

# **INVENTORY MANAGEMENT OF UNILEVER NEPAL LIMITED**

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# **RECOMMENDATION**

**This is certify that the thesis**

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**Entitled:**

**INVENTORY MANAGEMENT OF UNILIVER NEPAL LIMITED**

Has been prepared as approved by this Department in the prescribed format of the faculty of management. This thesis is forwarded for examination.

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# VIVA-VOICE SHEET

We have conducted the viva-voice of the thesis presented

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And found the thesis to be original work of the student and written according to the prescribed format. We recommended the thesis to be accepted as partial fulfillment of the degree of master of business studies.

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## **Declaration**

I hereby declare that the project report entitled

### **"Inventory Management Of Unilever Nepal Limited"**

Submitted in partial fulfillment of the requirements for the degree of Master of Business  
Studies.

To office of the dean, faculty o management, Tribhuvan University is my orginal work  
and not submitted for the award of any other degree, diploma fellowship or any other  
similar title or prizes under the supervision of **Dr. Gopinath Regmi** of Tribhuvan  
University, Central Department of Management , Kirtipur, Kathmandu, Nepal.

.....

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I would like offer my gratitude to respect parents who spent their entire life to make me what I am today.

Niraj Poudyal  
April 5, 2013

## Executive Summary

Industrial sector is emerging as a driving force for promoting economic activities and national growth. Industrialization is a base of country's rapid economic and social progress. Now a days industrialization is considered as an essential for the economic development of the country. It facilitates effective mobilization of resource such as capital and skill of unutilized and underutilized manpower. It also acts as a vehicle for fostering innovation and technological improvement for industrial development, thus, has a multiplier effect on the economy.

It is believed that in order to achieve security, stability and high standard of living the country must be industrialized. The most important reason for embarking on a performance of industrialization is to increase the national income (Baryle,1969:396). The manufacturing sectors have to face various problems which have acted constraints in the growth of manufacturing industries. Such problem arises due to the country being landlocked and underdeveloped, lack of trained and skilled manpower, financial resources, inconvenience in transport and communication networks, non availability of assured energy at reasonable rate, shortage of capital, small size of the market, unawareness of the industrial potential, higher cost of production, low productivity of inputs, technology, instability in government policies etc (Pradhan, 1994: 181).

Nepal is a poor developing country with per capita of about \$724 per year (Economic Survey Report-2068/69). Annual economic growth rate in Nepal is about 4.48% (Economic Survey Report-2068/69). The rate must be substantially increased for the sake of rapid economic development. Due to various factors it is not developed in terms of many indicators used to measure the level of development of a nation in the present day world. So it has characteristic of developing country like shortage of capital, industrial backwardness, shortage of materials, lack of technological know-how, use of low level of technology in production, under utilization of natural resources, prevalence of unemployment, low productivity, etc.

The industrialization started very late in Nepal, only after the second world war. Industrialization is a comparatively new phenomenon in Nepal. Biratnagar Jute Mill set

up in 1936, marked the beginning of the organized industry in the country. After the Second World War, the shortage of essential consumer goods in the market, the promoters of these industries could reap windfall profits with a short period of time. Within a period of 10 years (1936-1946) as many as 63 industrial units were opened in the country.

In Nepalese context both import substitution and export-promoting industries are needed. Our first attention is towards the establishment of import substitution industries. Both the import substitution industries and export-promoting industries have great importance to our economy. Import substitution industry will help to minimize the import of the goods as well as local resources such as capital, material, labor, etc will get employment within the nations. Besides this, these industries will generate revenue more to the government and export promoting industries will maximize the export of goods and will generate income to the nations fund.

Industrial development in Nepal however started getting regular attention of the government under the ages of development plan after the dawn of democracy in 1951. Several industries were established in public sector mostly with the financial and technical assistance of USSR and China. The government gave much emphasis on the development of public enterprises, after the adoption of first five-year plan in 1956, the government established different public enterprises during various plan periods.

Lack of sufficient raw material of mainly unsatisfactory utilization of capacity is the failure of public sector manufacturing companies in Nepal. Due to which some of them have been liquidated, amalgamated and privatized. As the study concentrated over inventory management study followed in Unilever Nepal Ltd. It is necessary to know exactly what is inventory. Inventory can be in form of raw materials, work in progress and finished goods. Inventory constitutes the most significant part of current assets of large company. Hence considerable amount of funds is required to fulfill them. It is therefore absolutely imperative to manage inventories efficiently and effectively in order to avoid unnecessary inventory. A firm neglecting the management of inventory will be losing the long run profitability and may collapse ultimately.

Inventory management is an integral part of financial management. Or it is the determination of how much inventory there should be on hand to serve for the purpose of the business most economically.

Inventory management and controlled system followed by manufacturing companies are ABC analysis, perpetual inventory management system (physical checking), EOQ etc.

In the company, there are different types of inventories, like RM, WIP, finished goods and stores and spare parts. Purchasing is the first step of inventory management of manufacturing companies. When all items of inventories are received by purchasing department they are passed into the store. So these items are handled and managed carefully. There are various problems like political crisis, strikes lockout and transportation problem facing by the manufacturing companies regarding the management of inventories. The company has not been adopting appropriate inventory policy because inventory constitutes the higher proportion than that of other items of current assets. The company has not followed any type of inventory policies.

The fluctuation in stock of RM during the study period is very high. Defective purchasing policy and poor planning of raw materials are the main responsible factors for such fluctuation. There is no fixed policy of purchasing materials. Demand and sales of company (UNL) are very fluctuating. The main reason of such fluctuation is lack of appropriate inventory policy and ineffective demand forecast. The correlation between sales and net profit is 0.7861. Therefore, there is significant relationship between sales and net profit and it is concluded that the change in sales results change in net profit.

The correlation between inventory and net profit is 0.9337, so it becomes clear that there is positive and high degree of correlation between inventory and net profit. 'T' statistics also indicate that correlation coefficient between inventory and net profit is significant. EOQ is not similar during the study period. This type of fluctuation is due to variation of ordering cost and fluctuation in demand but the company has not used EOQ model to manage and control of the inventory. UNL is using bin card technique and ABC analysis to control and manage the store in order to minimize the cost of holding materials. The bin-cards are maintained by storekeeper.

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## ABBREVIATION

AIC	=	Agriculture Input Corporation
CA	=	Current Assets
Co.	=	Company
DRP	=	Distribution Requirement Planning
EOQ	=	Economic Order Quantity
F.G.	=	Finished Goods
FIFO	=	First In First Out
FNCCI	=	Federation of Nepalese Chamber of Commerce and Industry
FY	=	Fiscal Year
HCCL	=	Himal Cement Company Limited
HCIL	=	Hetauda Cement Company Limited
HLL	=	Hindustan Lever Limited
ITR	=	Inventory Turnover Ratio
JIT	=	Just –In-Time
LIFO	=	Last –In-First Out
MRP (I)	=	Material Requirement Planning
MRP (II)	=	Manufacturing Resource Planning
PM	=	Packaging Material
RM	=	Raw Materials
ROL	=	Re-order-Level
ROP	=	Re-order Point
Rs.	=	Rupees
UNL	=	Unilever Nepal Limited
VDC	=	Village Development Committee
WIP	=	Work-In-Progress

# CHAPTER ONE

## INTRODUCTION

### 1.1 BACKGROUND OF THE STUDY

Industrial sector is emerging as a driving force for promoting economic activities and national growth. Industrialization is a base of country's rapid economic and social progress. Now a days industrialization is considered as an essential for the economic development of the country. It facilitates effective mobilization of resource such as capital and skill of unutilized and underutilized manpower. It also acts as a vehicle for fostering innovation and technological improvement for industrial development, thus, has a multiplier effect on the economy.

In Nepalese context both import substitution and export-promoting industries are needed. Our first attention is towards the establishment of import substitution industries. Both the import substitution industries and export-promoting industries have great importance to our economy. Import substitution industry will help to minimize the import of the goods as well as local resources such as capital, material, labor, etc will get employment within the nations. Besides this, these industries will generate revenue more to the government and export promoting industries will maximize the export of goods and will generate income to the nations fund.

Industrial development in Nepal however started getting regular attention of the government under the ages of development plan after the dawn of democracy in 1951. Several industries were established in public sector mostly with the financial and technical assistance of USSR and China. The government gave much emphasis on the development of public enterprises, after the adoption of first five-year plan in 1956, the government established different public enterprises during various plan periods.

Lack of sufficient raw material of mainly unsatisfactory utilization of capacity is the failure of public sector manufacturing companies in Nepal. Due to which some of them have been liquidated, amalgamated and privatized. As the

study concentrated over inventory management study followed in Unilever Nepal Ltd. It is necessary to know exactly what is inventory. Inventory can be in form of raw materials, work in progress and finished goods. Inventory constitutes the most significant part of current assets of large company. Hence considerable amount of funds is required to fulfill them. It is therefore absolutely imperative to manage inventories efficiently and effectively in order to avoid unnecessary inventory. A firm neglecting the management of inventory will be losing the long run profitability and may collapse ultimately.

Inventory management is an integral part of financial management. Or it is the determination of how much inventory there should be on hand to serve for the purpose of the business most economically.

## **1.2 INTRODUCTION OF INVENTORY MANAGEMENT**

Inventory is one of the most important assets to most of the organization. Larger percentage of total capital is invested in inventory. Inventory is vital element of the firms in the efforts to achieve desire sales level. Inventory can be defined as a stock of any kind of items reserved in a store for a certain period. It constitutes the most significant portion of current assets. Inventories are stocks of finished product of a company or components that make up the product.

Inventory management involves planning of the optimum level of inventory and control of inventory cost supported by an appropriate organization structure, which is staffed by trained persons and directed by top management. It involves both financial dimension as well as physical dimension and these dimensions are interrelated and cannot be looked in isolation (Agrawal, 2000:21).

Inventory is the stock of materials or products that frequently occurs in the manufacturing organization. Depending upon the nature of industry and firm, inventories may be durable and perishable, valuable and inexpensive. When materials are purchased by an organization they have to be store until they are put into the production process. When the production is over the finished products have to be stored again until they are sold. In manufacturing there

are four types of inventories such as raw materials, work-in-process (semi manufactured product), finished goods and office supplies (Pandey, 1999: 755).

Thus, management should pay adequate attention to the inventory management to reduce the cost of production. Inventory should be maintained in appropriate quantity so as to avoid both under stock and over stock. The aim of inventory management is to maintain optimum level of inventory for the smooth production and sales. Therefore, inventory management is primarily concerned with minimizing cost of investment in inventory, maintaining desired level of inventory and minimizing total cost of inventory. Both the physical as well as financial dimension of inventory should be efficiently managed. Thus, the real task of top management lies in formulating the plan and policy that will lead to optimal inventory investment for the attainment of desired objectives.

Similarly inventory has direct relationship with profit planning to prepare different budgets, especially for production budget and purchase budget because

$$\text{Production Units} = \text{Sales Units} + \text{Closing inventory} - \text{Opening inventory}$$

$$\text{Purchase Units} = \text{Production Units} + \text{Closing inventory of raw materials} - \text{Opening inventory of raw material}$$

### **1.3 AN INTRODUCTION OF UNILEVER NEPAL LTD.**

This study attempts to focus on Unilever Nepal Ltd. The name was converted from the Nepal Lever Limited into Unilever Nepal Limited on 31<sup>st</sup> December 2004 in accordance with the law enforced by passing special resolution in general meeting. Unilever Nepal Ltd was formed as a subsidiary company of Hindustan lever Ltd. of India. The factory is situated at Basamadi VDC-5 of Makwanpur District, 6 km far from Hetauda of central development region of Nepal. The corporate office of the company is situated at Heritage Plaza II, Kamaladi, Kathmandu. UNL was formed as a public limited company in 1993 and production started from December 1994. It was registered under

Company Act 2053. As a growing manufacturing company, UNL has main objective of expanding the domestic business by introducing new brands and categories in the domestic market and import substitution of foreign goods too.

The business environment in the country was difficult throughout the year. Business were impacted by disruptions in the form of bands long blockades and finally the long demonstrations which brought the country to stand still. However, despite this, the company's domestic business achieved market growth of 6% during the year 2068/69.( i.e.21232 tons to 22409 tons ) (Annual report, 2068/69)

The company received the "Best Presented Accounts Award-2005 Runner Up Category Manufacturing Sector" by the Institute of Chartered Accountants of Nepal.

UNL is taking a great corporate social responsibility. It has contributed in various ways to the social sector. UNL is proud of its role in the income and employment generation opportunities in the country. UNL is providing direct employment to over 186 Nepalese citizens while generating indirect employment by over 20 times that number through its networks of suppliers, distributors and ancillaries ( Annual report, 2068/69). It is already one of the largest corporate taxpayers to Nepal Government.

It is involving in various social projects. The UNL employee Trusts mobile medical unit, which is extensively used in Makwanpur district for providing emergency medical services. The miles of healthy smiles programs, the ambitious project for contracting sector throughout Nepal to import oral health education, has covered more than 500000 children so far. The UNL is sponsoring a free clinic at Makwanpur. This clinic provides free medical treatment and medicines to needy patients. In addition the company has assisted in provision of education of poor, particularly the girl child, providing medical assistance in deserving cases and extended help to medical camps in and around the factory site, including donation of oral care products for free distribution.( Annual report, 2068/69).

Similarly UNL had contributed Rs. 3.5 lacs to the nepalese disabled Children Welfare Association for the procurement of braille Education Equipment to be further distributed to institute to enhance the educational experience of blind children. Also 47 student of makawanpur distric have been provided scholarship by UNL company to study technical SLC courses for two and half year at Balaju school of engeineering and technical institute, Balaju, Kathmandu. This progarmme would continue for future batches of eligible student for the year 2069/2070.

#### **1.4 THE CORPORATE PURPOSE OF UNILEVER NEPAL LTD.**

The main objective of UNL is to carry on its business of manufacturing detergent, toilet soaps, personal products, scourers, soap noodles, laundry soap, tea and vanaspati.

Other objective of Unilever Nepal Ltd. is to meet the every day needs of people everywhere to anticipate the aspirations of consumers and to respond creatively and competitively with the branded products and services, which rises up quality of life. They bring their wealth of knowledge and industrial expertise to the service of local consumers.

UNL has deep roots in local culture that the markets are unparallel inheritance thus has become foundation for the company's future growth.

For its long term success, UNL requires a total commitment to exceptional standards of performance and productivity to working together effectively and willingness to embrace new ideas and learn continuously. The company believes that the success required the highest of corporate behavior towards its employees, consumer, society and the world in which it operates. Thus UNL needs the sustainable profitable growth and long-term values creation for their shareholders and employee i.e. for their stakeholders.

#### **1.5 OWNERSHIP OF UNILEVER NEPAL LTD.**

It is a subsidiary company of foreign investment operating for technology transformation. It has an authorized capital of Rs 30, 00, 00,000 (Thirty

crores) divided into 30, 00,000 (thirty lakhs) ordinary shares of Rs 100 each. The issued, subscribed and paid up capital reached to the limit of Rs 9,20,70,000.00(9,20,700ordinary shares of Rs 100 each). The company is listed in Nepal Stock Exchange Center and has a positive response from its investors. The composition and percentage of sharing on capital are as follows:

Group	Allocation of shares	% of shares	No of shares
A	Hindustan Lever Ltd., India	80 %	7,36,560
B	Sibkrim land and Ind. Co. (Pvt.) Ltd. Kathmandu, the Nepalese Collaborator	5 %	46,035
C	Shares subscribed by the general public	15 %	1,38,105
<b>TOTAL</b>		<b>100%</b>	<b>9,20,700</b>

(Source: Unilever Nepal Ltd, annual report, 2065/66)

## 1.6 STATEMENT OF THE PROBLEM

Unilever Nepal Ltd. one of the joint venture industry of Hindustan Lever Ltd and Nepalese people is the first industry established of its own kind. Despite of the fact the return of Unilever can not be considered as satisfactory. Besides, Keeping in view of uproaring competition in this field Unilever Nepal Ltd. needs to operate with efficiently. But till now the result is not satisfactory.

Inventory directly affects profitability of an organization. So managing inventory in a proper way is a great challenge to every organization. I could not find optimum inventory policies in UNL by studying different journal and annual reports of the organization. Looking insight into the P/L account of UNL of different years, and it is found that profit is not increasing significantly.

Management should pay adequate attention to the inventory management to reduce the cost of production. Inventory should be maintained in appropriate quantity so as to avoid both under stock and over stock. The aim of inventory management is to maintain optimum level of inventory for the smooth production and sales. Therefore, inventory management is primarily concerned with minimizing cost of investment in inventory, maintaining desired level of inventory and minimizing total cost of inventory. Both the physical as well as financial dimension of inventory should be efficiently managed. Thus, the real task of top management lies in formulating the plan and policy that will lead to optimal inventory investment for the attainment of desired objectives. Therefore, the objective of inventory management should be to avoid excessive and inadequate level of inventories and maintain sufficient inventory for the smooth production, and sales operation. Efforts should be made to place an order at right time with the right source to acquire the right quantity and the right price and quality.

So, this topic has been selected for research and emphasis has been given to followings points.

- How inventories are managed in Unilever Nepal Ltd.?
- How can the factory reduce inventory cost?
- What is inventory turnover ratio?
- Whether or not inventory management policy of UNL is sound?
- What would be the impact of inventory management on the profitability of the company?

## **1.7 OBJECTIVES OF THE STUDY**

The major objective of this study is to study and analyses the existing problem underlying in inventory management of Unilever Nepal Ltd. In order

to meet the main objective the following specific objectives have been proposed.

- To identify the present inventory position of Unilever Nepal Ltd.
- To know the relationship of sales and inventories.
- To identify the problem faced by the Unilever Nepal Ltd. in the management of inventory.
- To assess the inventories and their consequences on profitability of Unilever Nepal Ltd..
- To suggest for the better practice of inventory management.

### **1.8 LIMITATIONS OF THE STUDY**

This study attempts to find out the problems in Inventory Management of Unilever Nepal Ltd. Therefore the following will be the major limitation of the study.

- ) This study is concentrated on the area of inventory management of Unilever Nepal Ltd..
- ) The comprehensibility and accuracy of the study are based on the data provided by the management and various published document of UNL ..
- ) This is the case study, so it is not applicable in general situation or all types of manufacturing enterprises.
- ) Unilever Nepal Ltd. produces different types of product and has diversified product groups. So this study deals with the corporate product groups namely, detergent, toilet soap, personal products, scourers, soap noodles, laundry soaps, tea and vanaspati.
- ) This study covers 5 years performance of Unilever Nepal Ltd.

