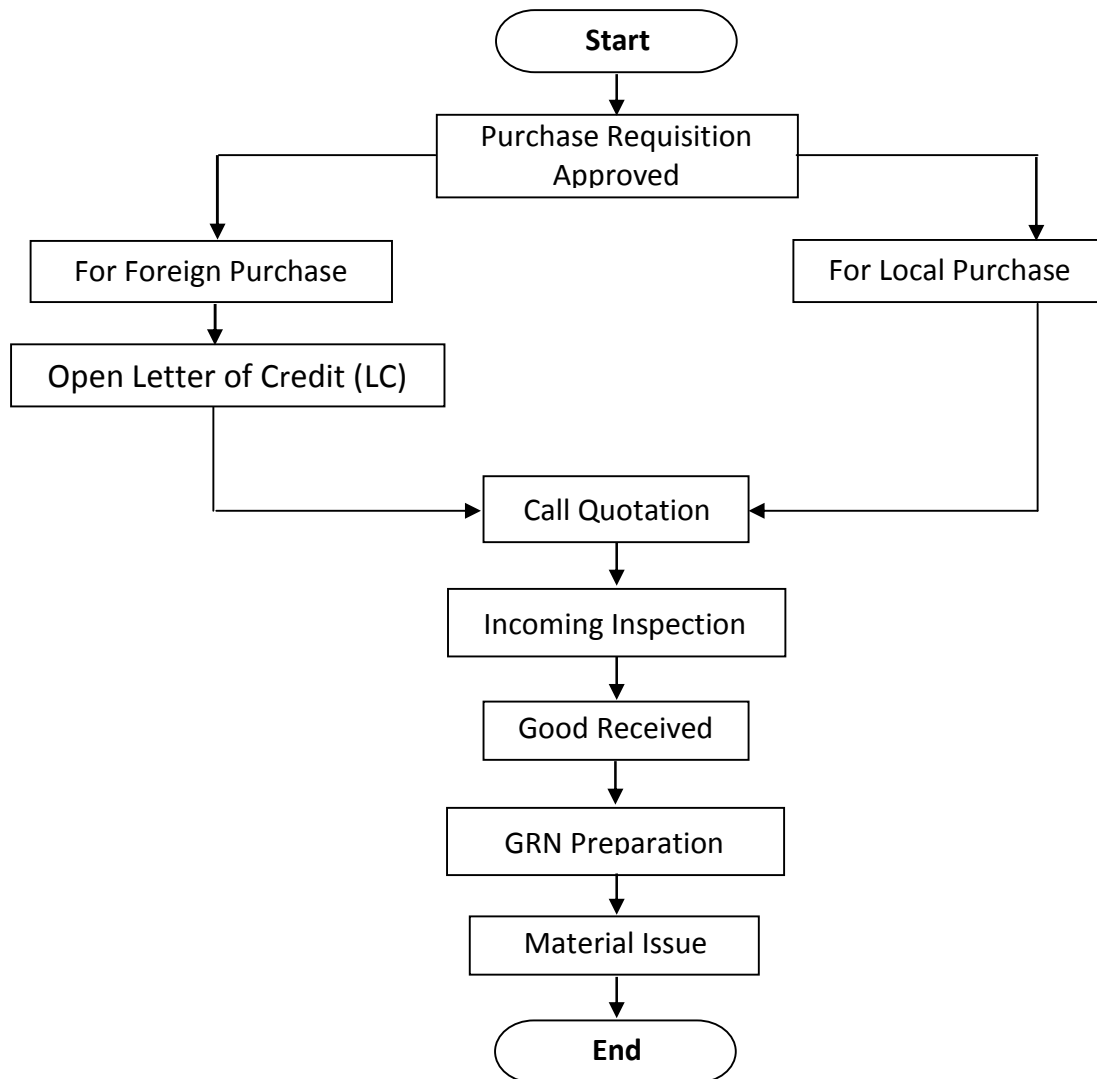
Purchasing procedure, store control device and issuing materials of BNTL are the descriptive analysis made in this study.

##### **4.1.1 Purchasing Procedure in BNTL**

BNTL is a manufacturing company so; purchasing is the first important function of inventory management. So it requires different types of raw materials such as concentrate, crown cock, closure, sugar etc. for the production of different types of soft drinks. BNTL needs regular supply of different types 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. Below mentioned figure 4.1 shows the purchasing procedure of essential in BNTL.

**Figure 4.1**  
**Purchasing Procedure of Essentials in BNTL**



Source: Provided by BNTL (2066/067).

Each of the steps in the purchasing procedure also follows the strict systematic sequence, which is described briefly here under.

#### **4.1.1.1 Collection of Purchase Requisition**

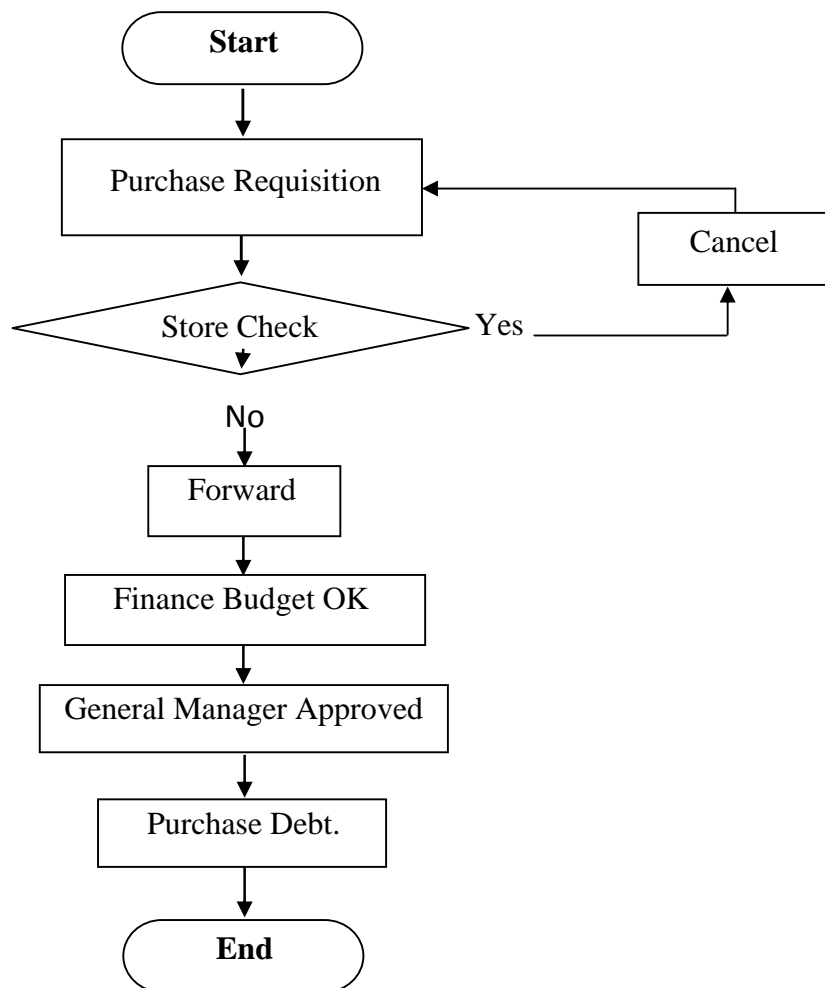
Purchasing procedure starts immediately with the collection of purchase requisition from the respective department for the supply of essentials.

#### 4.1.1.2 Approval of Purchase Requisition

When the purchase requisition is received by the purchasing 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 form. Store department checks the availability of that raw material in store. If it is available in sufficient quantity at the store then the process is 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. Flow of the process is presented in figure 4.2.

**Figure 4.2**  
**Approval of Purchase Requisition of BNTL**

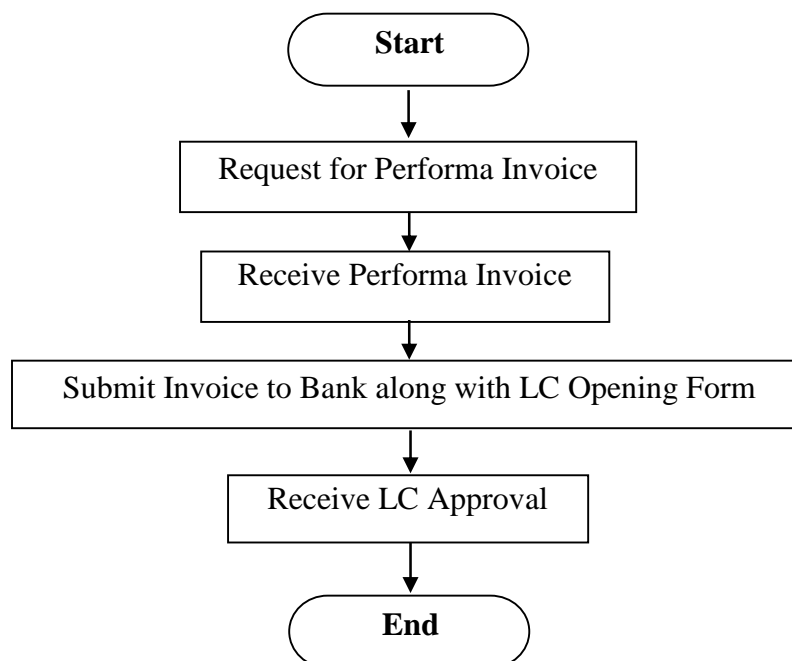


Source: Provided by BNTL (2066/067).

#### 4.1.1.3 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 Performa invoice to the bank. After receiving such Performa invoice, it will be submitted to concern bank along with LC opening form. At the end the bank provides LC approval. Figure 4.3 shows the steps of opening LC.

