

A STUDY ON INVENTORY MANAGEMENT AND CONTROL

**(A Comparative Study on Herbs Production and Processing
Company Limited and National Trading Limited)**

By:

Ganesh Prasad Timilsina

Balkumari College

T.U. Regd. No.: 7-2-508-5-202

Roll No.: 06 (062-064)

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DECLARATION

I hereby declare that the work reported in this thesis entitled "**A Study on Inventory Management and Control (A Comparative Study of HPPCL and National Trading Limited)**" submitted to the Office of the Dean, Faculty of Management, Tribhuvan University, is my original work done in the form of partial fulfillment of the Master Degree in Business Studies (M.B.S.), under the supervision and guidance of Lecturer Bhim Narayan Adhikari, Balkumari College, Narayangarh, Chitwan.

Date:

Ganesh Prasad Timilsina
Researcher
Balkumari College, Narayangarh

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Ganesh Prasad Timilsina
Narayangarh, Chitwan

Date:

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LIST OF ABBREVIATION

ABC	=	Always Better Control
AD	=	Anno Domini
AIC	=	Agriculture Inputs Corporations
B.S.	=	Bikram Sambat
CCC	=	Corporation Coordination Council
CDM	=	Central Department of Management
CEDA	=	Centre for Economic Development and Administration
e.g.	=	For example
EOQ	=	Economic Order Quantity
F/Y	=	Fiscal Year
HPPCL	=	Herbs Production and Processing Company Limited
i.e.	=	That is
Ltd.	=	Limited
Mt.	=	Metric Ton
No.	=	Number
NTL	=	National Trading Limited
PEs	=	Public Enterprises
Rs.	=	Rupees
T.	=	Ton
TU	=	Tribhuvan University

CHAPTER I

INTRODUCTION

1.1 Background of the Study

Nepal is the country with least development in industrial sector, so the economic status of Nepal is very poor. Most of the Nepalese public sector manufacturing enterprises are suffering from losses. Due to lack of proper inventory management and control many public enterprise is going to suffering losses day by day. Few private sector manufacturing enterprises has playing vital role in the Nepalese economy. After industrial act 2049, and by adopting privatization policy by Nepalese government, now a day's private industries operation is increasing day by day. So industrialization is an important factor to achieve basic objective of a country's economy and social progress.

Much business organization became failure due to not properly managing inventory. To produce any goods or service, it requires many types of material, direct or indirect. If the company did not get the required materials at needed time then production, system may be disturbed and fails to produce and sale required quantity of products Inventory is the stock of materials or product which frequently occurs in the organization. In this industrial age every organization has an own inventory system. There are various techniques to the solution of inventory management and control. When the materials are purchased by an organization they have to be stored until they are put into the production process. When the production is over the finished product have to be stored again until they are sold. Thus, inventory involves high amount of cost in terms of occupying the space and blocking the capital. However, we can not avoid inventories, because with out inventory it may effect even badly by creating obstacles on continuous production and ultimately on supply requirements. So inventory should be maintained in appropriate quantity so as to avoid both under-stock and over-stock situation, for this, proper inventory management is necessary. It is because,

the aim of inventory management is to avoid excessive and inadequate level of inventories and to maintain optimum level of inventory for the smooth production and sales operation.

Inventory management involves the planning of the optimal level, of inventories 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 dimensions as well as physical dimensions and these dimensions are interrelated and can not be looked in isolation. (Agrwal, 1980)

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

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

Inventory control also deserves special attention as over-investment in inventories results shortage of cash for other purpose like payment of maturing liabilities carrying of account receivable and expansion of fixed assets similarly the consequences of investment in inventories are loss of regular customs. They don't find selection of varieties and burden of unnecessary cost of operation due to shortages of raw materials.

Therefore inventory control involves the inventory decision models and determines the optimum investment inventory, so it is a topic of considerable and wide spread interest.

