

# **CHAPTER – 1**

## **INTRODUCTION**

### **1.1 GENERAL BACKGROUND**

Industrialization is a key factor for achieving the basic objective of a country's economic and social progress. It not only provides goods and services but also creates employment opportunities. It facilitates an effective mobilization of resources of capital and skill which might else remain unutilized and technological improvement. Hence, Industrialization is a key factor in the process of economic development and its importance as a means of achieving economic growth and prosperity has long been recognized in the economic literature. Industrialization offers prospects for the expansion of employment and income.

Similarly, the role of public enterprises in Nepal is prominent. Industrial development of the country began with the emergence of public enterprises. These enterprises have helped create an industrial base in the country, accelerated the pace of domestic production, acted as an anchor for import substitution, helped generate employment opportunities and contributed to economic growth. Though when people were more demanding and private sector was too shy to venture in the field of industrial establishment. Consequently, a good number of business enterprises were established by the government, some through external assistance.

After the dawn of democracy in 1951, several industries were established in the public sector mostly with the financial and technical assistance of the USSR and China. As a result, Nepal witnessed the development of quite a large number manufacturing industries in the public sector, particularly in areas like leather, sugar, paper, cigarette, bricks and tiles, agricultural tools and textiles.

Nepal has witnessed growth and development of public enterprises since 1956. Government of Nepal had played a vital role in the development process of the

country. For this purpose government of Nepal made maximum investment to create necessary infrastructure and run some of the large manufacturing industries to the people. This has necessitated certain of number of public enterprises as instruments of national development Nepal Bank Limited a commercial bank was the first public enterprise to have a separate legal entity in Nepal. During 2nd world war, some other public enterprise were established, however they could make only substantial progress.

The government began its program of establishing public undertakings in the first five-year plan (1956-1960). Before this, there was only one public enterprise, but by 1989/90, they numbered 59. Out of the total investment, share investment and loan investment were Rs. 11,039.7 million and Rs. 35,544.6 million respectively till F/Y 1996/97. These public enterprises comprise 25 industrial, 9 trading, 8 services, 6 social, 3 public utility, and 8 financial institutions. The overall performance of the public enterprises has been poor. The output ratio in terms of value added per employee has been stagnating. The level of their contribution to GDP is about 3 per cent. These enterprises are still dependent on government grants and subsidies. In fact, the public enterprises of Nepal are seen as white elephants. Excessive political interference, lack of adequate autonomy and accountability, absence of professionalism, financial indiscipline and conflicting goals are the main reasons for the poor performance of the public enterprise in Nepal.

Currently in Nepal, public sector covers a wide range of activities including key and basic industries to the commercially oriented being significantly engaged in manufacturing, service and wholesale trade. There has been a vast expansion of public understanding in the forms of manufacturing, mining, trading, banking, insurance, transport, communication, electric power systems and others. Many of these enterprises in the initial years of their establishment recorded very satisfactory performance. They contributed significantly to the nation's economic activities both in national product and employment terms. After realizing the profitability of industrialization the government of Nepal also commenced on establishment of public enterprises has a number of expectations. Among them the socio-economic revolution of the country is the most important. More

specially, public enterprises are supposed to help in reducing regional imbalance, in providing more employment, in generating more revenue and fulfilling the people requirement.

Now the situation has become so pathetic that each year government has to bear sizeable amount of loss caused by the public enterprises from the treasury. The total amount of investment inclusive of share and loan investment in thirty-eight public enterprises is amounts to almost eighty six billion rupees. Those public enterprises that are in profit are paying slightly higher than half a billion rupees as dividend. Whereas those public enterprises that are in loss have created almost five billion rupees additional liability to the government. It is really surprising to note that assets of the thirty-eight public enterprises, which add to rupees one hundred and fifty six billion, are being mobilized in such a manner that they are creating a net loss to the extent of almost five billion rupees to the government. Hence managing public enterprises is possibly a biggest headache of the present day government. The government has been neither able to operate or liquidate these enterprises. Managerial inefficiency, bureaucratic orientation and political alignment in the name of unionism of employees are the major factors that somehow created obstacles in operating enterprises in a manner required. Beside these problems, Inventory planning and materials purchase are the some other difficulties faced by the manufacturing public enterprises Nepal.

## **1.2 FOCUS OF STUDY**

This thesis is focused in the problem faced by the manufacturing public enterprises in inventory management and material purchase. Though there are many manufacturing and processing public enterprises, NEPSE have listed only 21 public manufacturing enterprises.

Due to shot span of time study of all the organization is not possible. Hence to make the study more appropriate and effective five different manufacturing public enterprises has been selected, which are as follows;

1. Unilever Nepal Ltd.
2. Gorakhkali Rubber Udhyog Ltd.
3. Nepal Lube Oil Ltd.

4. Bottlers Nepal (Balaju) Ltd. and
5. Nepal Bitumin & Barrel Udhdyog.

Case study of these five different manufacturing public enterprises will help to analyze the inventory management and material purchasing behavior and condition of the Nepalese Manufacturing Public enterprises more closely. Hence this thesis is specially focused on problems faced by manufacturing public enterprises regarding inventory management and planning of material purchase for production.

### **1.3 STATEMENT OF PROBLEM**

Success of any business organization is measured by capacity of surplus generation but the financial performances of public enterprises in Nepal are quite dismal and have not been able to run smoothly. Hence public enterprises are not to contribute any impact on economic growth and profit generation. It seems that Nepalese public enterprises are neglecting inventory management.

Nepalese public manufacturing enterprises are unable to implement efficient tools for inventory control. Many public enterprises are suffering losses. The management of the organization is not conscious about inventory management is the main reason of increasing in cost of production and decreasing in the market share. Besides that Nepalese manufacturing public enterprises is also seriously suffering from the poor material management system.

In the past due to many reasons public enterprises went into either liquidation or stopped production. Lack of enough investment, negligence of management, lack of effective managerial skill etc; are the main reason of liquidating the manufacturing enterprises. The other initial reasons are lack of study on effective and efficient inventory management tools and techniques adopted for material purchase planning. Due to lack of study on inventory management, huge amount of capital fund is locked on the inventory.

Management experts also claim that inventory management in Nepal is probably the weakest aspects of management. The tools and techniques for controlling inventory have not been applied in Nepalese public enterprises for controlling their physicals as well as financial dimension. (Agrawal, 1981) The ignorance of how much amount should be company investing in the inventory, how much inventory should be stocked, how can be minimized ordering, carrying(holding) cost and other related costs, what is the EOQ level to be maintained etc. are the major problems in inventory management. Thus, this study research paper intends to explore the following basic questions:

- a. What are the major problems in the existing /current material and inventory management system in Nepalese manufacturing public enterprises?
- b. Is there correlation between material purchases and sales of finished goods?
- c. Is there significant correlation between sales and closing stocks
- d. What is the position of material inventory in Nepalese manufacturing public enterprises?
- e. What are the inventory turnover ratios in Nepalese manufacturing public enterprises?

#### **1.4 OBJECTIVES OF STUDY**

Public manufacturing enterprises are facing various problems in production due to lack of enough investment, negligence of management, lack of effective managerial skills, and ignorance in the field of inventory and purchase management. The key objectives of the study revolve around the subject of finding out difficulties in inventory management and material management. The basic objective of this study is to analyze the problems faced by Nepalese enterprises in inventory and material management. The specific objectives of the study are:

- ⇒ To analyze the major problems in the existing /current material and inventory management system in Nepalese manufacturing public enterprises.
- ⇒ To examine the correlation between material purchases and sales of finished goods.
- ⇒ To examine the significant correlation between sales and closing stocks.

- ⇒ To evaluate the material inventory position of Nepalese manufacturing public enterprises.
- ⇒ To indicate the remedial measures and contemporary steps to be taken instantly.

## **1.5 SIGNIFICANCE OF STUDY**

Unfortunately, the performance and profitability of most of the public manufacturing enterprises are not much satisfactory. The actual production of most of the public manufacturing enterprises is much behind the targets, and they are operating below installed capacity. A number of public manufacturing enterprises are running at losses and those earning profits have not shown adequate return on the capital employed. Even though profit maximization is not the prime objectives of public enterprises, but they should meet their all financial obligation and give adequate return on capital employed and generate sufficient internal resources, internal requirements, while in the same time keeping in view their social responsibility.

Inventories are the stock held in business and they can be finished goods, work in progress, raw materials and stock of supplies. Thus, Inventory is the valuable assets to all industries. The large part of the capital is invested on inventories. This varies is not only in the number and nature of the goods hold but also due to uncertainty of demand and supply of goods. Inventory management help to maintain adequate level of inventory required for production process and distribution. It also helps to determine the ordering level and quantity for minimizing the cost for ordering and holding of inventory.

An inventory constitutes a major share of working capital of the business. The average companies spend about 50% of their sales income and purchase of parts components and raw materials but some firm spends considerably more than this. Inventories are less liquid assets. The management of inventory affects on the liquidity position of the business organization. Changes in inventory levels affect the fund management. It also affects the marketing, production and purchase management of the organization.

Management of every organization is always working against risk and uncertainties. Organization should be alert in deciding their personnel, financial resources and requirement of inventories equally. This will surely help organization to control and minimize the product cost. The organizations investment on inventories is productive, but in the absence of proper management it could block the capital, which can be better utilized in other alternative having high profitability and it could also loose the market share of the firm. Proper inventory management helps to overcome in under and overstocking of materials. Hence, this study will provide information's on inventory management and purchase of materials management in manufacturing public enterprises.

Inventory constitutes the most significant part of current assets of a large majority of companies. An average inventories are approximately 60% of current assets in public limited companies in India. It is, therefore, a serious matter and must be planned well. Ignorance in inventory and purchase management may create bad impact for achieving goal of the organization.

Benefits of the study will be received by financial managers, entrepreneurs, production managers and accountants. This research work will be the valuable assets for the further research work.

## **1.6 LIMITATION OF STUDY**

This research work is not able to study the whole Nepalese manufacturing public enterprises in detail due to various reasons. The study concentrates only on the five random selections of different manufacturing public enterprises. Therefore, this study is not free from the limitations. The major limitations of the study are as follows:

- a. The study period is limited to F/Y 2061/62 to 2065/66s.
- b. The accuracy and the reliability of the study are based on the secondary data available from different sources.

- c. Mainly the study is concentrated on inventory and purchase management of five selected Nepalese public manufacturing enterprises; other public manufacturing enterprises are evaluated on the basis of previous studies.
- d. There is time constraint as it is only a study to fulfill partial requirement of confining MBS Degree.
- e. Most of the data are the matter of confidential, so available information and data of annual report are used in many cases.

## **1.7 OVERVIEW OF THESIS**

The thesis will be organized into five chapters as; Introduction, Literature Review, Research Methodology, Presentation and Analysis of Data, Summary, Conclusion, and Recommendation.

The brief outline of each of these chapters has been given as below:

### **Chapter-1**

The first chapter entitled 'Introduction' introduces the subject, presents the research problems with the objectives of the study, along with the significance of the study and limitations. The current conditions and problems faced by Nepalese manufacturing public enterprises are stated in this chapter.

### **Chapter-2**

The second chapter deals with review of literature. For the simplicity this chapter is divided into two sections. In the first section the literature terms of inventory management system and material purchase management are explained. The second section deals with the review of selected studies.

This thesis will be mainly focused in five selected manufacturing public enterprises. However, the overall scenario of Nepalese manufacturing public enterprise will be drawn based on review of previous studies.



### **Chapter-3**

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

### **Chapter-4**

The fourth chapter focuses on presentation and analysis of data. This chapter will be also divided into numbers of sections. Data are analyzed applying the statistical tools, such as percentage, index, coefficient of correlation and ratio. In the last of this chapter extracted major findings on the basis of analysis have presented.

### **Chapter-5**

This fifth chapter presents summary, conclusion and recommendations of the study based on facts found from observation and analysis of data has been presented in the fourth chapter.

Finally, bibliography with reference of materials used in the study is added to the end of this research study.

## **CHAPTER – 2**

### **REVIEW OF LITERATURE**

Literature review is essential and helpful to survey the literature and studies, in order to get better understanding of the subject relevant and related to it. The related studies provide the researcher in making his problem more realistic, precise, researchable and meaningful. Having these advantages in mind, the researcher review the relevant literature in the field of management. The major purpose of the present study is to analyze the inventory management system and the materials purchase management of Nepalese manufacturing public enterprises. This thesis will be mainly focused in five selected manufacturing public enterprises. However, the overall scenario of Nepalese manufacturing public enterprise will be drawn based on review of previous studies.

#### **2.1 THEORETICAL CONCEPTS**

This study deals the conceptual and theoretical concepts of material purchase and inventory management in the first section by considering published and unpublished books, journals, articles, official records and reports, then review of selected studies in Nepal.

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

The dictionary meaning of the word inventory is stock of goods. The classical definition of inventory is that it is an idle resource of any kind having an economic value. It costs money to hold stock. It costs money in terms of storage, space, equipment, personnel, insurance, deterioration and obsolescence and above all cost of capital involved in financing stocks. Inventory management is the procedure and the body of knowledge which can help us in planning to maintain an optimum level of the idle resources.

Inventory management is an important concern for managers in all types of business. Every manufacturing organization however big or small has to maintain

some inventory. Inventory helps the company quickly responding to the customer demand, which is an important element of competitive strategy. Inventories of finished goods of the correct items to meet the market demand at the different point of the time within a reasonable response time play an important role in a company's ability to compete in the market. Inventories of raw materials or partially processed goods can help a company complete the production cycle in a much shorter time than would otherwise be possible.

Inventories require valuable space, consumers' taxation and insurance charge trying up of more capital which leads to cost of capital losses and opportunity losses of investments. On the other angle no organization can work with out maintaining some inventory i.e. it is a necessity. It is observed that cost of not having inventory is usually greater than the cost of having them. Thus, it is said that, "inventory for any organization is a necessary evil." (Sthapit, 2006)

Inventories may be held for various purposes, but generally there are five types of inventories organization use for serving their purpose, which are as below;

**1. Cycle Inventory:** The portions of total inventory that varies directly with lot is called cycle inventory. Where lot sizing means finding how frequently to order and in what quantity. Cycle inventory are held for the reason that purchases are usually made in lots rather than for the exact amounts which may be needed at a point of time. But, purchases are made in lots, the reasons behind that if purchases are made frequently and in small numbers, then the cost involved in obtaining the items would be very large.

**2. Anticipation Inventories:** Inventory use to absorb uneven rates of demand or supply which the production system often face, is referred to as anticipation inventory. Production of specialized items like umbrella, raincoats, before rainy season, fans while summers are approaching or the piling up of the inventory stocks when a strike is susceptible is examples of the anticipation inventories. Such uneven demands may lead a manufacturer to stockpile anticipation inventory during periods of low demand so that output levels don't have to be increased much when demand peaks. Smoothing output rates with

inventory can increase productivity because varying output rates and workforce size can be costly. A company may stock up on a certain purchased item or raw materials if its suppliers are threatened with the strike or to have capacity limitation.

**3. Transit Inventory:** When inventories are moved between the various element of the supply chain i.e. between suppliers, distributors, manufacturers, wholesalers, retailers and the end customers, these are called transit inventory. Transit inventory consists of orders that have been placed but not yet received. During the transportation period between two places, these stocks don't serve any purpose, so the organizations try to reduce the transit time of those stocks as much as possible.

**4. Work in Progress Inventory:** The concept of work in progress inventories is to decouple different parts of the production system. When operations take place in a sequence, then in the case of the breakdown of one or any disturbance of some stage can affect the entire system. This kind of interdependence is not only costly but also disruptive for the entire system. Thus stocking points of inventory with reasonable stock level are created between adjacent stages so as to achieve a certain degree of interdependence in operating the stages.

**5. Safety Inventory:** Safety inventory are held to protect against the uncertainties of demand and supply. Safety inventory protects against uncertainties in demand, lead time and supply. To cope with the uncertainties an extra level of stock maintained in the company in excess of the anticipation inventory, which is the safety stock.

#### **2.1.1.1 Objectives of Inventory Management**

The main objective of inventory management is to maintain optimum investment in inventory. And other objectives of inventory management are (Munakarmi, 2003):

- a. To maintain adequate stock of raw materials and finished goods for smooth production and sales operation,

- b. To utilize available storage spaces properly and prevent stock levels from exceeding space availability,
- c. To have suitable organization for management of inventory for maintaining adequate accountability of inventory assets,
- d. To ensure an adequate supply of materials and others of required quality with a reasonable price,
- e. To minimize stock out and shortages and avoid cost of irruption in operations,
- f. To optimize investment in inventories and keep down inventory carrying cost and to minimize others loss like obsolescence, thefts, carelessness etc.,
- g. To eliminate the possibility of duplication in ordering,
- h. To decide which items to stock and which items to produce on demand,
- i. To provide a perpetual inventory system for eliminating differences between actual and recorded stock and provide inventory value for the preparation of financial statement,
- j. To provide information about inventories for planning and control of inventory.

#### **2.1.1.2 Importance of the Inventory**

Inventory provides the regularity of the business by regularizing production and marketing. Inventories serve the vital function of developing to various operations in the sequence beginning with raw materials, extending through all the manufacturing operations and into finished goods storage and continuing to warehouse and retail stores. The reason behind maintaining inventory by the business/manufacturing organization can be listed as below (Sthapit, 2006):

- a. To provide and maintain good customer service.
- b. To enable the organization smooth flow of goods in the production process.
- c. To provide protection against the uncertainties of demand and supply.
- d. To perform various production operations economically and independently.
- e. To allow flexibility in schedule.
- f. To ensure a reasonable utilization of equipment and labour.
- g. To take advantages of economic purchase order.

#### **2.1.1.3 Function of Inventories**

Inventories thus require both substantial cost and investment commitments. It is understandable, then, why some businessmen view inventories and their

attendant costs as a necessary evil. However, such individuals fail to make a fair analysis of the total situation. Before one looks unfavorably upon the size and costs of inventory, he must also assess carefully the benefits afforded his company by the existence of the inventory.

Generally speaking, inventories make possible smooth and efficient operation of a manufacturing organization by decoupling individual segments of the total operation. Purchased part inventories permit activities of purchasing department personnel to be planned and conducted somewhat independently of shop production operations. By the same token, these inventories allow flexibility for suppliers in planning, producing and delivering an order for a given part.

Inventories of parts and components produced "in house" decouple the many individual machines and production processes from various subassembly and assembly activities. This enables management to plan production runs in individual production areas in a manner in which utilizes manpower and equipment considerably more efficiently than if all were tied directly to the final assembly line. Also, finished goods inventories performs the function of decoupling the total production process from distribution demands, allowing on a broader scale the development of similar efficiencies of production. The results produced by these inventories should be good service to the customers on stock items, lower direct production costs, lower materials handling costs, and lower purchasing costs.

Thus well planned and efficiently controlled inventories can contribute substantially to a firm's profit. The real problem is to determine the inventory level at which money invested in inventory produces a higher rate of return though these benefits than it would were it invested in some other phase of the business. An interesting situation can be seen if these problems are viewed through personnel aspect of various operating department managers. The marketing manager favor relatively large inventory to assure rapid assembly, delivery of a wide range of product models and use this capacity as an effective sales tool. Production manager argues for high level of inventories so that high inventory of required items ensure against production shut downs due to stock outs, thus

avoiding the incurrence of high production downtime costs. While financial manager points out that the company's need for funds usually exceeds availability and that reduced inventories free sorely needed working capital for other use. And Purchasing manager points out that large buying volume buying often results in reduced purchasing prices, and that it also permits more efficient utilization of buying personnel and more effective advance planning for major activities such as value analysis, vendor investigation, so on. Thus, it is clear that each departmental executive supports his/her position with quite legitimating justification on inventories.

#### **2.1.1.4 Inventory Costs**

Cost of inventory includes price of raw materials, transportation, insurance, store charge etc. All these costs directly affect cost and price of goods. To maximize profit of an organization, management should focus on minimization of inventory cost. Thus, inventory cost can be classified in the following categories:

1. **Material Cost:** Material cost the cost of purchasing goods. In other words, the price paid to the supplier for buying items of inventories are called material cost, which directly affects the cost of production.

$$\text{Material Cost} = \text{Annual Demand (A)} * \text{Purchasing Price (P)}$$

2. **Ordering Cost (O):** Ordering Cost includes those costs, which are incurred for placing order or the set up cost if goods are manufactured. 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 levels there will be few orders placed and ordering cost will be relatively small. Thus ordering costs decreases with the increasing size of inventory.

Generally ordering costs are the cost involved in placing and receiving an order, requisition cost, transportation and shipping cost, receiving and storing costs, sales tax and customs, cleaning and forwarding cost, stationary cost, bank commission/LC charges, telephone/fax and postage

expenses, and cost incurred when the raw materials are in transit, etc. Total Ordering Cost can be derived from the following formula;

Total Ordering Cost (TOC) = Numbers of orders \* Ordering Cost per order

OR

$$\text{Total Ordering Cost} = \frac{\text{Annual requirement (A)}}{\text{Ordering quantity(Q)}} \times \text{order cost per order (O)}$$

3. **Carrying Cost (C):** Carrying cost is incurred for keeping stocks in the store. It includes rent, insurance, security, heat, light, power, taxes, thefts, leakage, spoilage, maintenance and running, carrying cost etc. Carrying cost generally increase in portion to the average amount of inventory held. Carrying cost are generally stated as rupees per unit per period and total carrying cost (TCC) is calculated as follows:

Total Carrying Cost (TCC) = Average inventory \* Carrying cost per unit

OR

$$\text{Total Carrying Cost} = \frac{\text{Ordering quantity(Q)}}{2} \times \text{Carrying cost per unit}$$

4. **Cost of Safety Stock:** The safety stock is the minimum level of inventory that the firm wishes to hold as a protection against running out. Safety stocks held to avoid these shortages (i) if demand increases or (ii) if shipping delays are encountered. The cost of carrying safety stocks is equal to the percentage cost of carrying inventories times the purchase price per units held as the safety stock. These costs are separate from those used in EOQ. Cost of safety stock is calculated by using the following formula:

Cost of safety stock = Safety stock in units (S.S.) \* Carrying cost per unit (C)

5. **Cost of Funds:** the cost of funds is measured as the cost of capital rate times the average level of investment.

$$\text{Cost of funds} = \frac{\text{Ordering quantity (Q)}}{2} \times \text{Cost of capital} \times \text{Purchase price}$$

6. **Stock-out Costs:** Stock out refers the shortage of stock to meet demand of customers. Stock out cost includes the cost of back order, loss of goodwill,



loss of the profit, expenses incurred for receiving the stock from supplier and notifying the customers when goods are arrived.

### **2.1.2 Material Management**

Materials as raw materials and semi finished goods have great significance for the success of enterprises. These can directly affect the efficiency of a system. It is observed that irrespective of the size of an enterprise, the expenditure on materials is a major item of the budget. In many cases, out of total cost 20% to 75% cost is related to material cost based on nature and types of product. The expenditure made on materials money is invested in inventories, cost of storage, transportation costs, insurance, wastage etc. Because of the magnitude of expenditures required in acquiring and controlling materials and their impact on profits, a great deal of attention is required towards the management of operations associated with materials.