**Figure 4.3**  
**Opening of Letter of Credit (LC) of BNTL**

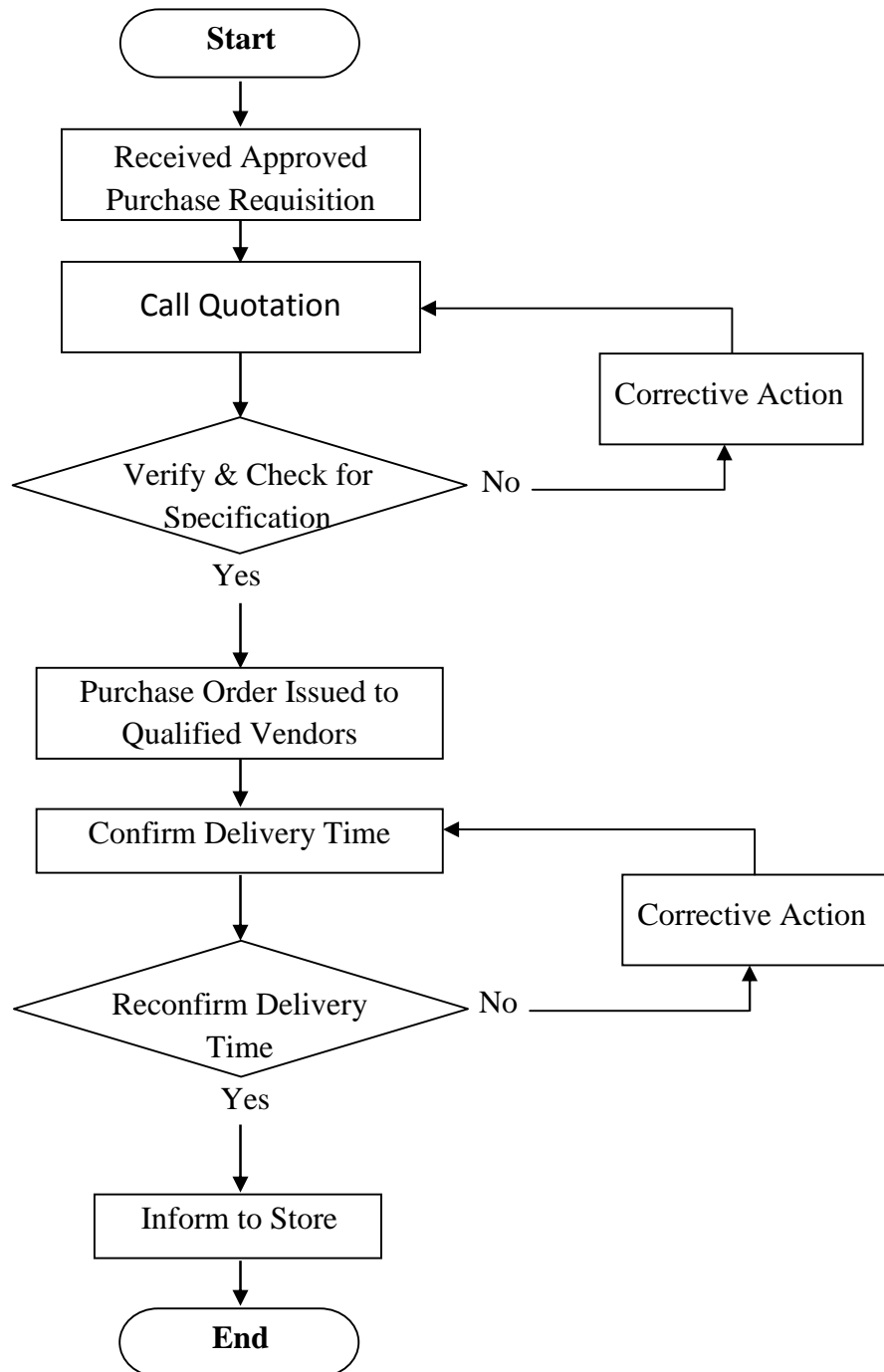


Source: Provided by BNTL (2066/067).

#### 4.1.1.4 Purchase Procedure

BNTL needs regular supply of different types of raw materials and WIP materials for the continuous production operation. Approval of purchase requisition now 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 arises 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 date and quantity of goods arrival. Figure 4.4 shows the sequential of the purchase procedure.

**Figure 4.4**  
**Purchase Procedure of BNTL**



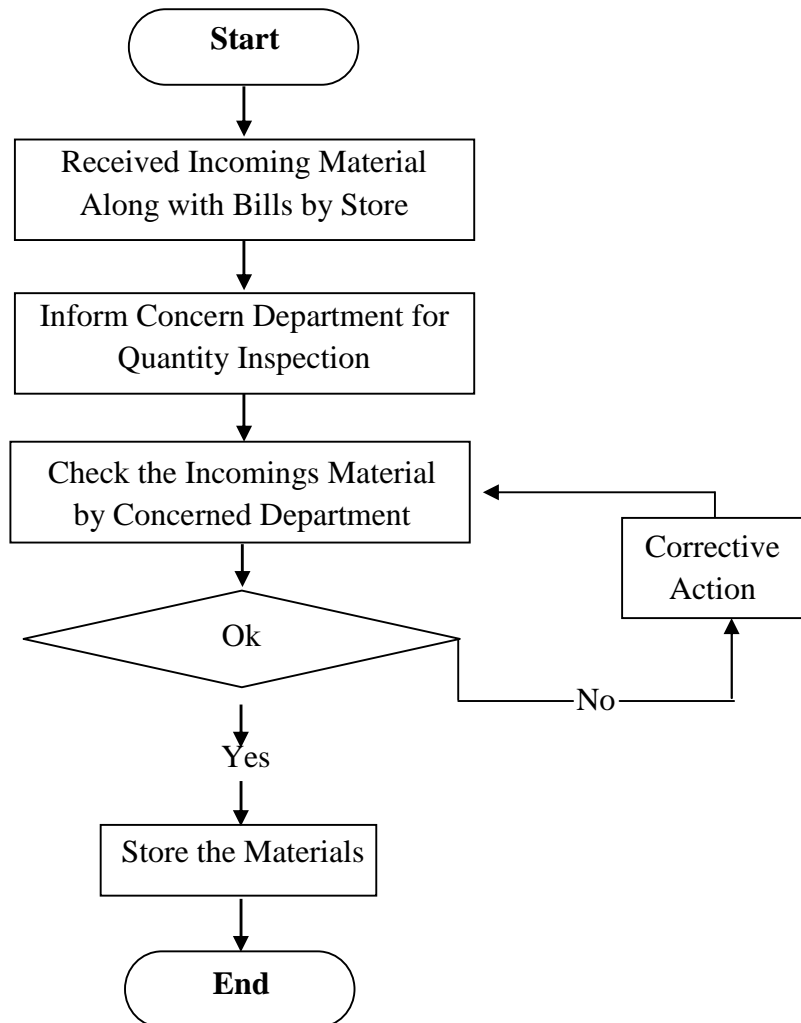
Source: Provided by BNTL (2066/067).

#### **4.1.1.5 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 verifying the weight, count or measurement is that of the receiving department, but

the responsibility to see whether that goods have been received according to purchase order specifications, is that of the inspection department. Therefore, the concerned department then checks the incoming materials, which must be taken to ensure the correct material of specified quality at correct amount. The flow of action of incoming inspection is presented in figure 4.5.

**Figure 4.5**  
**Incoming Inspection of BNTL**

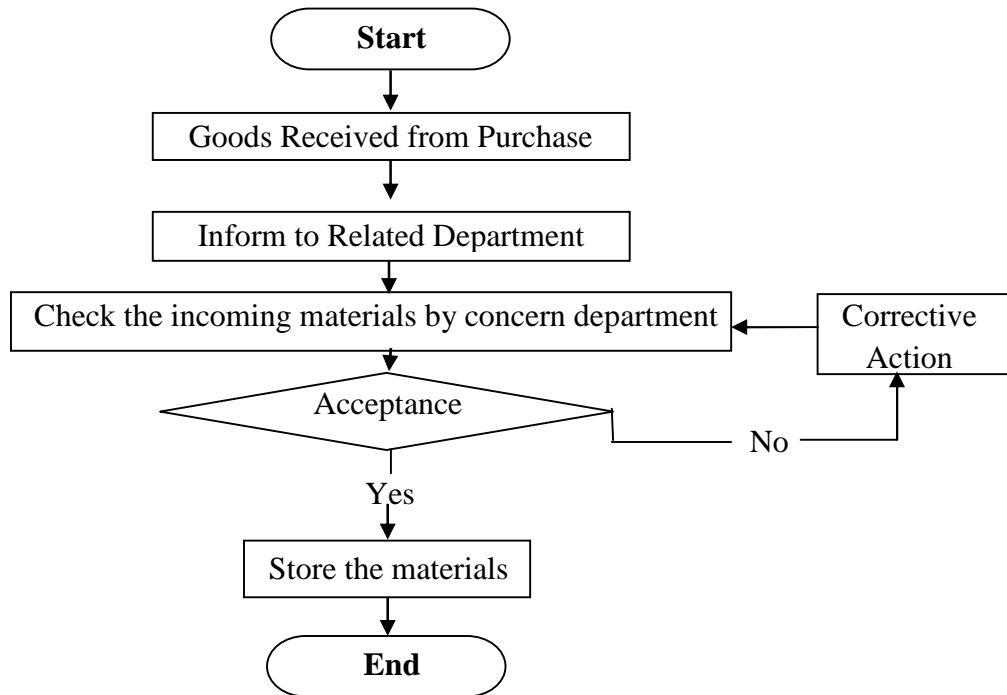


Source: Provided by BNTL (2066/067).

#### 4.1.1.6 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 it finally will goes to storage from where the concerned department acquire as per it needs. Figure 4.6 shows the picture of the goods receiving process.

**Figure 4.6**  
**Goods receiving process of BNTL**

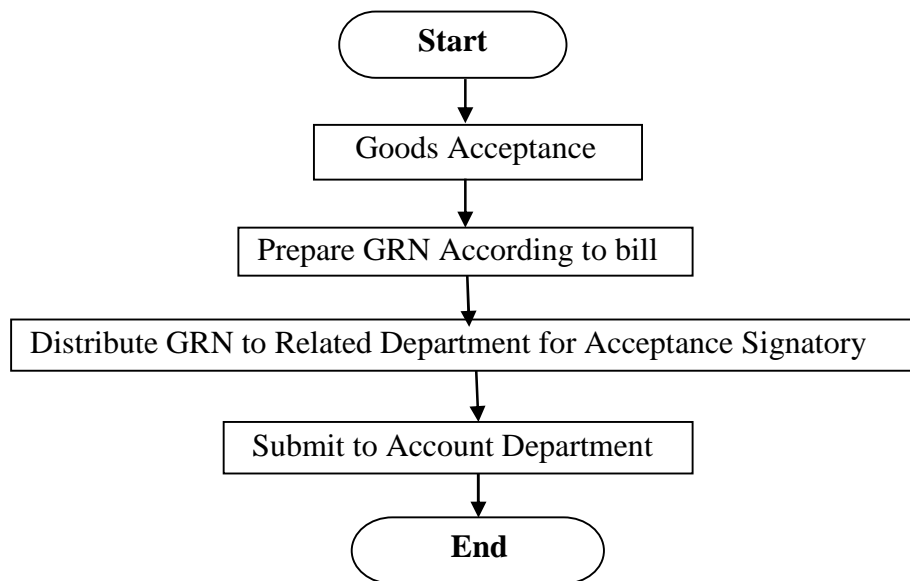


Source: Provided by BNTL (2066/067).

**4.1.1.7 GRN Preparation**

GRN should be prepared after the goods are accepted. This GRN will further distribution to related department for acceptance signatory. Then finally it has to be submitted to account department. Process of preparation is presented in Figure 4.7.

**Figure 4.7**  
**GRN preparation on BNTL**



Source: Provided by BNTL (2066/067).

### **4.1.2 Store Control Device Practice**

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

#### **4.1.2.1 Bin Cards**

A bin cards makes a records of receipt and issue of materials is kept for each item of stores carried. The storekeeper maintains these cards and storekeeper is answerable for any difference between the physical stock and the balance shown in the bin cards. Bottlers Nepal Terai Limited (BNTL) 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. In the lost sheet 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 in time. Sample of bin card of BNTL has been presented in Appendix II.

#### **4.1.2.2 Store Ledger**

This ledger is kept in the costing department and is identical with the bin cards except receipts, issues and the balances in quantity and value. Thus, this ledger provides the information for the pricing materials issues and the many value at any time of each of items of stores (Jain & Narang, 1991). Appendix III presents the outline of store ledger of BNTL.