1.1.1 Introduction of The Companies

A) Introduction of “National Trading Limited”

National trading Limited (NTL) was established as a public limited company in March 1962AD A.D. (1st Chaitra 2018 B.S) under the Nepal company Act in

public sector completely owned by his majesty's Government of Nepal. NTL was created in order to channels commodity aids from the people's Republic of China and USSR with a view to meet the local cost of development projects initiated by these countries through the sales of aid goods in the domestic market. It has authorized capital of Rs 30 crores, issued capital and paid up capital of Rs169.335,000 each. NTL has five regional offices in five development regions of the country. It also maintains six branch offices and eight sales depots across the business centers of the kingdom. Its head office is situated in Teku. Kathmandu. Previously, the department of commerce, HMG handled this function in order to create a better channel to serve growing needs of the national economy and the people at large through the regular supply of essential goods at reasonable prices. HMG set up the NTL as a State Trading, Organization. It was entrusted with the functions of engaging on all kinds of trading activities including quote goods to be imported from India for the purpose of establishing domestic prices. regularizes, industrial raw materials. machinery and equipment and consumer goods.

As NTL began to produce goods from diverse sources and also as it was exporting to diverse market. NTL through activities definitely support the country's policy of trade diversification. As the first leading trading organization at the national level, NTL was made of deal with both the import and export aspects of foreign trade for the purpose of rendering support services to the economic development of the country.

B) Introduction of “Herbs Production and Processing Company Limited”

Different kinds of public enterprises are operating in Nepal. Among them "Herbs Production and Processing Company Limited" is one of the public enterprises. With production of the different kinds of the medicine and perfumery oil, it processes the herbs, which are collected from the Himalayan region.

Due to the variation of climate and geographical structure of the country, Different kinds of medicinal and aromatic plants are found in the country. They are valuable forest resources. It has had a good recognition in the Indian market since ancient time. The highest peak of the world, Mt. Everest and a series of Himalayan ranges found in the country are symbolic of the existence of the valuable medicinal and aromatic plants. During the past days, the country had significant role in trading of crude herbs till the date about 700 varieties have been identified. The major thrust of the nation is to process the natural resources domestically balancing their depletion in nature with regeneration the inception of herbs production and processing company limited in 1981AD as an undertaking of the then HMG/Nepal. After thorough research and dedication of the national core of scientists under the department of medicinal plants, this company was founded.

HPPCL is the first company in the country to harness the rich treasure of herbs and aromas for processing production medicinal extracts and essential oils for drugs and perfumery industries within the country and abroad. The painstaking research on selected herbs resources and flora of the country by modern scientific methods results the introduction of the production of selective medicinal extracts and essential on a commercial scale. At present, the company is capable of exporting indigenous products like Sugandha Kokila Oil and Jatamasi oil as well as the exotic varieties such as Palmorosa oil, Citronella oil, Lemongrass oil and some crude drugs to neighboring and third countries.

This company was established in 1981AD at Koteshwor with authorized capital five crore and paid-up capital two crore seventy five lakh and seventeen thousand. There are 198 employees in HPPCL. Among them 23 employees are in officer level and 145 employees are in assistant level.

These raw materials for the production of the different kinds of perfumery oil are either purchased directly or taken from the cultivated area. There are no specific methods for the collection of different kinds of raw materials.

1.2 Statement of Problems

The public enterprises process in Nepal is being developed very slowly. In spite of various activities, policies of the government. Investment on PEs sectors is not satisfactory. The rate of return of public corporation is very low.