- ) This study is based on data provided from companies and other available resources. Hence this study is based on secondary data as well as primary data.
- ) Financial tools are used in analyzing the inventory management of Unilever Nepal Ltd..

## **1.9 IMPORTANCE OF THE STUDY**

Inventory management is one of the most important functions in an organization. Without effective and efficient inventory management, no organization can achieve its goals. A firm cannot achieve its goals unless inventories are controlled effectively and capital is allocated properly. Proper inventory management helps to increase the profit of an organization. A slight change in the cost of inventories will bring a great change in the firm's profitability. Reduction in the material cost may result in high profit.

Most of Nepalese manufacturing organizations are suffering from poor inventory management. Unilever Nepal Ltd. has different types of products thus deals with diversified product group to meet everyday need of domestic consumers. It has been producing several products since last twelve years. Being a manufacturing company, it spends a lot of time, money and effort in inventory management. Therefore, the researcher is very much interested to examine its inventory management system of UNL So, this topic is chosen for the study. It is hoped that the study may help to solve the problem faced by Unilever Nepal Ltd. to eliminate the obstacles presently traced in inventory management.

## **1.10 ORGANIZATION OF THE STUDY**

This study has to be completed within the format provided by the Research Department of Tribhuban University, Central Department of Management, T.U. So, the research is divided into five chapters, which are as follows

- a. **Chapter One:** It includes general background of study statement of problem, objectives of the study, introduction of the company, objectives and limitations of the study.
- b. **Chapter Two:** This chapter includes review of literature. The researcher has divided this chapter into two portion ,first being theoretical framework and second is review of previous studies.
- c. **Chapter Three:** The Chapter three includes research methodology research design, nature and sources of data, data gathering procedure, presentation and analysis of technique. Research methodology consists of research design & research tools. Both primary and secondary data are used in this study. But secondary data are used considerably.
- d. **Chapter Four:** Fourth chapter of this study is concern with data presentation & analysis. This is the main part of the study. Obtained data are presented in the tabular & other forms. Various statistical presentation are used for analyzing the collected data from different sources. Actual results are obtained after analysis of data by using financial and statistical tools and techniques. Major findings are drawn after analysis of data.
- e. **Chapter Five:** This is the last chapter of study & includes, summary conclusion, findings and some recommendations.

An extensive **bibliography and annexes** are also included at the end.

## **CHAPTER TWO**

### **REVIEW OF LITERATURE**

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

There are many researches made in the field of Nepalese manufacturing enterprise. Only limited numbers of studies have been conducted in the field of inventory management. In this chapter attempts have been made to present the review of literature regarding inventory management. This chapter is divided into two-sub section. Conceptual Framework (theoretical concept of inventory management) is presented in first section and review of related studies has been presented in the second section.

#### **2.1 CONCEPTUAL FRAMEWORK**

The term inventory refers to the stockpile of the product a firm is offering for sale and the components that make up the product. In other words, inventory is composed of assets that will be sold in future in the normal course of business operation (Khan&Jain, 2003:20.3). Inventory may be defined as the goods held for eventual resale by the firm. As such inventories are vital elements in the efforts, of the firm to achieve desired sales level.

The dictionary meaning of inventory is stock of goods or a list of goods. Various authors have given the meaning of inventory differently. In accounting

language inventory denotes stock of finished goods. In a manufacturing concern, it may include raw materials, work-in process and stores etc.

“Inventory as a current assets, differ from the other current assets because only financial manager are not involved. Rather, all the financial areas i.e. finance, marketing, production and purchasing are involved. The views concerning the appropriate level of inventory would differ among the different functional areas” (Khan &Jain, 2003:20.4). “Inventory refers to the physical stock of goods. Which though remain idle in the store but is essential for smooth selling of the company and hence has economic values” (Kothari, 1996:39).

Inventory form a link between production and sale of product. The optimum level of inventories should be judged in relation to the flexibility of inventories. The lower level of inventories makes less flexibility of the firm. And higher level of inventory increases the flexibility organization.

Any things that a firm kept meeting in future requirements of production and sale is called inventory. The basic reasons for holding inventory are to keep up the production activities unhampered. It is neither physically possible nor economically suitable to wait for the stocks to arrive at when they are actually required. Therefore, keeping up inventory is a must for efficient working of a business unit (Jain & Narang, 1994:109).

### **2.1.1 Production Budget**

For manufacturing companies production budget is prepared prior to sales budget. Production budget shows the quantities to be produced for achieving sales targets and keeping sufficient inventories.

The production is based on budgeted sales volume and desired inventory level. The responsibilities for the preparation and operation of production budget lie with production manager. Inventory budget is one of the important components of production budget. Future is uncertain so production has to be made inventory also. Inventory has direct relationship with production budget. Without making appropriate

inventory policies, the organization can't prepare production budget because,

**Production budget**

Sales units for the period	****
(+) Closing inventory (inventory at the end)	****
Total requirement for the period	****
(-) Opening inventory (beginning inventory)	****
Production units for the period	****

**2.1.2 Purchase Budget**

Manufacturing company purchases raw materials for its products to be produced. The quantity of materials to be purchased is determined by both production volume and inventory need/requirement. Purchase budget helps to determine the quantity and volume of materials required for the budgeted period and also the inventory of materials required to be maintained. Thus inventory has also direct relationship with material purchase budget. The organization can't purchase material whenever it is needed. So organization has kept sufficient stock or inventory of material for smooth operation of the organization.  $\text{Material Usage/Consumption Budget} = \text{Production budget} * \text{Standard Usage rate}$

**Material Purchase budget**

Material usage units for the period	****
(+) Closing inventory (inventory at the end) of material	****
Total requirement for the period	****
(-) Opening inventory (beginning inventory) of material	****
Material Purchase units for the period	****

Before preparing to material purchase budget, the organization has to consider the following points:

- i) **Units to purchase:** Material usage } inventory
- ii) **Timing for purchase or reorder level (ROL):** Replacement stock + safety stock

Or, Lead time stock + safety stock

Or,  $ROL = (Lead\ time * Daily\ Consumption) + Safety\ Stock$

Where,

Lead time = time gap between order and receive

- iii) **Economic Order Quantity (EOQ):**

It determines optimum quantity to be purchased

Similarly for non- manufacturing organization, it has to prepare material purchase budget and open to buy budget.

Where,

**Purchase Budget** = sales + stock at the end + reductions (discount, mark up, loss on storage, damage, demurrage, water, paste, mice, obsolesces, shoplifting, etc) – stock at the beginning.

**Open to buy budget** = Stock needed – stock available

Where,

**Stock needed** = budgeted sales for the period + budgeted reduction + stock at the end – (Actual sales to date + actual reduction to date)

**Stock available** = Stock at the beginning + Merchandise/stock received today + merchandise order for the period delivery – (Actual sales to date + actual reduction to date)

## 2.2. NATURE OF INVENTORY

Every business operation however big or small has to maintain some inventory. An inventory serves as cushions to observe the stock in demand forecast and provides more efficient use of resources. Inventory for any organization is necessary thing and require careful planning and formulation of policies keeping in view the best interest of organization. Depending upon the nature of the industry and firm, inventory may be durable or non-durable, perishable or non-perishable, valuable and inexpensive.

Manufacturing firms generally hold four types of inventories:

- Raw materials
- Work-in-process
- Finished goods
- Supplies and spare parts.

**i.) Raw Materials**

Raw materials are those basic inputs that are converted into finished product through the manufacturing process. These are goods that have yet committed to production in manufacturing firm. “Raw materials inventories are those units which have been purchased and stored for future production” (Weston& Copeland, 1992:814). The level of raw materials inventories is influenced by anticipation production, seasonally of production, reliability of sources of supply and the efficiency of scheduling purchase and production operation.

Materials used in a factory are classified as direct material and indirect material. Direct materials are generally classified to include all materials and parts that are integral part of finished product and their contribution can be directly identified. Indirect materials are generally defined as materials used in manufacturing process as supported materials. Chemicals and perfumes are the main raw materials used by the company i.e.UNL.

**ii.) Work-in-Process**

These categories include those materials that have been committed to the production process but have not been completed. “Goods in process include such items as components and sub assemblies that are not yet ready to be sold.” (Hampton, 1990:241). Works in process inventories are semi-manufactured products. They represent products that need more work before they become finished product for sale.

Work-in-process is neither a finished product nor raw materials. It is the product in the middle of raw materials and finished product. WIP inventories are strongly influenced by the length of production, which is the time between placing raw materials in production and completing the finished product. It is very difficult to separate which materials are WIP and which are not. Because the same materials may be a WIP as well as finished goods in other industry. It depends upon nature of production. Soap noodles are the WIP materials used by the company.

### **iii.) Finished Product**

Finished goods are those completely manufactured products, which are ready for sale. In a manufacturing firm, they are final output of production process. Stock of raw materials and WIP facilitate production of finished goods. Finished goods are required for smooth marketing operation. "Therefore finished goods are completely goods a waiting for sale" (Pandey, 1999:756). Mainly following types of finished products are produced by UNL.

- ) Detergents
- ) Toilet Soaps
- ) Personal products
- ) Scourers
- ) Laundry Soap
- ) Tea and Vanaspati etc.

### **iv.) Supplies and Spare Parts**

Firm also maintains the fourth kind of inventory of supplies. "It includes office and plant cleaning materials (soap, broom etc), oil, fuel, light, bulb and like those materials that don't directly enter into production, but the necessary for the production process: usually these supplies are small part of total inventory and don't involve significant investment."(Pandey, 1999:884).

### **2.3 MOTIVES OF HOLDING INVENTORIES**

The question of managing inventories arises only when the company holds inventories. Manufacturing inventories involved tying of the company funds and insurance of storage and holding cost, if it is expensive to maintain inventories, why do companies hold inventories? There are three motives for holding inventories.

#### **a) The transaction Motives**

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

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

It necessitates holding of inventories to guard against the risk of unpredictable change in demand and supply forces and other factors. Stock of finished goods has to be hold because production end sales are not instantaneous. A firm cannot produce immediately when goods are demanded by customers. Therefore, to supply finished goods on a regular basis their stock has to be maintained. Stock of finished goods has also to be maintained for sudden demand from customers. In case the firms sales are seasonal in nature substantial finished good inventories should be kept to meet the peak demand. Failure to supply products to customers, when demanded, would mean loss of the firm's sales to competition. "The level of finished good, inventories would depend upon the co-ordination between sales and production as well as on production time "(Pandey, 1999:984).

**c) Speculative Motive**

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

**2.4 NEED/ BENEFITS OF HOLDING INVENTORIES**

There are many benefits of holding inventories. Inventories are used to provide cushions so that the purchasing production and sales function can proceed at their own optimum paces. "In achieving the separation of these functions, the firm realizes a number of specific benefits" (Hampton, 1990:228).

**(i) Avoiding Losses of Sales**

If the firm doesn't have goods available for sale, it will lose sales. Customers requiring immediate delivery will purchase their goods from the firms competitors and other will decide that they do not need the goods after all, if they must wait for delivery. The ability of the firm to give quick service and to provide prompt delivery is closely tied to the proper management of inventory.

**(ii) Gaining Quantity Discounts**

If a firm is willing to maintain large inventories in selected product lines, it may be able to make bulk purchase of goods at large discounts. Suppliers, frequently offer a greatly reduce price if the firm orders double or triple its normal requirement. By paying less for its goods, the firm can increase profits, as long as the cost of maintaining the inventories are less then the amount of discount.

### **(iii) Reducing Order Costs**

Every time a firm places an order, it incurs certain costs. Forms must be typed, checked, approved and mailed. When goods arrive, they must be accepted, inspected and counted. The invoice must be checked with the goods and then sent to the accounting department so that supplier can be paid. The variable costs associated with individual orders can be reduced if the firm places a few large then numerous small orders.

### **iv) Achieving Efficient Production Runs**

Once a assemble line or piece of machinery is prepared to receive certain raw materials and perform selected production operation, a set up cost has been incurred. This cost must be absorbed in the subsequent production run. Inventories assist the firm in making sufficiently long runs to achieve efficient production.

## **2.5 OBJECTIVE OF INVENTORY MANAGEMENT**

Efficient management of inventory should ultimately result in the maximization of owner's wealth. In order to minimize cash requirement, inventory should be turned over as quickly as possible, avoiding stock-outs that might result in closing down the production line or lead to a loss of sales. It implies that while management should try to peruse the financial objective of turning as quickly as possible. Sufficient inventories satisfy production and sales demand. The objectives of inventory management consist of two counter balancing parts (Khan & Jain, 2003:20.1).

- i) To minimize the firms investment.
- ii) To meet a demand for the product be efficiently organizing the firms production and sales operation.

In the context of inventory management, the firm is faced with the problem of meeting to conflicting needs.

- To maintain a large size of inventory for efficient and smooth production and sales operation.
- To maintain a minimum investment in inventories to maximize profitability.

Both excessive and inadequate inventories are not desirable. There are two larger points within which the firm should operate. The objective of inventory management should be to determine and maintain optimum level of inventory investment. The optimum level of inventory will lie between two danger points of excessive and inadequate inventories.

The major danger points of excessive inventory are:

Unnecessary tie-up of the firm's fund and loss of profit.

Excessive carrying cost.

Risk of liquidity

The excessive level of inventories consumes funds of the firm, which cannot be used for any other purpose, and thus, it involves an opportunity cost. The carrying cost such as cost of storage, handling, insurance, recording and inspection, also increase in proportion to the volume of inventory. These costs will impair the firm's profitability further. Excessive inventories carried for a long period increase the chance of loss of liquidity.

Maintaining an inadequate level of inventories is also dangerous. The consequences of under investment in inventories are

- Production hold-ups
- Failure to meet delivery commitments.

Inadequate raw materials and WIP inventories will result in frequent production interruptions. Similarly, if finished goods inventories are not sufficient to meet the demand of customer regularly, they may shift to competitors, which will amount to a permanent loss to the firm.

Therefore, the objective of inventory management should be to avoid excessive and inadequate level of inventories and maintain sufficient inventory for the smooth production, and sales operation. Efforts should be made to place an order at right time with the right source to acquire the right quantity and the right price and quality. Effective inventory management objectives can be summed up as follows:

- Ensure a continuous supply of raw materials to facilitate uninterrupted production.
- Maintain sufficient stock of raw materials in period of short supply and anticipate price charges.
- Maintain sufficient finished goods inventory for smooth sales operation and efficient customer service.
- Minimize the carrying cost and time, and
- Control investment in inventories and keep it an optimum level.

## **2.6 TECHNIQUES OF INVENTORY MANAGEMENT**

To manage inventories effectively, a firm should use a system approach to inventory management. A system approach considers in a single model all the factors that effect the inventory. The model called a system may have any number of sub systems tied together to achieve a single goal. "In the case of inventory systems, the goal is to minimize the costs." (Hampton, 1990:235).

"The financial manager should aim at an optimum level of inventory on the basis of the trade off between cost and benefit, to maximize the owner's wealth. Many sophisticated mathematical techniques are available to handle inventory problems. But, they are more approximately a part of production management" (Khan & Jain, 2003:20.11).

To manage inventories, the firm's objective should be in consonance with the shareholders wealth maximization principle. To achieve this, the firm should determine the optimum level of inventory. Efficiently controlled inventories make the firm flexible. Inefficient, control result in unbalanced inventory and

flexibility the firm may sometimes run out of stock and sometimes may pile up unnecessary stocks. This increase the level of investment and it makes the firm unprofitable.

To manage inventories efficiently, answers to be sought to the following two questions:

- ) How much should be ordered?
- ) When should be ordered?

The question, how much to order, relates to the problem of determining economic order quantity, and is answered with an analysis of costs of maintaining certain level of inventories. The second question, when to order, arises because of uncertainty and is a problem of determining the re-order point. (Pandey, 1999:902).

In every aspect of inventory management, there is necessary control of inventory. There are various techniques of inventory control to avoid excess cost, physical loss, damage, theft, over inventory and lower inventory, some of these techniques are discussed below.

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

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

EOQ refers to the order size that will result in the lowest total of order and carrying costs for an item of inventory. If a firm places unnecessary orders. It will incur unneeded order costs. If it places too few orders it must maintain large stocks of goods and will have excessive carrying costs. By calculating a EOQ, the firm identifies carrying costs. By calculating a EOQ, the firm

identifies the number of units to order that results in the lowest total of these two costs.(Hampton, 1990:231).

How much to order, or produce is one of the main problems of inventory management. That is, the determination of a quantity for which the orders should be placed is one of the important problems concerned with inventory management.

The correct quantity is the quantity at which the cost of acquisition equals the cost of possession. This is technically known as the economic order quantity or reorder quantity. EOQ refers to size/quantity or under which minimize the total inventory cost. Ordering or set up cost and holding or carrying cost constitute the total cost of inventory excluding material cost. Increasing in ordering numbers increases the ordering cost, but decreasing the holding cost and vice-versa. A balance is, therefore, struck between the two opposing cost factors and EOQ is determined at a level for which the ordering cost and carrying cost is equal and minimum in total. Therefore, it is necessary calculate order quantity which minimizes carrying cost and ordering cost. Reorder quantity is such that when it is added to the minimum stock, it should not exceed the maximum stock.

### **2.6.2 Economic Order Quantity Assumptions**

The EOQ model relies on several assumptions:

- (i) There is a continuous, constant, and known demand rate.
- (ii) The lead time/replacement cycle is known and constant.
- (iii) The constant purchase price is independent of the amount ordered.
- (iv) Transportation costs are constant no matter the amount moved or the distance traveled.
- (v) No stockouts are permitted.
- (vi) There is no inventory in transit.
- (vii) All inventory parts are independent of each other
- (viii) The planning horizon is infinite.

- (ix) There is no limit on the amount of capital available.

These assumptions often stay far from real life. Demand is rarely continuous, constant and known, lead times, transportation costs, and prices vary. No inventory in transit means that the firm buys on a delivered price basis and sells. Planning horizon is limited, as is capital available. Nonetheless, EOQ is most widely used single inventory model. It is simple to use and it produces exact answers.