#### **4.1.2.3 ABC Analysis**

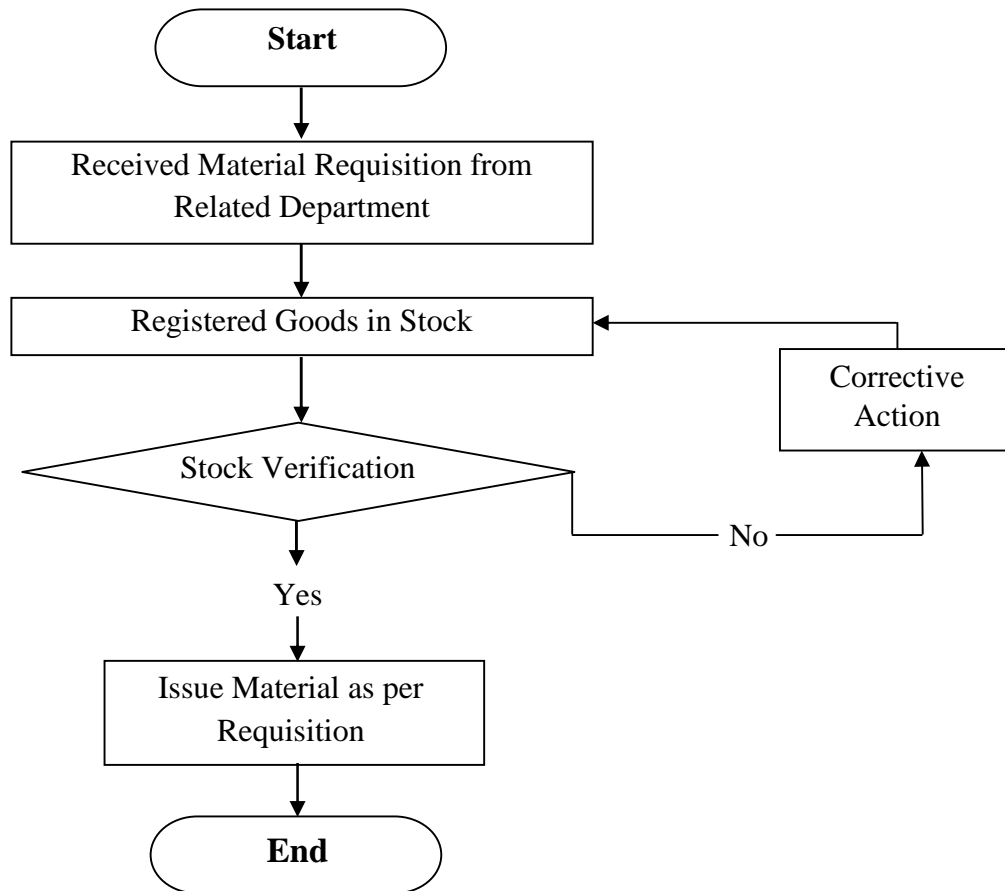
ABC Analysis is a widely used classification technique to identify various items of inventory for the purpose of inventory control. This analysis is important that a firm should not exercise the same degree of control on all types of inventory. ABC analysis including determining the relative value of items in the database, ranking items according to multiple criteria, and grouping items into classes that represent the

relative value of the items. ABC analysis is a widely used classification technique to identify various items of inventory for the purchase of inventory control. BNTL 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.

#### **4.1.3 Issuing Material**

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

**Figure 4.8**  
**Issuing Material from Store in BNTL**



Source: Provided by BNTL (2066/067).

## 4.2 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.

### 4.2.1 Relationship between Actual Sales and Actual Material Purchase

The table 4.1 shows the actual total sales and actual total purchase of BNTL for the study period of 2005/06 to 2009/10.

The table 4.1 indicates that there is overall increase in both actual sales and actual purchase, however the increase was erratic. That means there is continuous rise and fall in both variables during the given periods.

**Table 4.1**  
**Relationship between Actual Total Sales and Actual Total Purchase**  
**(Rs in Million)**

Year	Actual sales	Actual purchase
2005/06	354.10	118.17
2006/07	484.99	172.97
2007/08	475.12	152.90
2008/09	621.17	251.46
2009/10	845.26	303.73
Average	556.126	199.846
Standard Deviation	167.49	67.90
Coefficient of Variation (CV)	30.12%	33.98%
Correlation Coefficient(r)	0.98	
Probable error (P.E.)	0.012	

*Source: Annual Report of BNTL (2005/06 to 2009/10) and Appendix 4*

In order to find out the nature of variability, correlation and other statistical measures, calculation of mean, standard deviation, coefficient of variation and coefficient of correlation from the available data were made. The average actual sale of BNTL for the periods was Rs.556.126 million and that of purchase was Rs.199.846 millions. Lower coefficient of variation for actual sales indicates the consistency of actual sales compared to actual purchase. Again correlation coefficient + 0.98 shows that the relationship between actual sales and actual purchase was positive. Also probable error measured to ascertain the reliability of the correlation coefficient. Here  $r > P.E.$  (i.e.  $+ 0.98 > 0.012$ ) which shows that coefficient of correlation is significant.

#### **4.2.2 Relationship between Actual Sales and Closing Stock**

The table 4.2 shows the relationship between actual sales and closing stock. The table gives the picture of actual sales and closing stock from FY 2005/06 and 2009/10.

**Table 4.2**  
**Relationship between Actual Sales and Closing Stock (Rs in Million)**

Year	Actual sales	Closing stock
2005/06	354.10	71.18
2006/07	484.99	52.61
2007/08	475.12	25.09
2008/09	621.17	38.94
2009/10	845.26	46.39
Average	556.126	46.842
Standard Deviation	167.49	15.24
Coefficient of Variation (CV)	30.12%	32.53%
Correlation Coefficient(r)	-0.31	
Probable error (P.E.)	0.27	

*Source: Annual Report of BNTL (2005/06 to 2009/10) and Appendix 4*

Table 4.2 shows that change in sales is not well defined, there is intermittent rise and falls during the five years and closing stock is continuously decreased during the five years.

Average standard deviation and coefficient of variation are calculated to analyze the nature of variability of sales and closing stock. The average actual sales and closing stock of BNTL for given five years was Rs.556.126 millions and 46.842 millions respectively. Standard Deviation of actual sales and closing stock was 167.49 and 15.24 respectively. This signifies that closing stock more consistent compared to actual sales. But C.V indicates that closing stock fluctuates more than the actual sales.

Coefficient of correlation for these two variables was -0.31. Here Negative sign indicates the Negative relation between actual sales and closing stock. We know that if the value lying between -0.25 to -0.50 prove a low degree of Negative correlation. Calculation of probable error and comparing it with correlation coefficient value shows the significance of correlation coefficient value. This analysis shows the significant value of correlation coefficient due to value of correlation coefficient (-0.31). Table 4.2 also presents the calculation of mean, standard

deviation, coefficient of variation, coefficient of correlation and probable error of actual sales and closing stock.

#### 4.2.3 Relationship between Actual Purchase and Closing Stock

In manufacturing organization, purchasing is the procurement of materials, supplies machines, tools and services required for the equipment maintenance and operation of the business. Purchasing must be of right quantity in proper quality for delivery at the correct time at the most favorable price from outside the organization. BNTL has purchased all types of raw materials from other countries. Similarly, closing stock means inventory at the end of the month or year. The following table 4.3 shows the data of purchase and closing stock of BNTL for the entire study period of 2005/06 and 2009/10.

**Table 4.3**  
**Relationship between Actual Material Purchase and Total Closing Stock**

(Rs in Million)

Year	Actual Purchase	Closing stock
2005/06	118.17	71.18
2006/07	172.97	52.61
2007/08	152.90	25.09
2008/09	251.46	38.94
2009/10	303.73	46.39
Average	199.846	46.842
Standard Deviation	67.90	15.24
Coefficient of Variation (CV)	33.98%	32.53%
Correlation Coefficient(r)		-0.30
Probable error (P.E.)		0.27

Source: Annual Report of BNTL (2005/06 to 2009/10) and Appendix 4

Through the table 4.3 shows the actual purchase erratic rise and fall for the given periods and closing stock was decreased continuously and 2008/09 to 2009/10 is erratic rise.

In addition to find out the nature of variability of actual purchase and closing stock of different years, standard deviation and coefficient of variation along with mean was calculated. Together with measure of dispersion, correlation coefficient was also calculated to analyze the relationship between actual purchase and closing stock.

Average actual purchase was Rs 199.846 million with standard deviation of 67.90 signifying the higher deviation of annual purchase from average purchase. Similarly, average closing stock was Rs 46.824 million with standard deviation of 15.24, relatively more deviated compared to actual purchase. Relating to the uniformity or stability actual purchase was found relatively stable compared to closing stock, which is shown by the higher value of coefficient of variation for actual purchase i.e. 33.98% compared to that of closing stock i.e. 32.53%.

On the other hand, correlation coefficient was calculated to analyze the relationship between actual purchase and closing stock. Negative value of correlation coefficient between actual purchase and closing stock justifies the negative relationship between those two variables. This means that movement of both variables in opposite direction. The value of -0.30 shows the low degree of negative 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 or not. Here  $r < P.E$  (i.e.  $-0.30 < 0.27$ ) shows that coefficient of correlation is not significant. Calculation of mean, standard deviation, coefficient of variation, correlation coefficient and probable error of actual purchase and closing stock has been presented in table 4.3.

#### **4.2.4 Investment in Inventories in Relation to Total Assets**

The inventory indicates the stock of raw materials. Inventory of raw materials is very important for the manufacturing company like BNTL. The shortage of inventory causes either stoppage of production resulting into failure to meet the demand of consumers. In other hand the excess investment in inventory causes the unnecessary holding of capital. The following table 4.4 shows the proportion of inventory to total assets.

**Table 4.4****Inventory to Total Assets of Bottlers Nepal (Terai) Limited (BNTL)**

Year	2005/06	2006/07	2007/08	2008/09	2009/10	Average	S.D	C.V.
Ratio (%)	26.8	10.0	5.75	6.25	5.42	10.8	8.15	75.5
Change (%)		-62.7	-42.5	8.7	-0.13			

Source: Annual Report of BNTL (2005/06 to 2009/10) and Appendix 4

The above table 4.4 shows the percentage of inventory with respect to its total assets in FY 2005/06 to 2009/10. In FY 2005/06 it was 26.8% of total assets and decreased by 62.7% and reached to 10% for the year 2006/07. Again there was decrease in ratio by 42.5% for the year 2007/08 and the ratio was 5.75% for that year. For the successive year 2008/09 increase in ratio by 8.7% and reached to 6.25% for the year 2008/09 and there was slight decrease in the ratio by 0.13% and increase the ratio by 5.42%. The average inventory ratio for the period was 10.8%. With the standard deviation and C.V are 8.15% and 75.5% respectively.

**4.2.5 Proportion of Raw Material on Total Inventory**

Raw materials are the major component of total inventory so proportion of raw material on total inventory shows the clear inventory condition in an organization.

**Table 4.5****Proportion of Raw materials on total Inventory**

Year	Raw material (Rs. in million)	Total inventory (Rs. in million)	% of Raw material on total inventory
2005/06	66.91	71.18	94%
2006/07	50.13	52.61	95.29%
2007/08	20.13	25.09	80.23%
2008/09	37.13	38.94	95.35%
2009/10	45.43	46.39	97.93%
Average	43.946	46.842	92.56%

Source: Annual Report of BNTL (2005/06 to 2009/10) and Appendix 4

$$\text{Note: \% of Raw material on Inventory} = \frac{\text{RM}}{\text{Inventory}}$$

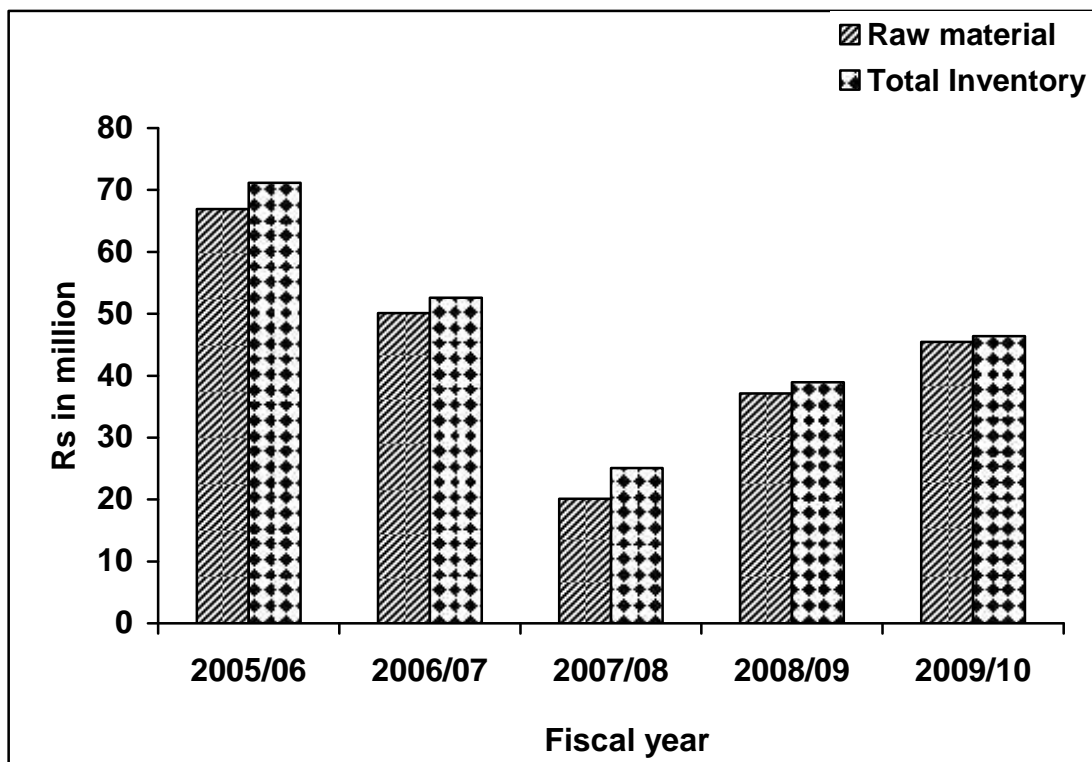
BNTL has been using different types of chemicals: that constitute the major portion of raw material on total inventory in BNTL.