In the context of inventory management, “Management experts claim that inventory management of Nepal is probably the weakest aspect of management the tool and techniques for controlling its physical as well as financial dimensions” (Agrawal, 1980)

Industrialization plays the vital role for the national development but most of Nepalese enterprises are operating in losses. The then HMG had established a number of PEs in different fields. But the financial performances of such enterprises in Nepal are quite dismal and have not been able to contribute towards the generation of surplus there could be many factors for the failure of the PEs i.e. lack of integration of activities, mismanagement, less utilization of capacity, lack of motivated skilled employees and mismanagement of inventory. One probable cause for failure of the enterprises might be related to inventory management and control. So, to address the problem, the study intends proper inventory management of the PEs. The study covers the following research questions

Some research questions are given below

1. What types of inventory maintained by HPPCL and National Trading Limited?
2. What are the techniques being used to manage the inventory by HPPCL and National Trading Limited?
3. Which inventory policy is adopted by both companies?
4. How do both companies control the cost?
5. How do both companies manage the Inventory?

1.3 Objectives of the study

The objectives of the study are as follows:

1. To analyze the inventory level maintained by National Trading Limited and Herbs Production and Processing Company Limited.
2. To study the inventory management and control system followed by National Trading Limited and Herbs Production and Processing Company Limited.
3. To examine the techniques being employed to manage the inventory by these enterprises.

1.4 Limitation of the Study

The study confines only to budgeting inventory management and profit of public enterprise. The following factors have limited the scope of the study.

-) The main concern of this study is to cover the present managerial status in terms of their inventory planning as well as profit planning. So, this study is naturally confined to the planning aspect.
-) The data and trend have been analyzed based on last five year period.
-) Analysis is concentrated in some managerial, financial and accounting aspect and does not cover the other aspects of the selected enterprises (HPPCL and NTL).

1.5 Needs of the Study

Every organization can not be success with out proper management of inventory, proper inventory reduce cost and increase profit and maintain sound level of stock also.

A firm cannot achieve its goals unless inventories are controlled effectively and capital is allocated efficiently. Therefore study on inventory management is inevitable. "Inventory is the most important thing but large inventory is the evil for the company." (I.M Panday, 1993)

Inventory is the current assets playing vital role for the organization. Many Nepalese public enterprises have poor inventory management systems so that they can not be run successfully. When market demand is high at that period, if there is lack of proper inventory there will be few production and can not supply regularly. Some times due to over stock level inventory hold unnecessary current assets. So that excessive as well as inadequate inventories are not desirable. Inadequate inventories cause obstacles in smooth production as well as in market operation.

In this competitive age organization should be conscious about own product. They should try to give quality, durable and cheap price for product to the customer. So that it is necessary to public enterprises to run smoothly, efficiently as well as profitably. So that in this situation, the management and control system of inventory play a prime role even to the manufacturing public enterprise thus, it is very important to know how the PEs utilizes its inventory to fulfill its objectives.

1.6 Organization of the Study

The overall study work has divided into five chapters.

Introduction

The first chapter consists of the introduction of the study, Statement of problems, objectives of the study, needs of the study, and organization of the study.

Review of Literature

The second chapter is review of literature consists of reviews of different dissertations including findings and recommendations, and the Conceptual framework.

Research Methodology

The third chapter is research methodology consisting of research design, nature and scope of data, population and sample size, data collection procedure and data analytical tools.

Presentation and Analysis of Data

The fourth chapter is presentation and analysis of data based on facts and figures gathered by different methods i.e. EOQ, targeted and actual production, targeted and annual sales and major findings.

Summary Conclusion and Recommendation

The fifth chapter is last chapter which includes summary, conclusion and recommendation.

Bibliography and appendixes are also included at the end.

CHAPTER II

REVIEW OF LITERATURE

2.1 Theoretical Framework

2.1.1 Inventory Management

Managing of inventory is a challenging task for both private as well as public manufacturing and non-manufacturing enterprises. There are various scientific tools and techniques for the solution of inventory management problem. However, in Nepalese context many manufacturing public enterprises have been facing the problem of effective handling of inventory. In this study, attempts have been made towards the review of literature regarding inventory management and control system. The term '**inventory management**' is formed with '**inventory**' and '**management**'.

The stock of different types of consumable goods held by an organization is called inventory. Inventory is the indispensable item for all types of organizations. Inventories are vital elements in the efforts of the firm to achieve desired sales levels. Depending upon the nature of the industry and firm, inventories may be durable or endurable perishable or undesirable, valuable or inexpensive.