There are variations to basic EOQ. One variant keeps the order quantity constant, but allows the timing to vary. This is known as the fixed quantity, variable time model. Another EOQ variation is set the order time (re-order point) but vary the order quantity (variable quantity, fixed time).

### **2.6.3 Prerequisite for EOQ**

Following facts are to be considered as prerequisites for determination of EOQ.

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

### **2.6.4 Approaches to Set EOQ**

EOQ model can be determined by following methods:

- (i) Mathematical or formula method.
- (ii) Trail and error approach.
- (iii) Graphic method

#### **(i) Mathematical or Formula Method**

Mathematical models are also available to calculate economic order quantity. There are numerous model exist, as the field of inventory management and

can be studied in college programs such operation research and production management. Even many mathematical model exists, the main objective of these model is to reduce, minimizes the inventory cost/total costs.

Without getting into highly refined decision models we can illustrate the concept of EOQ with a basis mathematical model. We calculate EOQ by using the following formula:

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

Where,

A = Annual demand/Requirement/Sales

O = Ordering cost per order

C = Carrying or holding cost per unit per year

EOQ = Economic Order Quantity.

**(ii) Trial and error approach.**

This is another approach to calculate economic order quantity. A firm has different alternative purchases policy of its inventory. It can purchase its entire requirement own one single lot. Alternatively, the firm can purchase its inventory is small lots periodically say weekly, monthly, bimonthly, half yearly and so on. It means more than one time the firm can place on order to purchase inventory. The smaller lot sizes the lower average inventory and vice-versa. How inventory holding are associated with high ordering cost and low carrying cost. This approach to the determination of EOQ uses different permutations and combination of total cost inventory purchases so as to find out the total cost.

According to this approach the carrying and ordering cost for a different sizes of order to purchase inventories computed and the order size with the lowest total cost (ordering + carrying) of inventory is the economic order quantity (Khan & Jain, 2003:20.7).

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

- (a) No. of orders = Increase no. of order decrease order size.
- (b) Order size = Annual requirement divided by no. of orders.
- (c) Average inventory = (Equal to half of order size)
- (d) Ordering cost = (ordering cost per order  $\times$  No of order)
- (e) Carrying cost = (Average inventory  $\times$  Carrying cost per unit per year)
- (f) Total cost = (Ordering cost + Carrying)

### **(iii) The Graphic Approach**

The economic ordering quantity can also found out graphically. Figure 2.1 given below illustrates the EOQ function. In the figure, carrying, ordering and total costs are plotted on vertical and horizontal axis is used to represent the order size. Total carrying increases as the order size increases, because, on an average, a larger inventory will be maintained, and ordering costs decline with increase in order size because large order size means less number of orders. The behaviour of total cost line is noticeable since it is a sum of two types of costs, which behave differently with order size. The total cost decline in the first instance, but they start rising when the decrease in average ordering cost is more than offset by the increase in carrying costs. The EOQ occurs at the point Q where the total cost is minimum. Thus, the firms operating profit is maximized at point Q.

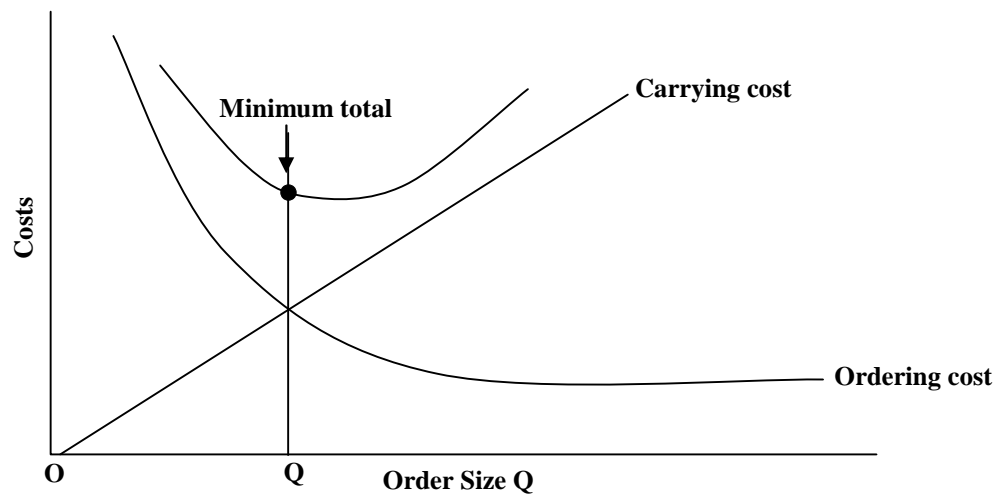


Figure No. 2.1: Graphic Approach of EOQ

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

## 2.7 ROLE OF INVENTORY IN OVERALL PROFIT PLANNING OF THE ORGANIZATION

Profit Planning and Control (PPC) is important approach developed for effective management system mainly in profit-oriented organization. Simply planning is the process of forecasting for future time period. It shows the direction for the organization where to go and how to go to accomplish the certain objective made by the organization. Without making appropriate plan, the organization can't reach it's destination. A profit plan or budget is comprehensive and coordinated plan, express in financial terms for the operation and resources of an enterprises for some specific period in future.

Profit planning is the part of overall planning. PPC includes comprehensive, coordinated, financial terms, resources plan, time etc.

For appropriate profit planning of the organization it has to prepare different budgets like sales budget, production budget, material purchase budget, material usage/consumption budget, open to buy budget, labor hour budget, labor cost budget overhead budget(manufacturing as well as non manufacturing overhead),flexible expenses budget, capital expenditure budget, cash budget (cash receipt and cash disbursement budget),budgeted income statement, budgeted balance sheet, activity based budget, cost volume profit analysis(CVPA), etc

### **2.7.1 COORDINATION BETWEEN SALES, PRODUCTION AND INVENTORY**

The manager must plan an optimum co-ordination between production, inventory and sales. An efficient coordination production plan is necessary for optimum production and sales. There may be high pressure from both sales and manufacturing for high inventory level. The production budget and inventory policies provide the basis for obtaining this co- ordination.

Production manager must translate the quantity in the sales budget into unit production requirement for the budget period for each product while considering the management of inventory policies. An efficient plan should represent the optimum coordination between sales budget, essential inventory levels and production levels.

### **2.8 RESPONSIBILITY OF PRODUCTION MANAGER**

In the present day of cut throat competition at various stage of production an enterprise should produce goods and services keeping into consideration for the requirement & satisfaction of potential customer .The objective should be to produce goods at least cost and to maximize satisfaction of the buyer .The

production manager assembles appropriate resources and direct use of those resources, which may be man, machine, material, capital, processes, etc. Thus “manager has to pay more attention not only to what their customers might buy also to increasing government regulation and behavior of customer and environment protections group”(Goel,1992: 61)

The main responsibility of the production manager can be presented as:

- Producing right quantity of material right time
- Should concern with production planning
- Fully responsible product and quality control
- Capable to select the most efficient and economical method to perform the operations
- Plant layout and material handling
- Use of Proper inventory model
- To find the relationship between output and input etc

## 2.9 METHOD OF INVENTORY COMPUTATION

We can calculate inventory by different methods. Mainly the organization can compute inventory by following methods.

1 Average sales method:

This method can be divided into 2 categories

i) **Average sales method:**

Under this method inventory is calculated with average sales of certain time period

Inventory=

$$\frac{\text{Yearly sales / totalsales during the time period}}{\text{No of time period or 12}} \mid \text{require stock of period}$$

It is stable and suitable to basic product but it can't be used in big organization.

ii) Moving Average Method:

It is based on uneven no of period mostly 3,5 or 7. Under this method inventory can be calculated as;

Inventory=

$$\frac{\text{Sales(Previous month/s } \Gamma \text{ current month } \Gamma \text{ next month/s)}}{\text{Total no of time period}} \quad | \text{ require no. of month}$$

Under this method, both inventory and production are fluctuating. It is appropriate in those organizations, whose sales are highly seasonal.

2 Sales to turnover Ratio:

This method has also two types.

**i) Historical sales Turnover Ratio method:**

This method is also called HSTR, Turnover method or withdrawn method. Under this method inventory is calculated on the basis of historical ratio of sales to inventory.

Inventory = Sales for the period\* HSTR or Multiplier

Where,

HSTR = Historical sales Turnover Ratio

$$= \frac{\text{No. of month in a year or 12 (N)}}{\text{Turnover Time (TT)}}$$

$$\text{And TT} = \frac{\text{Sales(historical) for the year}}{\text{Average inventory}}$$

$$\text{Average Inventory} = \frac{\text{Opening inventory } \Gamma \text{ closing inventory}}{2}$$

It is stable and shows the relationship between sales and inventory.

**ii) Turnover Time Method:**

Under this method, inventory can be calculated as;

$$\text{Inventory} = \frac{\text{TotalSales / Budgeted sales for the year}}{\text{Turnover Time}}$$

Mostly it is used for stable inventory policies.

3 Proportional sales method:

It is not widely used. Mostly it is used in small industry or basic product/commodity or monopoly market, which has certain sales. Under this method inventory can be calculated as;

Inventory = Sales for the month\* given ratio

## **2.10 DETERMINANTS OF INVENTORY POLICIES**

Inventory policies or levels are affected by different factors. Sometimes the organization has kept more inventories whereas in some times it has to kept low inventory levels. Some major determinants of inventory levels are as follows:

i) Types of market:

Sales season affect inventory policies. In peak season the organization has to kept high inventory whereas in slack season it has to kept low inventory. So organization has to keep inventory according to types of market or sales season.

ii) Types of products:

For necessary product, inventory is stable or it has to kept low inventory whereas for luxuries goods high inventory is required. So while determining inventory level, organization has to consider regarding the types of products

iii) Life of products:

If goods are perishable, low inventory is required but for durable goods the organization can keep high inventory. So the life of the product affects in determining inventory policies.

iv) Processing time:

If production/ process time is long, high inventory should be kept otherwise organization has to keep low inventory.

v) Establishment Cost:

If pre-production or Establishment Cost is high stable inventory is better otherwise organization has to keep inventory in fluctuating level.

vi) Availability of capital:

If sources of capital are cheap and sufficient, it can be kept high inventory. And if sources of capital are more expensive or scarce, organization has to keep low inventory level.

vii) Storage facility:

If the organization has its own and ideal store, it can be kept high inventory otherwise it has to keep low inventory level.

viii) Storage Risk:

If loss on storage like obsolescence, season off, out of fashion, loss due to fire, theft, mice, pests, decrease in price, lifting by employee, it has to keep low inventory otherwise it can be kept high inventory.

ix) Availability of Raw material:

If material are easily available in the market, it can be kept low inventory otherwise it should be kept high inventory.

x) Re order point:

If reorder point is long, the organization has to keep high inventory but if reorder time is long is short organization has to keep high inventory level.

## **2.11 PROCEDURES OF INVENTORY MANAGEMENT**

The procedures of inventory management cover the activities such as purchasing, receiving and store keeping, issuing and pricing the inventory items.

### **2.11.1 Purchasing**

#### **(I) Meaning of Purchasing**

The process of inventory management in fact begins with purchasing. The need for particular materials initiates purchasing in a firm. Purchasing in narrow sense refers merely to the act of buying items at a price and in boarder sense purchasing makes its a management activity that goes beyond the simple act of buying and including the planning and policy activities, research and development service section. Management suggests that purchasing decisions involve the weighting of alternatives possibilities and may of these alternatives involve the influence on the other function on the purchasing decision. A good purchasing management has played important role in the manufacturing companies. We should pay more attention in the purchasing of raw materials, supplies and equipment. We should purchase raw materials, supplies in the right quantity of the right quality from the right origin at the right time and cost. Purchase management should be effective other wise it hampers in the quality of production. The production is hampered by the scarcity of raw materials on time, purchasing department should take greater responsibilities and should analysis the existing procurement policy and should tune with the overall organizational objectives and policies. The efficiency of any business activity depends upon having material, supplies and equipment available in proper price. We can improve management of purchase by the help of standardization, value analysis, material substitution, transportation saving and cost reduction of packing modification.

Purchasing also known as procurement is the process by which companies acquire raw materials components, products, services, and other resources, from supplies to execute their operations. Sourcing is the entire set of

business process required to purchase goods and services. Sourcing process include the selection of supplies, design of supplies contracts, product design collaboration, procurement of material and evaluation of supplier performance.

Purchasing function in any organization is concerned with the cost of materials purchased. Therefore the purchasing agent has an important role in industry for purchasing. Purchasing which the only department that deals with both the materials and cost should be recognized as the value expert of the organization.

Thus purchasing in modern sense is a strategic managerial function and any negligence will ultimately result into decrease in profit.

## **(II) Objectives of Purchasing**

The objectives of purchasing should conform the overall objectives of an organization. The objectives of purchasing are like the objectives of integrated logistics. The efficient acquisition of products and services requires the right material, in right quantity, in right condition, at the right time, from the right source, with the right service, and the right price.

More explicitly is expected to accomplish nine items (Bloomberg & Hanna, 2002:481).

- (a) Provide an uninterrupted flow of materials, supplies and services required to operate the firm.
- (b) Minimize Inventory Investment and Loss
- (c) Maintain Adequate Quality Standards
- (d) Find or Develop Competent Suppliers
- (e) Standardize, where ever and whenever possible, the items bought when ever possible

- (f) Purchased required item and services at the lowest ultimate price
- (g) Improve the organizations competitive position
- (h) Work harmoniously with other department in the organization
- (i) Accomplishing the purchasing objectives at the lowest possible level of administrative costs**

### **(III) Procedures of Purchasing**

“Effective purchasing means learning the purchase requirements, identified qualified sources of supplies, minimizing the total cost of supplies and administrating the purchase” (Adam & Ronald, 2003:221). While individual purchase may appear quite different, this is general underlying purchasing process. The process is described below (Bloomberg & Hanna, 2003:451).

- (a) Recognized a Need:
- (b) Identifying a Supplier
- (c) Qualifying and Placing an Order
- (d) Monitoring and Managing the Delivery Process:
- (e) Evaluating the Purchase and the Supplier

#### **2.11.2 Receiving and Store Keeping**

After some time of placing the order, flow up process starts to get quick delivery of the items. The purchasing department at the time of delivery receives the items and received items are compared with purchase order and actual material received should be entered in goods received note. Then all items received by the purchasing department should be passed into store for protection against deterioration and pilferage. They are stored in such a way

that, their location is easily identified at the time of issue. "The store function involves both keeping and store of materials and keeping the store records, the former being physical task and the later being accounting task depending the nature and requirement of the organization. The stores are classified as centralized and decentralized store" (Agrawal, 2000:21).

In the word of Maynard, the duties of store keeping are to receive materials to protect than while in storage from damage and unauthorized removal to issue the material in the right quantity at the right time, to right place and to provide these services promptly and at least costs.

When we refer to stores here, we mean those materials are used in the product or which are consumed in production operations. The stores keeper responsibility for verifying and receiving incoming materials is a naturally of his responsibility for their safekeeping. Responsibility for proper storage materials is naturally associated with store keeping. This includes protection against physical damage from handling, decay or corrosion from exposure and shrinkage of quantity. The store keeper may also assume charge of potentially useful materials for which there is no strict accounting. These include excess and absolute materials for which future uses may be found, these by guarding against waste.

Inflammable or explosive materials enamel thinners and gasoline should be kept part from the main building in tanks or sheds. Highly polished or delicate parts should be stored in dry, clean places and protected from too much pressure or rubbing against each other. Some papers, textile materials, and plastic films may require temperature and humidity control. Valuable metals, like platinum, must be protected against theft. Heavy loads, like piles of sheet steel, require adequate floor strength. In any case, the decision as to location depends, on physical requirements, convenience, safety and the economics of storage and handling cost.

Store keeping should be given due place in the organization. Otherwise mishandling of goods, wastage in storing and handling will add to the cost of production. The importance of store keeping has not been properly recognized by the manufacturing organization so far. Many organizations spend lavishly on machines and wages while storekeeping is ignored and store housed in camped quarters, ill equipped and ill ventilated. Storekeeper are also ill paid in comparison to others in similar status. All these causes are responsible for wrong or short issues, loss of stock of raw materials, unexpectedly running of stock and preparation or incorrect vouchers, all these led to theft and pilferage of stock and delay in production.

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

#### **(I) Objectives of Store Keeping**

The major objectives of storekeeping may be stated as follows:

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

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

#### **(a) Bin Cards**

A bin card makes a record of receipt and issue of materials is kept for each item of stores carried. These cards are maintained by the storekeeper and storekeeper is answerable for any difference between the physical stock and the balance shown in the bin card. These card are used not only but recording receipts and issues of stores but also assist the storekeeper to control the stock.

For each item of stores, minimum quantity, maximum quantity and ordering quantity are stated on the card. By seeing the Bin card the storekeeper can send the materials requisition for the purchase of materials in time.

### Sample of Bin Card

Bin Card No.	Bin No.
Name of the Articles:	Maximum quantity
Code No.:	Minimum quantity
Store ledger folio:	Ordering qty.

Date	Receipts		Issues		Balance	Date of checking	Remarks	Goods on order		
	Goods rec. note no.	Qty.	Store requisition note no.	Qty.				Qty.	No. and date of order	Qty.

### **(b) Store Ledger**

This ledger is kept in the costing department and is identical with the bin card except that receipts issues and balanced are shown with their money values. This contains an account for every time of stores and makes a record of the

receipts, issues and the balances, both in quantity and value. Thus, this ledger provides the information for the pricing of materials issues and the many value at any time of each items of stores (Jain & Narang -1991).

### Sample of Store Ledger

Name of Article Maximum quantity  
 Code No. Minimum quantity  
 Bin No. Ordered quantity

Date	Receipts				Issues				Balance			Remarks
	S.No.	Qty	Rate	Amt.	S. No.	Qty	Rate	Amt.	Qty.	Rate	Amt.	

#### 2.11.3 Issuing and Pricing

Each item the inventory has some value associated with it. This value depends on the price duration of the item inside the inventory, procurement cost, storage cost etc. Pricing the inventory is one of the most interesting and widely matters in accounting process. Many organizations are interested in various method of pricing inventory because it has a direct affect on the income. Inventory valuation approach is important in the aspect of income tax problem.

A basic function of the storekeeper is to issue materials as required. The function should embrace prompt efficient service and the accurate recording of each transaction. The vouchers that support each materials issue may include some from of requisition that specify quantity, time and place of the delivery. The requisition should indicate proper authorization and the account or order to which material cost is to be changed.