From the above table 4.5 it observed that raw material on total inventory during the study period, the highest proportion is 97.93% in FY 2009/10 and the lowest proportion is 80.23% in FY 2007/08.

Similarly, average inventory in overall study period is Rs. 46.842 million, average inventory raw material in study period is Rs. 43.946 million and average % of R.M. in total inventory in overall study period is 92.56%

The graphical presentation of raw material on total inventory is as follows:

**Figure 4.9**  
**Level of Raw material on Total inventory**



From the above analysis, it is observed that raw material consumption in the company is continuously decrease in 2005/06 to 2007/08 which represent the defective purchasing policy and poor planning of raw material. Then in year 2008/09 to 2009/10, Raw material consumption is slowly grown up.

#### 4.2.6 Proportion of Inventory to current Assets

The company should maintain the adequate level of inventory to meet the demand. The inventory of Raw material work in progress, finished goods is also major sources of current Assets.

**Table 4.6**  
**Proportion of Inventory on current Assets**

Year	Total inventory (Rs. in million)	Current Assets (Rs. in million)	% of inventory on current Assets
2005/06	71.18	255.15	27.90%
2006/07	52.61	328.61	16%
2007/08	25.09	284.80	8.81%
2008/09	38.94	418.93	9.30%
2009/10	46.39	575.85	8.06%
Average	46.842	372.668	14.014%

*Source: Annual Report of BNTL (2005/06 to 2009/10) and Appendix 4*

$$\text{Note: \% of Inventory on current Assets} = \frac{\text{Total Inventory}}{\text{Current Assets}}$$

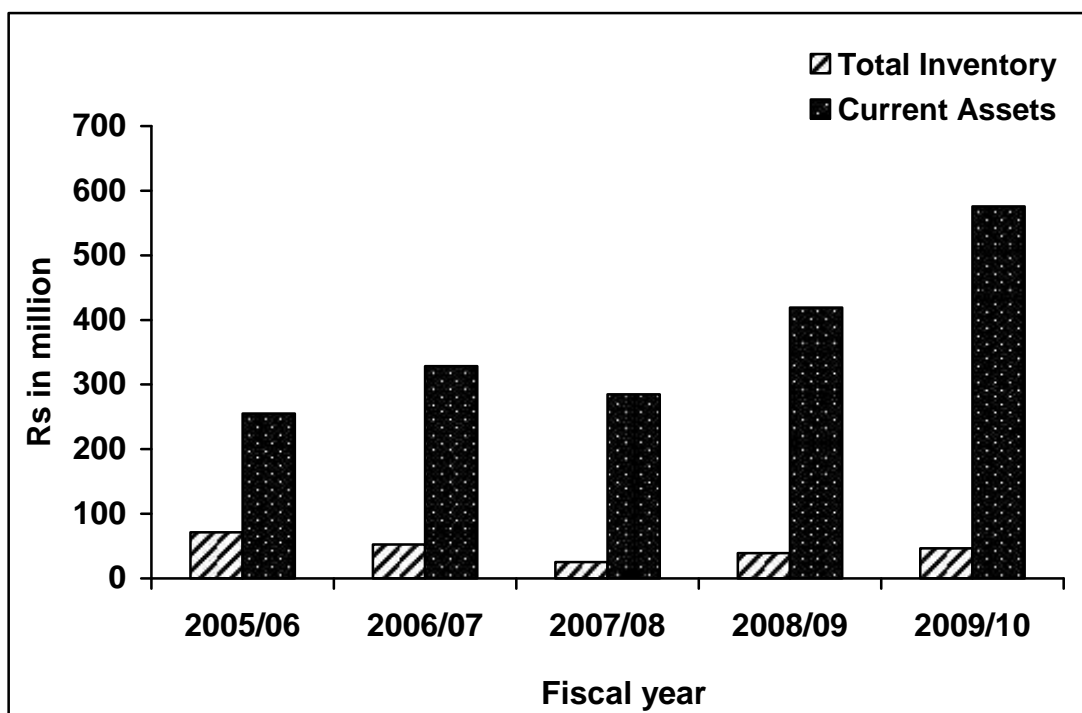
From the above table 4.6 shows the proportion (%) of inventory with respect to its current assets. In FY 2005/06 it was 27.90, which is highest for the study period. And there is sharp decline in the ratio in FY 2009/10 to 8.06% which is lowest for that study period. Proportion of inventory on current assets is continuously desired except FY 2008/09.

Similarly, average inventory in an overall study period is Rs.46.842 million, average current assets in an overall study period is Rs.372.668 million and average % of inventory on current assets in an overall study period has been 14.014%. The result shows that company has not been adopting an appropriate inventory policy because inventory level is not stable.

The graphical presentation of level of inventory and current assets is as follows:

**Figure 4.10**

**Level of Inventory and Current Assets**



**4.2.7 Proportion of work in progress (WIP) material on Total Inventory**

The BNTL has used the smaller proportion of WIP on Total Inventory which is shown by Table 4.7.

**Table 4.7**

**Proportion of Raw materials on total Inventory**

Year	WIP material (Rs. in million)	Total inventory (Rs. in million)	% WIP on total inventory
2005/06	0.489	71.18	0.7%
2006/07	0.474	52.61	0.9%
2007/08	0.470	25.09	1.9%
2008/09	0.612	38.94	1.6%
2009/10	0.505	46.39	1.1%
Average	0.51	46.842	1.24%

*Source: Annual Report of BNTL (2005/06 to 2009/10) and Appendix 4*

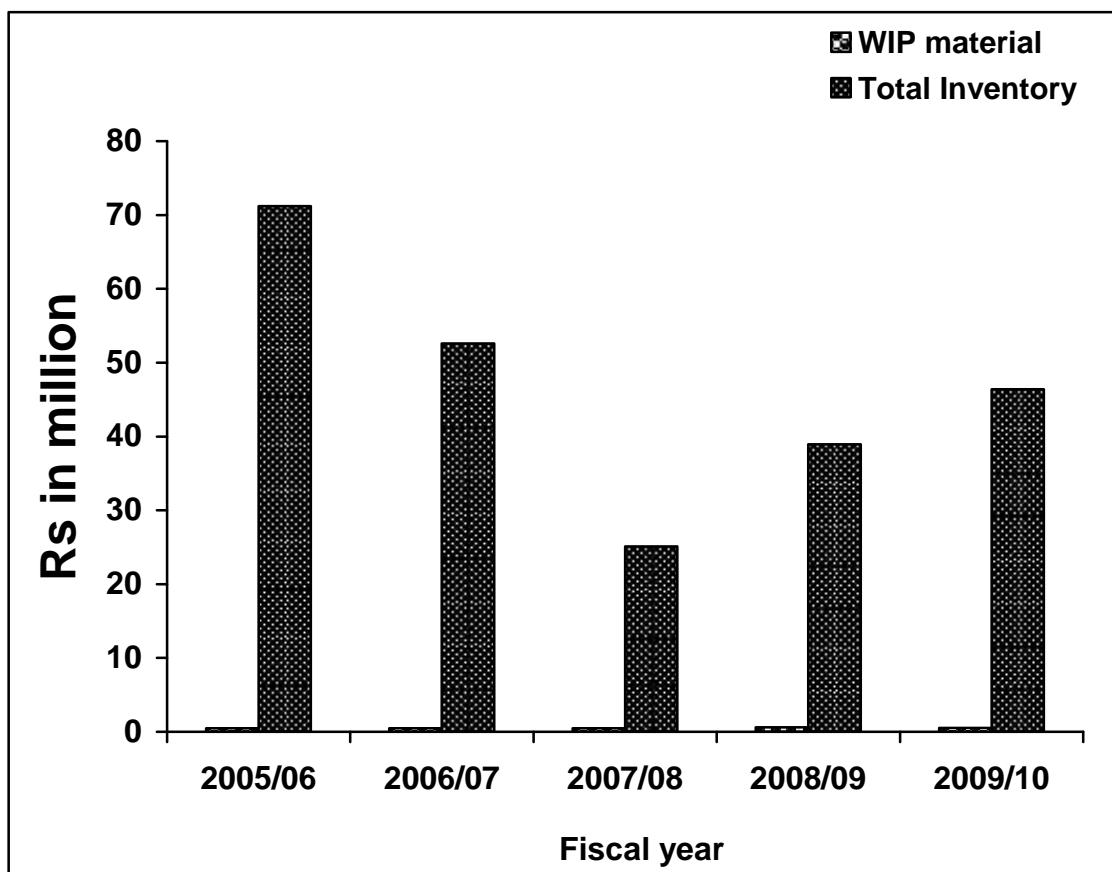
**Note: % of WIP material on Inventory =  $\frac{\text{WIP material}}{\text{Total Inventory}}$**

From the above table 4.7, it is observed that the proportion of WIP material on Total inventory during the study period is 0.7 % in the FY 2005/06, 0.9% in the FY 2006/07, 1.9% in the FY 2007/08, 1.6% in the FY 2008/09 and 1.1% in the FY 2009/10.

Whereas the average percentages of WIP material in total inventory in overall study period is 1.24%. Similarly average inventory in period is Rs.46.842 million and average WIP material in overall study period is Rs.0.51 million.

The Graphical presentation of level of WIP material on total Inventory is as follows

**Figure 4.11**  
**Level of WIP material on Total Inventory**



From the above analysis, it is observed that WIP material of the BNTL is less fluctuating which is considered as good form the point of view on inventory management.

#### 4.2.8 Proportion of finished Goods in Total Inventory

BNTL has been producing different kinds of product namely, Coca-Cola, Fanta, Sprite etc which is the part of finished goods stock.