In the context of manufacturing or trading enterprises, most of the public enterprises have been facing the problem of effective managing of inventory. We know large proportion of the total capital will be invested in the inventory. This is vital element on the efforts of the firm to achieve desired sales level.

Management is the function consists of planning, organizing, directing, coordinating and controlling of different activities that is done to achieve predetermined goal of the organization. Hence, Inventory management can

be defined as the function to plan, organize, direct, co-ordinate and control of inventory as per the requirement of the organization.

“Inventories Management involves the planning of the optimal level of inventories and control of inventory cost, supported by an appropriate organization structure which is staffed by trained persons and directed by top leveled management. It involves both financial dimensions as well as physical dimensions and these dimensions are interrelated and cannot be looked in isolation.” (Hampton, 1990)

Every organization associates with inventory as their nature. The majority of the company’s inventory represents a substantial investment. Thus, the goal of the wealth maximization is related to the efficiency with which inventory is managed. Consequently, the financial manager has an important role to play in the management of inventory, although it is not his/her responsibility to control inventory. The financial manager should see that only an optimum amount is invested in inventory. He/she should be familiar with the inventory control techniques and ensures that inventory is managed well. In other words inventory management can be defined as the planning, directing, coordinating and controlling of various activities which are concerned with inventory requirement.

Therefore Inventory management is mainly concerned with minimizing investment on inventories on one hand and minimizing cost of inventory maintaining on other hand. Both physical as well as financial dimensions of inventory should be managed effectively; the main duty of top-level management is formulating planned policies that will be helpful to maintain optimum level of inventory investment of achievement of desired goal.

(i) Raw Material

Raw materials are those basic inputs. Which are generally purchased from outside and converted into finished goods through this production process. Raw materials are those basic inputs that are converted into finished product through the manufacturing process. Raw materials inventories are

those units have been purchased and stored for future production. And raw material is very important factor of production in a manufacturing organization. It is the first and the most important element production which covers nearly 60% of cost of production.

(ii) Work in Progress

Industries generally have work in progress inventories if they involve in production activities. These types of inventories consist of all the items, of finished products which are accurately on the production cycle. In other words, work in progress is semi finished products, which help in the smooth production process. It includes those materials that have not been completed such item are component and subassemblies that are not ready to sale. It is difficult to identify which are semi-finished goods, because the same materials might be work in progress for one organization whereas finished for the organization. It depends upon the nature of production.

(iii) Finished Goods

Finished goods inventory is those manufactured products that are ready to sale or that satisfies the anticipated demand of customer in future. “Finished goods inventories are those completely manufactured products which are ready for sale. Stocks of raw materials and work in progress facilitate production while stock of finished goods is required for smooth marketing operation.” (I.M. Panday, 1993)

(iv) Supplies Store and Spare Parts

Suppliers maintain a forth Kind of inventory supplies, which are indirect inputs in process of production. A Forth kind of inventory of supplies includes office and cleaning materials do not directly involve in to production but are necessary for the production process. Unusually these supplies are small part of the total inventory and do not invoice significant investment.

2.2 Objective of Inventory Management

Inventory management is challenging management for these days. Both excessive and inadequate inventories are not desirable. These are two danger points within which the firm should operate. The objective of inventory management is to keep optimum level of inventory for smooth production and sales operation as well as to maintain minimum investment in inventory so as to minimize cost or to maximize profit. Every firm should maintained adequate inventory to insure an adequate supply of materials to the customer.

Inventory management plays a crucial role in any manufacturing or non manufacturing company. So, aim of the inventory management should be determined and maintained at an optimum level of inventory management. The aim of the inventory management is to avoid excessive inventory for smooth production, sales operations, and efficient customer service and centralize in investment.