When materials are issued from the storeroom on requisition, there cost is deducted from the inventory balance. Their cost is also entered in the cost

accounting records of material cost of goods in process of manufacture suppliers issued for use in a line or staff department are also deducted at cost from the inventory balance and are recorded as an expenses of the department.

There are many methods of inventory valuation but most significance method is cost and other method is lower of cost of market. Both methods give different results.

### **Cost Basis for Inventory Valuation**

The primary basis of accounting for inventory is cost which has been defined generally as the price paid to considerate given to acquire an assets. As applied to inventories, cost means in principle the sum of the applicable expenditure and changes directly or indirectly incurred in bringing an article to its existing condition and location.

Conceptually, the process of valuation the inventory is simple. We can calculate inventory value that multiplying physical quantity of goods by cost per unit. But in practice, many organizations's purchase different types of raw materials at different price and different time.

It is not always possible to identify the individual particular purchase group. At that solution firms have faced difficulties in valuation the inventories. In this situation there are many methods which are based on historical cost used in determining the value of inventory are:

#### **(a) Specific Identification Method**

The specific identification method requires that each unit in inventory be identified with the particular time, it was purchased. In this method, the item have serial numbers or are distinguishable by model, color or size to identify the particular items but specific items separate at first and record in stock

book. This method is more suitable to low volume high cost item such as automobiles. It is not very practical when the firm purchases large quantity of identical units of various time and prices.

**(b) Weighted Average Cost**

It assumes that goods are removed from the beginning inventory and purchases group in proportion to the number of units, in these groups consequently; cost of the ending inventory also represents a proportional distribution from the beginning inventory and various purchase groups. The weighted average cost computed by dividing the total cost goods available for during the period.

$$\text{Weight Average Cost} = \frac{\text{Total cost of goods available for sale}}{\text{Total units available for sale}}$$

The method is widely used by organization that hold item of inventory long period of time because it average out of the effects of price increases and decreases. In addition, weighted average process is satisfactory when there are both increases and decreases in cost with in the accounting period. Some organization uses this method which purchases the inventory items frequently interval because it does not require that the ending inventory cost be associated with any particular purchases group. A common criticism of the methods is that it attaches no more significance to current price than to price that prevailed several months earlier.

**(c) First in First Out (FIFO) Method**

FIFO method is based on the assumption that the materials first received are the first to be issued. The materials received and changed on each invoice are changed out from the inventory are the price stated on that invoice until the lot has been exhausted. Materials issues are then assumed to be issued from the next lot received at the invoice price of the second lot until that lot is

exhausted. The units on hand at any time are assumed to be the units last purchased because all issues of materials have been made from the earlier issues. The FIFO method is used in the balance of stores record.

**(d) Last in First Out (LIFO) Method**

The LIFO method of pricing is based on the assumption that the last units received are the first to be issued. Materials issued from stock are charged out at the cost of the latest shipment received until that lot is exhausted. The next issues are then made from the next order preceding, provided the materials in that order were not previously issued. This method is designed to charge goods manufactured with the prevailing costs materials instead of with cost which may have been paid for materials at a much earlier date.

**(e) Standard Cost Method**

LIFO, FIFO and weighted average cost methods are often awkward to work within the subsidiary records for materials under perpetual inventory system. For this standard cost method may be used in accounting for individual items in materials inventory (Man Mohan & Goyal, 1997:294).

This method changes material unit into the factory at a predetermined a budget or estimated price reflecting a normal or an expected future price. Receipts and issues of materials are recorded in quantities only on materials cared there by greatly simplifying the record keeping. Then, there is a basis for comparing existing cost from day to day. Which should exist under normal condition.

**(f) Base Stock Method**

Accounting to this method a certain quantity or base stock of material is assumed to be necessary to keep the going to be concern. The base stock is valued at the cost prevailing at the time firm began or when the method was

adopted. Any additional layers of materials in the inventory close beyond the unit. The base may be on the basis of FIFO, weighted average etc. method.

All method has their advantage and disadvantage. However, the method chosen is significant for efficient inventory management especially in its financial dimensions.

## **2.12 INVENTORY MANAGEMENT MODELS**

Inventory management models can be classified either push or pull models:

### **2.12.1 Push Inventory Model**

Push models schedule orders for production or order good in advance of customer demand. Manufactures push the finished products through the distribution channel to intermediaries and the final consumer. Economic Order Quantity (EOQ), Material Requirement Planning (MRPI), Manufacturing Resource Planning (MRP II) and distribution requirement planning (DRP) are all push models.

#### **Types of Push Inventory Model**

Mainly there are following 4 types of push inventory models;

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

In a ideal environment, forecasting demand would be easy and straight forward. Simply look at past demand patterns to predict future consumption. Under these conditions, EOQ model can be used to calculate when to order the item and how much to order.

##### **b) Material Requirement Planning (MRPI)**

MRPI is a manufacturing-planning tool. It is a computer based production and Inventory control system that minimizes inventory while ensuring that adequate materials are available for production. MRPI performs three functions.

- Ordering planning and control: When to release orders and what quantity.
- Priority planning and control : How the expected date of availability compares to the need date for each item.
- Planning opacity requirements and development of broad business plan.

Although the principles of MRPI can be applied to distributing Job shops and process industries, it fit best in continuously assembly of standard products like automobiles and electrical equipment.

MRPI pushes products through manufacturing and distribution process on a schedule to meet forecasted demand. As processes improve, the integrated logistics pipelines become shorter, so order replace forecasts earlier and earlier. When the time between the start of production and customer delivery is acceptably short, then each job is an order.

**c) Manufacturing Resource Planning (MRPII) :**

While MRPI addresses the inbound flow of inventory, MRPII add finance, Marketing and integrated logistics like MRPI and MRPII is a push inventory model. However, it adds to the basic model.

MRPII considers not only the inbound flow materials but also plant capacity. Additionally, it handles production scheduling, labor needs and inventory budgets. MRPII benefits could include fewer shortages and stock outs, which should increase customer service, improve delivery, allow better response to demand changes, reduce inventory levels and costs, and allow more planning flexibility.

**d) Distribution Requirement Planning (DRP)**

DRP applies MRPII principles to the flow of finished goods to field wore houses and customers. Although MRPII improved MRPI by taking into account both material management and production scheduling, it failed to

account for this out bound movement. DRP adjusts ordering patterns of inventory needs vary, responds more readily to system wide inventory needs, and better deals with product availability and receipt timing.

## **2.12.2 Pull Inventory Model**

Pull inventory models are based on making goods once customer demand is known. The product is pulled through the channel of distribution by the order: Recent trends suggest a movement to use pull inventory models to reduce inventory throughout the channel. JIT and KanBan are the most widely used pull inventory models.

### **Types of Pull Inventory Model**

#### **a) Just-in-Time Inventory Model:**

JIT is disciplined approach to improve manufacturing quality, flexibility and productivity through the elimination of waste and the total improvement of people. JIT is not simply reducing inventory: rather its overall objective is increased quality.

There are three components to JIT. First is JIT purchasing which ensures that the materials arrive so that production can immediately use them. Next is JIT manufacturing, which production finished good for immediate shipment, sub assemblies for immediate assembly, and fabricate parts for immediate use in sub assemblies. Last is JIT delivery, which transports goods to meet the tighter transit times and reliability standards of JIT operations. All three JIT components must work together for a company to benefit from them.

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

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

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

#### **b) KanBan Pull Model**

The KanBan means, "visual record" and is the production control system the uses JIT production system, allowing production with smaller inventories, KanBan is also referred to as card system, a single card KanBan and two-card KanBan system.

##### **i) Two card KanBan:**

Inventory is usually controlled at low levels by using a manual two card KanBan system. One card is conveyance KanBan, the requisition and authorization of transference of materials from supply center to work center. A second card the production Kanban authorizes the production of materials.

The inventions of raw materials, component parts or final product do not exist.

##### **ii) Single card Kanban**

The single card Kanban system uses only a conveyance (move) Kanban and no production Kanban. The single card Kanban is most common used in Japan (Shrestha & Silwal, 2002:157).

## **2.13 COST ASSOCIATED WITH INVENTORY**

Two types of costs are associated with inventory: Carrying cost and ordering cost. Carrying costs are associated with physically storing a product, while ordering costs are the costs of placing an order. These two inventory costs are having an inverse relationship. A firm can carry more inventory and order less often, or order more often and carrying fewer inventories. "While carrying cost increase, ordering fall and vice versa. The problem is to find the lowest total cost "(Bloomberg & Hanna,2002:159).Mainly there are two types of cost.

### **2.13.1 CARRYING COST**

Carrying cost are associated with physically storing goods, once the goods have been accepted they become part of firms inventories prior to the recent period of high interest rates, a number of studies determined that the annual cost of carrying a production inventory ranged between 10 and 34 percent of the value of the inventory, with the model figure running at approximately 25 percent. The escalating cost of money since 1979, however has increased the typical firms annual inventory carrying cost to appropriate 30 to 35 percent of the value of the inventory. Five major elements make up these costs in the following manner.

1.	Opportunity cost of investment funds	12-20%
2.	Insurance costs	2-4%
3.	Property taxes	1-3%
4.	Storage costs	1-3%
5.	Obsolescence and deterioration	<u>4-10%</u>

Total carrying cost 20-40% (Dobler-1992)

Total carrying cost vary in proportion to the value of inventory usually they are computed from the following formula.

Total carrying cost = Average inventory × carrying cost per unit.

$$\text{Symbolically TCC} = \frac{Q}{2} | C$$

Where, Q = Quantity order size.

### 2.13.2 ORDERING COST

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

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

- Requisitioning
- Order placing
- Transportation
- Receiving, inspecting and storing
- Clerical and staff

Ordering cost increase in proportion to the number of orders placed. The clerical and staff costs, however do not have to vary in proportion to

the numbers of ordered placed and one view is that so long as they are committed costs, they need not be reckoned in computing ordering cost. Alternatively, it may be argued that, as the number of orders is increase. The clerical and staff costs tend to increase. If the number of orders are drastically reduced, the clerical and staff force released now can be used in other departments. Thus, these costs may be included in the ordering costs. It is more appropriate to include clerical and staff costs on a pro-rata basis. Ordering cost increase with the number of orders; thus the more frequently inventory is acquired, the higher the firm's ordering costs. On the other hand, "if the firm maintains large inventory levels, there will be few orders placed and ordering cost will be relatively small. Thus, ordering cost decrease with increasing size of inventory" (Pandey, 1999:894).

Firm's usually after discount for purchase materials in large quantity, such discounts help reduction in the unit price of the items purchase, such facilities encourages buyers to place a fewer orders rather than placing one.

Ordering cost is calculated by following formula.

$$\text{Total ordering cost} = \frac{\text{Annual requirement}}{\text{Quantity order size}} \mid \text{Ordering cost per unit}$$

Symbolically,

$$\text{TOC} = \frac{A}{Q} \mid O$$

### **Cost Trade Off**

Our objective in inventory management is to find out the minimum cost operating doctrine over some planning horizon. We need not to consider all relevant costs. Using a one-year planning horizon. The cost can be expressed in a general cost equation.

Total annual-relevant costs = Cost of item + Procurement cost + Carrying cost + Stockout costs

Each cost in equation can be expressed, in terms of order quantity and reorder point for a given inventory situation. The solution method is then to minimize the total cost. This can be accomplished graphically, by tabular analysis using trial and errors, or by using calculus, the most accurate method. Using calculus, operation researchers have developed a wide range of optimal formulas, which vary with change in the actual inventory situation. Graphically, minimizing total cost means cost trade offs.

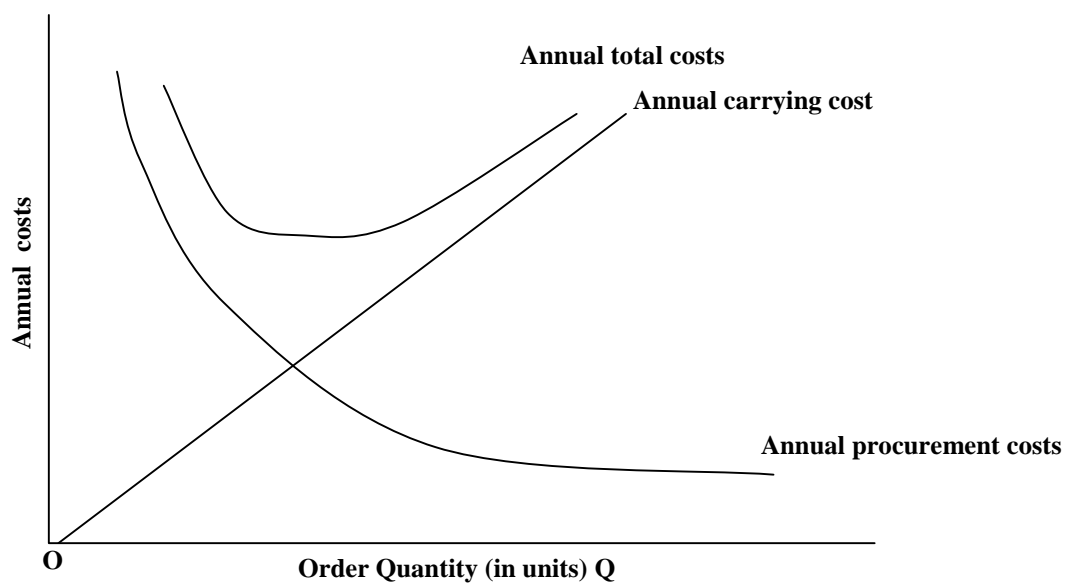


Figure No. 2.2: Cost Trade Off in Inventory Control (Q is the optimal ordering quantity)

There, as shown in figure above (2.2) procurement cost increases as carrying cost increase. There is cost trade off between the two. If we add the cost graphically, we obtain a total cost curve. The optional order quantity (Q) is the point at which annual total cost is minimum.

## **2.14 FIXATION OF STOCK LEVEL**

### **2.14.1 Reorder Point**

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

The problem how much to be ordered is solved by determining the EOQ. The second problem is when to be ordered. This question is related to determine the reorder point. It is also known as ordering point or optimal reorder point or reordering level or ordering level. It is the point at which its stock of material falls down then the storekeeper initiates the purchase requisition for fresh supply of material. This level is fixed somewhere between the maximum and minimum level in such a way that the difference between reordering level and maximum level will be sufficient to meet the requirement of production up to the time the fresh supply of materials is received (Jain & Narang 1994:109).

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

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

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

#### **(ii) Lead Time**

This is the amount of time between placing an order and receiving the goods. The purchasing department usually provides this information. The time allow for order to arrive may be estimated from a check of the company's records and the time taken in the past for different suppliers to fill orders.

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

The minimum level of inventory may be expressed in terms of several days' sales. The level can be calculated by multiplying the usage rate times the number of days that the firm wants to hold as a protection against shortage.

#### **Reorder Point under Certainty**

Here lead-time is the time normally taken in replenishing inventory after the order has been placed. This formula is taken under certainty condition i.e. usage and lead-time do not fluctuate.

$$\text{Reorder point} = \text{Lead time} \times \text{Average daily usage}$$

#### **Reorder Point under Uncertainty**

We cannot predict lead time and usage accurately. The demand for material fluctuates day to day and delivery time may be varies. If the actual usage increase delivery time is delayed. The firm can face stock out problem. To solve the stock out problem, the firm should maintain safety stock.

Reorder level can calculate by applying the following formula

$$\text{ROP} = (\text{Lead time} \times \text{average usage}) + \text{Safety stock.}$$

$$\text{Reorder level} = \text{Minimum level} + \text{Consumption during lead time.}$$

#### **2.14.2 Maximum Stock Level**

It is a stock level that can be maintained on the basis of requirement. It is a quantity that can be maintained on the basis of need. It is the stock level above which stock should not be allowed to rise. It is an upper limit beyond

which the quantity of any item is not normally allowed to rise. Holding of stock more than limit will increase material and storage cost, tied up working capital unnecessary. The maximum stock level is affected by availability of financial resources, store space, lead-time, and nature of material, reasonability of material and government control. The maximum level is fixed by considering the following points.

- (i) Reorder level
- (ii) Minimum consumption rate during lead time.
- (iii) Minimum lead time or reorder period
- (iv) Reorder quantity

Maximum Stock Level = Re-ordering level + Reordering quantity - (Minimum consumption × minimum reorder period)

### **2.14.3 Minimum Stock Level**

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

- (i) Reorder level.
- (ii) Average rate of consumption, and
- (iii) Average lead time - The period of time between ordering and replenishment (Re-order-period)

Minimum Stock Level = Re-order level - (Average / Normal consumption × Average/normal lead time/Reorder period)

#### **2.14.4 Average Stock Level**

An average stock level indicated the average stock held by the firm. It is calculated by the following formula.

$$\text{Average stock level} = \text{Minimum level} + 1/2 \text{ of reorder quantity}$$

#### **2.14.5 Danger Stock Level**

These a level of which normal issue of the material are stopped and issued are made only under specific instructions. This is the level below the minimum quantity. It is a signal to the concerned people to arrange for the procurement of materials urgently to avoid stock out. It is applying the following for formula.

Danger level = Average consumption × Maximum reorder period for emergency purchase

### **2.15 ABC ANALYSIS (SELECTIVE INVENTORY CONTROL)**

ABC analysis is the application of stock holding of Pareto's law, which shows that the majority of inventory value will be represent by relatively few items.

The first step in the inventory control process is classification of different type of inventories to determine the type and degree of control required for each. The ABC system is widely used classification technique to identify various items of inventory for purpose of inventory control. This technique is based on the assumption that a firm should not exercise the same degree of control on all items of inventory. "It should rather keep a more rigorous control on items that are the most costly and/or the slowest turning, while items that less expensive should be given less control effort "(Jain & Narang, 1994:112).

It is very difficult to monitor and control the enormous number of stock items. As such manufacturing organization find it useful to divide inventories into three categories for the purpose of exercising selective control on inventories.