**Table 4.8**  
**Proportion of finished Goods in Total Inventory**

Year	Finished goods (Rs. in million)	Total inventory (Rs. in million)	% of Raw material on total inventory
2005/06	3.79	71.18	5.32%
2006/07	2.01	52.61	3.82%
2007/08	4.49	25.09	17.9%
2008/09	1.20	38.94	3.08%
2009/10	1.19	46.39	2.57%
Average	2.536	46.842	6.538%

*Source: Annual Report of BNTL (2005/06 to 2009/10) and Appendix 4*

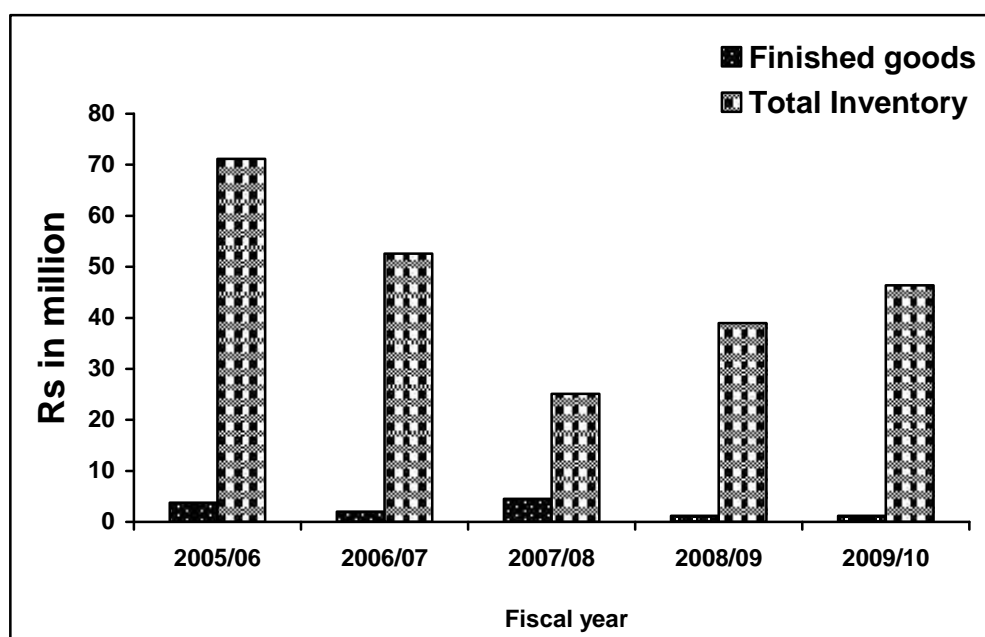
From the above table 4.8 it is observed that the proportion of finished goods on total inventory during the study period is 5.31% in the FY 2005/06, 3.82% on FY 2006/07, 17.9% on in FY 2007/08, 3.08% in FY 2008/09 and 2.57% in FY 2009/10.

Whereas the average percentage of finished goods inventory in total inventory in overall study period is 6.538% similarly average inventory in overall study period is Rs. 46.842 million average inventory of finished good is overall study period is Rs 2.536 million.

The graphical presentation of level of finished goods on total inventory is as follows:

**Figure 4.12**

**Level of finished goods on Total Inventory**



**4.2.9 Inventory Turnover**

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. A low inventory turnover implies excessive inventory levels than warranted by production and sales activities or slow moving or obsolete inventory.

**Table 4.9**

**Inventory Turnover of BNTL**

Year	2005/06	2006/07	2007/08	2008/09	2009/10	Average
COGS (Rs. In million)	187.72	259.93	250.80	326.51	406.07	
Average Inventory (Rs. In Million)	74.57	61.89	38.85	32.01	42.45	
Inventory Turnover (Time)	2.52	4.2	6.46	10.20	9.57	6.59

*Source: Annual Report of BNTL (2005/06 to 2009/10) and Appendix 4*

The table 4.9 shows the inventory turnover ratio of BNTL for the study period. In FY 2005/06 the ratio was 2.52 times and increased to 4.20 times for the FY 2006/07. Again in FY 2007/08 the ratio was increased to 6.46 times and Increased to 10.20 times for FY 2008/09 but in FY 2009/10 the ratio was decreased to 9.57 times. The Ratio was recorded highest and lowest in FY 2008/09 and 2005/06 respectively. In average inventory turnover ratio was 6.59 times.

#### 4.2.10 Inventory Conversion Period

The inventory conversion period measures the length of time required to convert materials into finished goods and then to sell those goods. It is the amount of time the product remains in inventory in various stages of production.

The table 4.10 shows the inventory conversion period of BNTL for the study period of Five years (2005/06-2009/10).

**Table 4.10**  
**Inventory Conversion Period of BNTL**

Year	Total inventory (Rs. in million)	COGS (Rs. In million)	Days in year	Inventory Conversion Period (Days)
2005/06	71.18	187.72	360	137
2006/07	52.61	259.93	360	73
2007/08	25.09	250.80	360	36
2008/09	38.94	326.51	360	43
2009/10	46.39	406.07	360	41
Average				66
S.D.				37.8
C.V.				57.3%

Source: Annual Report of BNTL (2005/06 to 2009/10) and Appendix 4

The table 4.10 shows the inventory conversion period on days. The inventory conversion period of the company in FY 2005/06 is 137 days it was decreased to 73 days for the year 2006/07. Again, there is fall in inventory conversion period for the year 2007/08 resulted into the conversion period of 36 days. Similarly, inventory conversion period fluctuates from the FY 2008/09 to 2009/10, resulted into the 43

days and 41 days respectively. In an average conversion period for the study period was 66 days. It means that average length of time required converting material into finished goods and then to sell those goods required 66 days.

#### 4.2.11 Payable Deferral Period

The payable deferral period shows the length of time between the purchase of raw material and labour and payment of cash for them. The following table 4.11 shows the payment deferral period during the study period. Here A/c payable includes (sundry creditors and other payable only).

**Table 4.11**  
**Payable Deferral Period of BNTL**

Year	Account Payable (Rs. in million)	COGS (Rs in million .)	Days in year	PDP (Day)	Payment made per year
2005/06	36.40	187.72	360	70	5.14
2006/07	76.47	259.93	360	106	3.40
2007/08	58.46	250.80	360	85	4.23
2008/09	69.75	326.51	360	77	4.68
2009/10	98.67	406.07	360	87	4.14
Average	68.03	286.206		85	4.318

Source: Annual Report of BNTL (2005/06 to 2009/10) and Appendix 4

The table 4.11 gives the payable deferral period in days. In FY 2005/06 PDP is 70 days which is the lowest payable deferral period during the study period. In FY 2006/07 the PDP was increased to 106 days, which is the highest PDP during the study period. Again the PDP was decreased to 85 days for the year 2007/08, Further the PDP was decreased to 77 days for the year 2008/09. In FY 2009/10 the PDP is increased to 87 days. From the fluctuated PDP for the study period, it can be said that the company was not adopting the fixed policy to make payment for the labour and raw materials purchase. The average payable deferral period for the study period was 85 days and payment is made 4.318 times in year for purchase material and labour.

#### 4.2.12 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 future. Different aspects of inventory management for which trend analysis were made are presented as follows.

#### 4.2.12.1 Trend Analysis of Purchase of Raw Material

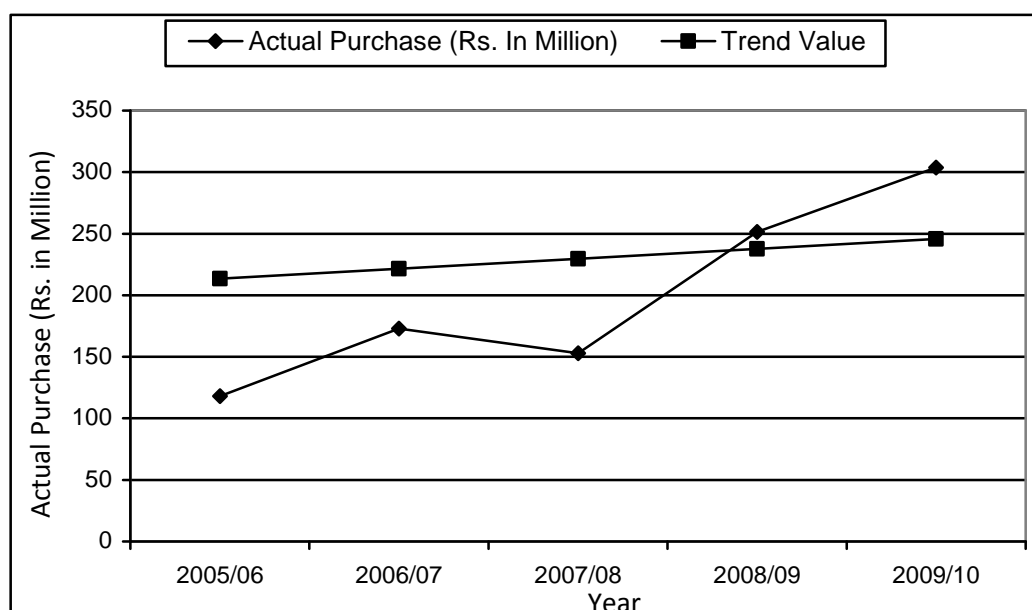
Purchase is the process of acquiring something necessary to run the firm. Purchase includes the acquisition of essential inputs as well as other stationeries and goods for the efficient functioning of management. This also includes the acquisition of spares and parts of plants.

**Table 4.12**  
**Trend Analysis of Purchase of Raw Material**

Year	Actual Purchase (Rs in million )	Trend Value (Rs. in million)
2005/06	118.17	213.45
2006/07	172.97	221.55
2007/08	152.90	229.65
2008/09	251.46	237.75
2009/10	303.73	245.85

Source: Annual Report of BNTL (2005/06-2009/10) and appendix 6

**Figure 4.13**  
**Trend Analysis of Purchase of Raw Material**



Source: Table 4.12

From The above table 4.12 & figure 4.13 shows the trend value of raw material is continuously increased. But actual purchases are below the trend value for all study period, except 2008/09 & 2009/10. In FY 2008/09 and 2009/10, the actual purchase is above the trend value. In overall we can compare between trend value and actual purchase, there was high fluctuation between them. The whole picture can be seen from table 4.12 & figure 4.13.

#### **4.2.12.2 Trend Analysis of Inventory**

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

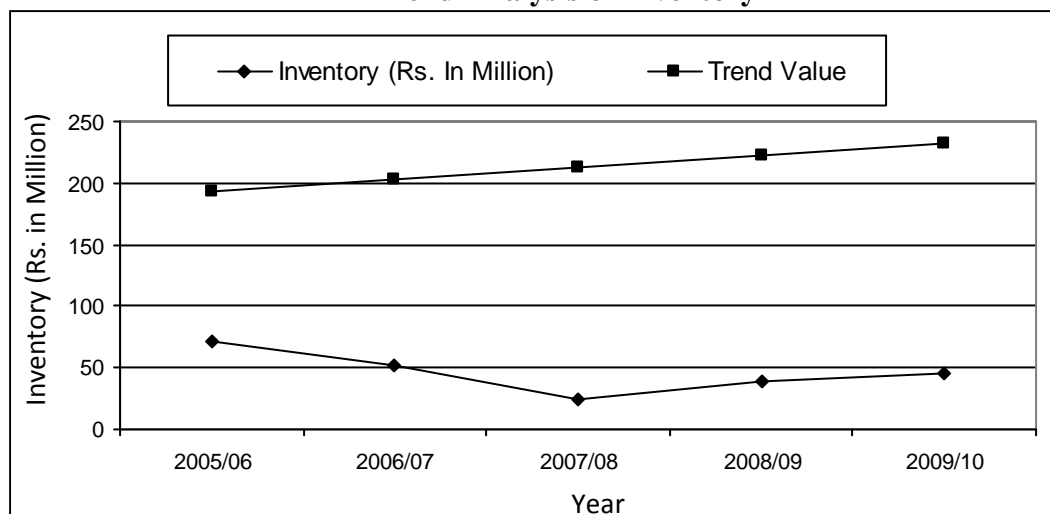
**Table 4.13**  
**Trend Analysis of Inventory**

Year	Inventory (Rs.in million )	Trend Value (Rs in million )
2005/06	71.18	193.5
2006/07	52.61	203.29
2007/08	25.09	213.08
2008/09	38.94	222.87
2009/10	45.95	232.66

Source: Annual Report of BNTL (2005/06-2009/10) and appendix 6

**Figure 4.14**

**Trend Analysis of Inventory**



Source: Table 4.13

Trend value of Inventory of BNTL has been increased but actual inventory as continuously decreased in FY 2005/06, 2006/07 and 2007/08. In FY 2008/09 and 2009/10, the actual Inventory is continuously increased then trend value during the study period. Finally, we conclude that there is high fluctuation during the entire study period, which is shown in table 4.13 and figure 4.14.