- 1) To maintain optimum level of inventory for efficient, smooth production and sales operation.
- 2) To control excess investment in inventories and keep it an optimum level.
- 3) To minimize carrying, ordering and other indirect cost.
- 4) To minimize the cost and time.
- 5) Risk of spoilage and obsolescence of inventory must be avoided.
- 6) Information about availability of stock should be made continuously available to the management

2.3 Need of Holding Inventory

The questions of managing inventories arise only when the company holds inventories. Maintaining inventories involves tying of the company's funds and incur race of storage and handling costs if it expenses to maintain

inventories, why do companies hold inventories? There are three general motives for holding inventories (Starr & Miller, 1962).

The Transaction Motive: This emphasizes the need to maintain inventories to facilitate smooth production and sales operations.

The Precautionary Motive: This necessitates holding of inventories to guard against the risk of unpredictable change in demand and supply forces and other factors.

The Speculative Motive: Which influence the decision to increase or reduce inventory levels to take advantage from price fluctuations.

A company should maintain adequate stock of material for continuous supply to the factory for an uninterrupted 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. In addition, there exists uncertainty in procuring of material because of factors such as strike, transport disruption and short supply. Therefore the firm should maintain sufficient stock of raw materials at a given time to streamline production.

Some purposes of holding inventories are as follows:

- To maintain optimum level of inventory for efficient smooth production and sales operation.
- To maintain minimum investment in inventory.
- To maintain adequate accountability inventory assets.
- To ensure an adequate supply of materials, stores spares etc. minimize stock out, shortage and avoid costly interruption in operation.
- To control the quantity of finished product.

The fundamental reason for carrying inventories is that it is physically impossible and economically impractical for each stock to arrive exactly where it is needed. Even if it were physically possible for a supplier to deliver raw materials every few hours for example, it could still be probably

expensive. The manufacturer must therefore keep extra needed in the conversion process. Other reason for carrying inventories is summarized below.

2.4 Evils for Excess Inventory

Inventory being a vital element for the organization, but it is harmful to hold excess quantity. Some of the evils are:

1. Excess inventory covered the huge amount of capital. Which could be invested in operations that are more profitable?
2. Excess inventory adds to the cost of carrying, ordering, factory staff remuneration, space equipment and personnel, insurance, taxes, pilferage etc.
3. Excess inventory invites risk of deterioration and obsolescence.
4. Price levels of inventories changes sometimes, which may be unfavorable.
5. Maintenance and packaging, repairing cost automatically increase.

2.5 Factors Affecting Inventory Management

Inventory planning is the way to determine the requirement of raw materials, spare parts and other items that are necessary to meet production need. Taking of sufficient working capital, lead time, re-ordering system also affects in production system. Schedule of purchase and sale in proper manner, it helps in production system & selling system. Some of the factors which influencing inventory planning are given below.

1. Working capital
2. Store keeping or inventory control management
3. Total lead time
4. Techniques used to determine for cost.
5. Storage capacity
6. Supply of the item.

7. Demand of the product
8. Price trend and rigidity
9. Credit Policies
10. Import \Export policies
11. Available Information
12. Information about substitute product
13. Plant utilization
14. Technology availability
15. Business cycle
16. Rejection cycle
17. State of health of nation economy.
18. Foreign exchange regulation.
19. International market condition
20. Corporate objectives.
21. Communication system.
22. Delegation Power
23. Location of plant and location of suppliers

2.6 Inventory Cost

Cost Incurred for maintaining given levels is called carrying cost. Carrying cost varies with inventory size. Because of second world war, American economy as well as world economy plagued by capital utilization, material shortage, inflation. Balance of cost lie heart of all the production and inventory control problems (Killen, 1969).

Some of the factors which influencing inventory cost are given below:

- (1) Material costs
- (2) Ordering costs
- (3) Safety stock cost
- (4) Cost of funds tied up in inventory.
- (5) Cost of running out of goods
- (6) Carrying cost

1) Material Costs

These are the costs of purchasing of the goods plus transportations and handling. This may be calculated by adding the purchase price (less any discount). The delivery charges and the sales tax (if any).