ABC analysis is a control technique that divides items into sub classification and uses different control system for each group of inventories. Under these techniques of inventory control, inventories are listed in A, B and C group in descending order based on money value of consumption as follows;

- (i) High priced inventories                      A
- (ii) Medium price inventories                      B
- (iii) Low price inventories                      C

The items included in-group 'A' involves largest investment and would be under tightest control by management. Therefore, inventory control should be must rigorous and intensive and the most sophisticated inventory control techniques should be apply these items. The 'c' group consists of items of inventory, which involve relatively small investment although the number of items fairly large. These items deserve minimum attention. The lower level of managers may be given authority to exercise control over these items. The 'B' group stands mid way. It deserves less attention than 'A' but more than 'c'. The 'B' items fall in between these two categories and the responsibility to control these inventories may be given to middle level managers. Employing less sophisticated techniques can control it. The typical break down of inventory item is as shown given table below.

Group	Number of items (%)	Inventory value (%)
A	15	70
B	30	20
C	55	10
Total	100	100

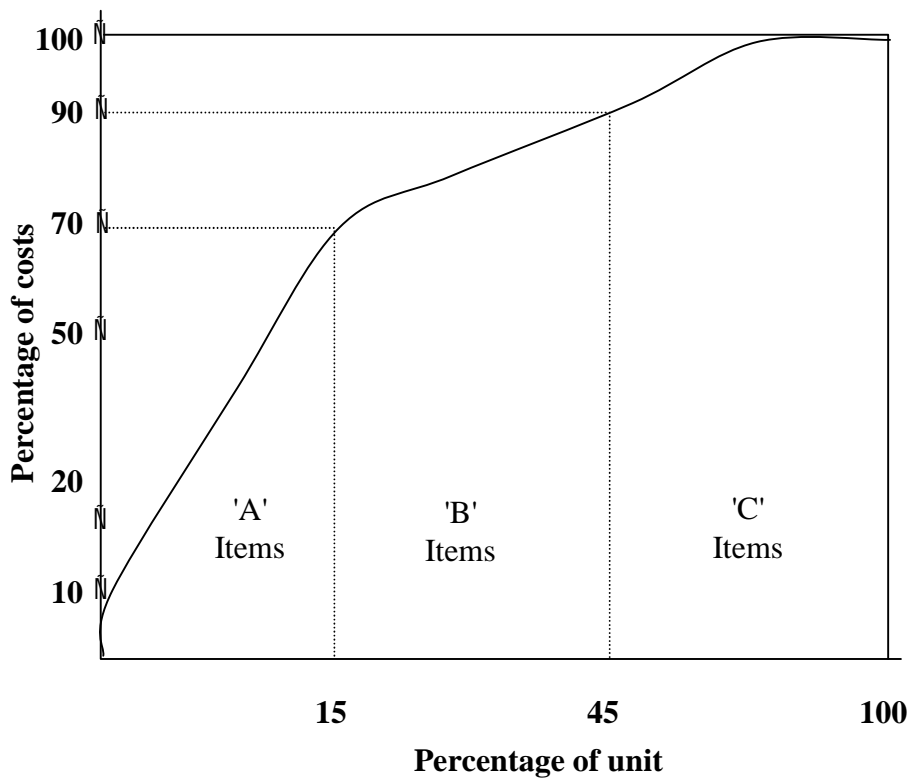


Figure No. 2.3: ABC Analysis

Some point stand out table given above while group 'A' is the least important in terms of the number of items, it is by far the most important in terms of the investment involved. With only 15 percent of the number, it account for as much as 70 percent of total value of inventory. The firm should direct most of its control efforts to the items included in this group. The items comprising B group account for 20% investment in inventory, they deserve less attention than 'A', but more than 'c', which involves only 10 percent of the total value although number-wise its share is as high as 55 percent.

## 2.16 REVIEW OF RELATED STUDIES

Above, we have emphasized on the review of text books only but attempt is also made to review the related studies conducted by different agencies,

expert, scholars related with inventory management of manufacturing enterprises in Nepal.

Some studies have been made in the subject of inventory management but few studies are review in this chapter.

Dhital, (2001) has conducted the research work on the topic of "Inventory Management: A Case Study of Nepal Food corporation".

The Main Objective of his study were to highlight the NFC's policies and objectives, functions and activities .To analyze the various related variables like purchase, sales, sales food quota of NFC. The findings of Mr Dhital are under food grains purchasing the domestic purchase are more fluctuated and greater than import. The relationship between edible cereal production and requirement is negative. The total food grains quota is fluctuated in year after year because of production fluctuation in Nepalese Kingdom.

Mr Dhital has recommended that some suggestions to improve the present inventory management procedure. The NFC should encourage food production by initiating farmers to produce more food grains. It should facilitate farmers by managing various inputs through coordination with concern agencies. NFC must do timely procurement of food grains. Food Grains should be stored during harvesting time and should be supplied in areas where there is food deficit. NFC should be released from interference of government as well as political parties.

Baral, (1994) has also made study regarding "Inventory Management: A case study of Gandaki Noodles Pvt. Ltd". The Main Objective of his study were to highlight the Co.'s policies and objectives, functions and activities regarding inventory management. Finally he came to know that the factory is following neither economic order quantity model in its purchasing decision nor ABC analysis in inventory management.

Balika, (1996) had studied about the Inventory Problem of Hetauda Cement Industry Limited (HCIL) to find the present inventory position and problem in managing inventory. After her studies she revealed that there is no proper system for material purchase in the industry. And the price and quantity of collected materials are fluctuating from year to year. The company is not following EOQ model in purchasing decision. The investment in inventory stock of HCIL is in large amount. The value of inventory is increasing from year to year.

Rijal, (1997) has conducted the research work on the topic of "Inventory Management: A case study of Agriculture Input Corporation (AIC)". His Main objectives are to find present inventory position of AIC, to find out inventories management techniques used by AIC and to provide optimum suggestion regarding inventory management of AIC.

He observed that the Inventory Management of AIC has no been based on scientific methods adopted by modern organizations of today. For example, EOQ method, the reasonable method for calculating number of orders in a year and the size were inapplicable in AIC because of uncontrollable variables, like daily fluctuation which is to be born while importing inventory components like fertilizer, insecticides and implements. There are also controllable variables like

procurement practices, absences of different cost required for EOQ Limited storage facilities with AIC. For these variables AIC seems passive to do any exercise to improve inventory management situation of AIC.

Agrawal, (1980) has made a study relating to the Nepalese public Enterprises, which stated that inventory management is the weakest aspect of the management. The tools and techniques for controlling inventory have not been applied in Nepalese manufacturing Enterprises for controlling their physical as well as their financial dimension.

Shrestha, (2005) had conducted the study on the topic of "Inventory Management of Royal Drug Ltd". His study stated that to achieve the objective of Royal Drug Limited, the efficient management of inventory is essentials. He revealed that to achieve the object of Royal Drug Ltd., the efficient management of inventory is essentials. If the royal Drug Ltd. applies the scientific techniques of Inventory management, certainly it will cope it's objectives very successfully. He further suggested purchase plan should be should be prepared for different types of raw material with proper Co. ordination and cooperation among the planning, purchasing storing, producing marketing, selling etc. to avoid the excessive investment on inventory .He also recommended that for purchasing various types of raw material and inventory the Co. should use scientific inventory management techniques to minimize total inventory cost i.e. carrying and ordering cost.

Pandey, (2005) on his study of Gorkhapatra Corporation stress that for a good inventory system, to maintain suitable level of inventory ,so as to able to fulfill the Corporation's requirement on time. The rules for maintaining proper stocks of inputs as

discusses previously are necessary to know the answer about how much to buy and when to buy. Moreover it is evident from previous discussions that the unnecessary cost involved in ordering and carrying can be reduced to a certain level by using the model, formulas, etc.

Pradhan, (2000) has conducted a study on Significance of Inventory Management of Nepalese Manufacturing Enterprises. He had studied the ratio of inventories to total assets computed for selected non-financial Nepalese enterprises. One of the important findings was to invest on average, about 22 percent of total assets in the form of inventories in 2000/01 by Nepalese enterprises indicates that larger amount of money has to be invested in the form of inventory. Hence, the inventory management has greater significance.

Bajracharya, (1983) has conducted his study on Management in Public Sector Manufacturing Enterprises in Nepal. The main objectives of his study are to find out the different problems faced by public sector manufacturing organization in Nepal. One of the important findings was the inventory management suffers from the lack of planning, high carrying cost, poor record keeping and stores management and virtual absence of controlling system.

## **2.17 RESEARCH GAP**

Although there are various studies related to inventory management regarding different organizations and available in different libraries, but review literature indicates that there are few studies devoted to inventory in Nepalese context. These few studies conducted earlier have now needed to carryout a study to assess the recent development in inventory management. This study covers the data of five years. Nobody of the earlier studies had focused on role of inventory in overall profit planning of the organization although inventory and different components of profit planning like production planning, purchase planning etc are closely related to each other. Similarly nobody had shown the relationship of inventory with sales, production and purchase although they are closely related to each other. Moreover this study has not been done by previous researcher as separately. Further no one had test the correlation of different parts of the inventories using data of 2061 to 2066 B.S. Further here the researcher has analyzed the t-test of correlation of coefficient. Thus, to fill the gap, this study has been conducted. Thus this study will be milestone in the field of inventory management and control in Unilever Nepal Ltd. In spite of above, multiple gaps among the researcher's view as well as there is time gap regarding the study of inventory management.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 INTRODUCTION**

This chapter presents all the necessary steps to be followed throughout this research work in order to achieve and accomplish the objective of the study. Research methodology discussed in this chapter helps to guide the research study providing different issues and aspects. It systematically solves the various sequential steps to be adopted by a researcher in studying problem with the objectives in view. This chapter is to outline the nature and sources of data, sample selection & classification of variables, techniques and steps adopted in interpreting and analyzing the data. It also focuses on how to collect required data, what is the population and sample, and what techniques to be adopted to analyze and interpret etc.

#### **3.2 RESEARCH DESIGN**

To fulfill the objectives of the study certain research design is essential so the analysis of this study is based on the nature of data and tools for analysis. To fulfill the objectives of the study it emphasized on descriptive and exploratory. This study deals with Unilever Nepal Ltd. Only material collection, consumption and inventory position of product groups are variables under the study. This study is based on primary as well as secondary data. Some simple statistical methods such as trend line and correlation analysis have been applied to examine the facts of data.

#### **3.3 NATURE AND SOURCES OF DATA**

Both primary and secondary information have been used in this study. Primary information are based on informal interview as well as unstructured dialogues and discussions with the officials of Unilever Nepal Ltd. The

required data and information for analysis are directly collected from the annual reports of UNL, direct contact to UNL Corporate Office. Supplementary data and information are collected from number of institution and Web sites, like Central Library Kirtipur, and UNL Corporate Office, Google.com, etc.

Secondary data have been collected from the following sources.

- ) Report and Financial statement of the company.
- ) Published and Unpublished official reports.
- ) Books, articles, magazine, annual report etc.

All the data are compiled, processed and tabulated in the time series as per the need and objectives. Formal and informal talks to the concerned persons of the department of the bank were also helpful to obtain the additional information. Similarly, various data and information are collected from the economic journals, bulletins, magazines etc.

### **3.4 DATA GATHERING PROCEDURE**

The secondary data are directly obtained from various sources mentioned above for the purposes of data analysis are taken from official records, websites. The researcher had to visit the head office of Unilever Nepal Ltd and get data from the records.

For primary information, with a view of collecting the additional information, informal interviews with the officials have been taken. All the gathered data have been used according to need and requirement of the study.

### **3.5 METHODS OF DATA ANALYSIS**

To analyze the collected facts and figures, various accounting tools are used to effectiveness of inventory management and control wherever necessary. The techniques included are statistical tools, graphs, Karl Pearson coefficient and correlation. And the inventory management techniques applied in this

study are EOQ, different stock levels, Inventory turnover ratio and ABC analysis.

To achieve the objectives of the study, various financial as well as statistical tools have been used in this study. The analysis of data will be done according to pattern of data available. Because of limited time and resources, some simple analytical statistical tools such as percentage change, coefficient of correlation and method of least square are adopted in this study. Similarly, some strong accounting tools such as ratio analysis and trend analysis have also been used for financial analysis.

### 3.5.1 STATISTICAL TOOLS

Some important statistical tools are used to achieve the objective of this study. In this study, statistical tools such as coefficient of correlation analysis, standard deviation, coefficient of variance and t-test have been used.

## COEFFICIENT OF CORRELATION

This analysis identifies and interprets the relationship between two or more variables. In the case of highly correlated variables, the effect on one variable may have effect on other correlated variable. Under this topic, Karl Pearson's coefficient has been used to find out the relationship between the different variables. The formula for computing Person's correlation coefficient (r) using direct method is as follows:

$$r = \frac{N \sum xy - \sum x \sum y}{\sqrt{N \sum X^2 - (\sum X)^2} \sqrt{N \sum Y^2 - (\sum Y)^2}}$$

Where,

X = Dependent variable

Y = Independent variable

r = correlation coefficient

N = No of time period

### **3.5.2 FINANCIAL TOOLS**

#### **Percentage Analysis**

This ratio is calculated to measure the acceleration or retardation of any variable to the company in each year. This helps to identify the degree how the variable is moving in each year. It also helps the organization to take the suitable direction.

#### **Major tools for Analysis:**

- ) ABC Analysis
- ) EOQ Analysis
- ) Different Turnover Ratios (Inventory Turnover Ratio, R.M Turnover Ratio, FG Turnover Ratio etc.)
- ) Different Statistical Tools (Mean, Standard Deviation, Coefficient of correlation, Coefficient of variation and t-test etc.)

## **CHAPTER FOUR**

### **Presentation and Analysis of Data**

The main objective of this study is to examine the present practice of inventory management system in UNL. To achieve the said objective, collected data are analyzed in this chapter by applying inventory management tools and technique.

On the basis of official recorded data of UNL, the researcher has tried to explore the existing problem of inventory management and control system and the researcher has to analysis and diagnosis of the collected data and to provide the suggestion and recommendation to the UNL.

#### **4.1 PURCHASING PROCEDURE PRACTICE IN UNL**

Purchasing is the first important function of inventory management in any manufacturing company. So, UNL also requires different types of raw material such as oils, lauric acid, caustic soda, sorbitol, salt, palm, fatty acid, sulphuric acid, galaxy, chira clay, etc. for the production of different types of products.

UNL needs regular supply of different types of raw materials and WIP materials (Soap, noodles) for the continuous production operation. Required raw materials for the factory are purposed by using following purchasing procedures.

##### **4.1.1 Collection of Requisition**

Purchasing manager of purchasing department of UNL collects the purchase requisition slip from the store department for all items.

#### **4.1.2 Decision for Purchase**

When the purchase requisition is received by the purchasing manager, then he decides what, when and how much to buy.

The level of purchasing of raw materials directly affects the investment on inventory and cost associated with inventory, which ultimately affects the profitability rate of the company. So, the company should determine appropriate purchase quantity of raw materials to minimize the investment on inventory and cost associated with it. To cope with this situation the company may apply the EOQ model to determine the appropriate purchase quantity of material. But in UNL, EOQ model of purchase management is not in practice.

#### **4.1.3 Selection of Suppliers**

UNL is a subsidiary company of Hindustan Level Ltd. So, the requirements of all materials are purchased from Hindustan Lever Ltd. of India. Therefore, UNL has adopted centralized purchasing procedure.

#### **4.1.4 Purchase Order**

In case of centralized purchasing, UNL purchasing department prepares orders and sends to the HLL to supply a specific quality and quantity of materials at the stipulated terms at the time and place mentioned.

#### **4.1.5 Receiving and Inspection of Materials**

When materials are arrived then they are received and checked by receiving clerk against the order placed by the purchasing department to vendor. After proper checking, materials are delivered to the store department for checking, if any discrepancy is found regarding the quality and quantity, it is immediately sent to the purchasing department to adjust the discrepancy. Since the company is purchasing raw materials from HLL, there are no discrepancy regarding quality and quantity.

## 4.2 STORE CONTROL DEVICE

The raw materials are received by the purchasing department, then all items received by the purchasing department should be passed into store for protection against deterioration and pilferage. To minimize the cost of holding materials in store all companies generally use different types of controlling devices like Bin cards and store ledger. But the UNL uses bin cards. A bin card makes a record of the receipt and issues of materials. A bin card is kept for each item store carries. These cards are maintained by the storekeeper and storekeeper is accountable for any difference between the physical stock and balance shown in bin card. These cards are used not only for recording receipts and issues of stores but also for assist the storekeeper to control the stock.

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

## 4.3 ISSUING AND PRICING

The pricing of the issues can be determined by value as per weighted average method at the lower cost or market price.

## 4.4 PRESENT INVENTORY POSITION OF UNL

### 4.4.1 Relation between Inventory and Current Assets

**Table 4.1**  
**Relation between Inventory and Current Assets**

Fiscal year	Inventory (Rs) (in million)	Current assets Rs. in million	% of inventory on total current assets
64/65	144.46	399.14	36.19
65/66	126.11	589.88	21.37

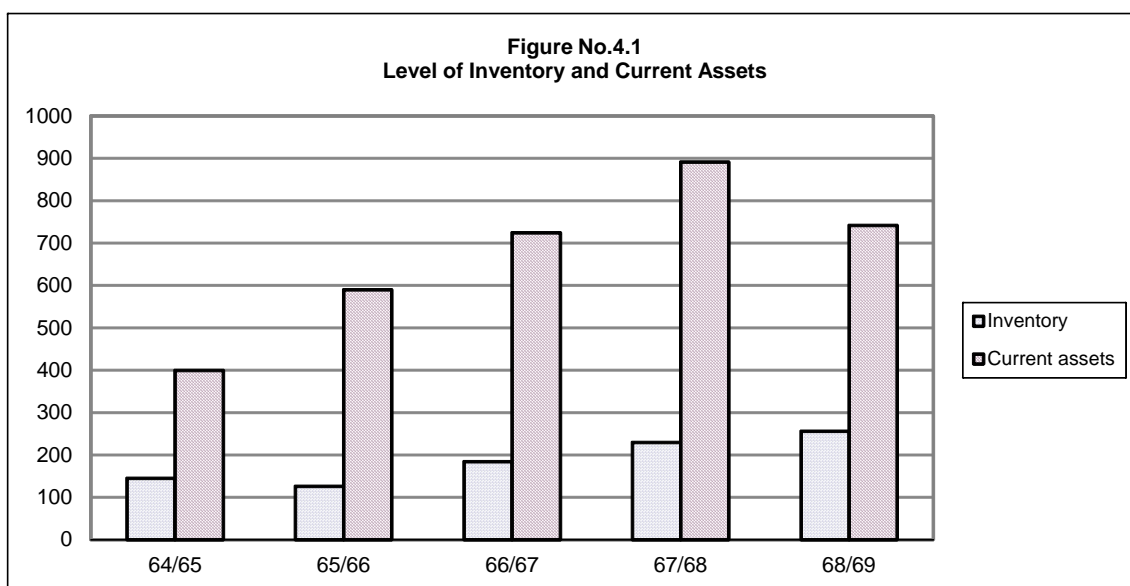
66/67	184.22	724.42	25.54
67/68	229.76	891.41	25.77
68/69	256.17	741.6	34.54
Average	188.14	669.29	28.11

Source: Annual Reports of UNL.