**4.2.12.3 Trend Analysis of Sales**

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

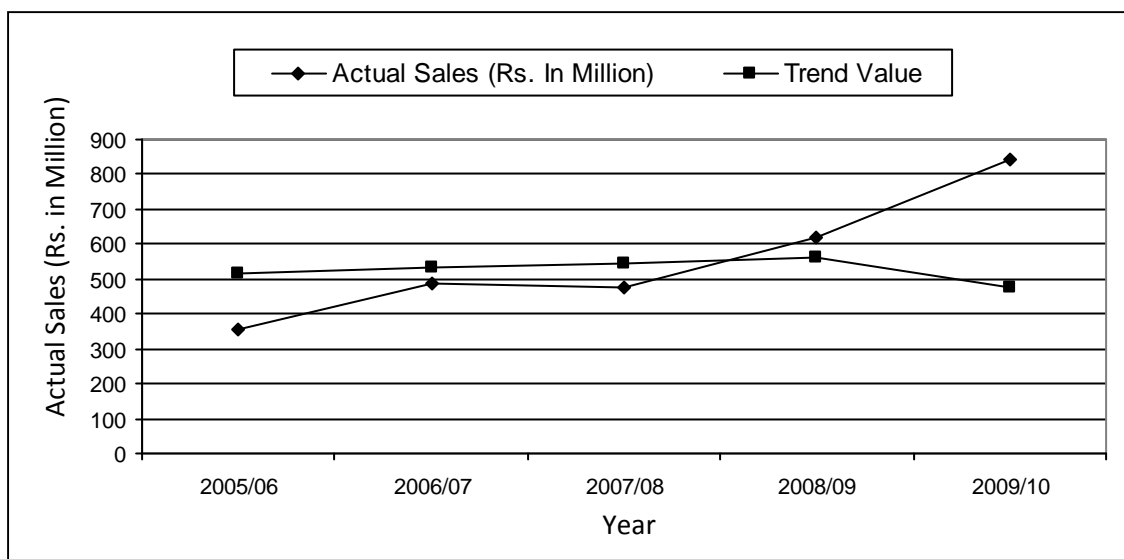
**Table 4.14**

**Trend Analysis of Sales**

Year	Actual Sales (Rs in million)	Trend Value (Rs in million)
2005/06	354.10	515.55
2006/07	484.99	530.65
2007/08	475.11	545.75
2008/09	621.17	560.85
2009/10	845.26	575.95

Source: Annual Report of BNTL (2005/06-2009/10) and appendix 6

**Figure 4.15**  
**Trend Analysis of Sales**



Source: Table 4.14

From the above table and figure, the trend shows the increasing trend of sales. In FY 2008/09, the actual sales value is above the trend value. In FY 2005/06, 2006/07 and 2007/08 the actual sales value is lower than the trend value.

#### 4.2.12.4 Trend Analysis of Raw Materials Inventory

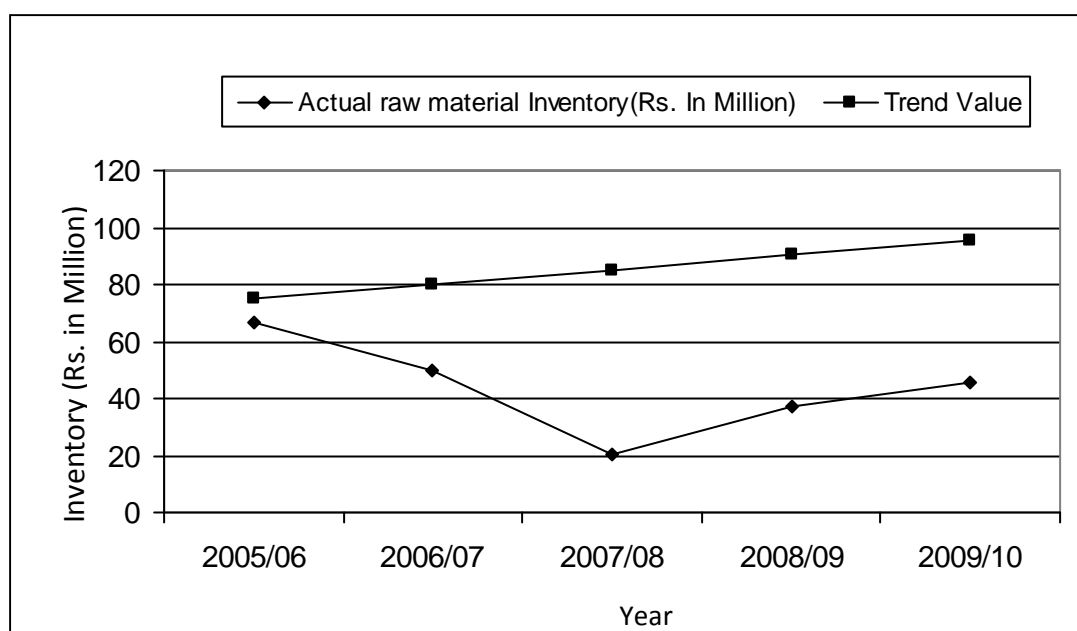
Raw material in this case signifies the stock of raw materials in godown to meet the unforeseen future demand so that the inventory will never faces how materials shortage in the period of adverse natural and man made circumstances.

**Table 4.15**  
**Trend Analysis of Raw Materials Purchase**

Year	Raw material (Rs in Million)	Trend Value (Rs in million)
2005/06	66.91	74.75
2006/07	50.13	79.94
2007/08	20.13	85.13
2008/09	37.13	90.32
2009/10	45.43	95.51

Source: Annual Report of BNTL (2005/06-2009/10) and appendix 6

**Figure 4.16**  
**Trend Analysis of Raw Material Purchase**



Source: Table 4.15

The trend value shows an increasing trend in raw materials. The actual Raw material is below the trend value during the whole study period. In FY 2005/06, 2006/07, 2007/08, the actual raw material is decreasing continuously but in FY 2008/09 and 2009/10, the actual raw material is increasing slightly. The highest gap between trend values is in FY 2007/08.

#### 4.2.12.5 Trend Analysis of Work-in-Process

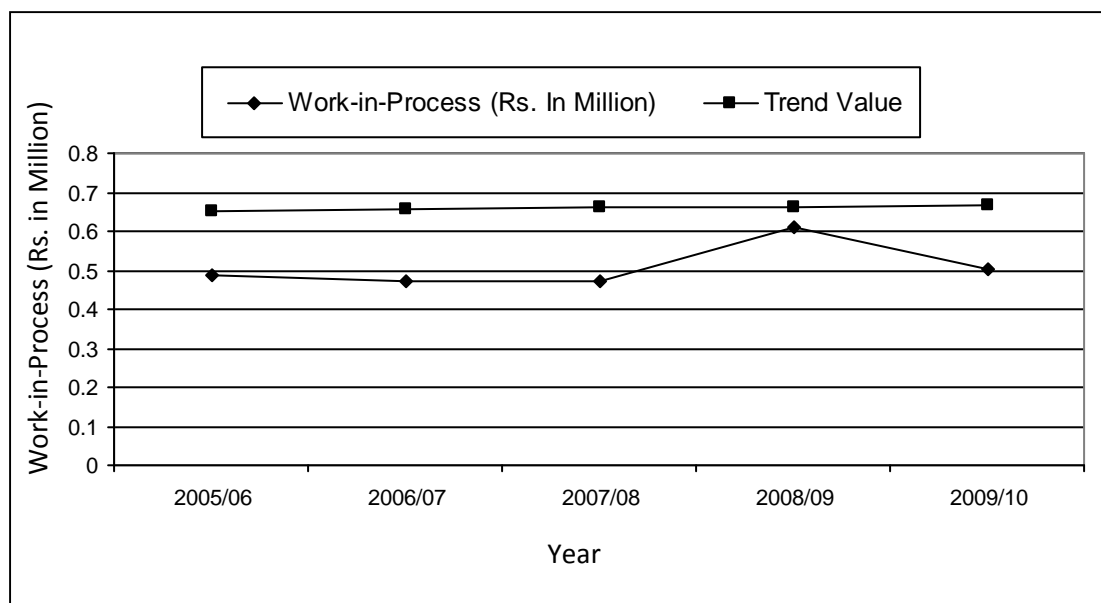
Work-in-process simply constitutes the product at various stages of processing before the finished goods. It serves as an indicator for the capital used for the company.

**Table 4.16**  
**Trend Analysis of Work-in-Process**

Year	WIP (Rs in Million)	Trend Value (Rs in million)
2005/06	0.489	0.652
2006/07	0.474	0.656
2007/08	0.470	0.660
2008/09	0.612	0.664
2009/10	0.505	0.668

Source: Annual Report of BNTL (2005/06-2009/10) and appendix 6

**Figure 4.17**  
**Trend Analysis of Work-in-Process**



Source: Table 4.16

There is fluctuating work-in-process for the given period 2005/06 to 2009/10. The actual WIP is decreased from 2005/06 to 2007/08 then it is highly increased in FY 2008/09 which is highest WIP for the study Period Then WIP is slightly decreased in FY 2009/10. The Actual WIP is less compare with trend value of WIP. Table 4.16 and figure 4.17 show the picture of Actual WIP and its trend Value.

#### 4.2.12.6 Trend Analysis of Finished Goods

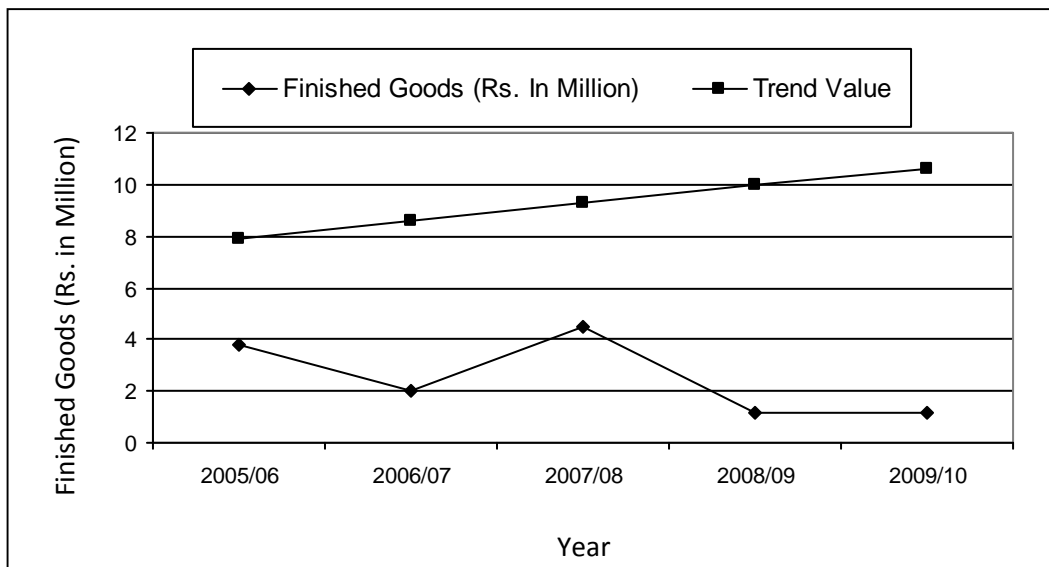
Trend analysis of finished goods reflects the trend of production of the company. The trend analysis of finished goods of BNTL is shown in below through the table and figure.

**Table 4.17**  
**Trend Analysis of Finished Goods**

Fiscal Year	Finished Goods (Rs in Million )	Trend Value (Rs in million )
2005/06	3.79	7.88
2006/07	2.01	8.57
2007/08	4.49	9.26
2008/09	1.20	9.95
2009/10	1.19	10.64

Source: Annual Report of BNTL (2005/06-2009/10) and appendix 6

**Figure 4.18**  
**Trend Analysis of Finished Goods**



Source: Table 4.17

From the above table and figure, In FY 2007/08 the finished goods is Rs.4.49 million which is maximum for the study period. But in FY 2009/10 it was decrease to 1.19 million. So actual finished goods were more fluctuated during the period. But trend value is slightly increased. Finally; we conclude that actual finished goods were below the trend value.