(2) Procurement/Ordering Cost

These are variable costs of placing of orders of the goods. Each separate shipment involves certain expenses connected with requesting and receiving materials. Examples of these are the typing of the order and inspection of goods after they arrive. The fewer the orders the lower the order cost will be for the firm. Ordering cost will be for the firm. Ordering cost can be calculated by the following formula.

$$\text{Ordering Cost} = \frac{A}{Q} \times O$$

Where,

A = Annual Requirement

Q = Order size

O = ordering cost per order

(3) Cost of Funds Tied-up in Inventory

Whenever the firm commits its resources to inventory, it is using funds that might be available for other purposes. A portion of inventories is financed by trade credit from suppliers and involves no costs. If the firm buys inventories on terms net 30, the inventories may be sold before the firm must pay its suppliers the balance of the inventory must be financed from the firm's general funds and involves a cost. If the firm is considering an expansion of inventories and plans to borrow to obtain funds, they will have to pay interest on the additional debt. If the firm finances additional inventory through the sale of common stock, an opportunity cost is involved. The firm has lost the use of funds for other profit-making processes. Whatever the sources of funds, inventory has a cost in terms of financial resources, excess inventories represent an unneeded cost.

(4) Cost of Running Out of Goods

Whenever a firm incurs shortage of production, it incurs cost. If the firm is unable to fill an order, the firm loses its regular customer. If the firm runs out of raw materials, it may force a costly shutdown of the production process. Adequate inventory helps reduce additional costs and lost revenues due to shortages.

(5) Carrying Cost

These are the expenses of storing goods. Once the goods have been accepted, they become a part of the firm's inventories. These costs refer to cost related to holding of inventory over a given time period. Total carrying costs vary in proportion to the value of inventory; usually they are computed from the following formula.

Carrying Cost = Average inventory \times Carrying cost per unit

Symbolically,

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

The following are examples of different kinds of carrying costs.

- (I) Storage Cost
- (II) Insurance
- (III) Obsolescence and Spoilage
- (IV) Damage of Theft

(I) Storage Cost

Maintenance of inventory means store cost. These costs include expenditures made on inventory staff, insurance of items and expenditure on providing various facilities like floor, space, racks, bins and containers, materials handling equipment and other provisions for safe and proper storage items. (Goel, 1992)

(II) Insurance

In spite of best precaution, firm must protect themselves against such hazards as fire or accident in the warehouse. Larger amounts of inventory require larger amount of insurance.

(III) Obsolescence and Spoilage

When firms hold goods, they expose themselves to the possibility that the goods will not be saleable when the time arrives. Obsolescence is the cost of being unable to sell goods because of current market factors deriving from changes in styles, tastes or other factors. If a product is no longer wanted, the firm must sell it at a fraction of its value or destroy it. Spoilage occurs when a product is not saleable because of deterioration during storage, such as foods that rot, plants that die, garments that are attacked by moths, candles that discolor or the chemical that decompose.

(IV) Damage or Theft

Although a firm makes every effort to protect goods against damage and safeguard item against pilferage, goods are damaged and stolen. A portion of these expenses is not covered by insurance and are losses to the firm. In some business, particularly retail stores and producing luxury products such as alcoholic beverages, damage and theft may constitute major carrying cost.