From the table, it is observed that, the inventory to current assets ratio during the study period is 36.19 % in FY 064/65, 21.37 % in FY 065/66, 25.54 % in FY 066/67, 25.77 % in FY 67/68, and 34.54 % in FY 68/69. Similarly, average inventory in an overall study period is Rs 188.14 Million, average current assets in an overall study period is Rs 669.29 Million and average percentage of inventory in an overall study period has been 28.11 percent.

From the above analysis, it is observed that the share of inventory on total current assets is highest in FY 064/65, i.e. 36.19 percent and lowest in FY65/66, i.e. 21.37 percent. This result shows that the company has not defined an appropriate share of inventory in current assets. The huge amount of inventory is beneficial to the company if market price is in increasing trend and vice versa.

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



#### 4.4.2 Proportion of Raw Material on Total Inventory

**Table 4.2**  
**Proportion of Raw Material on Total Inventory**

Fiscal year	Raw material(Rs) (in million)	Inventory (Rs) (in million)	% of raw material on total inventory
064/65	64.06	144.46	44
065/66	59.2	126.11	46.94
066/67	95.28	184.22	51.72
067/68	124.52	229.76	54.19
068/69	92.94	256.17	36.28
Average	87.2	188.14	46.35

Source: Annual Report of UNL.

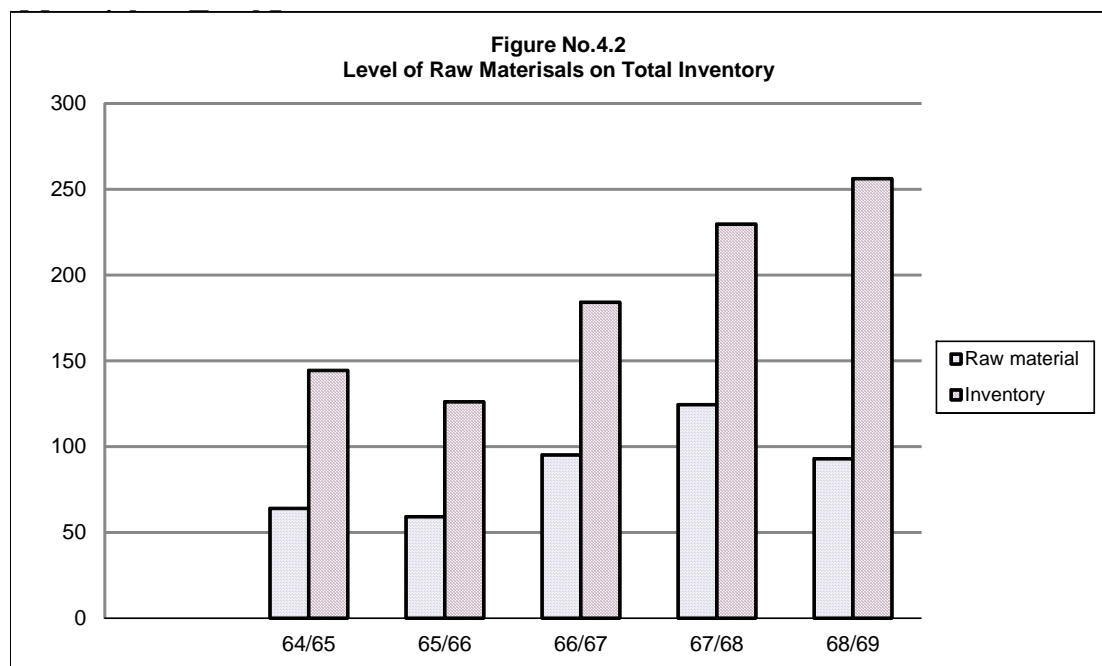
UNL has been using different types of chemicals and perfumes; that are constituting the major portion of raw materials on total inventory in UNL.

From the table 4.2, it is observed that, the raw material on total inventory during the study period is 44 % in FY 064/65, 46.94 % in FY 065/66, 51.72% in FY066/67, 54.19% in FY 067/68 and, 36.28 % in FY 068/69.

Similarly average inventory in overall study period is Rs 188.14 Million, average inventory of raw materials in overall study period is Rs 87.2 Million and average percentage of RM in total inventory in overall study period is 46.35 percent.

From the above analysis, it is observed that raw material consumption in the company is erratic. The fluctuation in stock of raw material during the study period is very high. Defective purchasing policy and poor planning of raw material may be responsible factors for such fluctuation. The large amount of raw materials in inventory is beneficial to the company if market price of raw material is in increasing trend and vice versa.

The graphic presentation of level of raw materials on total inventory is as follows:



#### 4.4.3 Proportion of Packaging Material on Total Inventory

**Table 4.3**

**Proportion of Packaging Material on Total Inventory**

Fiscal year	Packaging material (Rs) (in million)	Inventory (Rs) (in million)	% of packaging material on total inventory
064/65	21.3	144.46	14.7
065/66	11.5	126.11	9.00
066/67	21.76	184.22	11.81
067/68	23.40	229.76	10.18
068/69	32.21	256.17	12.57
Average	22.03	188.14	11.71

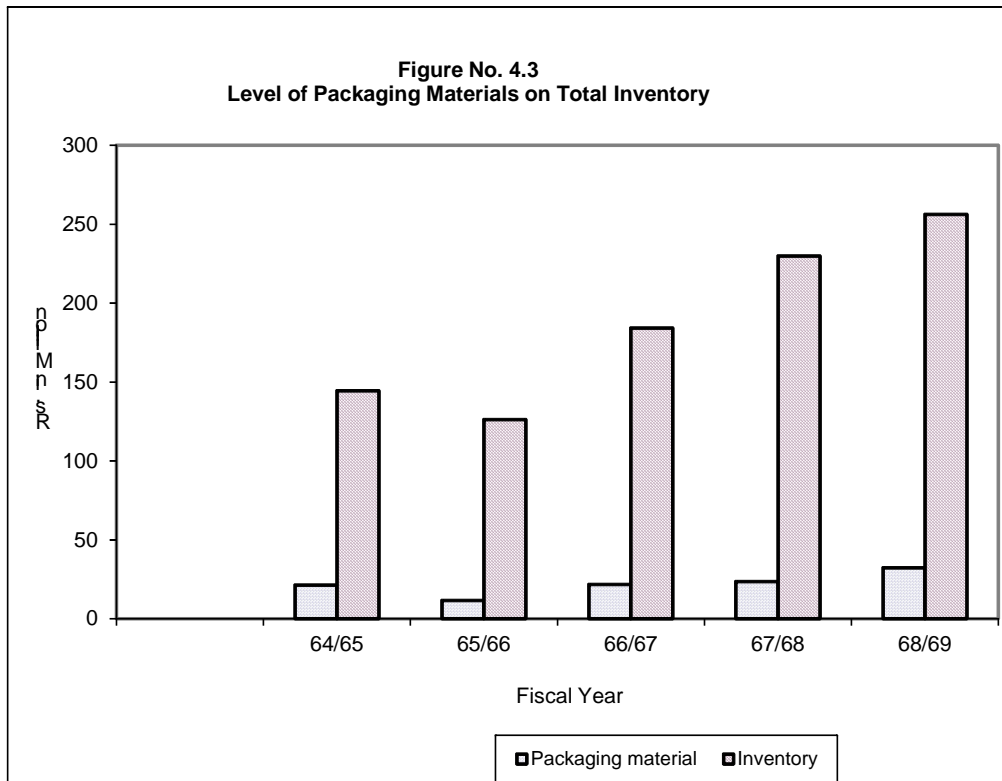
Source: Annual Reports of UNL.

From the table 4.3, it is observed that the share of packaging material on total inventory during the study period is 14.70 percent in 064/65, 9 percent in 065/66, 11.81 percent in 066/67, 10.18 percent in 067/68, 12.57 percent in 068/69.

Whereas the average percentage of packaging material in total inventory in overall studies period is 11.71 percent. Similarly average inventory in overall study period is Rs 188.14 Million average inventory of packaging materials in overall study period is Rs 22.03 Million

From the above analysis, it is observed that the share of packaging material in the company is erratic. This result shows that there is no fixed policy of purchasing of packaging material. It is because that the company might have forecasted higher level of sales volume by looking at the gradually increasing trend of sales volume in previous year.

The graphic presentation of level of raw materials on total inventory is as follows:



#### 4.4.4 Proportion of WIP Materials on Total Inventory

**Table 4.4**  
**Proportion of WIP Materials on Total Inventory**

Fiscal Year	WIP material Rs. (in million)	Total inventory (Rs) (in million)	% of WIP on total inventory
064/65	6.30	144.46	4.40
065/66	4.02	126.11	3.20
066/67	5.52	184.22	2.99
067/68	3.49	229.76	1.52
068/69	7.68	256.17	3.00
Average	5.40	188.14	2.87

Source: Annual Reports of UNL.

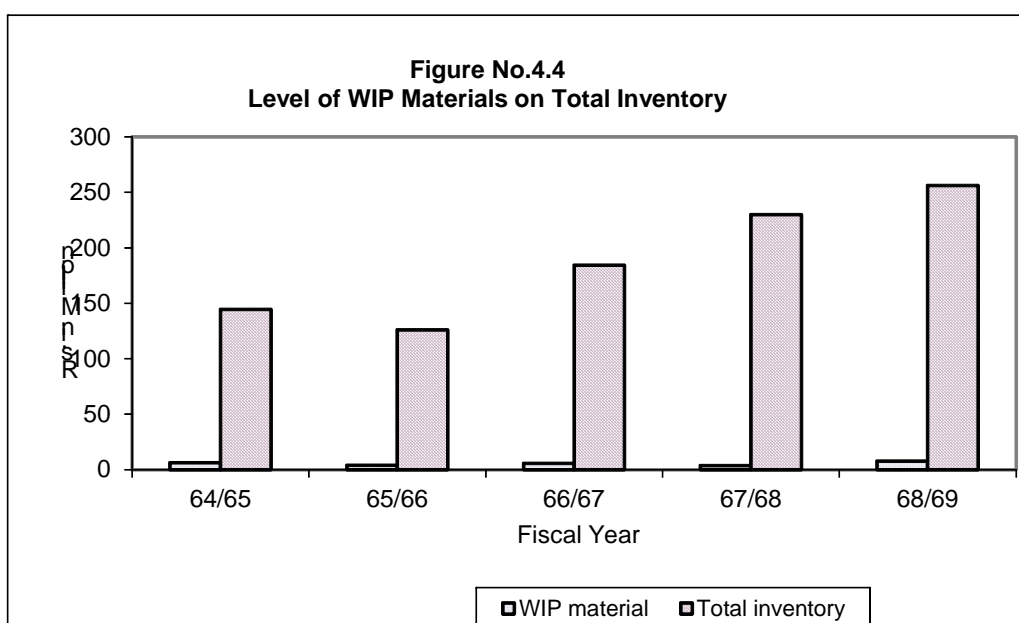
UNL has been using soap noodles to produce the final product. The smaller portion of WIP on total inventory is used by the company.

From the table 4.4, it is observed that the portion of WIP material on total inventory during the study period is 4.40 percent in the FY 064/65, 3.20 percent in the FY 065/66, 2.99 percent in the FY 066/67, 1.52 percent in the FY 067/68, and 3 percent in the FY 068/69.

Whereas the average percentages of WIP materials in total inventory in overall study period is 2.87 percent. Similarly average inventory in overall study period is Rs 188.14 Million, average inventory of packaging materials in overall study period is Rs 5.40 Million

From the above analysis, it is observed that WIP materials of the company are fluctuating during the study period. Such fluctuation in inventory position is not considered as good from the point of view of inventory management. Fluctuation in demand and sales of company products, lack of appropriate inventory policy and ineffective demand forecast are the main reasons of such fluctuation

The graphic presentation of level of WIP materials on total inventory is as follows:



#### 4.4.5 Proportion of Finished Goods on Total Inventory

**Table 4.5**

**Proportion of Finished Goods on Total Inventory**

Fiscal year	Finished Goods (Rs) (in million)	Total inventory (Rs) (in million)	% of Finished Goods on total inventory
064/65	41.30	144.46	28.60
065/66	44.50	126.11	35.30
066/67	55.50	184.22	30.13
067/68	73.83	229.76	32.13
068/069	116.35	256.17	45.42
Average	66.30	188.14	35.24

Source: Annual Reports of UNL.

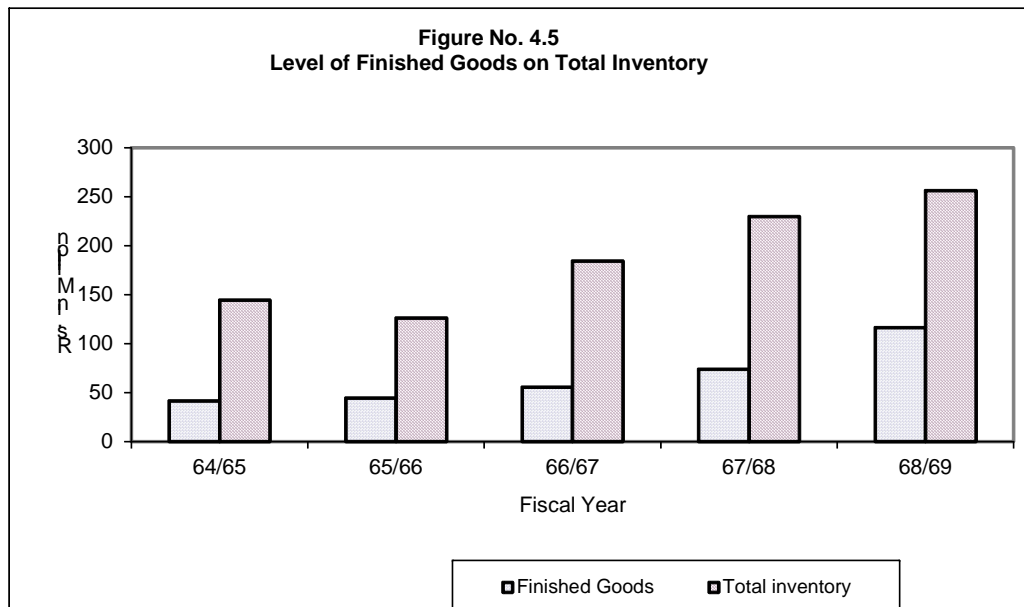
UNL has been producing different kinds of products and product groups namely, detergents, toilet soaps, oral care, scourers, skin creams, laundry soaps, hair care etc.

From the table 4.5, it is observed that the portion of finished goods on total inventory during the study period is 28.60 percent in the FY 064/65, 35.3 percent in the FY 065/66, 30.13 percent in the FY 066/67, 32.13 percent in the FY 067/68, and 45.42 percent in the FY 068/69.

Whereas the average percentage of finished goods inventory in total inventory in overall study period is 35.24 percent. Similarly average inventory in overall study period is Rs 188.14 Million, average inventory of finished goods in overall study period is Rs 66.30 Million

From the above analysis, it is observed that the production rate was increasing from the FY 064/65 to FY 065/66. In that period contribution raw material and packaging material was also in increasing trend. But from as the FY 065/66 to FY 066/67 the production rate was in decreasing trend. Fluctuation of demand and sales of the company are the main reasons of such situations.

The graphic presentation of level of finished goods on total inventory is as follows.



#### 4.4.6 Proportion of Stores and Spare Parts on Total Inventory

**Table 4.6**

### Proportion of Stores and Spare Parts on Total Inventory

Fiscal year	Store and spare parts (Rs) (in million)	Total inventory (Rs) (in million)	% of Store and Spare Parts on total inventory
064/65	11.50	144.46	7.90
065/66	6.90	126.11	5.50
066/67	6.15	184.22	3.34
067/68	4.52	229.76	1.97
068/69	6.98	256.17	2.72
Average	7.21	188.14	3.83

Source: Annual Reports of UNL.

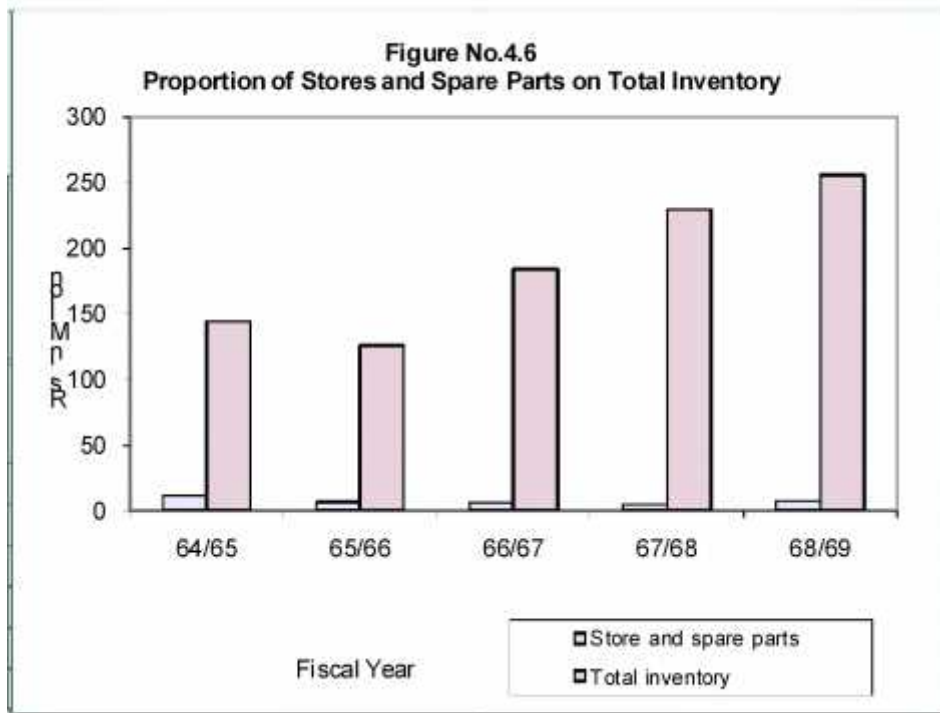
Stores and spare parts are not directly entered production and it facilitates the smooth production process. Store and spare parts are comparatively less and don't require significant investment.