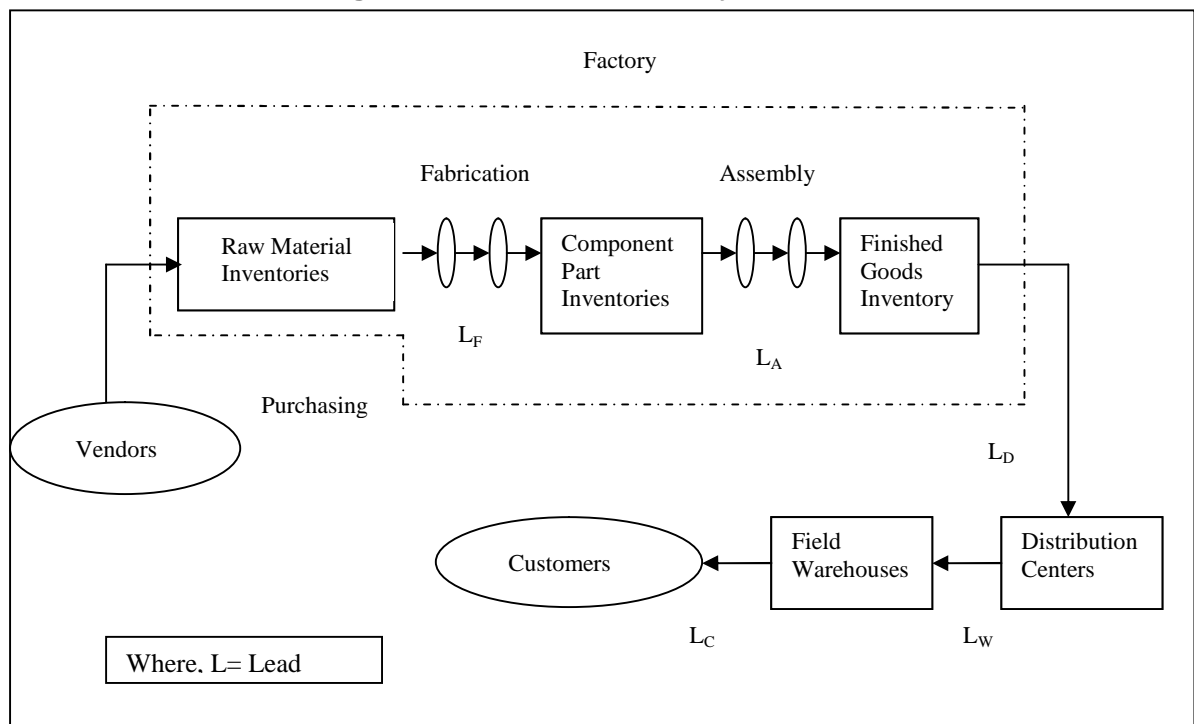
Though management is aware of the fact that manufacturing and marketing are the two main activities of enterprises, material management can not be ignored for a third basic economic activity. Like manufacturing and marketing in materials management also, capital is employed and costs are incurred to produce something of economic value.

Materials management is the planning, controlling and coordinating those activities which are concerned with materials and inventory requirements, from the point of their inspection to their introduction into the manufacturing process. It begins with the determination of materials quality and ends with its issuance to production to meet customers demand as per schedule and at the lowest cost.

Thus, material management is an important function of covering various aspects of input process i.e. it deals with raw materials, procurement of machines and other equipments necessary for the production process and spare parts for the maintenance of the plant. Thus in a production process materials management can be considered as a preliminary to the transformation process. It involves planning and programming for the procurement of material and capital goods of

desired quality and specification at reasonable price and at required time. It is also concerned with market exploration for the items to be purchased to have up to date with market information, stores and stock control, inspection of the material received in the enterprise, transportation and material handling operations related to materials and many other functions.

**Figure 2.1: Materials Flow System**



### 2.1.3 Purchasing Management

Purchasing is the first phase of materials management. Purchasing means procurement of goods and services from some external agencies. The object of purchase department is to arrange the supply of materials, spare parts and services or semi- finished goods, required by the organization to produce the desired product from some agency or source outside the organization. The purchase items should be of specified quality in desired quantity available at the prescribed time at a competitive price. Thus, purchasing is an operation of market exploration to procure goods and services of desired quality, quantity of optimal price and at the desired time.

Purchasing in an enterprise has now become a specialized function. It is experienced that by assigning the purchase responsibility to a specialist, the firm

can obtain greater economics in purchasing. Moreover, purchasing involves more than 50% of capital expenditure budgeted by the firm. In modern prospective purchasing is a strategic managerial function and any negligence on it will ultimately result in great loss to the company.

In the organization key person to manage the purchasing is purchase manager. Purchase manager occupies an important position in the organization, his company is very important for the successful purchasing. He/she should be a person having quick decision making power pleasing personality quality of good leadership and for sighted approach.

### **2.1.3.1 Objectives of Purchasing**

The objectives of purchasing should conform to the overall objectives of the organization. It is one major activity where responsible optimization can be accomplished. Following are the major objectives of purchasing.

- a. To procure materials which are most appropriate to the product and are supplied in right quantity and quality at right time and right place?
- b. To control the quality of material following economical order size and optimal inventory management system.
- c. To find best suppliers and making proper negotiations.
- d. To make proper use of materials avoiding duplication waste and obsolescence of materials and equipment.
- e. To make the effective coordination with other departments.
- f. To maintain company's goodwill.
- g. Other objectives:
  - ⇒ Exploring to find new supplies.
  - ⇒ Assessing information about new materials and processes which can reduce the cost of production and improve the performance of the product.
  - ⇒ To achieve economy and efficiency in the activities of the purchase department by analyzing its performance.

### **2.1.3.2 Centralized versus Decentralized Purchasing**

Centralized purchasing refers the process of purchasing, inventory from one place, department and division whereas decentralization is the process of buying inventory from two or more departments places or divisions. Centralized and decentralized purchasing policy depends on many factors like size of organization, availability of resources, nature of resources, scope of organization, philosophy of management.

### ***Advantages of Centralized Purchasing***

- a. This ensures undivided responsibility. The officials can concentrate in their operations more efficiently.
- b. There can be economics due to buying in bulk. Bulk buying increases the bargaining power of the department and can encourage quantity discounts.
- c. Reduces inventory carrying costs as well as investment inventories.
- d. More specialized personnel in purchasing can be employed.
- e. There is more economy in maintenance of records, easy adaptability to the market conditions. All this leads to most efficient use of the resources.

### ***Advantages of Decentralized Purchasing***

- a. Greater feasibility to react rapidly to change.
- b. Close contacts with customers.
- c. Autonomous in buying.
- d. It helps to reduce high initial cost.
- e. It eliminates the delays in getting materials from central store.

### **2.1.3.3 Purchasing Principles**

Following are the some important principles of purchasing:

- a. The acceptance of order is to be specific and not implicit. Preferably, it should be acknowledged by either of sides before it is binding.
- b. Ambiguity and misinterpretation should be avoided specially in respect of quality, delivery, service, discount or any other such changes.
- c. The Indian sales of goods act lays down that unless a specific provision is made regarding the time of payment or any other stipulation as to time being essence of contact, the same is not implied. It has to be stipulated.

- d. The suppliers' takes warranty of goods as per specification laid down intender and not whether these are fit of intended use. If it is so required that detailed information has to be stipulated well in advance or through negotiation.
- e. The other features are buyers' right to reject unwanted goods, liquidation for damages, passing of owner ship etc, are covered in legal aspects.

#### **2.1.3.4 Purchasing Procedure**

Following are the purchasing steps that are commonly followed by the various purchasing departments.

**Step 1** Various departments are requested to send their requirements on a proper requisition form. This authorizes the purchase department to procure the requisitioned items i.e. to issue purchase order.

**Step 2** Purchasing department consolidates the requirements from various departments to know the total requirement for each item.

**Step 3** Market explanation is made to locate the goods and services of desired quality and quantity at the reasonable price.

**Step 4** Potential suppliers are identified from catalogues, quotations and past records.

**Step 5** Purchase order in specified form is prepared and sent to the approved suppliers. Purchase order is the commitment of the buyer to the supplier establishing a contractual relationship between buyer and seller.

**Step 6** After some time of placing the order, follow up process starts to get quick delivery of the items. The follow up process starts to get quick delivery of he items. The follow up procedure implies acceptance of the order and promise to supply the items on desired date.

**Step 7** The items are received by the purchasing department at the time of delivery and the items received are compared with purchase order.

The checking of the delivered goods is done with regard to:

- ⇒ Prices charged and quoted
- ⇒ Approval of he invoice
- ⇒ To ascertain the quality and quantity of he items.

**Step 8** Defective items i.e. items which aren't in accordance with the specifications laid down in the purchase order are returned to the suppliers on credit note for exchange.

The received consignment is then delivered to the stores department are the department which requisitioned the material.

#### **2.1.3.5 Purchasing Transaction**

Under purchasing transactions, there are various buying methods, which are listed below (Goel, 1992):

- 1) Purchasing of Requirement:** Under this method purchase are made only when required. This method is suitable for goods, which are not regularly purchased and kept in stock.
  
- 2) Material Purchasing:** Purchase made to take advantage of price changes is known as market purchasing. Such purchase result in lower purchase price, greater margin of the profit on finished goods and saving in purchasing expenses. But sometimes it is argued that such a purchasing may not suit entirely the needs of production.
  
- 3) Regular Buying:** This method results low prices of materials and delivery to meet scheduled future requirements. This is very scientific method of buying. This method ensures the organization of adequate supplier and prevents excessive purchases as well as below the requirements.
  
- 4) Purchasing with Special Order:** It can also be termed as contract purchasing. Under this method, special order is placed to purchase the special good required. A contract is made with suppliers for the purchase of goods regarding schedule of supplier, means of transportation and term of payment.

**5) Speculative Purchasing:** Under this method, purchases are made in excess of needs at the time market price is low. This purchasing helps the company to save money in purchasing and to increase income in sales.

#### **2.1.4 Material Purchase Budget**

After the estimation of sales and production, the next step is to prepare material purchase budget when the production budget is completed then the requirement of raw materials and components to be used in the process of manufacturing the finished product could be measured. On the basis of production budget production manager determines the raw material requirement in terms of quantity for each product. And this determination of materials usage leads to the solution of the problem when and how much to purchase of each material. While preparing the materials plan there should be serious consideration to coordinate among the followings items:

- a. Production requirement for materials and components parts,
- b. Purchase of raw material, and
- c. Raw materials and parts inventory level

To ensure that the appropriate amounts of raw materials and components parts will be on hand at the time required and to plan for the cost of such materials and parts the tactical short term. Profit plan should include (a) a detailed budget that specifies the quantity and cost of such materials and parts, (b) a related budget of raw materials to parts purchase.

Planning raw materials and parts usually requires the following four sub budgets.

##### **2.1.4.1 Materials and Parts Budget**

The budget specifies the planning quantities of each raw materials and part required for planned production. It should specify quantities of each raw material and part by time, product and responsibility center.

The materials budget includes only the quantities (not cost) of direct materials factory supplies and direct materials that are included in the manufacturing or factory overhead budget. The budgeted quantities of each raw materials and part needed for each finished product must be specified in the materials and parts budget by interim period (months and quarters) and by reclassifications should follow the pattern used in the sales and production plan. The manufacturing managers should be responsible for developing the data included in the materials and parts budget. The principle purpose in developing detailed raw materials and parts requirements for planned production are to provide data for developing the four budgets listed above.

The basic (estimated) inputs required to develop the direct materials and parts budget are; 1) volume of output planned (from the production plan) and 2) standard usage rates by type of raw materials and part for each finished product. Material usage rates are applied to the production data (from the production plan) to develop the materials and parts budget. In manufacturing situations it is not difficult to determine standard unit usage rates for unit raw materials and parts used in each department per unit of finished product. Unit usage rates can be derived 1) during initial development of the product 2) from engineering studies or 3) from past consumption records and bills of materials.

Thus preparation of the materials and parts budgets requires careful study of the products to determine unit usage rates and realistic allowance must be made for normal spoilage waste and scrap.

#### **2.1.4.2 Materials and Parts Purchase Budget**

The materials and parts purchase budget specifies the quantities and timing of each raw material and component, parts needed; therefore a plan for purchase must be developed. The purchase and parts needed; therefore a plan for purchase must be developed. The purchase and parts budget specifies the planned quantities of materials and part to be purchased the estimated cost and the required delivery dates. It is directly concerned with the timing of actual receipt of materials and parts rather than the timing of purchase order or usage.



Careful planning of purchases can result in significant cost saving in many enterprises. If realistic estimates of material and part requirements are specified in the materials and part budgets by interim period the purchasing manager can effectively plan the purchasing activities. The purchases budget specifies; (1) the quantities of each type of material and parts to be purchased (2) the timing of those purchases, (3) the estimated cost of materials and parts per unit and in total. The purchase budget is directly concerned with the timing of actual receipt of materials and parts rather than with timing purchase orders and usage. The purchasing manager must order materials and parts so that delivery date will correspond to the materials and parts inventory levels and usage requirements in the production process.

To develop the purchase budget the purchasing manager is responsible for the following.

- a. Adhering to management policies about materials and parts inventory levels.
- b. Determining the number of units and timing of each type of material and part to be purchased.
- c. Estimating the unit cost of each type of materials and part to be purchased.

#### **2.1.4.3 Materials and Parts Inventory Budget**

This budget specifies the planned levels of raw materials and parts inventory in terms of quantities and cost. The difference in units between the requirements as specified in the materials budget and the purchases budget is shown as planned between the materials and parts budget and the purchases budget is accounted for by the change in materials and parts inventory levels. As with the finished goods inventory budget with respect to sales and production the materials and parts inventory budget provides a cushion between materials and parts requirement and purchases. If materials and part inventory levels means that purchases must exactly parallel factory materials and parts requirements. Yet in the some case purchases can be at a uniform level only if inventory is allowed to absorb variations in materials and parts requirements. The optional purchasing plan will generally be between these two expenses. The timing of purchases will depend on inventory policies. The primary considerations are setting inventory

policies. The primary considerations are setting inventory policies for materials and parts are;

- a. Timing and quantity of manufacturing needs.
- b. Economics is purchasing through quantity discounts.
- c. Availability of materials and parts
- d. Lead time (order and delivery)
- e. Storage facility needed
- f. Capital requirements of finance inventory
- g. Cost of storage
- h. Expected change is the cost of materials and parts
- i. Protection against storage's
- j. Risk involved in inventories
- k. Opportunity costs (inadequate inventory)

Like finished goods inventory policies raw materials and parts inventory policies are intended to minimize the carrying cost. In developing the inventory policy with respect to purchase the two basic timing factors should be considered: (1) How much to purchase to a time? (2) When to purchase?

To determine how much to purchases at a time a well know economic order quantity (EOQ) is used. While the second question “when to purchase?” in other word called the re order point is reached when the inventory levels is equal to the time to reorder and receive the replenishments. It is also desirable to included safety stock to accommodate unusual fluctuation is usage and replenishment time.

Other approaches to these problems require turnover ratios monthly supply data days of cost of goods sold is inventory and specifications of minimum and maximum limitation.

#### **2.1.4.4 Cost of Materials and Parts Used Budget**

The budget specifies the planned cost of materials and parts that will be used in the productive process. This budget cannot be completed until the planned cost of purchases is developed.

The planned cost of materials and parts should be the estimated invoice price, less any purchase discount, plus freight and handling charges incident to delivery of the goods it is frequently impractical to identify transportation costs with specific materials and parts; therefore the planned purchase price is often the net cost of raw materials and transportation and handling costs are separately planned and budgeted. Purchase constructs may provide some unit cost data. Historical costs as indicated by the cost records may provide a basis for estimating some unit costs. In many cases fluctuating materials and parts unit prices must be planned for the budget period. Many materials have prices that tend to vary reasonably, thereby necessitating the budgeting of varying unit-purchasing costs.

Thus quantity and unit cost data are available to develop the budgeted cost of materials and parts that will be used. If the purchases budget anticipated and constant unit cost for a materials and parts during the planning period multiplication of units by the unit cost yields the budgeted materials and parts costs. Alternatively when a changing unit price is planned for materials and parts the budget of the cost of materials and parts used and the related inventory budget must be developed using a selected inventory flow such as FIFO, LIFO moving average or weighted average. FIFO is usually preferred because of its internal consistency.

### **2.1.5 Valuation of Inventory**

Pricing the inventory is one of the most interesting and widely used subject matter in accounting process. Many organizations are interested in the various methods of pricing inventory because it has a direct effect on the net income. Inventory valuation approach is important in the aspect of income tax problem. One method of inventory valuation may lead lower tax liability than other inventory valuation method. There are a number of methods which may be employed for the inventory valuation but most significant method is cost and other method is lower of cost or market. Both methods give different results.

For inventory valuation, cost may mean historical, current (replacement) or standard cost. Historical cost represents the cost actually incurred at the date of acquisition. Current replacement cost represents the replacement price on the date of its consumption. Standard cost represents the pre-determined cost that should be incurred at a given level of efficiency and capacity utilization. But with regard to the objectivity, verifiability and efficiency line with realization concept, the historical cost basis is almost universally accepted and used. Historical cost represents an appropriate combination of (Tulsian, 2003):

- a. The cost of purchase
- b. The cost of conversion; and
- c. The other cost incurred in the normal course of business in bringing the inventories up to their present location and condition.

The various methods for assigning the cost between sold and unsold goods include following:

- a. First In First Out (FIFO) Method
- b. Average Cost Method
- c. Last In First Out (LIFO) Method
- d. Base Stock Method
- e. Specific Identification Method
- f. Standard Cost
- g. Adjusted Selling Price or (Retail Inventory Method)
- h. Latest Purchase Price
- i. Next In First Out (NIFO) Method
- j. Highest In First Out (HIFO) Method

According to Nepal Accounting Standard, following requirement was issued for cost formula:

- a. The cost of inventories of items that are not ordinarily interchangeable and goods and services produced and segregated for specific projects should be assigned by using specific identification of their individual costs.

- b. The cost of inventories, other than above should be assigned by using the FIFO or weighted average cost formula.
- c. Alternatively, by using the LIFO formula.

### **2.1.6 Inventory Control and Techniques**

Inventory control means regulating inventories by accounting and physical method. It can be defined as the system used in the firm to control the firm's investment in stock. This includes monitoring of stock levels, deciding when and how to order. Inventory control is very essential in every organization; there should be a good inventory policy and controls. The set of policies and controls refer the inventory system of the organization.

Inventory control may be defined as planning, ordering and scheduling of materials used in the manufacturing process. It is possible to exercise control over the three types of inventories recognized by accountants i.e. raw materials, work in process, and finished goods (Gupta, 1989).

The purpose of inventory control is the stock of an adequate balanced inventory of material and to reduce storage and handling costs, obsolescence and deterioration costs, insurance and interest charges and risk of price level changes. Hence the overall objective of inventory control is to minimize, in total, the costs associated with stock.

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

#### **1. Re-Order Level (ROL)**

It is the point at which the storekeeper should initiate purchase requisition for fresh supply. Whenever an item of stock touches the re-order level, the purchase procedure is automatically activated so that fresh stock can be procured in time. Re-order level depends upon the lead time, rate of consumption an economic order quantity.

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 place the order the inventory reaches the reorder point, the new goods will arrive before the firm runs out of goods to sell (Hampton, 1986).

In other words, the level of inventory at which a reorder should be placed is known as re order point. The reorder point depends on lead time and safety stock. It is calculated by using the following equation.

Re-order point =

$$\text{Safety stock} + \text{Lead time} * \text{Average consumption} - \text{Goods in transit}$$

## 2. Economic Order Quantity (EOQ)

Economic Order Quantity is that quantity for which the total cost is minimizes. In determining Economic Order Quantity, it is assumed that the cost of managing an inventory is made up solely of two parts; ordering cost and carrying cost. These two costs react against each other for changes in order size. As the order size increases, the total carrying cost increase but the total ordering costs decreases. If the order size decreases, the total carrying cost decrease but the total ordering costs increases. The minimum total cost occurs when total carrying coat equal the ordering cost. Hence Economic Order Quantity can be computed by using the formula below:

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

Where,

A= annual quantity used in units

O= average annual cost of placing on order

C=annual carrying cost of carrying one unit in inventory for one year.

(e.g.: storage, insurance, return on investment in inventory)

## 3. Selective Inventory Control

Take care of the forest, the tree will take care of itself should be the motto of an inventory controller. Classification of inventory can help in effective control i.e. concentrating on items which are most important as it is difficult to give equal

attention to all the items in the inventory. This is also known as 'management by exception' which is a system of identification and communication that signals a manager when and where his attention is preliminary needed. (Goel, 1995)

**Table 2.1: Selected Inventory Control Exhibit**

<b>Title</b>	<b>Basis</b>	<b>Main Uses</b>
ABC (always better control)	Value of Consumption	To control raw material components and work in progress inventories in the normal course of business.
HML (High, Medium, Low)	Unit price of the material	Mainly to control purchases
XYZ	Value of items in storage	To review the inventories and their uses at scheduled intervals
VED (Vital, Essential, Desirable)	Critically of the component	To determine the stocking levels of spare parts.
FSN (Fast moving, Slow moving, Non-moving)	Consumption pattern of the component	To control obsolescence
SDE (Scare, difficult, easy to obtain)	Problems faced in procurement	Lead time analysis and purchasing strategies
GOLF (Government, Ordinary, Local, Foreign)	Source of the material	Procurement strategies
SOS (Seasonal, Off-seasonal)	Nature of supplies	Procurement/ holding strategies for seasonal items like agricultural products.

## **2.1.7 Dependent Demand Inventory System**

### **2.1.7.1 Material Requirement Planning (MRP):**

Material Requirements Planning is software based production planning and inventory control system used to manage manufacturing processes. Although it is not common nowadays, it is possible to conduct MRP by hand as well. An MRP system is intended to simultaneously meet 3 objectives:

- a. Ensure materials and products are available for production and delivery to customers.
- b. Maintain the lowest possible level of inventory.
- c. Plan manufacturing activities, delivery schedules and purchasing activities.

All manufacturing organizations, whatever it is they produce, face the same daily practical problem - that customers want products to be available in a shorter time than it takes to make them. This means that some level of planning is required.