#### 4.2.12.7 Trend Analysis of Cost of Goods Sold (COGS)

Cost of goods sold for the study period was found fluctuated. In FY 2005/06, it was Rs.187.72 million and it was increased to Rs.259.93 million in FY 2006/07. In FY 2007/08, COGS was Rs.250.80 million. Then again it was increased and meets of Rs.326.51 and Rs.406.07 in FY 2008/09 and 2009/10 respectively. Trend value is increased by Rs.17.52 million every year.

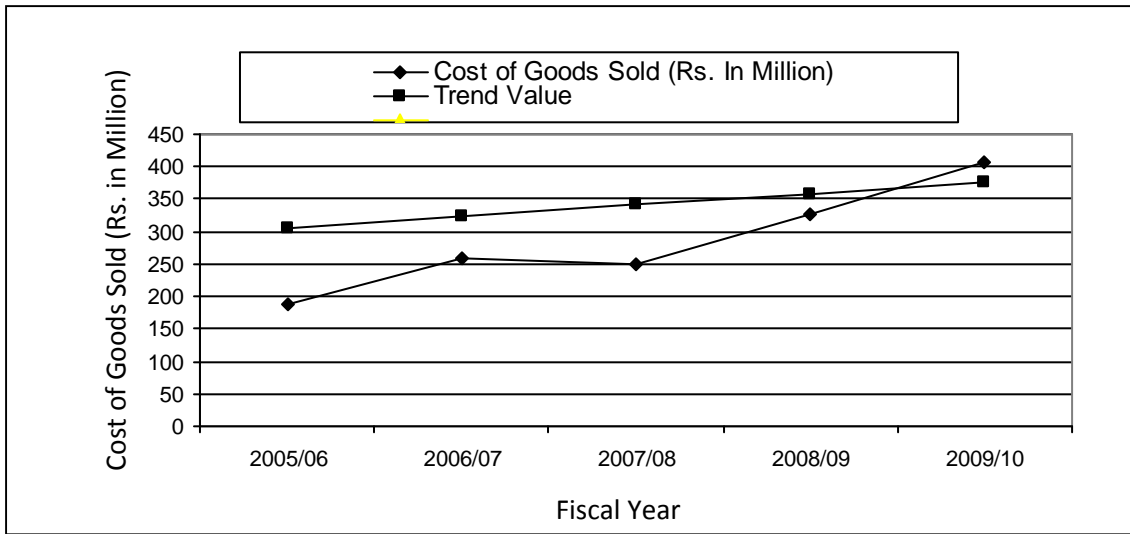
**Table 4.18**  
**Trend Analysis of Cost of Goods Sold (COGS)**

Year	COGS (Rs in Million)	Trend Value (Rs in million)
2005/06	187.72	306.43
2006/07	259.93	323.95
2007/08	250.80	341.47
2008/09	326.51	358.99
2009/10	406.07	376.51

Source: Annual Report of BNTL (2005/06-2009/10) and appendix 6

**Figure 4.19**

**Trend Analysis of Cost of Goods Sold**



*Source: Table 4.18*

**4.2.12.8 Trend Analysis of Net Profit**

Net profit was found declined from Rs.42.99 millions during 2005/06 to its lowest level of Rs.56.26 millions for the year 2009/10. Trend value had also shown the continuously decreasing trend of net profit for the study period. That was the year 2006/07 during which there was sharp increment in net profit compared to the previous year 2005/06. Net profit was recorded the highest for the year 2006/07, which was shown in table 4.19 and figure 4.20

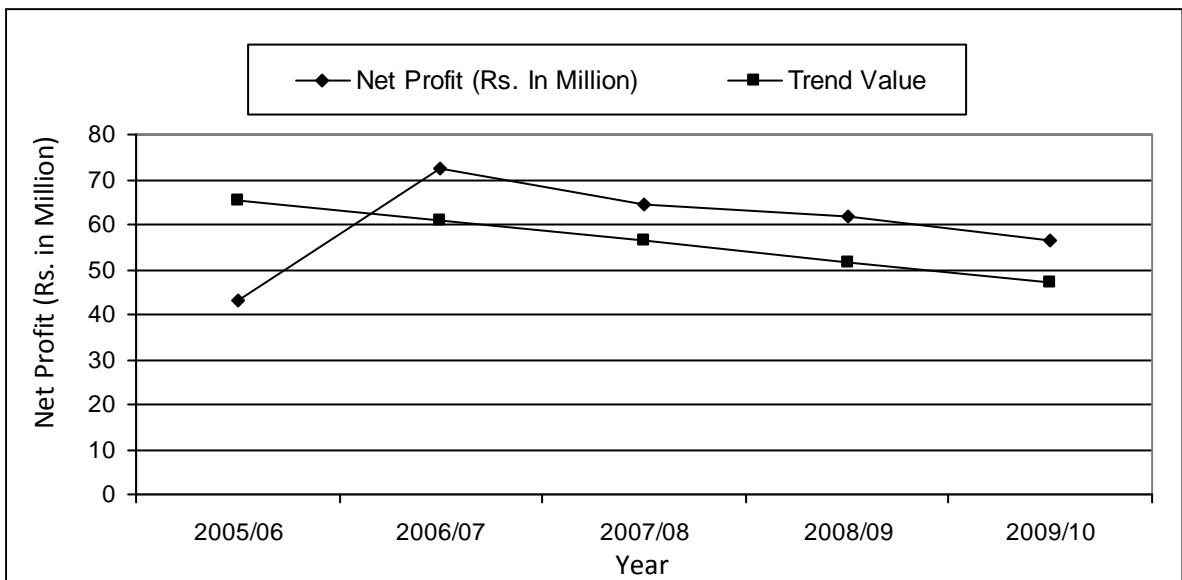
**Table 4.19**

**Trend Analysis of Net Profit**

Year	Net Profit (In Million Rs)	Trend Value (In million Rs)
2005/06	42.99	65.38
2006/07	72.4	60.83
2007/08	64.4	56.28
2008/09	61.62	51.73
2009/10	56.26	47.18

Source: Annual Report of BNTL (2005/06-2009/10) and appendix 6

**Figure 4.20**  
**Trend Analysis of Net Profit**



*Source: Table 4.19*

### 4.3 Major Findings of the Study

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 BNTL, the major findings related to this study have been presented below.

- 1) Required raw materials for the production of different types of soft drinks are imported from the foreign countries like Iran, Pakistan, Indonesia, Germany and India.
- 2) Letter of credit is used to import raw materials from foreign countries.
- 3) 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 right quality and quantity of material at the reasonable rate at proper time to help smooth running of the production function.
- 4) Goods receiving process is a document on the basis of which purchases are verified and payment is made to the suppliers. It is also helpful in filling any claim for short supplies. It provides a complete record of all materials received.

- 5) Store Control Device Practice: In BNTL, the store control device is adopted in Bin card and store ledger. The company has not applied ABC analysis techniques to control various types of inventory in the stores.
  - ) Bin cards: In context of BNTL with its help the storekeeper can send material requisition for the purchase of material in time
  - ) Store ledger: The store ledger is systematically maintained by BNTL. This ledger provides the information for the pricing of material issued and the money value at any time for each item maintained in store.
- 6) 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
- 7) There is not classification system so there is difficult to determine the ordering and carrying cost.
- 8) The company was not following scientific inventory management techniques i.e. economic order quantity model for purchasing different types of raw material.
- 9) The higher value of standard deviation for actual sales indicates its inconsistent nature compared to closing stock. However, value of C.V. indicates that closing stock fluctuates more than actual sales. The value of correlation coefficient -0.31 means the negative relationship between these two variables i.e. increase in closing stock result into decrease in actual sale and vice versa.
- 10) The higher value of standard deviation for actual purchase indicates its inconsistent nature compared to closing stock. However, value of C.V. indicates that actual purchase is relatively stable compared to closing stock. The value of correlation coefficient -0.30 means the negative relationship between these two variables this means the movement of both variable is in the difference direction.
- 11) In an average actual purchase are less than the actual sales value of both S.D and C.V. signifies the consistent nature of actual sales compared to actual purchase.
- 12) Average proportion of inventory of current assets of BNTL was only 14.014% for the study period. The result shown that the company has not been adopting an appropriate inventory policy because inventory level is not stable.
- 13) Average proportion of raw material in total inventory in overall study period is 92.56% from this study if it observed that raw material consumption in the company is in decreasing order from 2005/06 to 2007/08 and then is in increasing order for the study period.

- 14) Average proportion of WIP in total inventory in overall study period is 1.24% it is observed that WIP materials of the BNTL is decreasing order.
- 15) It is observed that the finished goods stock is more fluctuated. The main reason for fluctuation is the fluctuation of demand and sales of the company.
- 16) Inventory conversion period. In BNTL the average length of time requires to convert material into finished goods and then to sell these goods required 66 days.
- 17) Payable deferral period: In BNTL average payable deferral periods for the study period was 85 days and payment is made 4.318 times in a year for purchase and labour.
- 18) Inventory turnover: Inventory turnover ratio is an indicator of the efficiency of management. The inventory turnover for the study period was fluctuating with the average of 6.59 times. The highest ratio signifying the most efficient inventory management was recorded in 2008/09 and the lowest signifying the worst inventory management situation was recorded in 2005/06 within the study period.
- 19) Trend Analysis:

**Table 4.20**  
**Findings of Trend Analysis**

<b>Variable</b>	<b>Slope of Trend line</b>	<b>Nature of Actual Line</b>
Purchase	Slightly upward slope	Fluctuating
Sales	Slightly upward slope	Fluctuating (below trend line)
Purchase of R.M.	Slightly upward slope	Fluctuating (Below trend line)
Inventory	Slightly upward slope	Fluctuating
Raw Material	Slightly upward slope	Fluctuating
Work-in-Process	Slightly upward slope	Fluctuating
Finished Goods	Moderately upward slope	Highly Fluctuating
Cost of Goods Sold	Slightly upward slope	Fluctuating
Net Profit	Moderately downward slope	Fluctuating

*Source: Figure 4.9 to Figure 4.17*

The major findings of the trend analysis indicate that there are all variables in upward sloping trend however Net profit is in downward trend.

## **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. Success of any enterprises basically depends on the efficiency and effectiveness of systematic management. 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 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 sorted out by issues of inventory management of Bottlers Nepal (Terai) Limited are presented, analyzed and the major findings of the study has been also presented in the chapter four.

Summary of the study and recommendation on the basis of the main findings are studied in this concluding chapter which is derived from the analysis of financial statement of BNTL and conclusion is presented.

#### **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 the most significant part of current assets. It should therefore be managed efficiently to avoid unnecessary investment. Bottlers Nepal (Terai) Limited is the leading multinational company among the manufacturing and processing company, which was established in 1987, BNTL supplies the quality product at right time at reasonable price. To earn profit, it is necessary to run the company efficiently, economically as well as profitability. To ensure this situation in BNTL, the efficient management of inventory takes vital role. So, this study is concerned with in what extent the company is applying the inventory

management techniques to minimize the cost of inventory, which directly affect the price of product.

Most of manufacturing and trading company invests a huge amount of money in the form of inventory. BNTL is also being the manufacturing company, which invests huge amount of capital in form of inventory and cost of carrying inventory, is higher out of total inventory cost. The cost of inventory directly affects the cost of production and profitability of company. It means slight reduction in cost of inventory, decreases the production cost and ultimately increases the profitability at remarkable rate. For this, the efficient management of inventory is desirable.