From the table 4.6, it is observed that the portion of stores and spare parts on total inventory during the study period is 7.9% in the FY 2064/65, 5.5% in the FY 065/66, 3.34% in the FY 066/67, 1.97% in the FY 067/68 , and 2.72% in the FY 2068/69.

Whereas the average percentage of stores and spare parts inventory in total inventory in overall study period is 3.83 percent. Similarly average inventory in overall study period is Rs 188.14 Million, average inventory of stores and spare parts in overall study period is Rs 7.21 Million

From the above analysis, it is observed that, the quantity of stores and spare parts used by the company is irregular during the study period. Since the company's production is totally dependent on stores and spare parts, it obviously fluctuates over the study period.

The graphic presentation of Level of stores and spare parts on total inventory is as follows.



#### 4.4.7 Relation between Inventory and Net Profit

**Table 4.7**

**Relation Between Inventory and Net Profit**

**(in million)**

Fiscal year	Inventory Rs.	% Deviation on an average inventory	Net Profit Rs.	% Deviation on an average net profit
064/65	144.46	(23.22)	42.6	(69.74)
065/66	126.11	(32.97)	93.2	(33.80)
066/67	184.22	(2.08)	140.78	0
067/68	229.76	22.12	189.19	34.38
068/69	256.17	36.16	238.16	69.16
Average	188.14		140.79	

The table 4.7, shows the relation between inventory and net profit from the FY 2064/65 to 2068/69. From the above table it is observed that the average inventory during the study period is Rs. 188.14 million and the average net profit during the study period is Rs.140.79 million. Similarly, the above table shows the percentage deviation of inventory and net profit over the study period. The highest positive deviation from the average inventory is 22.12 percent in the FY 2067/68 and the highest positive deviation from the average net profit is 69.16 percent in the FY 2068/69. Similarly, the highest negative deviation from the average inventory is (32.97) percent in the FY 2065/66, and the highest negative deviation from on the average net profit is (69.74) percent in the FY 2064/65.

From the above analysis it is observed that inventory and net profit were fluctuating during the study period. Therefore there is no specific policy of investment on inventory and inventory management system.

The correlation between inventory and net profit has been observed to be 0.9337. Which is shown in annex 'B'. Therefore, there is positive and high degree of correlation between inventory and net profit.

### **TEST OF SIGNIFICANCE OF CORRELATION COEFFICIENT**

To test the significant of correlation of coefficient we can use T statistic. Here sample size is less than 30 so we can use T statistics.

Here,  $r = 0.9337$

$$T \text{ statistic} = r \sqrt{\frac{(n-2)}{1-r^2}}$$

Null Hypothesis ( $H_0$ ) = 0 i.e. 'r' is not significant

Alternative Hypothesis | 0 i.e. 'r' is Significant

Now test statistic

$$T = r \sqrt{\frac{(n-2)}{1-r^2}}$$

$$= 0.9337 \sqrt{\frac{(5-2)}{1-0.9337^2}}$$

$$= 4.52$$

Now tabulated value of t for (n-2) i.e. 5-2 =3 degree of freedom for two-tail test at 5% level of significance is 3.182

### **DECISION:**

Since calculated / t/ is >Tabulated value of /t/ at 3 degree of freedom at 5% level of significance we reject H0 and we accept H1, which indicate that correlation coefficient between variables are significant or ' r ' is significant. This t tests proves that there is relation between inventory and net profit.

#### **4.5 RATIO ANALYSIS OF UNL**

Ratio analysis is the process of determining and interpreting numerical relationship between any two figures of financial statements. Inventory ratio analysis of any organization may help to know the efficiency of management of finished goods. Inventory turnover ratio is also known as stock turnover ratio or sales stock ratio. This ratio measures turnover of stocks in terms of time. The higher the turnover is better the efficiency. .

#### **4.6 INVENTORY MANAGEMENT AND CONTROL TECHNIQUES**

##### **4.6.1 Economic Order Quantity Calculation**

##### **4.6.2 Economic Order Quantity of RM on FY 064/65**

The optimal level of raw material has been determined by the application of "Economic Order Quantity" model. EOQ can be calculated by using 2 methods

- 1) Formula Method

## 2) Graphical Method

### 1) Formula Method

Under this method, EOQ can be calculated as follows:

Raw Materials:

On the basis of company's records, the following data are available

Total Raw Material Consumed (A) = 17665 tones

(Annual Requirement)

Carrying cost per tones (C) Rs. 1373.

Ordering cost per order (O) = Rs. 109094.

Note:

\* Calculation of carrying cost is based on godown rent, insurance, electricity and security.

\* Ordering cost is based on data provided by the corporate office by Direct Personal Interview.

By applying the EOQ formula.

$$EOQ = \sqrt{\frac{2AO}{C}} \times \sqrt{\frac{2 \times 17665 \times 109094}{1373}} \times 1675 \text{ tones}$$

(i) EOQ = 1675 tones

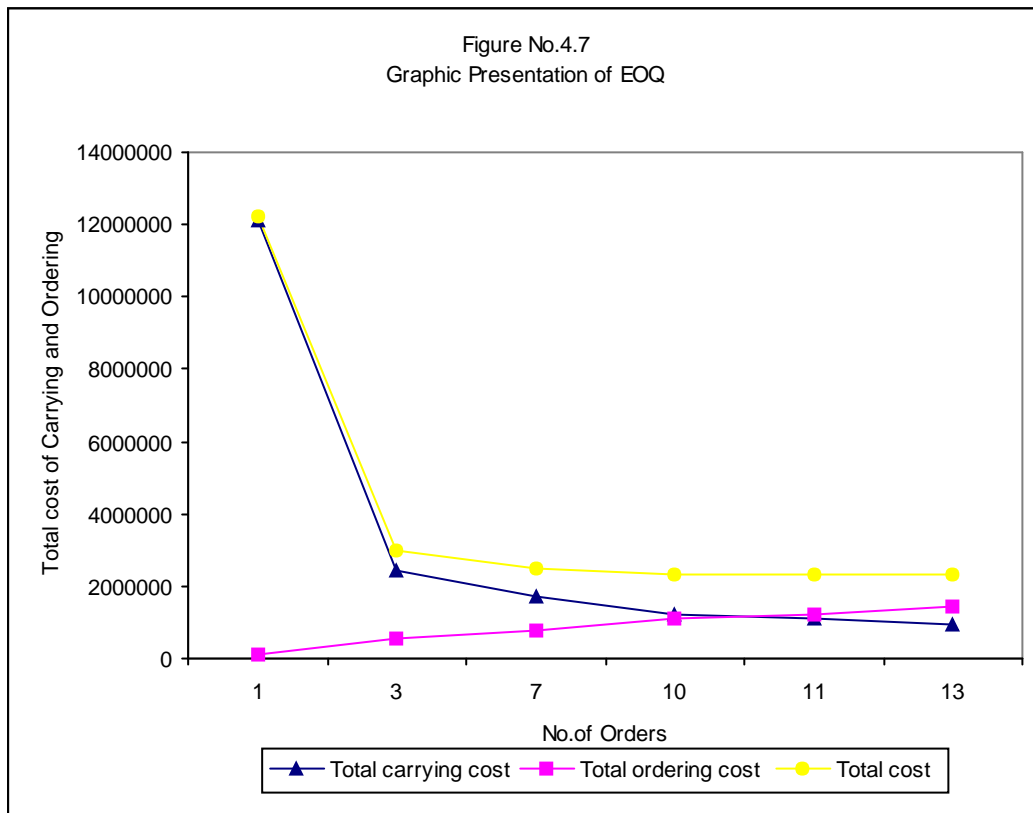
(ii) No. of orders =  $\frac{\text{Annual Requirement}}{EOQ} \times \frac{17665}{1675} \times 10.54 \approx 11$  times

From the above calculation, the EOQ is 1675 tones, which minimizes the total cost of carrying and ordering with the no. of order 11 times.

## 2) Graphical Method:

Under this method carrying and ordering cost are plotted in graphs and the point ,where carrying cost and ordering cost is equal that quantity is taken as EOQ.

Graphic presentation of EOQ is as follows



The figure 4.7, shows the minimum carrying cost and ordering cost, which minimizes the total cost. X axis denote the no. of orders and Y axis denotes the total cost of ordering and carrying. Ordering cost is going up ward and carrying cost is going downward. When order size is increasing, the carrying cost is decreasing and ordering cost is increasing.

So, it is clear that if the company wants to minimize total inventories of RM cost it should order only 11 times during the year.

So, it becomes clear from the formula method as well as graphical method, the company should order 1675 tones with 11 times during the year.

#### 4.6.3 Economic Ordering of RM on FY 2065/66

Annual Requirement (A) = 17362 tones

Ordering cost per order (O) = Rs. 108472

Carrying cost per tones (C) = Rs. 1123 per tones.

By applying EOQ formula,

$$EOQ \times \sqrt{\frac{2AO}{C}} \quad \times \sqrt{\frac{2 \mid 17362 \mid 108472}{1123}} \quad \times 1831 \text{ tones}$$

(i) EOQ = 1831 tones.

(ii) No. of orders =  $\left| \frac{\text{Annual Requirement}}{EOQ} \times \frac{17362}{1831} \times 9.48 \text{ times} \right|$  9 times approx.

From the above calculation, the EOQ is 1831 tones under the formula method. Which minimizes the total ordering and carrying cost with no. of orders 9 times, which is also clear the following tabular method.

So, it is clear that, if the company wants to minimize total cost of inventory of RM it should order 9 times during the year.

So, it becomes clear from formula method that the company should order 1831 tones with 9 times during the year.

#### 4.6.4 Economic Ordering of RM on FY 2066/67

Annual Requirement (A) = 21090 tones

Ordering cost per order (O) = Rs. 108492

Carrying cost per tones (C) = Rs. 1127 per tones.

By applying EOQ formula,

$$EOQ \times \sqrt{\frac{2AO}{C}} \quad \times \sqrt{\frac{2 \mid 21090 \mid 108492}{1127}} \quad \times 2014 \text{ tones}$$

(i) EOQ = 2014 tones.

(ii) No. of orders =  $\left| \frac{\text{Annual Requirement}}{EOQ} \times \frac{21090}{2014} \times 10.47 \text{ times} \right|$  10times approx.

From the above calculation, the EOQ is 2014 tones under the formula method. Which minimizes the total ordering and carrying cost with no. of orders 10 times.

So, it becomes clear from formula method that the company should order 2014 tones with 10 times during the year.

#### 4.6.5 Economic Order Quantity of RM on FY 2067/68

Annual Requirement (A) = 19484 tones

Ordering cost per order (O) = Rs. 113916

Carrying cost per tones (C) = Rs. 1183 tones

By applying the EOQ formula.

$$\dots EOQ \times \sqrt{\frac{2AO}{C}} \times \sqrt{\frac{2 \times 19484 \times 113916}{1183}} \times 1937 \text{ tones}$$

(i) EOQ = 1937 tones

(ii) No. of orders =  $\left[ \frac{\text{Annual Requirement}}{EOQ} \times \frac{19484}{1937} \times 10.05 \text{ times} \right]$  10 times

approx.

From the above calculation, the EOQ is 1937 tones under the formula method, which minimizes the total ordering and carrying cost with the no. of orders 10 times per year.

So, it becomes clear from formula method, that the company should order 1937 tones with 10 times during the year.

#### 4.6.6 Economic Order Quantity of RM on FY 2068/69

Annual Requirement (A) = 20929 tones

Carrying cost per tones (C) Rs.1228 per tones.

Ordering cost per order (O) = Rs.118256

By applying EOQ formula:

$$EOQ \times \sqrt{\frac{2AO}{C}} \quad \times \sqrt{\frac{2 \mid 20929 \mid 118256}{1228}} \quad \times 2008 \text{ tones}$$

(i) EOQ = 2008 tones.

(ii) No. of orders =  $\frac{A}{EOQ} \times \frac{20929}{2008} \times 10.42 \mid 10 \text{ times}$  approximately.

From the above calculation, the EOQ is 2008 tones under the formula method, which minimizes the total ordering and carrying cost with no. of orders is 10 times.

The table shows that the carrying cost is decreasing and ordering cost is increasing with the increasing number of order. The above table shows the minimum total cost of RM is Rs.2467048. Where the total carrying cost is Rs. 1284488 and total ordering cost is Rs.1182560 with the number of order is 10 times per year. So, it is clear that, If the company wants to minimize total cost of inventory of RM it should order only 10 times during the year.

So, it becomes clear from formula method, that the company should order 2008 tones with 10 times during the year.

#### 4.6.7 EOQ of Raw Materials in Total Study Period

**Table 4.8**

##### **EOQ of Raw Materials in Total Study Period**

Fiscal Year	EOQ in tones
2064/65	1675
2065/66	1831
2066/67	2014

2067/68	1937
2068/69	2008

From the table, it can be interpreted that, there is no similar size of EOQ during the study period.

In the FY 2066/67, the EOQ of RM is very high i.e. 2014 tones, while in the FY 2064/65 the EOQ of RM is very low i.e. 1675 tones. There is fluctuation in EOQ size during the study period due to various reasons. This type of fluctuation in ordering costs is due to fluctuation in demand.

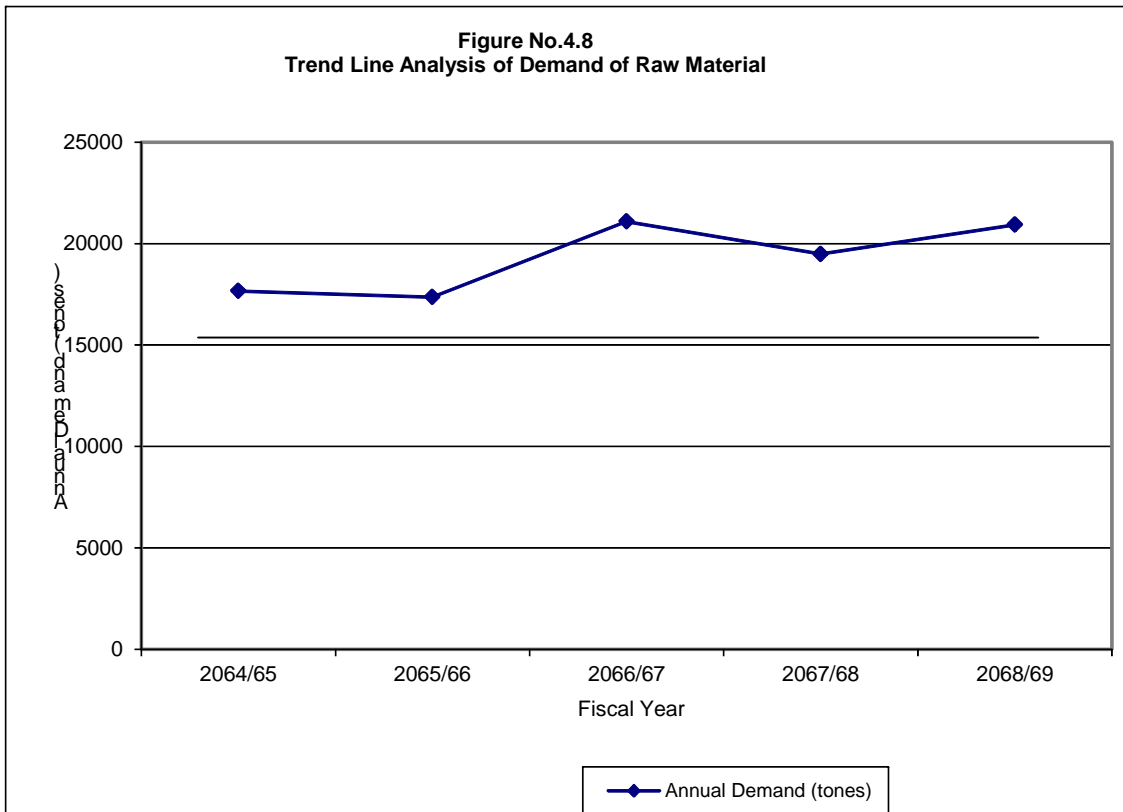
#### **4.6.8 Trend Line Analysis of Annual Demand of Raw Material**

Trend line analysis has been employed to the trend of purchase of raw materials so in this part, attempt has been made to analyze the purchasing trend of raw material by using trend lines.

**Table 4.9**  
**Raw Materials**

Fiscal Year	Annual Demand (tones)
2064/65	17665
2065/66	17362
2066/67	21090
2067/68	19484
2068/69	20929
Average	19306

Source: Annual Report of UNL.



From the table, it is observed that the average annual demand of raw material is 19306 tonnes. From the FY 2064/65 to 2065/66 the annual demand of raw material is below the average annual demand. Similarly, from the FY 2067/68 to 2068/69, the annual demand of raw materials is beyond the average annual demand. And after 2065/66 annual demand of raw material is increasing. From above table it is observed that years the company's production and selling transaction are fluctuating.

#### **4.7 SELECTIVE INVENTORY CONTROL (ABC ANALYSIS)**

As the term ABC implies Always Better Control which states that a fewer items of high investment value should be paid more attention than a bulk of items having low value and having a low investment in capital. Category A includes the most important items and recognized for special attention. Category B includes lesser important items and category C consists of the least important and low value items.

The classification of items into A, B and C categories is based upon the product value and usage rate. A item include 15% of items and 70% of total value of items. B items include 30% of the items and 20% of total value of items. C item include 55% of items and 10% of total inventory value.

According to ABC analysis concept, the item of inventory of Unilever Nepal Ltd. is categorized as A, B and C on the basis of product value and usage rate. The value items having more than Rs. one lakhs per tones fall under category 'A'. The items having value having from Rs. 50,000 to Rs. 100,000 per tone fall under category 'B' and the items having value to Rs. 50,000 per tones fall under category 'C'.

#### **4.7.1 ABC Analysis Concept**

According to ABC analysis Concept, the items of inventory of UNL are categorized as A, B and C group on the basis of the usage value of shown in table below.