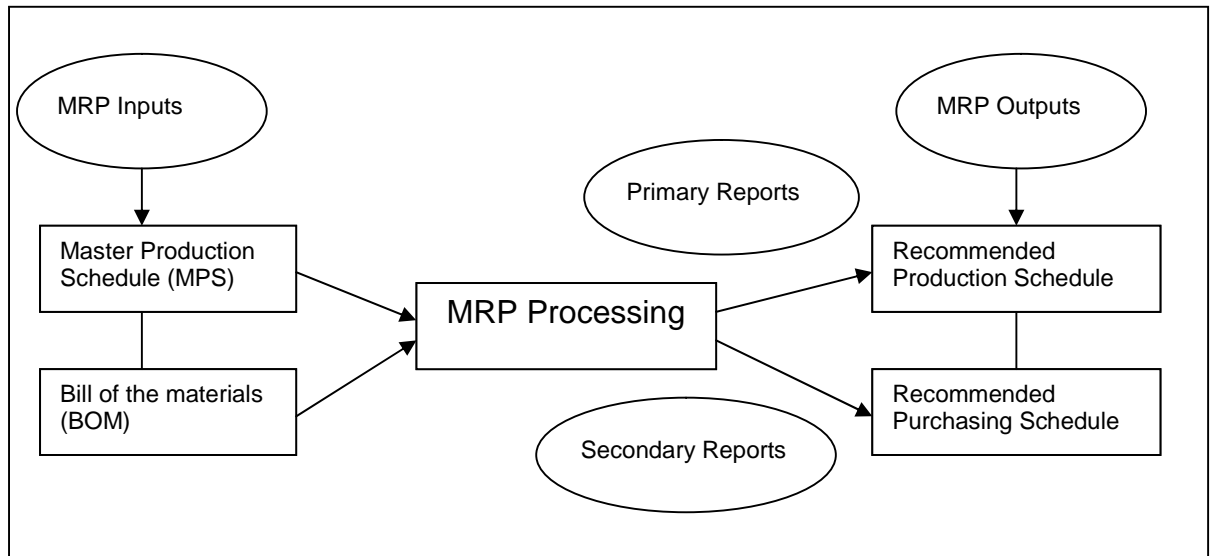
Companies need to control the types and quantities of materials they purchase, plan which products are to be produced and in what quantities and ensure that they are able to meet current and future customer demand, all at the lowest possible cost. Making a bad decision in any of these areas will lose the company money. A few examples are given below:

- ⇒ If a company purchases insufficient quantities of an item used in manufacturing, or the wrong item, they may be unable to meet contracts to supply products by the agreed date.
- ⇒ If a company purchases excessive quantities of an item, money is being wasted - the excess quantity ties up cash while it remains as stock and may never even be used at all. This is a particularly severe problem for food manufacturers and companies with very short product life cycles. However, some purchased items will have a minimum quantity that must be met, therefore, purchasing excess is necessary.
- ⇒ Beginning production of an order at the wrong time can mean customer deadlines being missed.

MRP is used by many organizations as a tool to deal with these problems. The questions it provides answers for are: WHAT items are required, HOW MANY are required and WHEN are they required by. This applies to items that are bought in and to sub-assemblies that go into more complex items.



**Figure 2.2: MRP System**



### **Inputs**

- ⇒ *MPS and Planning Data*: This includes all the restraints and directions to produce the end items. This includes such items as: Routings, Labor and Machine Standards, Pull/Work Cell and Push commands, Lot sizing technique(s) (i.e. Fixed Lot Size, Lot-For-Lot, and Economic Order Quantity), Scrap Percentages, and other inputs.
- ⇒ *Bills of materials*: Details of the materials, components and subassemblies required to make each product.

### **Outputs**

There are only two (2) outputs and a variety of messages/ reports.

*Output 1* is the "Recommended Production Schedule" which lays out a detailed schedule of the required minimum start and completion dates, with quantities, for each step of the Routing and Bill of Material required satisfying the demand from the MPS.

*Output 2* is the "Recommended Purchasing Schedule". This lays out the dates that the purchased items should be both received into the facility and the date(s) the Purchase orders, or Blanket Order Release should occur to match the production schedules.

### **2.1.7.2 Manufacturing Resources Planning and Implementation (MRP-II)**

Around 1980, over-frequent changes in sales forecasts, entailing continual readjustments in production, as well as the unsuitability of the parameters fixed by the system, led MRP (Material Requirement Planning) to evolve into a new concept called Manufacturing Resource Planning (MRP-II).

Manufacturing Resource Planning (MRP II) is defined by APICS as a method for the effective planning of all resources of a manufacturing company. Ideally, it addresses operational planning in units, financial planning in dollars, and has a simulation capability to answer "what-if" questions and extension of closed-loop MRP. This is not exclusively a software function, but a marriage of people skills, dedication to data base accuracy, and computer resources. It is a total company management concept for using human resources more productively.

MRP II integrates many areas of the manufacturing enterprise into a single entity for planning and control purposes, from board level to operative and from five-year plan to individual shop-floor operation. It builds on closed-loop Material Requirements Planning (MRP) by adopting the feedback principle but extending it to additional areas of the enterprise, primarily manufacturing-related.

MRP II is not a proprietary software system and can thus take many forms. It is almost impossible to visualize an MRP II system that does not use a computer, but an MRP II system can be based on either purchased or in-house software. Almost every MRP II system is modular in construction. Characteristic basic modules in an MRP II system are:

- a. Master Production Scheduling (MPS)
- b. Item Master Data (Technical Data)
- c. Bill of Materials (BOM) (Technical Data)
- d. Production Resources Data (Manufacturing Technical Data)
- e. Inventories & Orders (Inventory Control)
- f. Purchasing Management
- g. Material Requirements Planning (MRP)
- h. Shop Floor Control (SFC)
- i. Capacity Requirements Planning (CRP)

- j. Standard Costing (Cost Control)
- k. Cost Reporting / Management (Cost Control)
- l. Distribution Resource Planning (DRP)

The MRP II system integrates these modules together so that they use common data and freely exchange information, in a model of how a manufacturing enterprise should and can operate. The MRP II approach is therefore very different from the “point solution” approach, where individual systems are deployed to help a company plan, control or manage a specific activity. MRP II is by definition fully integrated or at least fully interfaced.

- a. Better control of inventories
- b. Improved scheduling
- c. Productive relationships with suppliers

For Financial and Costing:

- a. Reduced working capital for inventory
- b. Improved cash flow through quicker deliveries
- c. Accurate inventory records
- d. Timely and valid cost and profitability information

### **2.1.7.3 Just In Time (JIT)**

Just in Time is an inventory strategy implemented to improve the return on investment of a business by reducing in-process inventory and its associated costs. The process is driven by a series of signals, or Kanban, that tell production processes when to make the next part. Kanban are usually ‘tickets’ but can be simple visual signals, such as the presence or absence of a part on a shelf. When implemented correctly, JIT can lead to dramatic improvements in a manufacturing organization’s return on investment, quality, and efficiency.

The aim of JIT purchase is the elimination of wastage from all parts of the manufacturing process, from product design to product delivery. The implementation of JIT philosophy requires a major cultural change of companies, all employees needed to be involved in a process of continued improvement. JIT purchase assumes the following conditions:

- a. The suppliers must be reliable and there should be confidence for making delivery on time.
- b. There should be guarantee for supplying cent-percent qualitative supplies.

New stock is ordered when stock drops to the re-order level. This saves warehouse space and costs. However, one drawback of the JIT system is that the re-order level is determined by historical demand. If demand rises above the historical average demand, the firm will deplete inventory faster than usual and cause customer service issues. To meet a 95% service rate a firm must carry about 3 standard deviations of demand in safety stock. Forecasted shifts in demand should be planned for around the Kanban until trends can be established to reset the appropriate Kanban level. Others have suggested that recycling Kanban faster can also help flex the system by as much as 10-30%. In recent years manufacturers have touted a trailing 13 week average as a better predictor than most forecasters could provide.

## **2.2 REVIEW OF RELATED STUDIES**

Inventories and Purchase planning is the major aspects of general management in any organization. Without any effective and efficient planning of inventories and purchases, no organization can achieve its goal. Even though many organization seems to lack these planning seriously. There are many techniques to plan material purchases and inventories.

In the article of Ammer argues that materials management offers an important opportunity for many companies, and that the profit center approach in particular could make this policy an important contributor to corporate earnings. During the stages covered by materials management, value by distribution is added and capital is tied up. In principle, therefore, materials managers should change a price that gives them a reasonable return on the capital employed.

Of course, materials management doesn't possess the enormous potentials of manufacturing and marketing, usually no more than 10% for a company's assets are associated with materials (as compared with up to 70% in manufacturing and

up to 20% in the finished goods inventories associated with marketing). Nevertheless, it is an important function in the typical corporation, and its improvement could be a significant factor indeed in the struggle for improved earnings.

Ammer had also described the current approaches to materials management. In the first approach he described of others view, in which materials manager is made responsible for inventory of work in progress and finished product in addition of raw materials. Under this jurisdiction are the purchasing, production and inventory control, and traffic departments as well as such secondary activities as shipping receiving, non-production stores, and materials handling.

The secondary approach, as also agreed by him takes a more limited view of materials management process. Ammer believed that the materials managers line of responsibilities begins with selection of suppliers and ends when purchased materials is delivered to its point of use, the materials managers should be the most important voice in reaching decisions in purchasing questions or on raw material inventory levels. However, his role is more passive in determining manufacturing lot size and the right inventory investment in finished goods.

The author pointed the following leading advantages that can be gained by adopting materials management in an organization.

- a. Forced cooperation between purchasing and production control,
- b. Tighter inventory control,
- c. Efficiency in coordination &
- d. Better communication.

With heading 'why not a profit center?', Ammer tried to point out for materials management stated that top management should be only secondarily interested in the cost of operating its materials activities but its primary concern should be contributed to profit. The integrated materials management activity need no longer be treated as a cost center whose contribution is measured (in part, at

least) by whether or not it keeps other departments happy. The integrated materials management organization satisfies three out of four basic criteria for a profit center- it employs capital; it incurs cost, and it adds value by distribution. Just one basic criterion is missing in the typical company pricing. However, this lack is not terribly serious. It can be remedied just as it has been in the case of the conventional profit centers that produce differentiated products for internal corporate customers. (Dean, 1969)

Finally, reasons for rejection for adopting materials management, ground rules for running the new system of materials management, reduction of the disadvantages, inertia for overcoming the barriers for adoption of the materials management concept, etc. are presented by the Ammer in a very practical way.

In Nepal, there are numbers of public manufacturing enterprises have been established and analysis had been made but only the aspect of individual performance and financial analysis. Hence, this thesis will be mainly focused in five selected manufacturing public enterprises. However, the overall scenario of Nepalese manufacturing public enterprise will be drawn based on review of previous studies. So researches made on the inventory management and purchases planning of some public manufacturing enterprises are reviewed and their findings have been listed.

Ranjit in his thesis concluded that fluctuation in recovery rate of sugarcane had made impact upon the production, procurement and operations of the company. Capacity utilization seems very low and still forced to import sugarcane from India. Procurement of sugarcane was fluctuating due to unconsciousness of capacity and production of sugarcane of the Parsa area couldn't be able to meet the company's requirement. Return should be analyzed while investing capital for raw materials by using tools like capital budgeting or cost benefit analysis. Higher attention and research should be prolonged with sufficient amount of budget with it. (Rinjit, 2007)

The materials collection of the factory is satisfactory but production and sales of product (shoes) have no consistency due to lack of planned target on production.

Materials handling and control system is poor and the supply of material is not consistent. Inventories were also increasing than required. Inventory valuation should be done at cost price not at market price and accounting records of materials should be properly maintained. Improvement in all other systems should be made to improve materials management system (Pyakurel, 2004).

The composition of raw material inventory was much higher than other stocks of total inventory. Investment in chemical material inventory was more than other stocks of raw material in the case study of Royal Drug Ltd. (Shrestha, 2008)

In a study of Inventory Management in Hetauda Cement Industries Limited it is found that no determination of maximum, minimum and danger stock level; no use of scientific techniques regarding inventory management system. She suggested the company to coordinate between procurement department and other department, to fill the gap between annual needs and annual production to use full capacity and to use different tools like EOQ, ABC analysis, reorder level stock, sub system regarding inventory management. (Balika, 2005)

Similarly in a case study of Janakpur Cigarette factory it seems that purchases of raw material are made from India and abroad, high consumption of Indian tobacco than Nepali tobacco. He also suggested that the company for uniformity between cost and selling price realistic budget for purchasing and production, not to depend to India for raw material and not to overstock raw material, finished products. (Pokharel, 2008)

Whereas in a case study of Salt Trading Corporation Limited, Tiwari concluded that the sales of corporation are fluctuating from year to year due to lack of proper purchasing plan on the basis of realistic market studies. Product purchase planning of Salt Trading Corporation is not realistic. This is because the procurement of different products each year in fluctuating. So there must be a realistic and comprehensive purchasing plan in the corporation. It must follow the EOQ Model in its purchasing decision. (Tiwari, 2009)

From the above study it is clear that the Nepalese Enterprises are facing various problems in materials and inventory management. Many enterprises seem to be ignoring the importance of materials and inventory management. Hence, this thesis will be mainly focused on the problems faced by the Nepalese Public Manufacturing Enterprises in inventory management and purchase planning.

### **2.3 RESEARCH GAP**

No research works were found during this research period on similar case study. Most of the researches were done of individual organization. Hence, the primary aim of this research work is to present the major problems in the existing material and inventory management system of Nepalese manufacturing public enterprises in average.



## **CHAPTER – 3**

### **RESEARCH METHODOLOGY**

This chapter refers to the overall approach to the research process, from the theoretical under printing to the collection and analysis of data. As most of the data are quantitative, the research is based on scientific methods. It is composed of both part of technical aspect and logical aspect. On the basis of historical data, using both financial and statistical tools performs detail analysis of different variables. Results are presented in simple way. Detail research methods are described in following headings:

#### **3.1 RESEARCH DESIGN**

The research is based on the historical data that are collected from secondary sources. It covers five years period from fiscal year 2061/62 to fiscal year 2065/66 B.S. Data of fiscal year 2065/66 B.S. are unavailable due to incomplete auditing. During the research period, it is found that most of the public manufacturing enterprises are unsuccessful in finishing their auditing in the time.

The research are mostly focused on the sales & distribution, production, inventory position, inventory turnover ratio, and material purchase techniques etc. of public manufacturing enterprises on the basis of available information. As the title of research suggest, it is more analytical, empirical and less descriptive. Analytical in the sense, that the available data are analyzed by using various statistical tools and techniques such as mean, co-relation coefficient, regression coefficient etc.

#### **3.2 POPULATION AND SAMPLING PROCEDURE**

As on mid January 2009, there are 21 public manufacturing and processing companies that are listed in NEPSE and out of them only five public manufacturing and processing companies that are taken as sample which is 23.81% of population. The five selected companies are as below:

1. Unilever Nepal Ltd.,
2. Gorakhkali Rubber Udhdyog Ltd.,
3. Nepal Lube Oil Ltd.,
4. Bottlers Nepal (Balaju) Ltd., and
5. Nepal Bitumin & Barrel Udhdyog.

### 3.3 DATA COLLECTION TECHNIQUES

Most of the data are collected from secondary sources in a convenience sampling method. Most of the secondary data are collected from the annual report of the selected organization, previous studies, published and unpublished official records, financial statements (i.e. Balance Sheet and Profit/Loss Account) and the websites. Primary information's are collected through the observation and informal meeting with managers, accountants and staffs of concerned companies.

### 3.4 DATA ANALYSIS TOOLS

In order to achieve the organizational goal, there is a need of effective and efficient inventory management system in the organization because inventory management is the most important aspect of the general management. To achieve the findings of the study the collected data will be presented and analyzed in different suitable tables and graphs. Percentage, index, Mean, and correlation and regression analysis are used as the statistical tools; Ratio analysis will be used as the financial tool to achieve the objectives of the study.

1. **Annual Change:** Among the various major data of the study, annual change (in %) is the most important. Annual change is used in term of percentage to compare the inventory position and predict the total inventory for next following year. Basically, in terms of data of previous years and data of following year are computed to find the annual rate of changes. It is also used in ratio analysis to compare the annual changes in inventory turnover ratio.

$$\text{Annual change} = 100\% - \frac{P_0}{P_1} \times 100\% \quad \text{Where, } P_1 = \text{Price in the current year}$$

P0 = Price in the last year

2. **Index Number:** Index numbers are an indicator which reflects the relative changes in the level of certain phenomenon in any given period (or over a specified period of time) called the current period with respect to its values in some fixed period, called the base period selected for comparison. As a measure of average change in extensive group, the index number can be used to forecast future events. Generally, index numbers are derived by using following formula:

Symbolically,

$$I = \frac{C1}{C0} * 100$$

Where, I = Index Number

C1 = Cost of inventory in the current year

C0 = Cost of inventory in the base year

3. **Mean ( $\bar{x}$ ):** Mean is also referred as average. Averages are the typical values around which other items of the distribution congregate. They are the value which lies between the two extreme observations.

An average is a single value selected from a group of values to represents them in some way, a value which is supposed to stand for whole group of which it is part, as typical of all the values in the group. (Waugh, 1952)

Mean of given set of observations is their sum divided by the number of observations.

Symbolically,  $\bar{x} = \frac{\sum x}{n}$

Where,  $\bar{x}$  = mean

x = the sum of the observations

N = the total frequency

4. **Correlation Coefficient (r):** The correlation is a statistical tool which studies the relationship between two variables. The correlation coefficient can take on value ranging from -1 to +1. Correlation between two variables can be obtained from following equation.

$$r = \frac{n \sum uv - \sum u \sum v}{\sqrt{[n \sum u^2 - (\sum u)^2][n \sum v^2 - (\sum v)^2]}}$$

Where,

n = number of observations

u = x – A            where, assume A = mean of x

v = y – B            assume B = mean of y

r = correlation coefficient

- a. Perfect positive correlation (r = +1): Positive values of r indicate positive relation between the two variables. The changes in both variables take place in the same direction (i.e. there is direct relationship between two variables). E.g. If the sales increases that leads to increase in purchase of raw materials.
- b. Perfect negative correlation (r = -1): Negative value of r indicates negative correlation. The changes in two variables take place in the opposite directions (i.e. there is indirect relationship between two variables). Such condition occurs, when purchase of raw material increases but the sales remain constant which lead to increase in unnecessary inventory. It is only applicable when cost of raw materials is about to increase or in case of scarcity of raw materials.
- c. No relationship (r = 0): A zero value of r indicates that there is no association between the two variables. These kinds of case are only visible in the absence of planned inventory.

5. **Inventory Turnover Ratio:** The efficient of the management can be measured by the ratio analysis. The inventory ratio analysis of any organization helps us to know the efficiency of management of finished goods stock. Inventory ratio is found out to know the rate turnover of stock. This ratio measures turnover of stock in terms of time. Higher the turnover ratios, better the efficiency. There are two methods of measuring inventory turnover ratio. The inventory turnover can be calculated either by relating sales to closing inventory or by relating cost of goods sold to average inventory. Cost of goods is calculated by subtracting closing stock from the total of purchase and opening inventory. Formula to calculate inventory turnover ratio are as follows.

$$\begin{aligned} \text{Inventory turnover ratio} &= \frac{\text{Cost of goods sold}}{\text{Average inventory}} \\ &\text{(OR)} \\ &= \frac{\text{Sales}}{\text{Closing Inventory}} \end{aligned}$$

## **CHAPTER – 4**

### **DATA PRESENTATION AND ANALYSIS**

This chapter is the major part of the study and holds the main important places in the entire research. This chapter deals with analysis of data collected and their presentation with interpretation using different tools and techniques of analysis. In this chapter effort has been made to analyze planning and management techniques of inventory and purchases of materials in public manufacturing enterprises of Nepal. The analysis of data consists of organizing, tabulating and assessing financial and statistical result. Tables and diagrams are listed to make the result more simple and understandable with reference to the various readings and review of literature.

#### **4.1 DATA ANALYSIS OF INDIVIDUAL COMPANIES**

As per the Annual Report 2008/2009 of Securities Board, Nepal there are altogether 21 manufacturing and processing companies that are listed in NEPSE. Since the study is concentrated on the inventories and purchases of materials of the public manufacturing enterprises, analyses are done separately.

##### **4.1.1 Unilever Nepal Limited**

Unilever Nepal Limited was established in 1994 as a joint venture company with an objective of establishing a factory to manufacture soaps, detergents, cosmetics, toiletries, oleaginous, saponaceous, unguents and other chemical products under the brand name of the products of Hindustan Unilever Limited. Hindustan Unilever Limited with 80% ownership has invested Rs. 73.7 million in equity. This is the first Joint Venture of Hindustan Unilever Limited outside India.

<b>Performance View</b>	<i>Current Year</i>	<i>Last Year</i>
Authorized Capital	300,000,000	300,000,000
Issued & Paid Up Capital	92,070,000	92,070,000
Sales	1,469,685,740	1,484,894,595
Profit (Loss)	132,844,802	124,863,295
Current Assets	741,606,265	891,414,671
Fixed Assets	145,776,135	127,776,972

(Source: Annual Reports of Unilever Nepal Ltd, 2009)

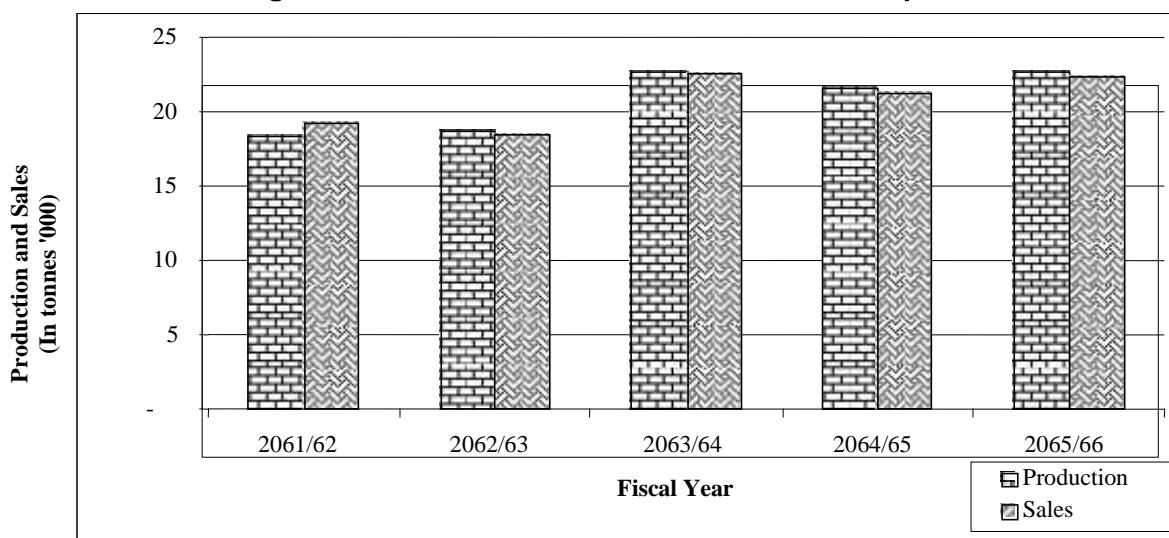
#### 4.1.1.1 Production and Sales

Production and Sales records of Unilever Nepal Limited are shown below in Table 4.1.