This study is based on the inventory management of BNTL. It is done with a view to solve the problem arises on achieving the objectives of the BNTL. Here, the main objectives of the study are to analyze the inventory practices and to analyze the inventory management system followed by BNTL. 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 basic objectives of the study are to examine the management of inventory in BNTL. To fulfill the objectives as described, appropriate research methodology has been developed. It consists the research design, population and sample, nature and source of data, data gathering procedures, data period covered and method of analysis. In order to carry out the study, data have been basically collected from secondary sources such as annual reports, official report and financial statement provided by BNTL. The primary data is also collected from with direct interviews with concerned staffs of the company to find out the problem of company and then the collected data are tabulated and presented as the stated methodology. Then the analysis has been made using the descriptive analysis of inventory management and others analytical tools. This study covers only five years of financial data i.e. from 2005/6 to 2009/10. It also used the various inventory tools and statistical tools to analyze the available data.

Descriptive analysis consists of the purchasing procedure practice in BNTL, store control device practice and issuing materials. In case of inventory management, analysis is done by the analysis of AR and AP. The company has poor estimation of AR. So the company should make the purchase budget. The company does not purchases the raw material based on the economic order quantity. So if the company wants to minimize the inventory cost, the company should use EOQ model.

The relationship between sales and closing stock, purchase and closing stock and sales and purchase has positive relationship. The average value of inventory in relation to total assets is very lower; therefore, the BNTL does not maintain the adequate level of inventory to fulfill the demand. The average inventory conversion period is 66 days and the company has not fixed policy. In average inventory turnover ratio is very low. It indicates the worst inventory management system. The average payable deferral period is 85 days. It is more fluctuated which can be said that the company does not adopting the fixed policy to make payment for the labour and raw material.

To find out the future trend, the trend analysis of purchase of raw materials, sales, inventory, raw materials, work-in-process, finished goods, cost of goods sold and net profit have been done. The trend analysis shows that except for the net profit, all other variable shows the upward slope.

## **5.2 Conclusion**

As per objectives and analysis of the study following conclusions have been drawn:

- i. The main objectives of this study are to analyze the inventory management practices of BNTL and problem faced by BNTL 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.
- ii. 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.
- iii. BNTL 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 carrying cost and ordering cost. The company does not follow the economic purchase order the total cost of carrying and ordering the inventory is higher. By the analysis, the average inventory conversion period BNTL is 66 days but the payable deferral period is 85 days. The average inventory turnover ratio is 6.59 times, which indicates that, BNTL has

maintained higher level of inventory as compared to the total cost of goods sold. The average trend value of all variables are increasing but trend value of net profit is decreased.

- iv. By the overall analysis, it can be concluded that BNTL should maintain the economic order size, which helps to minimize the inventory cost and to increase the profit of the company.

### **5.3 Recommendation**

The study stresses the need of a good inventory management system to the better performance of the company. So, analyzing the available data, some findings were extracted. Based on the major findings it may be appropriate to make some suggestions and recommendation for proper management of inventory in BNTL. Some of the recommendations based on the major finding are as follows:

- ) Coordination among Different Departments: 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 to avoid the excess investment on inventory.
- ) Minimize the Inventory Cost: The popular scientific inventory management techniques should be applied by the company for purchasing different types of raw materials so as to maintain optimum level of inventory and to minimize the total inventory cost i.e. carrying cost and holding cost.
- ) ABC Analysis: The Company should apply the selective inventory model (ABC analysis) to control the inventories in the store. ABC analysis divides the inventory into three groups i.e. A, B and C according to their usage value which helps to apply proper degree of control for different groups of inventory and minimize the investment on inventory and cost of storage.
- ) Optimal Order Size: In BNTL average actual order size surpasses the average economic order size consequence of which is the greater average actual inventory cost compared to average economic inventory cost thereby reducing the efficiency of the company, therefore effective steps must be taken to minimize this gap so that the company should run in most efficient way.
- ) Adequate Investment in Inventories: Lower investment on inventories in relation to total assets may create immediate crisis in the side of production in

short duration and unfavorable circumstances. Therefore, it is necessary to maintain the adequate level of investment on inventories.

- ) Purchase Budget: The Company should make purchase budget because the entire departments need to fulfill their needs as per the budget allocated. This should be made on the basis of past experience.
- ) To Increase the Profit: In context of BNTL, to increase the profit of the company, the company should minimize the operating cost and inventory holding cost with the use of optimal EOQ, which is higher in the case of the company.
- ) Inventory Conversion Period: In the context of BNTL, there is no fixed policy of inventory conversion period so the company should make plan to maintain the fixed inventory conversion period.
- ) Inventory Turnover Ratio: The average inventory turnover ratio is 6.59 /times. It seems that the company maintained higher level of inventory as compared to the total cost of goods sold, so the company has to maintain the adequate level of inventory to meet the demand. So the company should make the optimum inventory management policy, the higher inventory level makes the higher costs of inventory, so it is necessary to make the optimum inventory management plan.
- ) Effective Management: It is essential to give regular training on inventory management. For the changing environment, the training and seminars play a vital role to develop the employees' efficiency. Consequently, managerial forecasting ability of the concerned staffs will be enhanced.

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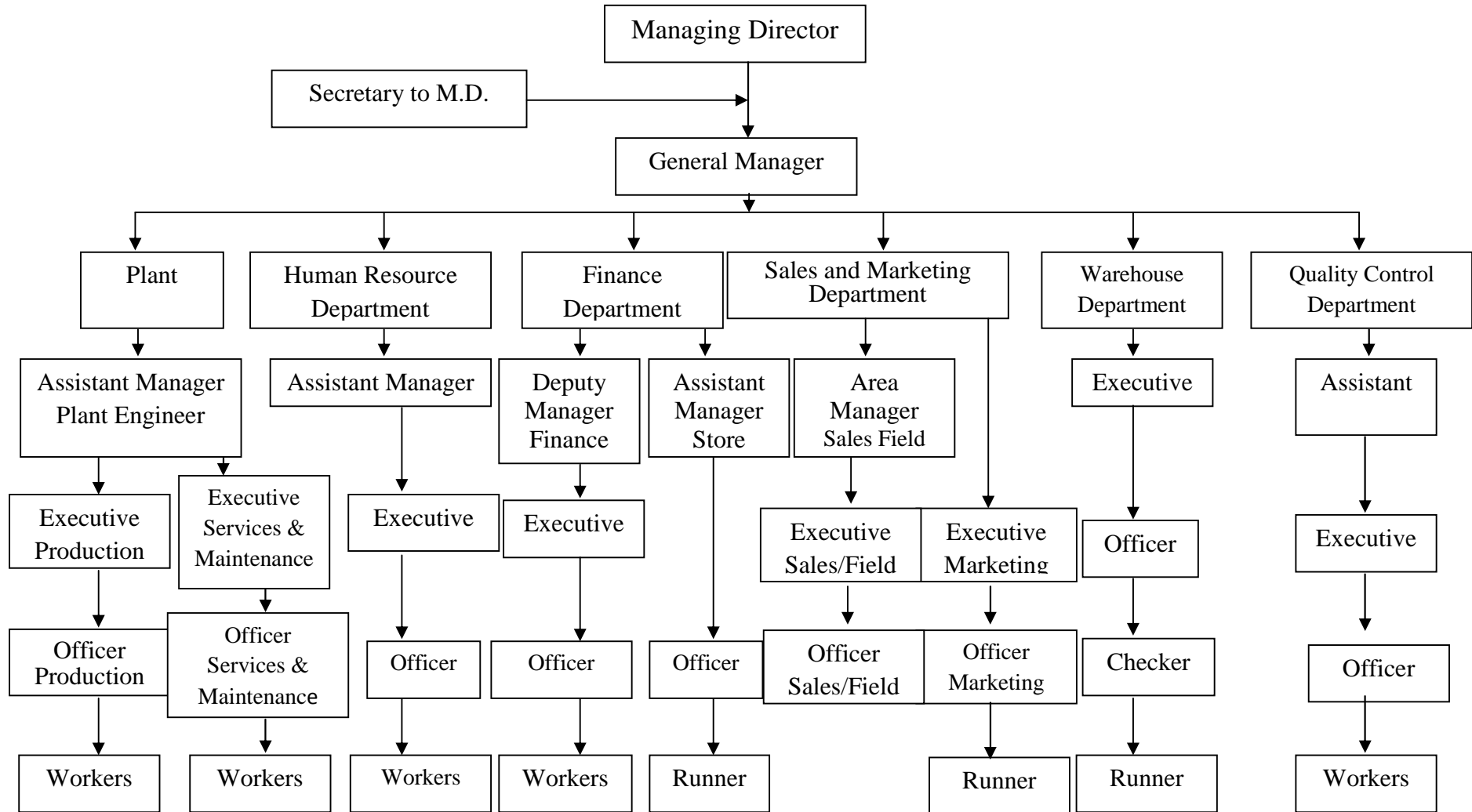
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## Appendix-1

### Organizational Structure of Bottler's Nepal (Terai) Limited



**Appendix-2**

**Bin Card of BNTL**

**Bottler's Nepal (Terai) Limited**

Bharatpur, Chitwan

Mate Code:.....

BIN CARD

Folio

No: .....

Description:

Location: .....

Date	Reference	Receipt	Issued	Balance	Signature

Minimum Level:.....

Re-order Level:.....

Re-order Quantity: .....

**Appendix-3**

**Store Ledger of BNTL**

**Bottler's Nepal (Terai) Limited, Bharatpur**

Purchase Consumption During the Period of 20..... to 20.....

Stock Ledger

Date	Ref. No.	MR	Received			Issued			Closing Balance		
		N	Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
		GR									
		N									
<b>Opening Balance</b>											
<b>Adjustment of</b>											

## Appendix-4

### Compiled Data of BTNL related to Inventory

Particulars	Year					Average	S.D.	C.V (%)
	2005/06	2006/07	2007/08	2008/09	2009/10			
Sales (in million)	354.10	484.99	475.12	621.17	845.26	556.123	167.49	30.12
COGS (in million)	187.72	259.93	250.80	326.51	406.07	286.21		
Purchase of R.M. (in million)	118.17	172.97	152.90	251.46	303.73	199.846	67.90	33.98
Total Inventory (in million)	71.18	52.61	25.09	38.94	46.39	46.842	15.24	32.53
Raw Material (in million)	66.91	50.13	20.13	37.13	45.43	43.95		
Work-in-Process (in million)	0.489	0.474	0.470	0.612	0.505	0.51		
Finished Goods (in million)	3.79	2.01	4.49	1.20	1.19	2.54		
Net Profit (in million)	42.99	72.4	64.4	61.62	56.26	59.53		
Current Assets (in million)	255.15	328.61	284.80	418.93	575.85	372.67		
Total Assets (in million)	265.13	523.64	436.20	622.67	855.95	540.72		
Account Payable (in million)	36.40	76.47	58.86	69.75	98.67	68.03		
ICP (days)	137	73	36	43	41	66	37.8	57.3
PDP(days)	70	106	85	77	87	85		
ITR (times)	2.52	4.20	6.46	10.20	9.57	6.59		

## Appendix-5

### Relationship between the different variable

Particular	Correlation Coefficient	Probable Error
Between Sales and closing Stock	-0.31	0.27
Between material purchase and closing stock	-0.30	0.27
Between sales and purchase	0.98	0.012

## Appendix -6

### Trend Value

Particulars	Year				
	2005/06	2006/07	2007/08	2008/09	2009/10
Sales	515.55	530.65	554.75	560.85	575.95
Material Purchase	213.45	221.55	229.65	237.75	245.85
Total Inventory	193.50	203.29	213.08	222.87	232.66
Raw Material	74.75	79.94	85.13	90.32	95.51
Work-in-Process	0.652	0.656	0.660	0.664	0.668
Finished Goods	7.88	8.57	9.26	9.95	10.64
COGS	306.43	323.95	341.47	358.99	376.51
Net Profit	65.38	60.83	56.28	51.73	47.18