**Table 4.10****ABC Classification of Overall Study Period**

Fiscal year	064/65		065/66		066/67		067/68		068/69		Average	
Proportion	% of total items	% of total cost	% of total items	% of total cost	% of total items	% of total cost	% of total items	% of total cost	% of total items	% of total cost	% of total items	% of total cost
Categories												
'A' items oral care, skin creams, hair care, food and beverages	16.4	51	33.4	62.3	17.1	49.3	10	28	17	31	18.78	44.32
'B' items Toilet soaps	15.4	24.7	29.7	25.6	31.1	33.7	53	53	53	54	36.44	38.2
'C' items Detergents, scourers, soap noodles, laundry soap.	68.2	24.3	36.9	12.1	51.8	17	37	19	30	15	44.78	17.48
Total	100	100	100	100	100	100	100	100	100	100	100	100

Source: Annual report of UNL.

From the table, it is observed oral care, skin creams, Hair care, food and beverages are categorized under 'A'. The table above shows that under a 'A' category, average percentage of total units is 18.78% and average percentage of total cost is 44.32% during the study period. Therefore, 'A' group involves largest investment and would be under tightest control by management. It should rather keep a more rigorous control and the most sophisticated control techniques should be applied in 'A' items than another items.

Toilet soaps is categorized under 'B' items. The table 4.10, shows that under 'B' items, average percentage of total units is 36.44% and average percentage of total cost is 38.2% of the overall study period. Therefore, in 'B' group involve normal inventory control is exercised. The 'B' group stands mid

way. It deserves less attention than 'A' but more than 'C'. It can be controlled by employing less sophisticated techniques.

Detergents, scourers, soap noodles, laundry soaps are categorized under 'C' items. The table above shows that under 'C' items, average percentage of total units is 44.78% and average percentage of total cost is 17.48% of the overall study period. In case of 'C' items, simple control will be sufficient.

The categories reflect the concept that it is uneconomical to spend the same cost of supervision to all items. Inventories are checked physically once every six months or every year to determine new order to placed. Based on these consideration the selective inventory control system of the company is analyzed. In the table 4.10, it is clearly seen that percentage of total cost of 'B' items is comparatively high but per tone cost is less than 'A' items and more than 'C'. In order to minimize the inventory cost, 'A' items should be paid more attention than 'C'. 'B' lies in between items 'A' and 'C'. It requires neither careful nor simple but a moderate control system is adequate for this item.

#### **4.8 CONCLUDING REMARKS**

Based on all the studies and analysis of primary and secondary data the major findings can be explained in following points.

- i) Inventory management and controlled system followed by manufacturing companies are ABC analysis, perpetual inventory management system (physical checking), EOQ etc.
- ii) In the company, there are different types of inventories, like RM, WIP, finished goods and stores and spare parts. Purchasing is the first step of inventory management of manufacturing companies. When all items of inventories

are received by purchasing department they are passed into the store. So these items are handled and managed carefully.

- iii) There are various problems like political crisis, strikes lockout and transportation problem facing by the manufacturing companies regarding the management of inventories.
- iv) The company has not been adopting appropriate inventory policy because inventory constitutes the higher proportion than that of other items of current assets. The company has not followed any type of inventory policies.
- v) The fluctuation in stock of RM during the study period is very high. Defective purchasing policy and poor planning of raw materials are the main responsible factors for such fluctuation. There is no fixed policy of purchasing materials.
- vi) Demand and sales of company (UNL) are very fluctuating. The main reason of such fluctuation is lack of appropriate inventory policy and ineffective demand forecast.
- vii) The correlation between sales and net profit is 0.7861. Therefore, there is significant relationship between sales and net profit and it is concluded that the change in sales results change in net profit.

- viii) The correlation between inventory and net profit is 0.9337, so it becomes clear that there is positive and high degree of correlation between inventory and net profit. 'T' statistics also indicate that correlation coefficient between inventory and net profit is significant.
- ix) EOQ is not similar during the study period. This type of fluctuation is due to variation of ordering cost and fluctuation in demand but the company has not used EOQ model to manage and control of the inventory.
- x) UNL is using bin card technique and ABC analysis to control and manage the store in order to minimize the cost of holding materials. The bin-cards are maintained by storekeeper.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATION**

This chapter includes three aspects of the study-summary, conclusion, and recommendations. The first aspect summarizing the whole study, the second draws the conclusion and the last but not the least recommendations.

#### **5.1 SUMMARY**

Inventory management is one of the most important functions in any organization. Without effective and efficient inventory management no organization can achieve its goal. Success of any enterprises basically depends on the efficiency and effectiveness of systematic management. Inventory management is the most important part for manufacturing Company. The Company has invested the most of amount for inventory, where the functions are associated as purchasing, storing selling, distribution etc.

Inventory management is the most important part for manufacturing company. A firm cannot achieve its goal unless inventories are controlled effectively and capital is allocated efficiently. Inventory functions are associated with production, marketing, finance and administration etc. Inventory constitutes most significant part of current assets. It should therefore be managed efficiently to avoid unnecessary investment. Unilever Nepal Limited is a subsidiary company of Hindustan Lever Limited. UNL produces different types of products and product groups. So this study deals with inventory management of Unilever Nepal Limited.

The basic problem area of this study is to examine the inventory management system practiced by the company is unscientific. The carrying cost, ordering cost, order size safety stock maintained are unsatisfactory and unscientific. It

is not paying much attention to the lead-time. Therefore, all these functions lead to increase total cost of the company.

The main objective of this study is identify the inventory management system of Unilever Nepal Ltd. In this study an attempt has been made to identify the inventory position of UNL, to know the relationship between sales and inventories with identifying their trends, to assess the inventories and their consequences on profitability of UNL and suggest over the better practice of inventory management of UNL.

This study is one of the new study, which only tries to know the inventory management of UNL.

The required information are secondary as well as primary. The researcher had submitted question to UNL to find out actual result and the researcher collected the secondary data from annual report of UNL.

All the collected data are analyzed on the basis of inventory management with the help of ABC analysis, EOQ model, Inventory turnover ratio, RM turnover ratio, correlation coefficient, average percentage of the total study period by presenting with table and figure in required places. The analysis has been done year wise as well as the average of total study period is analyzed. To make certain type of inventory management decision many statistical tools and financial tools and technique are available for controlling the inventory but the company has not applied some sort of technique for managing the inventory.

## **5.2 CONCLUSIONS**

Based on the findings, following conclusions have drawn as the concluding Framework of the study on inventory management.

The inventory management of UNL is not only necessary but also compulsion for better performance of the organization. If UNL initiates step to the appropriate management of inventory, certainly it will cope it's set objectives

successfully. This study is just a small part to fulfill the partial requirement of MBA. Concerning these findings it may be appropriate to make some suggestion and recommendations. Although these suggestions may not be enough they certainly suggest the areas that can be improved and require attention to bring some improvement in inventory of UNL.

The major finding of the study as revealed from the analysis can be stated as follows

- ) UNL is the subsidiary company of Hindustan Lever Limited with holds 80% share of UNL is used to take the centralized purchasing procedure. Therefore, required raw material and WIP material (soap noodles) are imported from HLL of India.
- ) UNL uses the bin card technique to control the store in order to minimize the cost of holding materials. The bin cards are maintained by store keeper.
- ) The pricing of the issues can be determined by value as weighted average cost method at the lower cost or market price.
- ) Inventory constitutes the higher proportion than that of other items of current assets. The average percentage of inventory on current assets is 28.11%. The highest proportion of investment on inventory in the FY 064/65,i.e.36.19%and the lowest proportion of investment on inventory in the FY 065/66,i.e.21.37%.This results shows that the company has not been adopting appropriate inventory policy.
- ) In UNL, inventory includes raw materials, packaging materials, WIP materials, finished goods and stores and spare parts. The average percentage of RM in total inventory in the overall study period is 46.35%. The highest proportion and RM on total inventory is 54.19 percent in the FY 2067/68, and the lowest proportion of RM on total inventory is 36.20 percent in the FY 2068/69. Therefore, it is observed

that raw material consumption in the company is elastic. The fluctuation in stock of RM during the study period is very high. Defective purchasing policy and poor planning of raw materials may be responsible factors for such fluctuation.

- J) The average percentage of packaging material in the total inventory is 11.71%. The highest proportion of packaging material on total inventory is 14.70 percent in the FY 2064/65. The lowest proportion of PM on total inventory is 9 percent in the FY 2065/66. The share of packaging material in the company is elastic. This results shows that there is no fixed policy of purchasing packaging material. It is because that the company might have forecasted higher level of sales volume by looking at the gradually increasing trend of sales in previous year.
- J) The average percentage of WIP materials in total inventory is 2.87% , which is low in comparison with other inventories. The highest proportion of WIP on total inventory is 4.4 percent in the FY 2064/65. The lowest proportion of WIP on total inventory is 1.52 percent in the FY 2067/68. The WIP materials consumptions in the company is fluctuating during the study period. Fluctuation in demand and sales of company products, lack of appropriate inventory policy and ineffective demand forecast are the main reasons of such fluctuation.
- J) The average percentage of finished goods in total inventory is 35.24%.. The highest value of finished product, i.e Rs. 45.42 million is produced in the FY 2068/69 as compared with the overall study period. Fluctuation of demand and sales of the company are the main reason for such situations.
- J) The average percentage of stores and spare parts in total inventory is 3.83%. During this period, the quantity of stores and spare parts used by the company is irregular during the study period. Since, the

company's production is totally dependent stores and spare parts, it obviously fluctuates over the study period.

) The average value of sales is Rs.1392.13 million and Average value of net profit is Rs.140.79 million. The highest positive deviation from the average sales is 9.53 percent in the FY 2066/67 and the highest positive deviation from the average net profit is 69.16 percent in the FY 2068/69. The highest negative deviation from the average sales is (11.18) percent in the FY 2064/65 and the highest negative deviation from the average net profit is (69.74) percent in the FY 2064/65. The correlation between sales and net profit is 0.7861. Therefore, there is significant relationship between sales and net profit and it is concluded that the change in sales results change of net profit.

) The average value of inventory is Rs.188.14 million and average value of net profit is Rs.140.79 million. The highest positive deviation from an average net profit is 69.16 percent in the FY 2068/69. Similarly, the highest negative deviation from an average net profit is (69.74) percent in the FY 2064/65. The fluctuating inventory and net profit indicates that there is no specific policy of investment on inventory. However, the level of inventory has been maintained according to the demand of products.

The correlation inventory and net profit is 0.9337. So, it becomes clear that there is positive and high degree of correlation between inventory and net profit.

) Inventory turnover ratio shows the relation between sales and inventory and it also shows the efficiency of inventory management. The average ITR is 7.78 times and found to be satisfactory. The highest ITR is 9.87 times in the FY 2065/66 times. So, in this year, low inventory is kept in the company and due to fast movement of the materials and finished goods.

The Correlation between inventory and sales is 0.7954. Therefore, there is significant relationship between inventory and sales and it is observed that changes in inventory results changes into the sales.

- ) EOQ is not similar during the study period. In the FY 2066/67 the EOQ of RM is very high i.e. 2014 tones, while in the FY 2064/65 the EOQ of RM is low i.e. 1675 tones. This type of fluctuation is due to variation of ordering cost and fluctuation in demand. There is high fluctuation in EOQ size during the study period due to various reasons.
- ) The annual demand of RM is fluctuating. An average annual demand of RM is 19306 tones. From the FY 2064/65 to 2065/66 the annual demand of RM is below the average annual demand. In these years, the company's production and selling transaction are increasing.
- ) The significance of the ABC analysis reflects the concept of appropriate management of inventory. The concept states that it is uneconomical to spend the same cost of supervision to all items. It is clearly seen that under 'A' items, an average percentage of total units is 18.78 percent and an average percentage of total cost is 44.32. Similarly, under 'B' items an average percentage of total units is 36.44 and the average percentage of total cost is 38.20. Again, under 'C' items, the average percentage of total units is 44.78 and the average percentage of total cost is 17.48. So it is clearly seen that the average percentage of total cost of 'B' items is comparatively high but per ton cost is less than 'A' items and more than 'C'. In order to minimize inventory cost of 'A' item should be controlled carefully and should be paid more attention than 'B' and 'C'. 'B' item lies in between 'A' and 'C' item. It requires neither careful nor simple but a moderate control system is adequate for this item.
- ) The company has faced some problems on managing proper inventories in using pull system because there is uncertainty about the future supply of materials, operation of factory, Nepal bands, lock outs, strikes, geographical problems, fluctuation of material prices etc.

### 5.3 RECOMMENDATIONS

To achieve all the objectives of UNL, the efficient management is essential. The management of inventory in UNL is not only necessary but compulsory for the better performance of the company. If UNL initiates steps to the appropriate management of inventory, certainly it will attain its set objectives successfully. On the basis of study, the following suggestion may be recommended for consideration.

- (i) The company should define its objectives clearly with regarding to its inputs and outputs separately. Quantities and time period should be specified.
- (ii) Purchasing plan should be prepared for different types of raw materials and WIP materials with the proper co-operation and coordination among the planning, purchasing, storing, production, marketing and sales department to avoid excessive investment on inventory.
- (iii) In UNL, inventory constitutes the highest proportion among the current assets. So UNL should give great attention to the inventory management. The company should adjust the inventory according to the sales and production and its priority basis. Holding large amount of inventory requires high operating cost. There should be good storekeeping system, better material handling system and timely inspection. Moreover, systematic inventory control system should be applied to know the inventory position in the company.
- (iv) UNL has not been able to satisfy the level of customers demand. Company should try to use optimal capacity which has been idle now to maintain the level of customer demand. By this way the company's profitability will be increased.
- (v) It is found that the company has not used EOQ model for optimum level of inventory management system. It is recommended that the order size of inventory which minimizes the total cost of inventory,

i.e. ordering and carrying cost should be applied. So that company should adopt inventory management technique.

- (vi) In order to minimize inventory cost, 'A' item should be controlled carefully and should be paid more attention than 'B' and 'C' items. 'B' lies in between 'A' and 'C' items. It requires neither careful nor simple but a moderate control system is adequate for this item.
- (vii) UNL is a multinational company and its products are competing in the international market. So, company can use either a push or a pull inventory model. Push inventory models deal with scheduling orders for production in advance of customer demand. It refers MRP(I), MRP(II) and DRP etc. On the other hand pull, model are based on making goods once customer demand is known. The products are pulled through the channel of distribution by the order: Recent trends suggest a movement to use pull inventory models to reduce inventory throughout the channel. Pull inventory models deals with Just-in-time and Kan Ban inventory models. Thus, the UNL should try to adopt pull inventory models.
- (viii) Planning of inventory is most welcomed in the world today. So products of different types of personal products, oral care, different groups of soaps, detergents etc. should be produced on planned basis and attention should given to implement better marketing strategies to take a strategic advantage of competitive world.
- (ix) Specific policy on inventory should be defined and comprehensive system of inventory management has to be introduced.
- (x) Inventory should not treated as a reason for investment rather it should be planed as coordinating factor between sales and production.
- (xi) Primary problem faced by UNL in production planning are unsuitable inventory and production policy, lack of coordination

between sales and production. So the Co. should clarify production and inventory policy.

- (xii) It can't reduce production without adjusting in sales and inventory. If there is limitation on factor of production, sales has to be adjusted in order to maintain coordination between sales, production and inventory.
- (xiii) To avoid the problem of overstocking, UNL should consider on following points,
  - i. Target sales should be realistic.
  - ii. Target should be within the capacity of being fulfilled.
  - iii. Demand should be forecasted with appropriate techniques.
- (ix) For timely procurement and supply of raw material, UNL should not depend upon unreliable sources. It is better to procure raw material by inviting tender because this system is more reliable and economic.
- (x) UNL should attempt to use scientific inventory model .UNL should use EOQ model to determine order size, which minimize cost of organization and increase the profitability.
- (xi) The organization should define it's objectives clearly with regard to it's inputs and output separately.
- (xii) Minimum, Maximum and reordering level for each types of material should be fixed by the Co. to avoid the overstocking of different types of materials.
- (xiii) The top level management should pay it's attention to the overall management, purchasing, production and financial aspect of factory.

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## Annex 'A'

### Calculation of Correlation between Inventory and Net profit

(Rs. in Million)

Fiscal Year	Inventory Rs.(X)	Net profit Rs. ( Y)	X <sup>2</sup>	Y <sup>2</sup>	XY
064/65	144.46	42.6	20868.69	1814.76	6153.99
065/66	126.11	93.6	15903.73	8686.24	11753.45
066/67	184.22	140.78	33937.00	19819.01	25934.49
067/68	229.76	189.19	52789.66	35792.86	43468.29
068/69	256.17	238.16	65623.07	56720.18	61009.45
	x = 940.72	y = 704.33	x <sup>2</sup> = 189122.15	y <sup>2</sup> = 122833.05	xy = 148319.67

Source: Annual Report of UNL.

Correlation between Inventory (X) and Net Profit (Y)

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

$$r = \frac{5 \times 148319.67 - 940.72 \times 704.33}{\sqrt{5 \times 189122.15 - (940.72)^2} \sqrt{5 \times 122833.05 - (704.33)^2}}$$

$$= 0.9337$$

Correlation (r) = 0.9337

## Annex 'B'

### Calculation of Correlation between Inventory and Sales

(Rs. in Million)

Fiscal Year	Sales Rs. (X)	Inventory Rs.(Y)	X <sup>2</sup>	Y <sup>2</sup>	XY
064/65	1236.45	144.46	1528808.60	20868.69	178559.78
065/66	1244.73	126.11	1549352.77	15903.73	156972.90
066/67	1524.90	184.22	2325320.01	33937.00	280917.08
067/68	1484.89	229.76	2204898.31	52789.66	341168.33
068/69	1469.69	256.17	2159988.70	65623.07	376490.49
	x = 6960.66.	y = 940.72	x <sup>2</sup> = 9768368.39	y <sup>2</sup> = 189122.15	xy = 1334108.58

Source: Annual Report of UNL.

Correlation between Sales (X) and Inventory (Y)

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

$$r = \frac{5 \times 1334108.58 - 6960.66 \times 940.72}{\sqrt{5 \times 9768368.39 - (6960.66)^2} \sqrt{5 \times 189122.15 - (940.72)^2}}$$

$$= 0.7954$$

Correlation (r) = 0.7954