**Table 4.1: Production and Sales of Unilever Nepal Ltd.**

<b>Year</b>	<b>Production Units</b> <i>(in tones '000)</i>	<b>Sales Units</b> <i>(in tones '000)</i>	<b>Profit</b> <i>(in Rs. '000)</i>
2061/62	18,382	19,236	256,055
2062/63	18,802	18,533	266,359
2063/64	22,781	22,624	303,944
2064/65	21,644	21,232	124,863
2065/66	22,806	22,409	132,844

**Figure 4.1: Production and Sales of Unilever Nepal Ltd.**



The above table and graph shows production and sales (in units) situation of Unilever Nepal Limited from the fiscal years 2061/62 to 2065/66. From the analysis it is found that the production and sales of Unilever products decreased

in the second year but later in fiscal year 2063/64 it raised to the highest point. In the fiscal year 2064/65 it did decreased little bit but in overall productions and sales (in units) of Unilever Nepal limited seems stable. It is also clear that the highest production in the year 2063/64 and the highest sales in the year 2065/66.

Comparing with its profits, demand for the products of UNL is increasing each year due to its product strategy rather than the marketing strategy or its management. Production units are increased as per to meet the future demand. Purchase and Inventory materials and semi finished product are maintained on the basis of future demand.

#### 4.1.1.2 Material Inventory Position

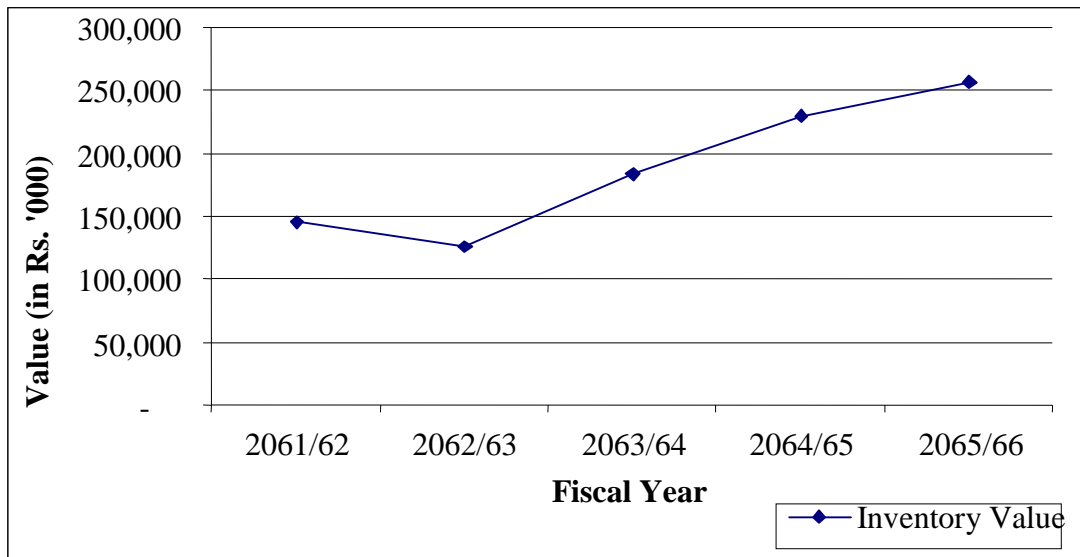
Inventory positions are always essential in manufacturing enterprises because it helps to determine the planned production and sales. In the table 4.2, the sum of inventory value and annual changes are presented to display the inventory position of Unilever Nepal Limited.

**Table 4.2: Material Inventory Position of Unilever Nepal Ltd.**

<b>Fiscal Year</b>	<b>Value</b> <i>(in Rs. '000)</i>	<b>Annual Change (%)</b>	<b>Index</b>
2061/62	144,447	-	100
2062/63	126,107	(12.70)	87.30
2063/64	184,215	58.78	146.08
2064/65	229,764	(21.35)	124.73
2065/66	256,167	(13.23)	111.49



**Figure 4.2: Material Inventory Position of Unilever Nepal Ltd.**



The table and graph above presents the inventory position and the annual changes (in percentage) of the Unilever Nepal Limited for fiscal year 2061/62 to 2065/66. The values in the table show the sum of materials inventory. From the above analysis we know that the investment in the inventory of Unilever Nepal Limited is in huge amount. It is increasing except the fiscal years 2062/63, 2064/65 and 2065/66. A huge increase in the investment on inventory stock is in the fiscal year 2063/64. The above result may be the outcome of the future demand of the products. The rising of the stock is due to increasing demand in market.

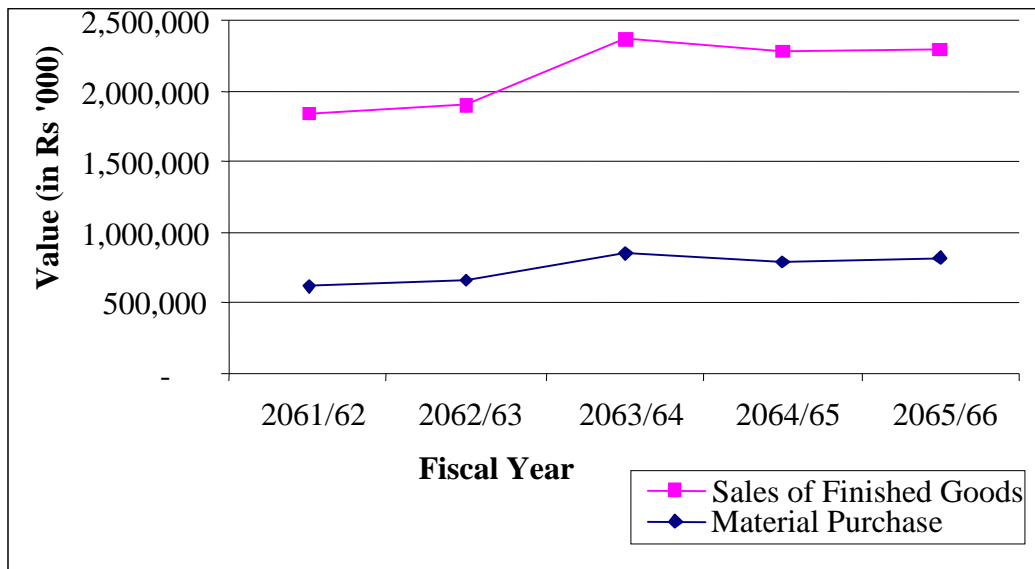
#### **4.1.1.3 Purchase of Raw Materials**

Purchases of raw materials are made on the planned production, inventory level and the planned sales. Since the data on planned production and sales are not available, it is compared on the basis of actual production and sales of the previous corresponding years. On the basis of last five years data, purchase and sales of Unilever Nepal Limited are shown in table 4.3 to figure out the relationship between them.

**Table 4.3: Purchase of Raw Materials of Unilever Nepal Ltd.**

<b>Fiscal Year</b>	<b>Material Purchase</b> <i>(in Rs. '000)</i>	<b>Sales Value</b> <i>(in Rs. '000)</i>
2061/62	610,331	1,236,052
2062/63	651,696	1,244,727
2063/64	841,483	1,524,901
2064/65	792,173	1,484,894
2065/66	824,086	1,469,685

**Figure 4.3: Purchase of Raw Materials of Unilever Nepal Ltd.**



The table and graph above presents the sales and cost of materials for the last five years from 2061/62 to 2065/66. For simplicity the sales and cost of materials is shown in total. Arithmetic mean and Karl Pearson's coefficient of correlation has been computed to measure the average and degree of relationship between sales and cost materials purchased are shown in Appendix 1.

The average sales and cost of five fiscal years are Rs. 743954 and Rs. 1392052 respectively. The coefficient of correlation ( $r$ ) between sales and cost of materials purchased of Unilever Nepal Limited is 0.98252. This indicates perfect positive correlation between them. And the tabulated value probable error is 0.01043 which is 94.20134 times lower than the computed value of correlation ( $r$ ). Therefore, the value of  $r$  is highly significant. The fact indicates good situation of the Unilever Nepal Limited. It proves that significant correlation between sales

and cost trend of materials purchase of Unilever Nepal Limited. In such cases, production increases as the sales increases and vice versa.

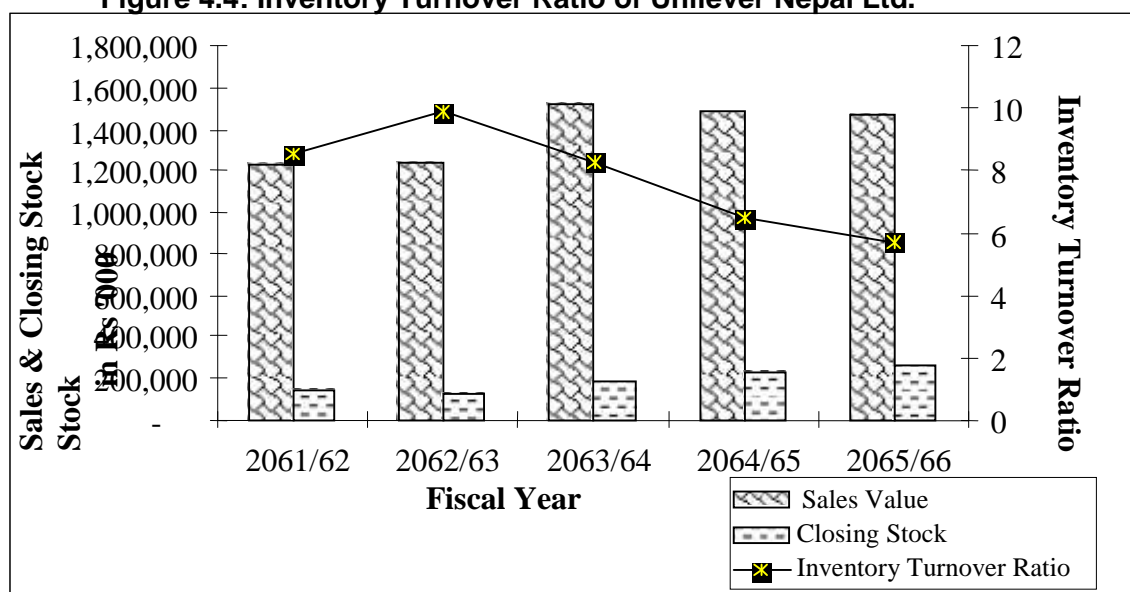
#### 4.1.1.4 Ratio Analysis

The inventory ratio analysis of any organization helps us to know the efficiency of management of finished goods stock. Inventory ratio is found out to know the rate turnover of stock. This ratio measures turnover of stock in terms of time. Higher the turnover ratios, better the efficiency. The inventory turnover can be calculated by relating sales to closing inventory or by relating cost of goods sold to average inventory.

**Table 4.4: Inventory Turnover Ratio of Unilever Nepal Ltd.**

Fiscal Year	Sales Value (in Rs. '000)	Closing Stock (in Rs. '000)	Inventory Turnover Ratio	Annual Change
2061/62	1,236,052	144,447	8.5571	-
2062/63	1,244,727	126,107	9.8704	15.35
2063/64	1,524,901	184,215	8.2778	(31.48)
2064/65	1,484,894	229,764	6.4626	(5.79)
2065/66	1,469,685	256,167	5.73721	10.70

**Figure 4.4: Inventory Turnover Ratio of Unilever Nepal Ltd.**



The table and graph above shows the calculation of inventory turnover ratio of the Unilever Nepal Limited for the last five fiscal years from 2061/62 to 2065/66. From the above analysis it is found that the inventory turnover ratio is not stable. The highest turnover ratio is in the fiscal year 2062/63. And the lowest turnover ratio is in the fiscal year 2065/66. Also, the Karl Pearson's coefficient of correlation (r) between sales and closing stock of finished goods has been computed from the above table no. 4.4 to measure the degree of relationship between them. The computation is presented in Appendix 6.

The coefficient of correlation (r) between the sales and closing stock of finished goods of Unilever Nepal Limited is 0.80095, which shows the perfect positive correlation. The probable error is 0.10795 and the value of r is 7.41964 times higher than this. Therefore, the relationship between sales and closing stock of finished goods of Unilever Nepal Limited is significant i.e. closing stocks are made on the basis of sales of previous year.

#### 4.1.2 Gorakhkali Rubber Udhog Limited

Gorakhkali Rubber Udyog Limited was incorporated in 1984 under the company act, 1964 with an objective of manufacturing tire and tube of various types of trucks, buses, cars, Jeeps, Motorcycles and other vehicles and market them in and outside the company, Nepal Oil Corporation, National trading Limited, NIDC, Salt Trading Corporation are the main promoters and is managed by Salt Trading Corporation. Asian Development Bank is also holding 13% equity in the company.

<b>Performance View:</b>	<i>Current Year</i>	<i>Last Year</i>
Authorized Capital	699,900,000	699,900,000
Issued Capital	180,000,000	180,000,000
Paid Up Capital	436,155,000	436,155,000
Sales	403,018,359	341,094,345
Profit (Loss)	(785,704,500)	(703,983,619)
Current Assets	225,129,945	224,740,555
Fixed Assets	378,520,773	397,294,620

(Source: Gorakhkali Rubber Udhog Ltd, 2009)

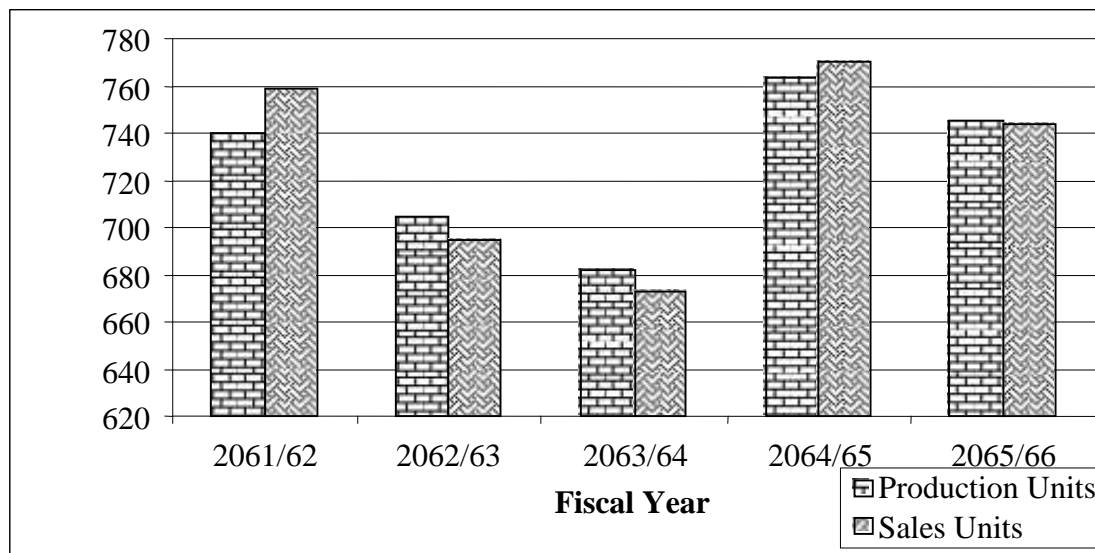
#### 4.1.2.1 Production and Sales

Production and Sales records of Gorakhkali Rubber Udyog are shown below in Table 4.5.

**Table 4.5: Production and Sales of Gorakhkali Rubber Udyog Ltd.**

<b>Year</b>	<b>Production Units</b> <i>(in tones '000)</i>	<b>Sales Units</b> <i>(in tones '000)</i>	<b>Profit</b> <i>(in Rs. '000)</i>
2061/62	740	759	(500,477)
2062/63	704	695	(556,734)
2063/64	682	673	(633,090)
2064/65	764	771	(703,983)
2065/66	745	744	(785,704)

**Figure 4.5: Production and Sales of Gorakhkali Rubber Udyog Ltd.**



The above table and graph shows production and sales (in units) situation of Gorakhkali Rubber Udyog Limited from the fiscal years 2061/62 to 2065/66. From the analysis it is found that the production and sales of rubber tires decreased in the first three years but later in fiscal year 2064/65 it raised to the highest point. In the fiscal year 2065/66 it did decreased to some extent. It is also clear that the highest production and sales were in the year 2064/65 and lowest production and sales were in 2063/64.

As the fluctuation in the trend of sales and production it is difficult to forecast the future demand as a result GRUL has been running in losses for years. Political

and ineffective management strategy has been the major causes for the current condition of GRUL.

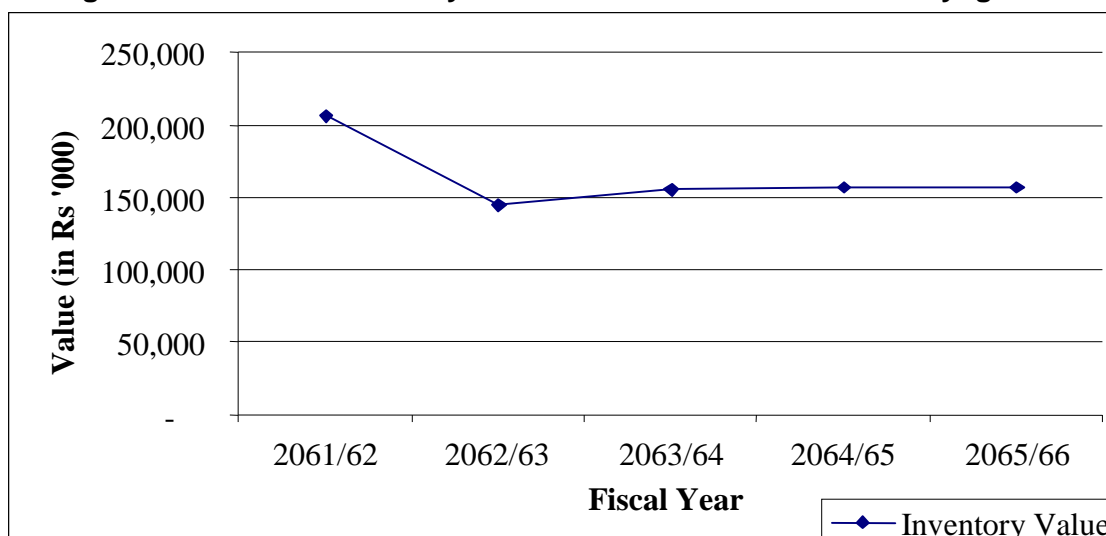
#### 4.1.2.2 Material Inventory Position

Inventory positions are always essential in manufacturing enterprises because it helps to determine the planned production and sales. In the table 4.6, the sum of inventory value and annual changes are presented to display the inventory position of Gorakhkali Rubber Udyog Limited.

**Table 4.6: Material Inventory Position of Gorakhkali Rubber Udyog Ltd.**

<b>Fiscal Year</b>	<b>Value</b> <i>(in Rs. '000)</i>	<b>Annual Change (%)</b>	<b>Index</b>
2061/62	206,634	-	100
2062/63	144,820	(29.91)	70
2063/64	155,364	37.20	107
2064/65	156,365	(6.64)	101
2065/66	157,160	(0.14)	101

**Figure 4.6: Material Inventory Position of Gorakhkali Rubber Udyog Ltd.**



The table and graph above presents the inventory position and the annual changes (in percentage) of the Gorakhkali Rubber Udyog Limited for fiscal year 2061/62 to 2065/66. The values in the table show the sum of materials inventory. From the above analysis we know that the investment in the inventory of Gorakhkali Rubber Udyog Limited is in huge amount. It is increasing except the fiscal years 2062/63, 2064/65 and 2065/66. A huge increase in the investment on

inventory stock is in the fiscal year 2063/64. The above result may be the outcome of the expected increase in sales.

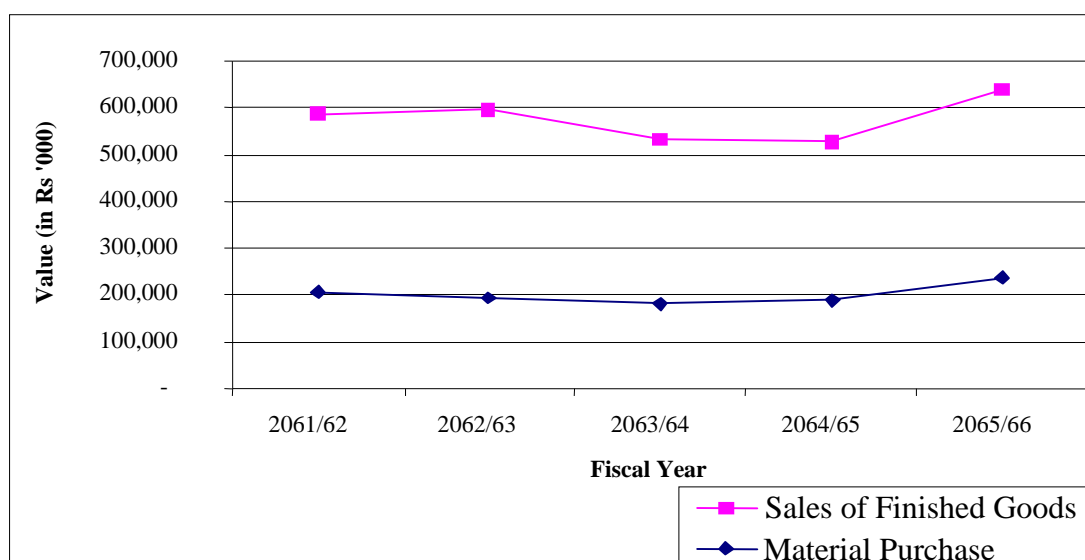
#### 4.1.2.3 Purchase of Raw Material

Purchases of raw materials are made on the planned production, inventory level and the planned sales. Since the data on planned production and sales are not available, it is compared on the basis of actual production and sales of the previous corresponding years. On the basis of last five years data, purchase and sales of Gorakhkali Rubber Udyog Limited are shown in table 4.7 to figure out the relationship between them.

**Table 4.7: Purchase of Raw Materials of Gorakhkali Rubber Udyog Ltd.**

<b>Fiscal Year</b>	<b>Material Purchase</b> <i>(in Rs. '000)</i>	<b>Sales</b> <i>(in Rs. '000)</i>
2061/62	207,984	381,164
2062/63	194,578	400,989
2063/64	178,989	351,620
2064/65	187,664	341,094
2065/66	235,806	403,018

**Figure 4.7: Purchase of Raw Materials of Gorakhkali Rubber Udyog Ltd.**



The table and graph above presents the sales and cost of materials for the last five years from 2061/62 to 2065/66. For simplicity the sales and cost of materials is shown in total. Arithmetic mean and Karl Pearson's coefficient of correlation has been computed to measure the average and degree of relationship between sales and cost materials purchased are shown in Appendix 2.

The average sales and cost of five fiscal years are Rs. 201004 and Rs. 375577 respectively. The coefficient of correlation (r) between sales and cost of materials purchased of Gorakhkali Rubber Udyog Limited is 0.72606. This indicates perfect positive correlation between them. But the tabulated value probable error is 0.14238 which is only 5.09945 times lower than the computed value of correlation (r). Therefore, the value of r is not significant. It proves that there is insignificant correlation between sales and cost trend of materials purchase of Gorakhkali Rubber Udyog Limited.

#### 4.1.2.4 Ratio Analysis

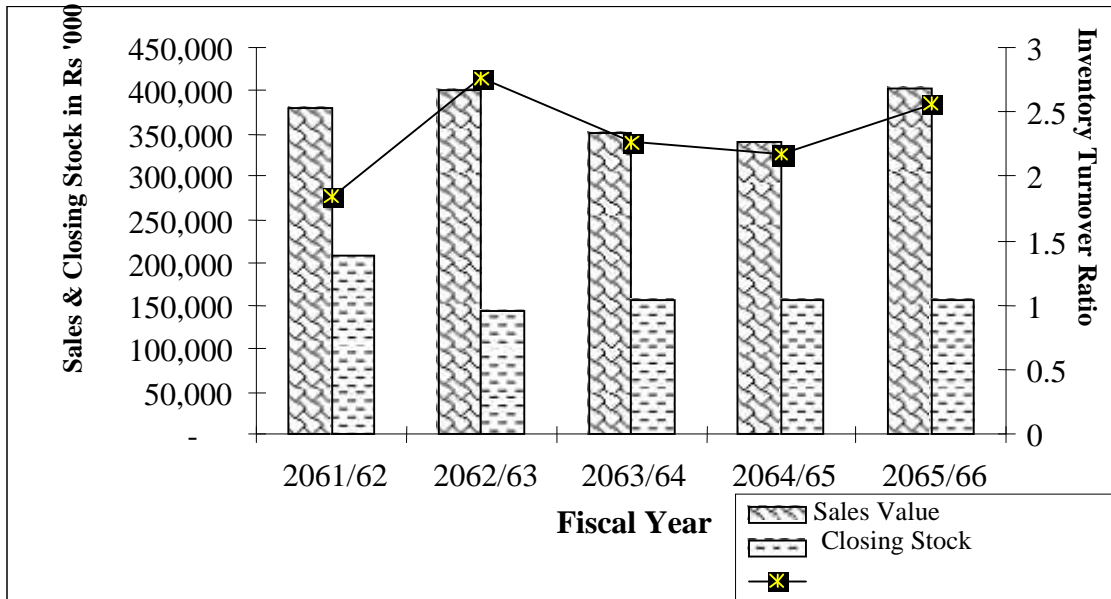
The inventory ratio analysis of any organization helps us to know the efficiency of management of finished goods stock. Inventory ratio is found out to know the rate turnover of stock. This ratio measures turnover of stock in terms of time. Higher the turnover ratios, better the efficiency. The inventory turnover can be calculated by relating sales to closing inventory or by relating cost of goods sold to average inventory.

**Table 4.8: Inventory Turnover Ratio of Gorakhkali Rubber Udyog Ltd.**

<b>Fiscal Year</b>	<b>Sales Value (in Rs. '000)</b>	<b>Closing Stock (in Rs. '000)</b>	<b>Inventory Turnover Ratio</b>	<b>Annual Change</b>
2061/62	381,164	206,634	1.8446	-
2062/63	400,989	144,820	2.7688	50.10
2063/64	351,620	155,364	2.2632	(68.37)
2064/65	341,094	156,365	2.1813	14.65
2065/66	403,018	157,160	2.5643	21.17



**Figure 4.8: Inventory Turnover Ratio of Gorakhkali Rubber Udyog Ltd.**



The table and graph above shows the calculation of inventory turnover ratio of the Gorakhkali Rubber Udyog Limited for the last five fiscal years from 2061/62 to 2065/66. From the above analysis it is found that the inventory turnover ratio is fluctuating year to year. The highest turnover ratio is in the fiscal year 2062/63. And the lowest turnover ratio is in the fiscal year 2061/62.

Also, the Karl Pearson's coefficient of correlation ( $r$ ) between sales and closing stock of finished goods has been computed from the above table no. 4.8 to measure the degree of relationship between them. The computation is presented in Appendix 7.

The coefficient of correlation ( $r$ ) between the sales and closing stock of finished goods of Gorakhkali Rubber Udyog Limited is 0.01211, which shows the perfect positive correlation. The probable error is 0.30107 and the value of  $r$  is not greater than 6 times its P.E. Therefore, the relationship between sales and closing stock of finished goods of Gorakhkali Rubber Udyog Limited is not significant.

### 4.1.3 Nepal Lube Oil Limited

Nepal Lube Oil Limited was established in 1984 as a public sector company under the company act, 1964. The main objective of the company is to produce lubricating oil and process them for the use of automatic machineries and also contribute for the economic development of the country by reducing the import of various lubricating oils. The company was privatized in 1993, in accordance with privatization programme of His Majesty's of Government. The company is managed by ABB Investment (Pvt.) Limited under the leadership of Mr. Arun K. Chaudhary as Managing Director.

<b>Performance View:</b>	<i>Current Year</i>	<i>Last Year</i>
Authorized Capital	50,000,000	50,000,000
Issued Capital	30,000,000	30,000,000
Paid Up Capital	33,672,200	33,672,200
Sales	148,752,321	118,103,607
Profit (Loss)	174,815	3,058,555
Current Assets	130,091,795	110,154,559
Fixed Assets	15,323,263	17,040,802

(Source: Annual Reports of Nepal Lube Oil Ltd, 2009)

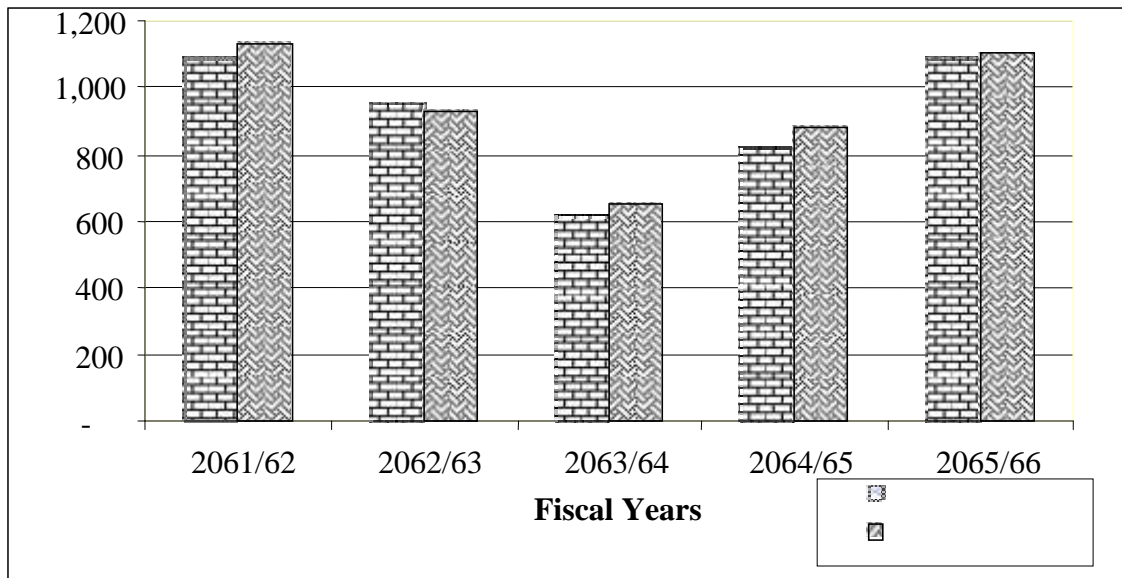
#### 4.1.3.1 Production and Sales

Production and Sales records of Nepal Lube Oil limited are shown below in Table 4.9.

**Table 4.9: Production and Sales of Nepal Lube Oil Ltd**

<b>Year</b>	<b>Production Units</b> <i>(in tones '000)</i>	<b>Sales Units</b> <i>(in tones '000)</i>	<b>Profit</b> <i>(in Rs. '000)</i>
2061/62	1,093,353	1,134,366	3,172
2062/63	955,713	930,025	1,195
2063/64	616,319	651,713	306
2064/65	823,292	884,222	3,058
2065/66	1,094,627	1,101,869	174

**Figure 4.9: Production and Sales of Nepal Lube Oil Ltd  
Production and Sales (in liters '000)**



The above table and graph shows production and sales (in units) situation of Nepal Lube Oil Limited from the fiscal years 2061/62 to 2065/66. From the analysis it is found that the production and sales of Nepal Lube Oil decreased in the first three years but from fiscal year 2064/65 it started to rise onwards. In the fiscal year 2063/64 it did decreased to the lowest point. It is also clear that the highest production and sales were in the year 2061/62 and 2065/66. In the fiscal year 2061/62, 2063/64, 2064/65 and 2065/66 sales units were higher than the productions unit except in 2059/60. From the above graph, it can be concluded that the Production plan of Nepal Lube Oil Limited is not effective. If similar condition keeps continuing then the Nepal Lube Oil Limited will not be able to supply as per the demand which will definitely hamper the sales and the market.

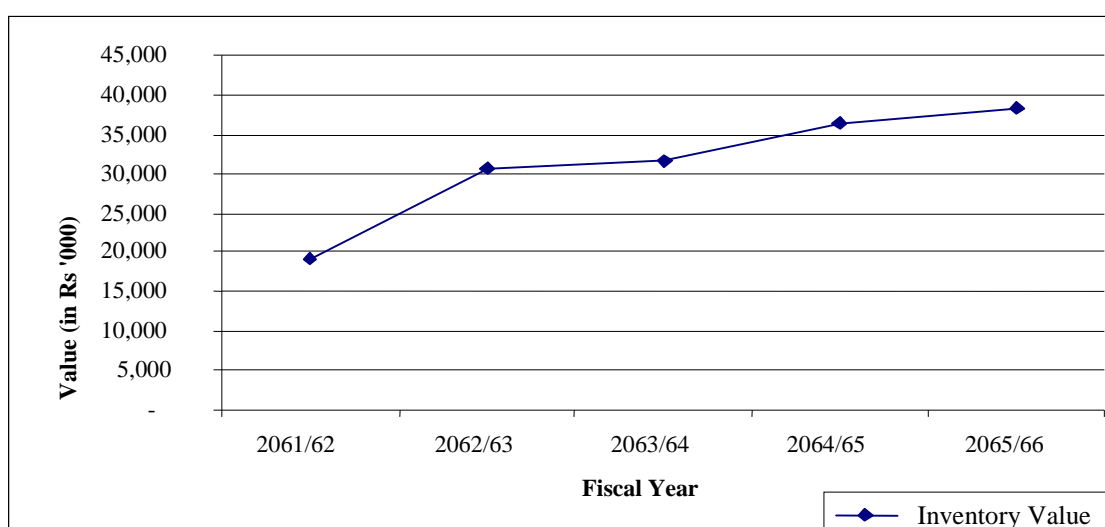
#### **4.1.3.2 Material Inventory Position**

Inventory positions are always essential in manufacturing enterprises because it helps to determine the planned production and sales. In the table 4.10, the sum of inventory value and annual changes are presented to display the inventory position of Nepal Lube Oil Limited.

**Table 4.10: Material Inventory Position of Nepal Lube Oil Ltd**

<b>Fiscal Year</b>	<b>Value</b> <i>(in Rs. '000)</i>	<b>Annual Change (%)</b>	<b>Index</b>
2061/62	19,268	-	100
2062/63	30,569	59	159
2063/64	31,603	(55)	103
2064/65	36,392	12	115
2065/66	38,259	(10)	105

**Figure 4.10: Material Inventory Position of Nepal Lube Oil Ltd**



The table and graph above presents the inventory position and the annual changes (in percentage) of the Nepal Lube Oil Limited for fiscal year 2061/62 to 2065/66. The values in the table show the sum of materials inventory. From the above analysis we know that the investment in the inventory of Nepal Lube Oil Limited is in huge amount. It is increasing except the fiscal years 2063/64 and 2065/66. A huge increase in the investment on inventory stock is in the fiscal year 2061/62. The above result may be the outcome of the decline in sales. The piling up of the stock is growing up due to the non-selling of production.

#### **4.1.3.3 Purchase of Raw Material**

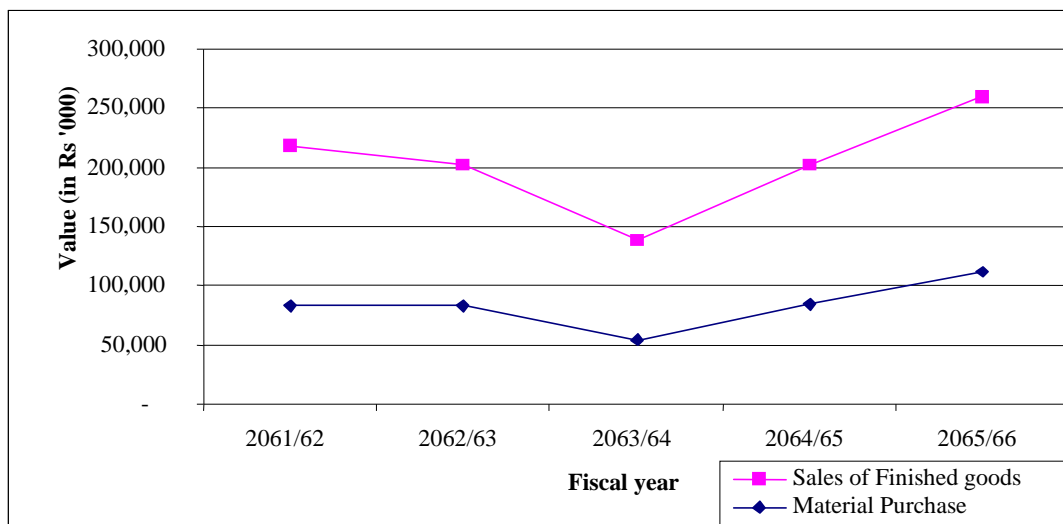
Purchases of raw materials are made on the planned production, inventory level and the planned sales. Since the data on planned production and sales are not available, it is compared on the basis of actual production and sales of the

previous corresponding years. On the basis of last five years data, purchase and sales of Nepal Lube Oil Limited are shown in table 4.11 to figure out the relationship between them.

**Table 4.11: Purchase of Raw Materials of Nepal Lube Oil Ltd**

<b>Fiscal Year</b>	<b>Material Purchase (in Rs. '000)</b>	<b>Sales (in Rs. '000)</b>
2061/62	82,734	136,004
2062/63	82,716	119,151
2063/64	53,917	84,712
2064/65	84,993	118,103
2065/66	111,262	148,752

**Figure 4.11: Purchase of Raw Materials of Nepal Lube Oil Ltd**



The table and graph above presents the sales and cost of materials for the last five years from 2061/62 to 2065/66. For simplicity the sales and cost of materials is shown in total. Arithmetic mean and Karl Pearson's coefficient of correlation has been computed to measure the average and degree of relationship between sales and cost materials purchased are shown in Appendix 3.

The average sales and cost of five fiscal years are Rs83124 and Rs121344 respectively. The coefficient of correlation (r) between sales and cost of materials purchased of Nepal Lube Oil Limited is 0.93518. This indicates perfect positive correlation between them. The tabulated value probable error is 0.03777 which is 24.75986 times lower than the computed value of correlation (r). Therefore, the value of r is highly significant. The fact indicates good situation of the Nepal Lube

Oil Limited. It proves that significant correlation between sales and cost trend of materials purchase of Nepal Lube Oil Limited.

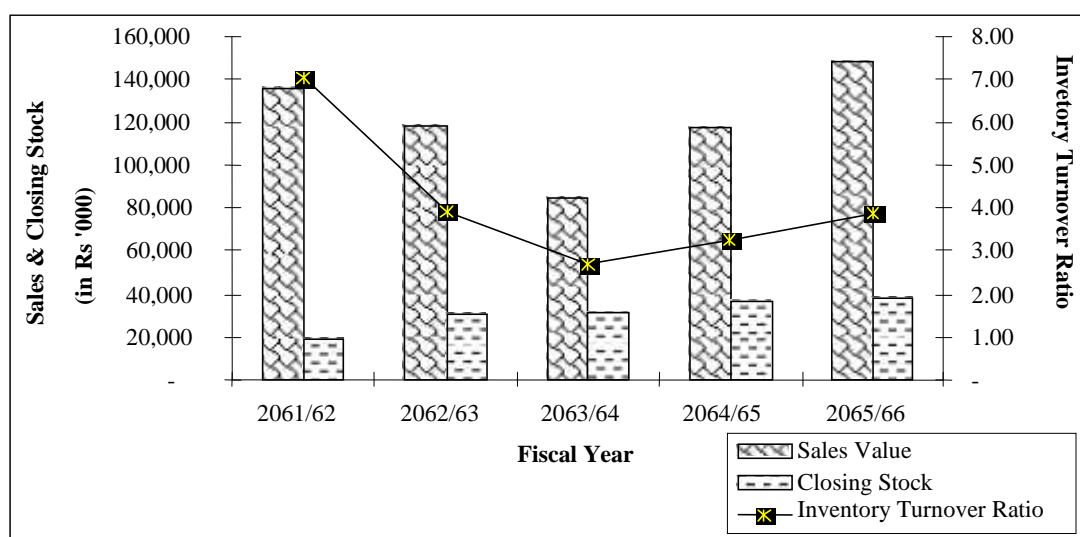
#### 4.1.3.4 Ratio Analysis

The inventory ratio analysis of any organization helps us to know the efficiency of management of finished goods stock. Inventory ratio is found out to know the rate turnover of stock. This ratio measures turnover of stock in terms of time. Higher the turnover ratios, better the efficiency. The inventory turnover can be calculated by relating sales to closing inventory or by relating cost of goods sold to average inventory.

**Table 4.12: Inventory Turnover Ratio of Nepal Lube Oil Ltd**

<b>Fiscal Year</b>	<b>Sales Value (in Rs. '000)</b>	<b>Closing Stock (in Rs. '000)</b>	<b>Inventory Turnover Ratio</b>	<b>Annual Change</b>
2061/62	136,004	19,268	7.06	-
2062/63	119,151	30,569	3.90	(45)
2063/64	84,712	31,603	2.68	14
2064/65	118,103	36,392	3.25	52
2065/66	148,752	38,259	3.89	(1)

**Figure 4.12: Inventory Turnover Ratio of Nepal Lube Oil Ltd**



The table and graph above shows the calculation of inventory turnover ratio of the Nepal Lube Oil Limited for the last five fiscal years from 2061/62 to 2065/66. From the above analysis it is found that the inventory turnover ratio is not stable.

The highest turnover ratio is in the fiscal year 2061/62. And the lowest turnover ratio is in the fiscal year 2063/64.

Also, the Karl Pearson's coefficient of correlation (r) between sales and closing stock of finished goods has been computed from the above table no. 4.12 to measure the degree of relationship between them. The computation is presented in Appendix 8.

The coefficient of correlation (r) between the sales and closing stock of finished goods of Nepal Lube Oil Limited is -0.01631, which shows the perfect negative correlation. The probable error is 0.30104 and the value of r lower than this. Therefore, the relationship between sales and closing stock of finished goods of Nepal Lube Oil Limited is insignificant.

#### 4.1.4 Bottlers Nepal (Balaju) Limited

Bottlers Nepal Limited was established in 1973 as a Private Limited Company under the company act 1964. It was converted into Public Limited Company in 1984. The main objective of the company is to produce and bottle soft drinks under the brand name of Coke, Fanta, and Sprite etc. The company has established a subsidiary company Bottlers Nepal (Terai) Limited in Chitwan District. F&N Coco Cola Pte. Limited, Singapore, the major shareholder of the company, is managing the company since September 1993. The installed capacity of the plant is 220 bottling per minute (BPM).

<b>Performance View:</b>	<i>Current Year</i>	<i>Last Year</i>
Authorized Capital	500,000,000	500,000,000
Issued Capital	370,000,000	370,000,000
Paid Up Capital	194,889,000	194,889,000
Sales	621,827,000	614,739,000
Profit (Loss)	342,594,000	399,913,000
Current Assets	436,045,000	453,211,000
Fixed Assets	323,573,000	409,427,000

(Source: Bottlers Nepal Limited, 2009)

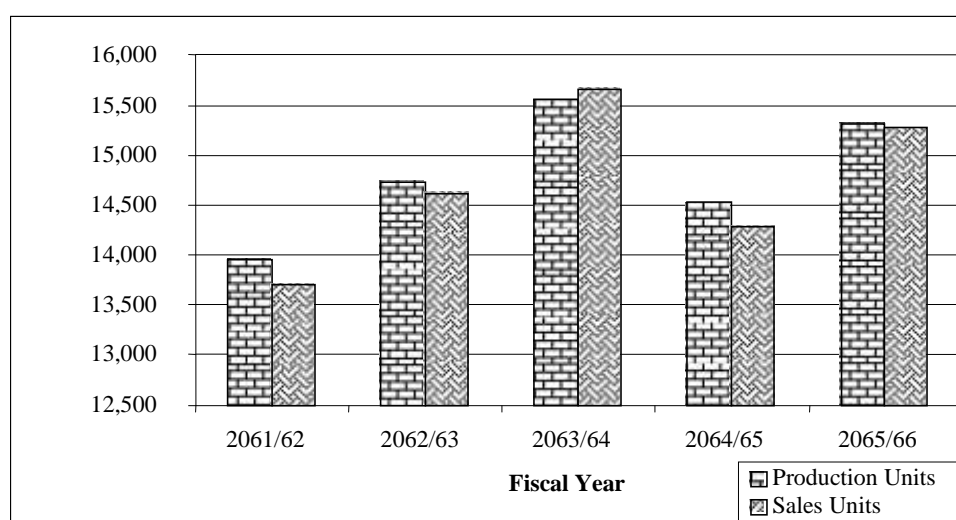
#### 4.1.4.1 Production and Sales

Production and Sales records of Bottlers Nepal Limited are shown below in Table 4.13.

**Table 4.13: Production and Sales of Bottlers Nepal Ltd.**

<b>Year</b>	<b>Production Units</b> <i>(in tones '000)</i>	<b>Sales Units</b> <i>(in tones '000)</i>	<b>Profit</b> <i>(in Rs. '000)</i>
2061/62	13,351	13,701	333,955
2062/63	14,631	14,623	343,583
2063/64	15,548	15,659	365,178
2064/65	14,524	14,279	399,913
2065/66	15,313	15,275	342,594

**Figure 4.13: Production and Sales of Bottlers Nepal Ltd.**  
Production & Sales (in Ltrs. '000)



The above table and graph shows production and sales (in Liters) situation of Bottlers Nepal Limited from the fiscal years 2061/62 to 2065/66. From the analysis it is found that the production and sales of cold drinks increased for the first three years but later in fiscal year 2064/65 it did decreased. In the fiscal year 2065/66 it did recovered to the extent. It is also clear that the highest production and sales were in the year 2063/64 and lowest production and sales were in 2061/62. As per the above table for the last five year BNL is earning profit every year. The company has never gone through losses. Profit of BNL has been increasing due to its guaranteed market and the international marketing strategy.



#### 4.1.4.2 Material Inventory Position

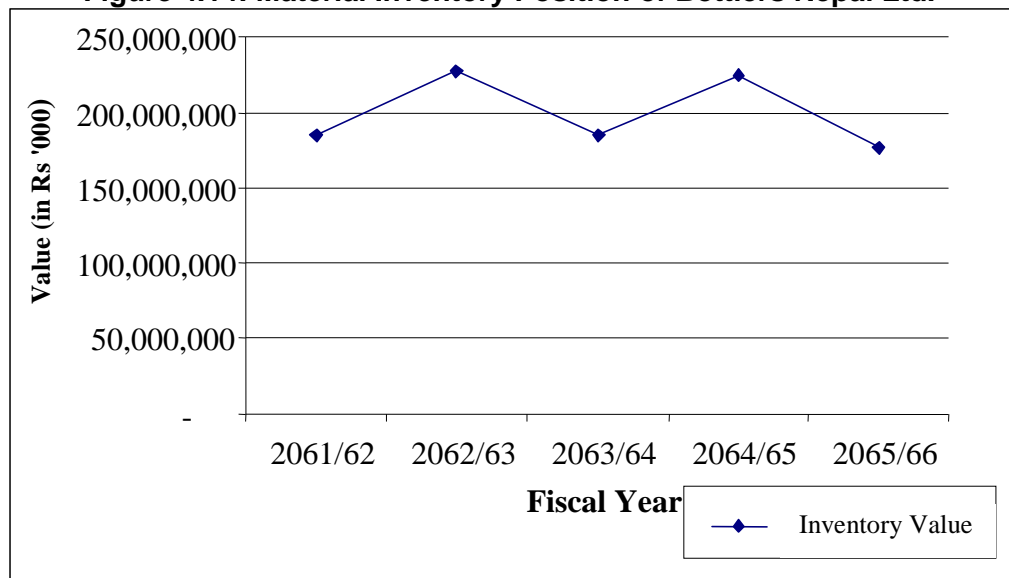
Maintaining inventory of materials is essential in every manufacturing organization whether it is small or large organization. Inventory needs investment not only in acquiring but also in holding them. Hence, inventory is a serious matter for any manufacturing organization because it acquires large portion of investment. So, it helps in predicting the sales and production for coming year.

In the case of Bottlers Nepal Limited, inventory position seems to be instable. Table 4.14 shows the sum of inventory value and annual changes to find the annual percentage changes in inventory.

**Table 4.14: Material Inventory Position of Bottlers Nepal Ltd.**

<b>Fiscal Year</b>	<b>Value</b> <i>(in Rs. '000)</i>	<b>Annual Change (%)</b>	<b>Index</b>
2061/62	185,341,000	-	100
2062/63	227,223,000	22.60	123
2063/64	184,980,000	(41.19)	81
2064/65	224,070,000	39.72	121
2065/66	176,936,000	(42.17)	79

**Figure 4.14: Material Inventory Position of Bottlers Nepal Ltd.**



The table and graph above presents the inventory position and the annual changes (in percentage) of the Bottlers Nepal Limited for fiscal year 2061/62 to 2065/66. The values in the table show the sum of materials inventory. From the above analysis we know that the investment in the inventory of Bottlers Nepal

Limited is in huge amount. It is increasing except the fiscal years 2063/64 and 2065/66. A huge increase in the investment on inventory stock is in the fiscal year 2064/65. The above result may be the outcome of the decline in sales. The piling up of the stock is growing up due to the non-selling of production.

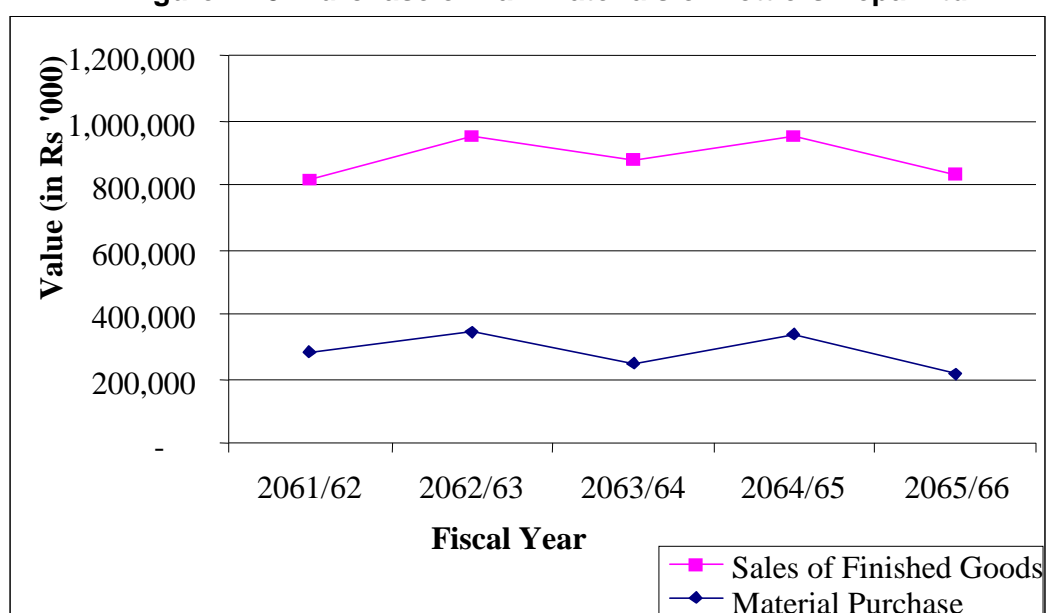
#### 4.1.4.3 Purchase of Raw Material

Purchases of raw materials are made on the planned production, inventory level and the planned sales. Since the data on planned production and sales are not available, it is compared on the basis of actual production and sales of the previous corresponding years. On the basis of last five years data, purchase and sales of Bottlers Nepal Limited are shown in table 4.15 to figure out the relationship between them.

**Table 4.15: Purchase of Raw Materials of Bottlers Nepal Ltd.**

<b>Fiscal Year</b>	<b>Material Purchase</b> <i>(in Rs. '000)</i>	<b>Sales</b> <i>(in Rs. '000)</i>
2061/62	283,718	535,494
2062/63	342,027	609,654
2063/64	246,377	632,114
2064/65	339,315	614,739
2065/66	212,880	621,827

**Figure 4.15: Purchase of Raw Materials of Bottlers Nepal Ltd.**



The table and graph above presents the sales and cost of materials for the last five years from 2061/62 to 2065/66. For simplicity the sales and cost of materials is shown in total. Arithmetic mean and Karl Pearson's coefficient of correlation has been computed to measure the average and degree of relationship between sales and cost materials purchased are shown in Appendix 4.

The average sales and cost of five fiscal years are Rs. 284863 and Rs. 602766 respectively. The coefficient of correlation (r) between sales and cost of materials purchased of Bottlers Nepal Limited is -0.15752. This indicates that there is perfect negative correlation between them. But the tabulated value probable error is 0.29364 which is higher than the computed value of correlation (r). Therefore, it proves that there is insignificant correlation between sales and cost trend of materials purchase of Bottlers Nepal Limited.

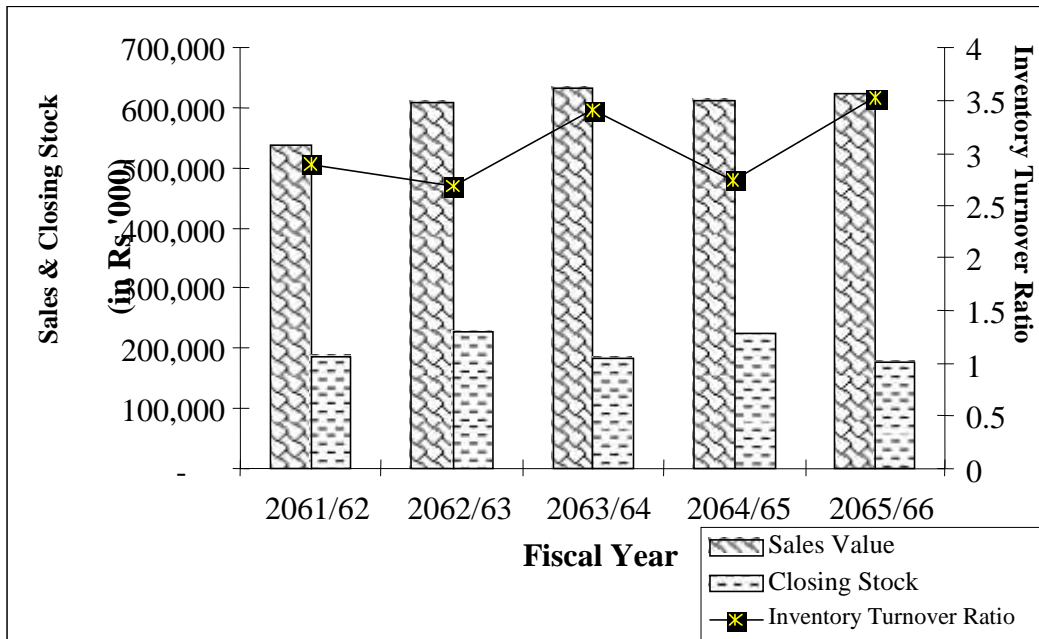
#### 4.1.4.4 Ratio Analysis

The inventory ratio analysis of any organization helps us to know the efficiency of management of finished goods stock. Inventory ratio is found out to know the rate turnover of stock. This ratio measures turnover of stock in terms of time. Higher the turnover ratios, better the efficiency.

**Table 4.16: Inventory Turnover Ratio of Bottlers Nepal Ltd.**

<b>Fiscal Year</b>	<b>Sales Value</b> <i>(in Rs. '000)</i>	<b>Closing Stock</b> <i>(in Rs. '000)</i>	<b>Inventory Turnover Ratio</b>	<b>Annual Change</b>
2061/62	535,494	185,341	2.8892	-
2062/63	609,654	227,223	2.6831	(7.14)
2063/64	632,114	184,980	3.4172	34.50
2064/65	614,739	224,070	2.7435	(47.08)
2065/66	621,827	176,936	3.5144	47.81

**Figure 4.16: Inventory Turnover Ratio**



The table and graph above shows the calculation of inventory turnover ratio of the Bottlers Nepal Limited for the last five fiscal years from 2061/62 to 2065/66. From the above analysis it is found that the inventory turnover ratio is fluctuating year to year. The highest turnover ratio is in the fiscal year 2065/66. And the lowest turnover ratio is in the fiscal year 2062/63.

Also, the Karl Pearson's coefficient of correlation ( $r$ ) between sales and closing stock of finished goods has been computed from the above table no. 4.16 to measure the degree of relationship between them. The computation is presented in Appendix 9.

The coefficient of correlation ( $r$ ) between the sales and closing stock of finished goods of Bottlers Nepal Limited is 0.15752, which shows there is perfect positive correlation between them. But the probable error is 0.29364 and the value of  $r$  is lower. Therefore, the relationship between sales and closing stock of finished goods of Bottlers Nepal Limited is insignificant.

#### 4.1.5 Nepal Bitumen & Barrel Udhyog Limited

Nepal Bitumen & Barrel Udhyog Limited was established in 2045 B.S. The main objective of the company is to produce Bitumen Emulsion, Mild Steel Barrels,

Mild Steel Drums, Mild Steel Container, Emulsion Sprayer Machine etc. and to contribute in the nation development by road constructions. The company is fully depended upon the Oil and Petroleum so there is direct relation between them. IOC is the main source of materials supply for the company.

<b>Performance View:</b>	<i>Current Year</i>	<i>Last Year</i>
Authorized Capital	70,000,000	70,000,000
Issued Capital	30,000,000	30,000,000
Paid Up Capital	21,068,000	21,068,000
Sales	201,311,621	223,358,972
Profit (Loss)	2,716,755	2,943,162
Current Assets	132,542,111	119,865,642
Fixed Assets	9,807,692	11,139,260

(Source: Annual Reports of Bitumen and Barrel Udyog Ltd, 2009)

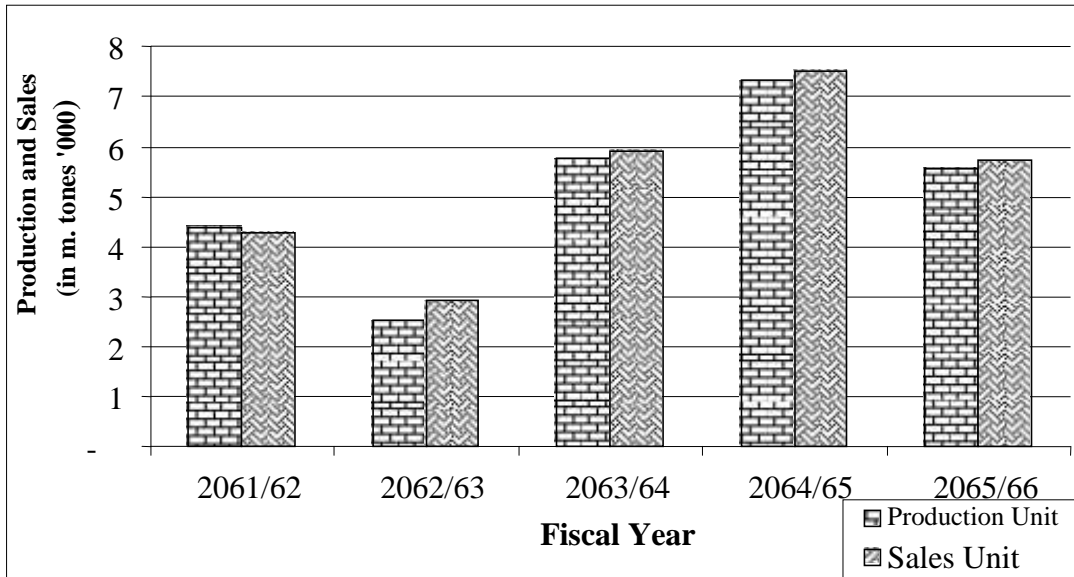
#### 4.1.5.1 Production and Sales

Production and Sales records of Bitumen and Barrel Udyog Limited are shown below in Table 4.17.

**Table 4.17: Production and Sales of Bitumen and Barrel Udyog Ltd.**

<b>Year</b>	<b>Production Units</b> <i>(in tones '000)</i>	<b>Sales Units</b> <i>(in tones '000)</i>	<b>Profit</b> <i>(in Rs. '000)</i>
2061/62	4,402	4,299	217
2062/63	2,526	2,903	6,735
2063/64	5,776	5,919	(3,822)
2064/65	7,340	7,526	2,943
2065/66	5,550	5,715	2,717

**Figure 4.17: Production and Sales of Bitumen and Barrel Udyog Ltd.**



The above table and graph shows production and sales (in units) situation of Bitumen and Barrel Udyog Limited from the fiscal years 2061/62 to 2065/66. From the analysis it is found that the production and sales of Bitumen and Barrel Udyog Limited decreased in the first two years but from fiscal year 2063/64 it started to rise onwards and again decreased in 2065/66. In the fiscal year 2062/63 it did decreased to the lowest point. It is also clear that the highest production and sales were in the year 2064/65. In the fiscal year 2062/63, 2063/64 2064/65 and 2065/66 sales units were higher than the productions unit except in 2061/62. From the above graph, it can be concluded that the Production plan of Bitumen and Barrel Udyog Limited is not effective. Though there are various causes like political & managerial, if similar condition keeps continuing then the Bitumen and Barrel Udyog Limited will not be able to supply as per the demand which will definitely hamper the sales and the market.

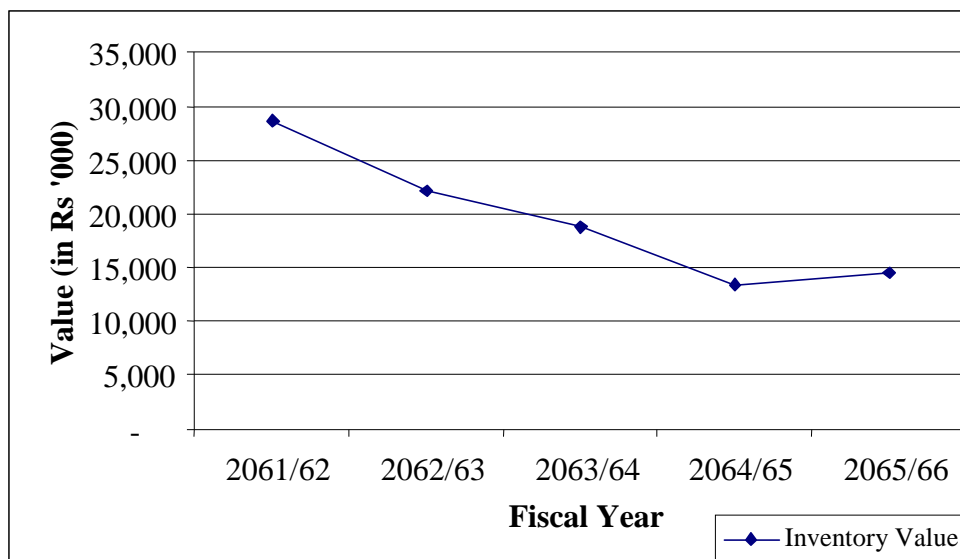
#### **4.1.5.2 Material Inventory Position**

Inventory positions are always essential in manufacturing enterprises because it helps to determine the planned production and sales. In the table 4.18, the sum of inventory value and annual changes are presented to display the inventory position of Bitumen and Barrel Udyog Limited.

**Table 4.18: Material Inventory Position of Bitumen and Barrel Udyog Ltd.**

<b>Fiscal Year</b>	<b>Value</b> <i>(in Rs. '000)</i>	<b>Annual Change (%)</b>	<b>Index</b>
2061/62	28,663	-	100
2062/63	22,069	(23.01)	76.99
2063/64	18,856	8.45	85.44
2064/65	13,459	(14.06)	71.38
2065/66	14,534	36.61	107.99

**Figure 4.18: Material Inventory Position of Bitumen and Barrel Udyog Ltd.**



The table and graph above presents the inventory position and the annual changes (in percentage) of the Bitumen and Barrel Udyog Limited for fiscal year 2061/62 to 2065/66. The values in the table show the sum of materials inventory. From the above analysis we know that the investment in the inventory of Bitumen and Barrel Udyog Limited is in huge amount. It is increasing except the fiscal years 2061/62 and 2064/65. A huge increase in the investment on inventory stock is in the fiscal year 2065/66. The above result may be the outcome of the decline in sales. The piling up of the stock is growing up due to the non-selling of production.

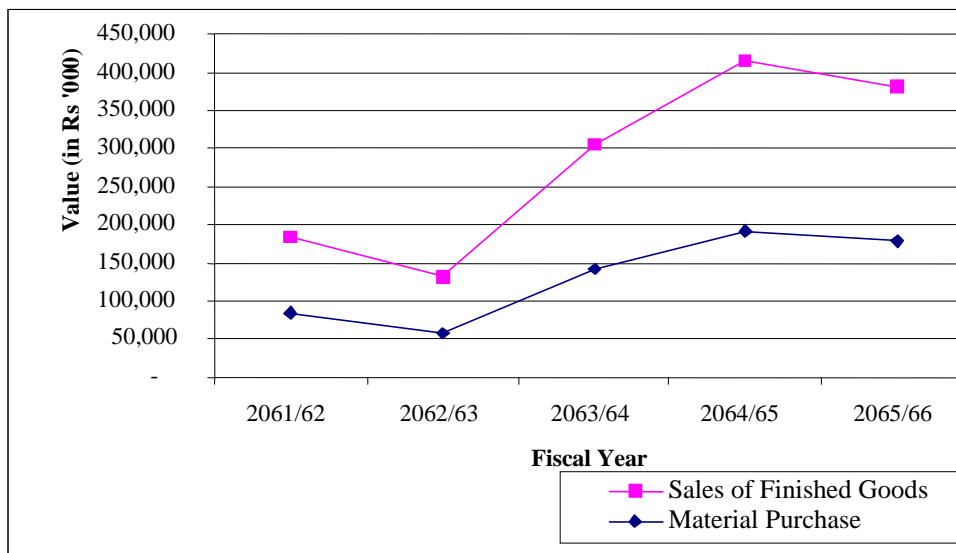
#### 4.1.5.3 Purchase of Raw Material

Purchases of raw materials are made on the planned production, inventory level and the planned sales. Since the data on planned production and sales are not available, it is compared on the basis of actual production and sales of the previous corresponding years. On the basis of last five years data, purchase and sales of Bitumen and Barrel Udyog Limited are shown in table 4.19 to figure out the relationship between them.

**Table 4.19: Purchase of Raw Materials of Bitumen and Barrel Udyog Ltd.**

<b>Fiscal Year</b>	<b>Material Purchase</b> <i>(in Rs. '000)</i>	<b>Sales</b> <i>(in Rs. '000)</i>
2061/62	84,098	100,607
2062/63	58,973	72,492
2063/64	141,523	164,678
2064/65	192,532	223,358
2065/66	178,961	201,311

**Figure 4.19: Purchase of Raw Materials of Bitumen and Barrel Udyog Ltd**



The table and graph above presents the sales and cost of materials for the last five years from 2061/62 to 2065/66. For simplicity the sales and cost of materials is shown in total. Arithmetic mean and Karl Pearson's coefficient of correlation has been computed to measure the average and degree of relationship between sales and cost materials purchased are shown in Appendix 5.



The average sales and cost of five fiscal years are Rs. 131217 and Rs. 152489 respectively. The coefficient of correlation (r) between sales and cost of materials purchased of Bitumen and Barrel Udyog Limited is 0.99922. This indicates perfect positive correlation between them. The tabulated value probable error is 0.00047 which is 2126 times lower than the computed value of correlation (r). Therefore, the value of r is highly significant. The fact indicates good situation of the Bitumen and Barrel Udyog Limited. It proves that significant correlation between sales and cost trend of materials purchase of Bitumen and Barrel Udyog Limited.

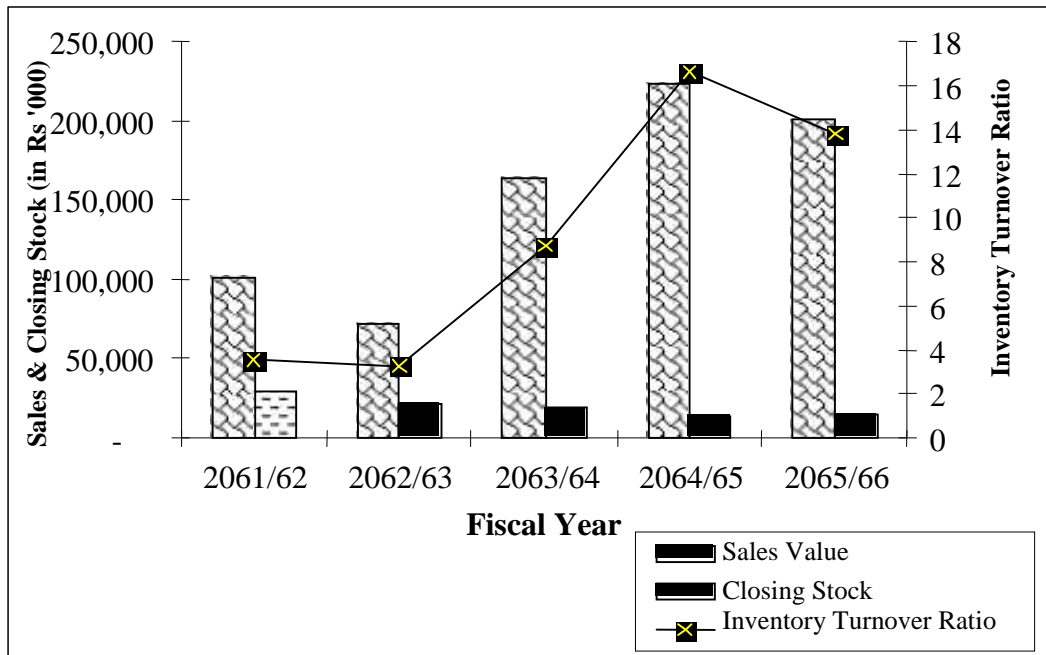
#### 4.1.5.4 Ratio Analysis

The inventory ratio analysis of any organization helps us to know the efficiency of management of finished goods stock. Inventory ratio is found out to know the rate turnover of stock. This ratio measures turnover of stock in terms of time. Higher the turnover ratios, better the efficiency.

**Table 4.20: Inventory Turnover Ratio of Bitumen and Barrel Udyog Ltd.**

<b>Fiscal Year</b>	<b>Sales Value</b> <i>(in Rs. '000)</i>	<b>Closing Stock</b> <i>(in Rs. '000)</i>	<b>Inventory Turnover Ratio</b>	<b>Annual Change</b>
2061/62	100,607	28,663	3.5099	-
2062/63	72,492	22,069	3.2847	(6.42)
2063/64	164,678	18,856	8.7334	172.29
2064/65	223,358	13,459	16.5954	(75.85)
2065/66	201,311	14,534	13.8510	(106.56)

**Figure 4.20: Inventory Turnover Ratio of Bitumen and Barrel Udyog Ltd.**



The table and graph above shows the calculation of inventory turnover ratio of the Bitumen and Barrel Udyog Limited for the last five fiscal years from 2061/62 to 2065/66. From the above analysis it is found that the inventory turnover ratio is decreasing year to year except fiscal year 2063/64. The highest turnover ratio is in the fiscal year 2065/66. And the lowest turnover ratio is in the fiscal year 2061/62.

Also, the Karl Pearson's coefficient of correlation ( $r$ ) between sales and closing stock of finished goods has been computed from the above table no. 4.20 to measure the degree of relationship between them. The computation is presented in Appendix 10.

The coefficient of correlation ( $r$ ) between the sales and closing stock of finished goods of Bitumen and Barrel Udyog Limited is  $-0.85421$ , which shows the perfect negative correlation. The probable error is  $0.08140$  and the value of  $r$  is lower than this. Therefore, the relationship between sales and closing stock of finished goods of Bitumen and Barrel Udyog Limited is insignificant.

## 4.2 INTER COMPANY ANALYSIS

The size of inventories not only varies from one industry to another but it also varies widely from one company to another within the same industry. It makes inventory management more difficult. In a survey of size of investment in inventories by different manufacturing enterprises, investment in inventories is generally large. In other words, inventory constitutes most significant part of current assets. On the basis of above section 4.1, comparative analysis of Inventory management and Purchase management are performed here. Correlations between sales and purchase for the year 2061/62 to 2065/66 are given in table 4.21.

**Table 4.21: Correlations between Sales and Purchase for Manufacturing Enterprises**

<b>Companies</b>	<b>Correlation</b>	<b>6 *P.E.</b>	<b>Remarks</b>
UNL	0.9825	0.0626	Highly Significant
GRUL	0.7261	0.8543	Insignificant
NLOL	0.9352	0.2266	Significant
BNL	(0.1575)	1.7618	Insignificant
BBUL	0.9992	0.0028	Highly Significant

The above table clearly shows that there is perfect correlation between sales of finished goods and purchase of materials in all manufacturing enterprises except Bottlers Nepal Limited. Most of the public manufacturing enterprises purchase materials on the basis of previous year sales of finished goods. Only Bottlers Nepal Limited purchase materials on different basis due to its seasonal nature. Similarly, Correlations between sales and closing stock for the year 2061/62 to 2065/66 are given in table 4.22.

**Table 4.22: Correlations between Sales and Closing stock for Manufacturing Enterprises**

Companies	Correlation	6 *P.E.	Remarks
UNL	0.8009	0.6477	Significant
GRUL	0.0121	1.8064	Insignificant
NLOL	(0.0163)	1.8062	Insignificant
BNL	0.1575	1.7618	Insignificant
BBUL	(0.8542)	0.4884	Insignificant

The above table shows that there is no significant correlation between sales and closing stock in public manufacturing enterprises except Unilever Nepal Limited. Hence, it is concluded that most of the public manufacturing enterprises do not plan the inventory on the basis of closing stock.

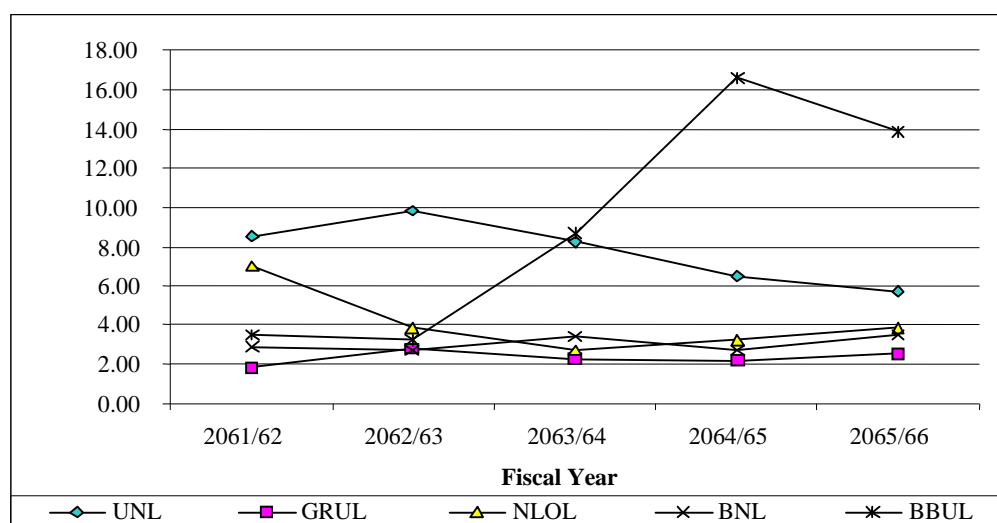
#### 4.2.1 Inventory Turnover Ratio of Nepalese Public Manufacturing Enterprises

**Table 4.23: Inventory turnover Ratio of Nepalese PME**

Companies	2061/62	2062/63	2063/64	2064/65	2065/66	Avg.
UNL	8.56	9.87	8.28	6.46	5.74	7.78
GRUL	1.84	2.77	2.26	2.18	2.56	2.32
NLOL	7.06	3.9	2.68	3.25	3.89	4.16
BNL	2.89	2.68	3.42	2.74	3.51	3.05
BBUL	3.51	3.28	8.73	16.6	13.85	9.19

**Figure 4.21: Inventory turnover Ratio of Nepalese PME**

Inventory turnover Ratio



The above table shows that Bitumen and Barrel Udyog Limited and Unilever Nepal Limited have the highest inventory turnover ratios, while other manufacturing enterprises have the poor inventory turnover ratio. Bitumen and Barrel Udyog Limited have highest inventory turnover ratio due to highly increasing inventory turnover ratio in last two year.

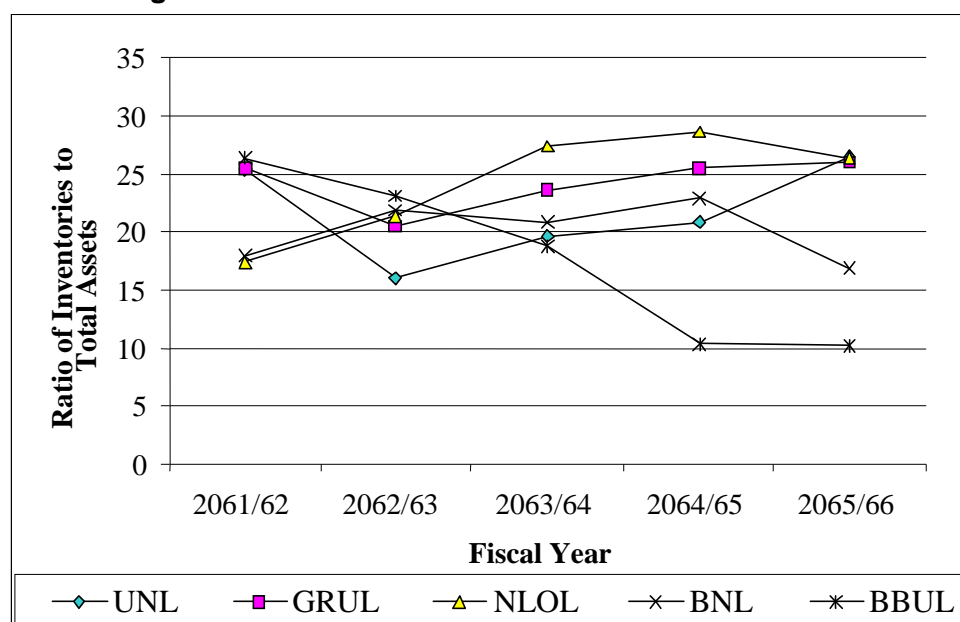
#### 4.2.2 Ratio of Inventories to Total Assets in Nepalese Public Manufacturing Enterprises

**Table 4.24: Ratio of Inventories to Total Assets of Nepalese Manufacturing Enterprises**

Companies	2061/62	2062/63	2063/64	2064/65	2065/66
UNL	25.28	16.07	19.60	20.91	26.49
GRUL	25.44	20.59	23.55	25.54	26.02
NLOL	17.38	21.33	27.45	28.61	26.31
BNL	17.89	21.88	20.86	22.97	16.88
BBUL	26.43	23.17	18.87	10.27	10.21
<b>Average</b>	<b>22.49</b>	<b>20.61</b>	<b>22.07</b>	<b>21.66</b>	<b>21.18</b>

*Note: The sum of percentages of cash, receivables, and inventories to total assets may turn out to be 100 percent due to miscellaneous current assets.*

**Figure 4.22: Ratio of Inventories to Total Assets PME**



The average investment in inventories by Nepalese manufacturing enterprises has been observed to be 22.49% in 2061/62, 20.61% in 2062/63, 22.07% in 2063/64, 21.66% in 2064/65, and 21.18% in 2065/66. The investment in

inventories has been observed almost equally for every enterprise. To invest about 23 percent of total assets in the form of inventories in 2061/62 by Nepalese public manufacturing enterprises indicates that larger amount of money has to be invested in the form of inventory.

### **4.3 PRACTICE OF BUDGETING FOR PURCHASE AND INVENTORY**

Budgeting helps the management perform its planning function by developing a strategic profit plan and a tactical profit plan. Both of these plans include monetary expectations for assets, liabilities, profits and return on investment. But in the case of Nepalese manufacturing public enterprises budgeting is done for strategic profit plan only. Organization like UNL and NLOL seems to plan inventory and purchase of materials in tactical profit plan basis. From the observation, most of the public manufacturing organization does not take short term planning seriously. While in the under developed country like Nepal price of the materials doesn't stay stable due to political instability. Short term planning of materials and inventory are quite essential for the public manufacturing organizations.

### **4.4 ISSUANCE OF PURCHASING ORDER AND STOCK LEVEL PRACTICE**

The production department of most of the public enterprises issues the material requisition to the store department when the raw materials are run out. The store department issues the raw materials to the purchase department from its stock. If there is shortage of raw materials in store department, the storekeeper orders the materials to the procurement division. Then the procurement division orders materials with the permission of management on the board of directors to the suppliers. Most of the public manufacturing enterprises have to purchase the materials from India and other nation. E.g. Nepal Lube Oil Ltd and Bitumen and Barrel Udyog Limited have to import oils from Indian Oil Corporation while Gorakhkali Rubber Udyog Limited has to import its materials from India and other nations. The purchase orders for such materials are placed by the purchasing division with the permission of the management to the suppliers. Other materials which are needed in the enterprises are purchased from local market as well as other countries.

In many public manufacturing enterprises Economic Order Quantity model (EOQ) is not in practice. But provision of safety stock is kept in order to make smooth production operation to supply the products smoothly to the market. Safety stock ensures against contingencies, such as sudden increases in the rate of the usage, failure to receive the ordered materials in time and receipt of low quality materials that cannot be used. A high level of safety stock is undesirable and lack of which may cause productions shut down. The time of production is not fluctuating due to the shortage of materials.

Most of the public manufacturing enterprises (PME) have made the provision of maximum, minimum and re order level only in paper. In reality, they are not arranged. In practice the center purchases majority of raw materials item through agents. PME arranges the regular supply of its needed materials from the agents, national and international.

From the above discussion, conclusion can be made that the duty of issuing purchase order comes under procurement division. Most PME regulates its purchasing of materials by agreement for the most parties. It has and agreement of safety stock of raw materials. Whatever may be in reality? It has better understanding that sock should not be too much high or too much low than the optimal level.

#### **4.5 MAJOR FINDINGS OF STUDY**

From the above analysis of following major findings are extracted as below:

1. Sales and Production quantity of Nepalese PME are increasing from year to year except GRUL and NLOL.
2. Sales revenue and Purchase cost are highly correlated except BNL and there is significant co-relationship between sales and purchase trend of the final product as shown below:

<b>Companies</b>	<b>Correlation</b>	<b>Remarks</b>
UNL	0.9825	Perfect positive correlation
GRUL	0.7261	Perfect positive correlation
NLOL	0.9352	Perfect positive correlation
BNL	(0.1575)	Perfect negative correlation
BBUL	0.9992	Perfect positive correlation

3. Most of the manufacturing enterprises are investing huge amount in inventory. Inventories of UNL and NLOL are increasing due to its increasing demand as shown in the table below:

<b>Fiscal Year</b>	<b>UNL</b>	<b>GRUL</b>	<b>NLOL</b>	<b>BNL</b>	<b>BBUL</b>
2061/62	144,447	206,634	19,268	185,341	28,663
2062/63	126,107	144,820	30,569	227,223	22,069
2063/64	184,215	155,364	31,603	184,980	18,856
2064/65	229,764	156,365	36,392	224,070	13,459
2065/66	256,167	157,160	38,259	176,936	14,534

4. There is no proper target and plan for material purchases and there is variation in the purchasing value and quantity of materials.
5. An inventory of finished goods is fluctuating from year to year. There is no proper Synchronization between sales and production department too.
6. The inventory turnover ratios of most of the organization are not satisfactory except UNL and BBUL.

<b>Companies</b>	<b>Avg.</b>
UNL	7.78
GRUL	2.32
NLOL	4.16
BNL	3.05
BBUL	9.19

7. Most of the organizations have maintained the provision of stock, minimum and maximum stock in materials. It has better knowledge that stock should



not be too much high and too much low than the optimal level but in the reality they are not in practice.

8. The relationship between materials purchase and sales of UNL, NLOL and BBUL are significant whereas GRUL and BNL are insignificant.

<b>Companies</b>	<b>Correlation</b>	<b>6 *P.E.</b>	<b>Remarks</b>
UNL	0.9825	0.0626	Highly significant
GRUL	0.7261	0.8543	Insignificant
NLOL	0.9352	0.2266	Significant
BNL	(0.1575)	1.7618	Insignificant
BBUL	0.9992	0.0028	Highly significant

9. The relationship between sales and closing stock value of UNL is significant whereas other public manufacturing enterprises have insignificant relationship

<b>Companies</b>	<b>Correlation</b>	<b>6 *P.E.</b>	<b>Remarks</b>
UNL	0.8009	0.6477	Significant
GRUL	0.0121	1.8064	Insignificant
NLOL	(0.0163)	1.8062	Insignificant
BNL	0.1575	1.7618	Insignificant
BBUL	(0.8542)	0.4884	Insignificant

## CHAPTER – 5

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 SUMMARY

Inventory management is an important concern for managers in all types of business. Every manufacturing organization however big or small has to maintain some inventory. Inventory helps the company quickly responding to the customer demand, which is an important element of competitive strategy. Inventories of finished goods of the correct items to meet the market demand at the different point of the time within a reasonable response time. And it also plays an important role in a company's ability to compete in the market. Inventories of raw materials or partially processed goods can help a company complete the production cycle in a much shorter time than would otherwise be possible.

Five samples are taken among 21 listed manufacturing and processing companies to analyze the inventory management system and planning inventory. During the research work, a brief review of literature has been conducted. Mathematical and financial tools are used in data analysis. Tables, graphs, and diagrams are used to present the data and results. Secondary data are collected from annual reports, audit reports and journals of related companies.

The average companies spend about 50% of their sales income and purchase of parts components and raw materials but some firm spend considerably more than this. Hence, inventory management is of great significance. Both over estimation and under estimation of inventories are bad. If there is under estimation of inventories, there would be production holdups, and the company fails to meet delivery commitments. Goods cannot be produced at once as much of goods as wanted. If there is over estimation of inventories, there would be more funds tied up in inventory which would result in more stock of goods and higher carrying costs. If inventory holding is large, there is a possibility that

inventory would become obsolete as taste of customer may change. Hence, major objective of this research work is to provide guidance in planning inventory or inventory management to the public manufacturing organization. For the study only five years data are collected.

Books, Journals, and Masters Degree's research works are reviewed for the research purpose. Very limited articles about similar subjects and objectives were found. The major research gap found about the planning inventory and relationship between sales and purchase of materials.

This research work covers sample of 5 different public manufacturing companies among the population of 21 companies. Secondary data form various sources i.e. websites regarding subjects, annual reports and audit reports of the related public manufacturing companies are analyzed. Especially, this study presents the production, sales, material purchases and stock position of the five selected companies in the appropriate tables and graphs.

There are various problems faced by Nepalese public manufacturing enterprises but inventory management is another problem that can not be ignored. These organizations are practicing inventory management without proper plan and techniques (budgeting, EOQ model, ABC analysis, stock level practice etc.). To analyze and present the prevailing condition of inventory management system of Nepalese public manufacturing enterprises, suitable research methodology is applied in this study.

## **5.2 CONCLUSION**

Every small or big manufacturing organization of Nepal has been suffering from the political problems of the nation. Political instability and civil war are the two major problems for the manufacturing enterprises. Most of the raw materials of manufacturing organization are either imported or transported from rural areas. Manufacturing organizations mostly depends on the transportations. And in every political as well as personal conflicts highway gets affected. Hence, manufacturing organization cannot maintain inventory of raw materials which

directly affects the production and sales of the organization. Planning also fails or affected by these problems. Due to political instability diplomatic relationship with the neighboring countries, business cannot be made as per the planning. These are the main problem which directly affects in the inventory management of the public manufacturing organization.

On the other hand, there are internal problems of the organization that also affects the inventory management. In the case of Bottlers Nepal Limited, it is a seasonal business organization which has been running on profit due to its strong goodwill in worldwide market rather than management. Till now, productions and sales have been little fluctuating due to increasing competitors and controversy about the pesticides. Inventory position is also not stable of Bottlers Nepal Ltd. due to the same reasons. There is no relationship between purchase of raw materials and sales of finished goods which show that purchase of raw materials are not planned as per the previous sales. On the other hand, inventory turnover ratio is also not significant.

Gorakhkali Rubber Udyog Limited is a public manufacturing enterprise which has been struggling to recover for a decade. Production and sales has been fluctuating while the inventory position is increasing year to year. There is insignificant relationship between purchase of raw materials and sales. And the inventory turnover ratio of Gorakhkali Rubber Udyog Ltd. is also not satisfactory. Hence, it can be concluded there is no planning for inventory. Inventories are maintained only on the basis of requirement.

Bitumen and Barrel Udyog Limited manufactures, materials required for road construction. Its sales, production, and inventories directly depend on the development program of the nation. Inventory position has been decreasing slowly due to its market nature. Inventory turnover ratio i.e. relationship between sales and closing stock is not satisfactory at all. But relationship between purchase of material and sale is highly significant. Similarly, Nepal Lube Oil Limited has also unsatisfactory inventory turnover ratio and significant relationship between purchase of materials and sales of finished goods. But the

material inventory position of Nepal Lube Oil Limited has been increasing which is appropriate as per sales.

Unilever Nepal Limited is a multinational company which produces daily use products. Production and sales are increasing slowly. Materials Inventory position is also increasing as per the sales to meet the requirement for production. There is significant relationship between purchase of materials and sales of finished goods. Inventory turnover ratio is also satisfactory.

### **5.3 RECOMMENDATION**

All the manufacturing organization has its own separate management system even in inventory management. But there is no realistic raw materials purchasing planning. This can be seen through the fluctuating purchase of materials and material inventory position. Most of the organizations are suffering from over stocking problem but there is no presence of any realistic and comprehensive plan to improve in its inventory management system. Due to shortage of time and other limitations, the researcher could not be able to provide the overall position of the organization, however, the following recommendation are listed for the further improvement.

1. The forecast of production and sales helps the inventory manager to maintain the stock of raw materials. Manufacturing enterprises like Morang Sugar Mills Ltd., Bottlers Nepal Ltd., Nepal Banaspati Ghee Udyog Ltd., and Arun Vanaspati Udyog Ltd. etc. have to maintain the inventory of materials that have limited life period so over stock of such materials might causes huge losses for the organization. These manufacturing enterprises must prepare production plan on the basis of realistic market studies.
2. The financial dimension of inventory management is ignored by the most of the manufacturing enterprises. Therefore, it must follow budgetary and financial analysis techniques in inventory management system.
3. There are no proper methods of inventory management and controlling techniques applies by most of the manufacturing companies. So, it must

apply the modern techniques in inventory management like ABC analysis, stock level fixing, material requirement planning, JIT etc. Similarly, optimal level of inventory also should be fixed. It will definitely improve the profitability of the organization.

4. Every public manufacturing enterprise should be allowed to function according to its own internal mechanism. The undue involvement and direct instructions from ministers and top level officers offset to achieve the organizational goals. These kinds of involvement should strictly be avoided.
5. Inventory information will be valuable to the decision makers. Therefore, manufacturing enterprises should keep its inventory record up-to date and unnecessary and old spare parts should be auctioned to save the inventory carrying costs.
6. In Nepalese public enterprises, top management do not pay enough attention to planning and managing, their time is spent on doing routine works and less importance are given to financial matters such as management of working capital, preparations of financial plans, capital budgeting etc. from the study it is found that there is not proper and timely involvement in inventory management in most of the organizations. So the top level management should pay due attention to the overall management, purchasing, production and financial aspects of inventory.

## Annex – 1

### Calculation of Arithmetic Mean and Correlation Coefficient between Purchases of Materials and Sales of finished Goods of Unilever Nepal Limited.

(in Rs '000)

x	u = x - $\bar{x}$	u <sup>2</sup>	y	v = y - $\bar{y}$	v <sup>2</sup>	uv
610,331	(133,623)	17,855,106,129	1,236,052	(156,000)	24,336,000,000	20,845,188,000
651,696	(92,258)	8,511,538,564	1,244,727	(147,325)	21,704,655,625	13,591,909,850
841,483	97,529	9,511,905,841	1,524,901	132,849	17,648,856,801	12,956,630,121
792,173	48,219	2,325,071,961	1,484,894	92,842	8,619,636,964	4,476,748,398
824,086	80,132	6,421,137,424	1,469,685	77,633	6,026,882,689	6,220,887,556
3,719,769	(1)	44,624,759,919	6,960,259	(1)	78,336,032,079	58,091,363,925

Now,

$$\bar{x} = \frac{\sum x}{n} = \frac{3719769}{5} = 743954$$

$$\bar{y} = \frac{\sum y}{n} = \frac{6960259}{5} = 1392052$$

Then,

$$r = \frac{n \sum uv - \sum u \sum v}{\sqrt{n \sum u^2 - (\sum u)^2} \sqrt{n \sum v^2 - (\sum v)^2}}$$

$$= \frac{(5 \times 58091363925) - [(-1) \times (-1)]}{\sqrt{5 \times 44624759919 - (-1)^2} \sqrt{5 \times 78336032079 - (-1)^2}}$$

$$= 0.982523$$

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

$$= 0.6745 \times \frac{1 - (0.982523)^2}{\sqrt{5}}$$

$$= \frac{0.6745 \times 0.03465}{2.24}$$

$$= 0.01043$$

Again,  $6 \times \text{P.E.} = 6 \times 0.017387 = 0.104322$

Since  $r = 0.982523 > 0.104322$ ; r is significant.

## Annex – 2

### Calculation of Arithmetic Mean and Correlation Coefficient between Purchases of Materials and Sales of finished Goods of Gorakhkali Rubber Udyog (in Rs '000)

x	u = x - $\bar{x}$	u <sup>2</sup>	y	v = y - $\bar{y}$	v <sup>2</sup>	uv
207,984	6,980	48,720,400	381,164	5,587	31,214,569	38,997,260
194,578	(6,426)	41,293,476	400,989	25,412	645,769,744	(163,297,512)
178,989	(22,015)	484,660,225	351,620	(23,957)	573,937,849	527,413,355
187,664	(13,340)	177,955,600	341,094	(34,483)	1,189,077,289	460,003,220
235,806	34,802	1,211,179,204	403,018	27,441	753,008,481	955,001,682
1,005,021	1	1,963,808,905	1,877,885	-	3,193,007,932	1,818,118,005

Now,

$$\bar{x} = \frac{\sum x}{n} = \frac{1005021}{5} = 201004$$

$$\bar{y} = \frac{\sum y}{n} = \frac{1877885}{5} = 375577$$

Then,

$$r = \frac{n \sum uv - \sum u \sum v}{\sqrt{n \sum u^2 - (\sum u)^2} \sqrt{n \sum v^2 - (\sum v)^2}}$$

$$= \frac{(5 \times 1818118005) - (1 \times 0)}{\sqrt{5 \times 1963808905 - (1)^2} \sqrt{5 \times 3193007932 - (0)^2}}$$

$$= 0.72606$$

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

$$= 0.6745 \times \frac{1 - (0.72606)^2}{\sqrt{5}}$$

$$= \frac{0.6745 \times 0.47284}{2.24}$$

$$= 0.14238$$

$$\text{Again, } 6 \times \text{P.E.} = 6 \times 0.14238 = 0.85427$$

Since  $r = 0.72606 < 0.85427$ ; r is insignificant.



### Annex – 3

#### Calculation of Arithmetic Mean and Correlation Coefficient between Purchases of Materials and Sales of finished Goods of Nepal Lube Oil Limited.

(in Rs '000)

x	u = x - x̄	u <sup>2</sup>	y	v = y - ȳ	v <sup>2</sup>	uv
82,734	(390)	152,100	136,004	14,660	214,915,600	(5,717,400)
82,716	(408)	166,464	119,151	(2,193)	4,809,249	894,744
53,917	(29,207)	853,048,849	84,712	(36,632)	1,341,903,424	1,069,910,824
84,993	1,869	3,493,161	118,103	(3,241)	10,504,081	(6,057,429)
111,262	28,138	791,747,044	148,752	27,408	751,198,464	771,206,304
415,622	2	1,648,607,618	606,722	2	2,323,330,818	1,830,237,043

Now,

$$\bar{x} = \frac{\sum x}{n} = \frac{415622}{5} = 83124$$

$$\bar{y} = \frac{\sum y}{n} = \frac{606722}{5} = 121344$$

Then,

$$r = \frac{n \sum uv - \sum u \sum v}{\sqrt{n \sum u^2 - (\sum u)^2} \sqrt{n \sum v^2 - (\sum v)^2}}$$

$$= \frac{(5 \times 1830237043) - (2 \times 2)}{\sqrt{5 \times 1648607618 - (2)^2} \sqrt{5 \times 2323330818 - (2)^2}}$$

$$= 0.93518$$

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

$$= 0.6745 \times \frac{1 - (0.93518)^2}{\sqrt{5}}$$

$$= \frac{0.6745 \times 0.12544}{2.24}$$

$$= 0.03777$$

$$\text{Again, } 6 \times \text{P.E.} = 6 \times 0.03777 = 0.22662$$

Since  $r = 0.93518 > 0.22662$ ;  $r$  is significant.

## Annex – 4

### Calculation of Arithmetic Mean and Correlation Coefficient between Purchases of Materials and Sales of finished goods of Bottlers Nepal Limited

(in Rs '000)

x	u = x - $\bar{x}$	u <sup>2</sup>	y	v = y - $\bar{y}$	v <sup>2</sup>	uv
283,718	-	-	535,494	(67,272)	4,525,521,984	-
342,027	57,164	3,267,722,896	609,654	6,888	47,444,544	393,745,632
246,377	(38,486)	1,481,172,196	632,114	29,348	861,305,104	(1,129,487,128)
339,315	54,452	2,965,020,304	614,739	11,973	143,352,729	651,953,796
212,880	(71,983)	5,181,552,289	621,827	19,061	363,321,721	(1,372,067,963)
1,424,317	1,147	12,895,467,685	3,013,828	(2)	5,940,946,082	(1,455,855,663)

Now,

$$\bar{x} = \frac{\sum x}{n} = \frac{1424317}{5} = 284863$$

$$\bar{y} = \frac{\sum y}{n} = \frac{3013828}{5} = 602766$$

Then,

$$r = \frac{n \sum uv - \sum u \sum v}{\sqrt{n \sum u^2 - (\sum u)^2} \sqrt{n \sum v^2 - (\sum v)^2}}$$

$$= \frac{[5 \times (-1455855663)] - [1147 \times (-2)]}{\sqrt{5 \times 12895467685 - (1147)^2} \sqrt{5 \times 5940946082 - (-2)^2}}$$

$$= -0.15752$$

$$\begin{aligned} \text{Probable Error (P.E.)} &= 0.6745 \times \frac{1-r^2}{\sqrt{n}} \\ &= 0.6745 \times \frac{1-(-0.15752)^2}{\sqrt{5}} \\ &= \frac{0.6745 \times 0.97519}{2.24} \\ &= 0.29364 \end{aligned}$$

$$\text{Again, } 6 \times \text{P.E.} = 6 \times 0.29364 = 1.76184$$

Since  $r = -0.15752 < 1.76184$ ; r is insignificant.

## Annex – 5

### Calculation of Arithmetic Mean and Correlation Coefficient between Purchases of Materials and Sales of finished Goods of Bitumen and Barrel Limited

(in Rs '000)

x	u = x - $\bar{x}$	u <sup>2</sup>	y	v = y - $\bar{y}$	v <sup>2</sup>	uv
84,098	(47,119)	2,220,200,161	100,607	(51,882)	2,691,741,924	2,444,627,958
58,973	(72,244)	5,219,195,536	72,492	(79,997)	6,399,520,009	5,779,303,268
141,523	10,306	106,213,636	164,678	12,189	148,571,721	125,619,834
192,532	61,315	3,759,529,225	223,358	70,869	5,022,415,161	4,345,332,735
178,961	47,744	2,279,489,536	201,311	48,822	2,383,587,684	2,330,957,568
656,087	2	13,584,628,094	762,446	1	16,645,836,499	15,025,841,363

Now,

$$\bar{x} = \frac{\sum x}{n} = \frac{656087}{5} = 131217$$

$$\bar{y} = \frac{\sum y}{n} = \frac{762446}{5} = 152489$$

Then,

$$r = \frac{n \sum uv - \sum u \sum v}{\sqrt{n \sum u^2 - (\sum u)^2} \sqrt{n \sum v^2 - (\sum v)^2}}$$

$$= \frac{(5 \times 15025841363) - (2 \times 1)}{\sqrt{5 \times 13584628094 - (2)^2} \sqrt{5 \times 16645836499 - (1)^2}}$$

$$= 0.99922$$

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

$$= 0.6745 \times \frac{1 - (0.99922)^2}{\sqrt{5}}$$

$$= \frac{0.6745 \times 0.00156}{2.24}$$

$$= 0.00047$$

$$\text{Again, } 6 \times \text{P.E.} = 6 \times 0.00047 = 0.00281$$

Since  $r = 0.99922 > 0.00281$ ; r is significant.

## Annex – 6

### Calculation of Arithmetic Mean and Correlation Coefficient between Sales of finished Goods and Closing Stock of Unilever Nepal Limited

(in Rs '000)

x	u = x - $\bar{x}$	u <sup>2</sup>	y	v = y - $\bar{y}$	v <sup>2</sup>	uv
610,331	(133,623)	17,855,106,129	144,447	(43,693)	1,909,078,249	5,838,389,739
651,696	(92,258)	8,511,538,564	126,107	(62,033)	3,848,093,089	5,723,040,514
841,483	97,529	9,511,905,841	184,215	(3,925)	15,405,625	(382,801,325)
792,173	48,219	2,325,071,961	229,764	41,624	1,732,557,376	2,007,067,656
824,086	80,132	6,421,137,424	256,167	68,027	4,627,672,729	5,451,139,564
3,719,769	(1)	44,624,759,919	940,700	-	12,132,807,068	18,636,836,148

Now,

$$\bar{x} = \frac{\sum x}{n} = \frac{3719769}{5} = 743954$$

$$\bar{y} = \frac{\sum y}{n} = \frac{940700}{5} = 188140$$

Then,

$$r = \frac{n \sum uv - \sum u \sum v}{\sqrt{n \sum u^2 - (\sum u)^2} \sqrt{n \sum v^2 - (\sum v)^2}}$$

$$= \frac{(5 \times 18636836148) - [(-1) \times (0)]}{\sqrt{5 \times 44624759919 - (-1)^2} \sqrt{5 \times 12132807068 - (0)^2}}$$

$$= 0.80095$$

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

$$= 0.6745 \times \frac{1 - (0.80095)^2}{\sqrt{5}}$$

$$= \frac{0.6745 \times 0.35848}{2.24}$$

$$= 0.10795$$

$$\text{Again, } 6 \times \text{P.E.} = 6 \times 0.10795 = 0.64767$$

Since  $r = 0.80095 > 0.64767$ ; r is significant.

## Annex – 7

### Calculation of Arithmetic Mean and Correlation Coefficient between Sales of finished Goods and Closing Stock of Gorakhkali Rubber Udyog Limited

(in Rs '000)

x	u = x - $\bar{x}$	u <sup>2</sup>	y	v = y - $\bar{y}$	v <sup>2</sup>	uv
381,164	5,587	31,214,569	206,634	42,565	1,811,779,225	237,810,655
400,989	25,412	645,769,744	144,820	(19,249)	370,524,001	(489,155,588)
351,620	(23,957)	573,937,849	155,364	(8,705)	75,777,025	208,545,685
341,094	(34,483)	1,189,077,289	156,365	(7,704)	59,351,616	265,657,032
403,018	27,441	753,008,481	157,160	(6,909)	47,734,281	(189,589,869)
1,877,885	-	3,193,007,932	820,343	(2)	2,365,166,148	33,267,915

Now,

$$\bar{x} = \frac{\sum x}{n} = \frac{1877885}{5} = 375577$$

$$\bar{y} = \frac{\sum y}{n} = \frac{820343}{5} = 164069$$

Then,

$$r = \frac{n \sum uv - \sum u \sum v}{\sqrt{n \sum u^2 - (\sum u)^2} \sqrt{n \sum v^2 - (\sum v)^2}}$$

$$= \frac{(5 \times 33267915) - [(0) \times (-2)]}{\sqrt{5 \times 3193007932 - (0)^2} \sqrt{5 \times 2365166148 - (-2)^2}}$$

$$= 0.01211$$

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

$$= 0.6745 \times \frac{1 - (0.01211)^2}{\sqrt{5}}$$

$$= \frac{0.6745 \times 0.99985}{2.24}$$

$$= 0.30107$$

$$\text{Again, } 6 \times \text{P.E.} = 6 \times 0.30107 = 1.80643$$

Since  $r = 0.01211 < 1.80643$ ; r is insignificant.

## Annex – 8

### Calculation of Arithmetic Mean and Correlation Coefficient between Sales of finished Goods and Closing Stock of Nepal Lube Oil Limited

(in Rs '000)

x	u = x - $\bar{x}$	u <sup>2</sup>	y	v = y - $\bar{y}$	v <sup>2</sup>	uv
136,004	14,660	214,915,600	19,268	(11,950)	142,802,500	(175,187,000)
119,151	(2,193)	4,809,249	30,569	(649)	421,201	1,423,257
84,712	(36,632)	1,341,903,424	31,603	385	148,225	(14,103,320)
118,103	(3,241)	10,504,081	36,392	5,174	26,770,276	(16,768,934)
148,752	27,408	751,198,464	38,259	7,041	49,575,681	192,979,728
606,722	2	2,323,330,818	156,091	1	219,717,883	(11,656,269)

Now,

$$\bar{x} = \frac{\sum x}{n} = \frac{606722}{5} = 121344$$

$$\bar{y} = \frac{\sum y}{n} = \frac{156091}{5} = 31218$$

Then,

$$r = \frac{n \sum uv - \sum u \sum v}{\sqrt{n \sum u^2 - (\sum u)^2} \sqrt{n \sum v^2 - (\sum v)^2}}$$

$$= \frac{(5) \times (-11656269) - (2 \times 1)}{\sqrt{5 \times 2323330818 - (2)^2} \sqrt{5 \times 219717883 - (1)^2}}$$

$$= -0.01631$$

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

$$= 0.6745 \times \frac{1 - (-0.01631)^2}{\sqrt{5}}$$

$$= \frac{0.6745 \times 0.99973}{2.24}$$

$$= 0.30104$$

$$\text{Again, } 6 \times \text{P.E.} = 6 \times 0.30104 = 1.80622$$

Since  $r = -0.01631 < 1.80622$ ; r is insignificant.

## Annex – 9

### Calculation of Arithmetic Mean and Correlation Coefficient between Sales of finished Goods and Closing Stock of Bottlers Nepal Limited

(in Rs '000)

x	u = x - $\bar{x}$	u <sup>2</sup>	y	v = y - $\bar{y}$	v <sup>2</sup>	uv
535,494	(67,272)	4,525,521,984	185,341	(14,369)	206,468,161	966,631,368
609,654	6,888	47,444,544	227,223	27,513	756,965,169	189,509,544
632,114	29,348	861,305,104	184,980	(14,730)	216,972,900	(432,296,040)
614,739	11,973	143,352,729	224,070	24,360	593,409,600	291,662,280
621,827	19,061	363,321,721	176,936	(22,774)	518,655,076	(434,095,214)
3,013,828	(2)	5,940,946,082	998,550	-	2,292,470,906	581,411,938

Now,

$$\bar{x} = \frac{\sum x}{n} = \frac{3013828}{5} = 602766$$

$$\bar{y} = \frac{\sum y}{n} = \frac{998550}{5} = 199710$$

Then,

$$r = \frac{n \sum uv - \sum u \sum v}{\sqrt{n \sum u^2 - (\sum u)^2} \sqrt{n \sum v^2 - (\sum v)^2}}$$

$$= \frac{(5 \times 581411938) - [(-2) \times (0)]}{\sqrt{5 \times 5940946082 - (-2)^2} \sqrt{5 \times 2292470906 - (0)^2}}$$

$$= 0.15754$$

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

$$= 0.6745 \times \frac{1 - (0.15754)^2}{\sqrt{5}}$$

$$= \frac{0.6745 \times 0.97518}{2.24}$$

$$= 0.29364$$

Again,  $6 \times \text{P.E.} = 6 \times 0.29364 = 1.76185$

Since  $r = 0.15754 < 1.76185$ ; r is insignificant.

## Annex – 10

### Calculation of Arithmetic Mean and Correlation Coefficient between Sales of finished Goods and Closing Stock of Bitumen and Barrel Limited

(in Rs '000)

x	u = x - $\bar{x}$	u <sup>2</sup>	y	v = y - $\bar{y}$	v <sup>2</sup>	uv
100,607	(51,882)	2,691,741,924	28,663	9,147	83,667,609	(474,564,654)
72,492	(79,997)	6,399,520,009	22,069	2,553	6,517,809	(204,232,341)
164,678	12,189	148,571,721	18,856	(660)	435,600	(8,044,740)
223,358	70,869	5,022,415,161	13,459	(6,057)	36,687,249	(429,253,533)
201,311	48,822	2,383,587,684	14,534	(4,982)	24,820,324	(243,231,204)
762,446	1	16,645,836,499	97,581	1	152,128,591	(1,359,326,472)

Now,

$$\bar{x} = \frac{\sum x}{n} = \frac{762446}{5} = 152489$$

$$\bar{y} = \frac{\sum y}{n} = \frac{97581}{5} = 19516$$

Then,

$$r = \frac{n \sum uv - \sum u \sum v}{\sqrt{n \sum u^2 - (\sum u)^2} \sqrt{n \sum v^2 - (\sum v)^2}}$$

$$= \frac{[(5) \times (-1359326472)] - (1 \times 1)}{\sqrt{5 \times 16645836499 - (1)^2} \sqrt{5 \times 152128591 - (1)^2}}$$

$$= -0.85421$$

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

$$= 0.6745 \times \frac{1 - (-0.85421)^2}{\sqrt{5}}$$

$$= \frac{0.6745 \times 0.27032}{2.24}$$

$$= 0.08140$$

$$\text{Again, } 6 \times \text{P.E.} = 6 \times 0.08140 = 0.48839$$

Since  $r = -0.85421 < 0.48839$ ; r is insignificant.



# BIBLIOGRAPHY

## Books

- Agrawal, Govind R. (1981), *Inventory Cost Control: Management Day Souvenir, Production Management*, Gandhi Bhawan, Kathmandu.
- Bajade, J.J. (1981), *Procurement the First Step in Material Management*, Production Management, IOM, T.U.
- Dobler, Donald W., Lee, Lamar Jr. & Burt, David N. (1984), *Purchasing and Materials Management Text and Cases*, McGraw-Hill Book Company New York.
- Goel B.S. (1992), *Production and Operation Management*, Pragati Prakashan, Meerut.
- Goel, S.L. (1995), *Modern Management Techniques*, Deep and Deep Publication.
- Gupta L.M. (1989), *Cost Account*, Kitab Mahal, 15 Thron Hill Road, Allahabad.
- Hampton J.J (1986), *Financial Decision Making*, Prentice Hall of India Limited, New Delhi, 4<sup>th</sup> edition.
- Jain S.P. and Narang K.L. (1993), *Financial Management Accountancy*, Kalyani Publishers, New Delhi.
- Levin I Richard & Kirkpatrick, Charles A. (1971), *Quantitative Approach to Management*, Mac-Graw Hill International Company Ltd, 2<sup>nd</sup> edition.
- Munakarmi, S.P. (2003), *Cost and Management Accounting*, Educational Publishing House, Kathmandu, 2<sup>nd</sup> edition.
- Pradhan Radhe S. (2004), *Financial Management*, Buddha Academic Enterprises Private Limited, Kathmandu.
- Regmi L.K., Joshi P.R., Chaudhary A.K. and Fago G. (2002), *Production and Operation Management*, Buddha Academic Publishers and Distributors Pvt. Ltd., Kathmandu, Nepal.
- Sthapit, Azaya Bikram, Yadav Rashindra Prasad, Tamang Govinda, Dhitak Sushil, Adhikari Prakash (2006), *Production and Operations Management*, Asmita Books Publishers and Distributor, Kathmandu.
- Tulsian, P.C. (2005), *Accountancy for CA Professional Examination-I*, Tata McGraw-Hill, New Delhi, First reprint.
- Waugh, A.E. (1952), *Elements of Statistical Methods*, Mc graw Hill Co., New York, 3<sup>rd</sup> edition.
- Welsch, G.A., R.W. & Gordon, P.N. (2002), *Budgeting: Profit Planning and Control*, Prentice Hall Inc, USA.
- Weston J.F., Bisleys, Brigham E.F. (2007), *Essentials of Managerial Finance*, The Dryden Press, USA.

- Wolff Howard K. and Pant Prem R. (2005), *A Handbook for social Science Research and Thesis Writing*, Buddha Academic Enterprises Pvt. Ltd., Kathmandu, Nepal.

### **Selected Studies**

- Balika Radha Kumari (2005), *A study on Inventory Management in Hetauda Cement Industries Limited*, An unpublished Master's Dissertation, submitted to the Faculty of Management, T.U.
- Pokharel Dhurba Raj (2008), *A study on Inventory Management in Janakpur Cigarette Factory*, An unpublished Master's Dissertation, submitted to the Faculty of Management, T.U.
- Pyakurel Bhesnath (2004), *A study of Material Management System in Bansbari Leather and Shoes Factory*, An unpublished Master's Dissertation, submitted to the Faculty of Management, T.U.
- Ranjit S.B. (2007), *A study on Materials Management with special reference of Birgunj Sugar Factory Limited*, An unpublished Master's Dissertation, submitted to the Faculty of Management, T.U.
- Shrestha Jayendra Bahadur (2008), *A study of Structure and Efficiency of Investment in Inventory of Royal Drug Limited*, An unpublished Master's Dissertation, submitted to the Faculty of Management, T.U.
- Tiwari Dipak Raj (2009), *A study on Inventory Management of Salt Trading Corporation Limited*, An unpublished Master's Dissertation, submitted to the Faculty of Management, T.U.

### **Articles and Journals**

- Dean S. Ammer, (1969), *Harvard Business Review*.
- Shah, J. R., (July 1, 2007), *Privatization of Public Enterprises In Nepal A Donor Prescribed Option*, The Rising Nepal.
- Wagle B., (June 8, 2007), *What ails Nepali public enterprises?*, [www.kantipuronline.com](http://www.kantipuronline.com).