2.7 Technical Framework

Technical formulation includes the question, which reduce the cost and increase in profitability. The problem, which is common to all, is how much to estimate and execute inventory policies. How much should they buy at a time? How low should they let inventory to fall before they replenish it? From whom they should buy and how should they ensure for getting items? but it is not possible to answer the entire questions. It has

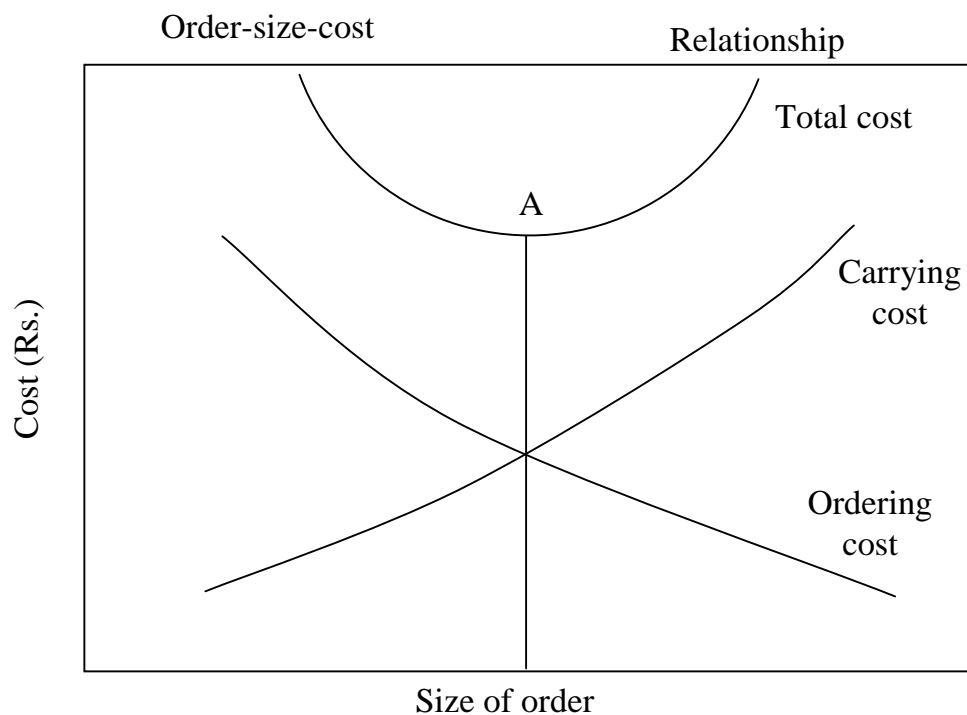
been possible to answer these varied question or problems faced by the business units. (Adam, 1993)

2.7.1 Inventory Model

We have already discussed about the different forms of costs then lets see how the production manager attack the problem fixed unit of given items of lowest price or produced for stock at a given time. The large quantity purchase enables the management to reduce the order placing cost incurred in a given period. Buying a bulk of items also makes it possible to take advantages of quantity discount and lower handling cost. We have that the procurement cost decreases, the carrying cost will increase. This is the cost trade off between the two. If we add the cost graphically, we will obtain the total cost curve. The optimal order quantity is the point at which annual total cost is at a minimum. The purchase of large increased size of the average inventory maintained which is shown below. (Magee, 1995)

Figure No. 2.1

Order-size-cost Relationship



Since order placing cost are largely independent of the size of the order. Ordering cost goes down as the order size is increased because fewer order are placed to reduce the inventory cost.

To illustrate the relationship between those costs let us consider the case of printing press that needs 1000 tons of newsprint. Of the process of orders from the manufacture in quantities of 100 tons at time means that ten orders must be placed whereas only two orders are needed for an order size of 500 tons. As consequences inventories cost such as storage, insurance and interest, which very with inventory level will be lower and are economic that belongs to large orders such as quantity discount. Lower ordering cost and lower receiving cost, a balance must be stock between the inventory carrying costs, will reflect a compromise and accommodation between the two costs, will reflect a compromise and accommodation between the two cost patterns. This compromise occurs at the lowest point in the total cost curve “A” shown in figure 2.1.

2.7.2 Economic Order Quantity

The EOQ is an important concept in the purchase of equipment as well as in the storage of goods and transit inventories. It attempts to establish the most economic balance between the carrying costs and ordering costs determining the quantities to be ordered. The economic order quantity is that inventory level, which minimizes the total of ordering and carrying, costs. The question of how much to be ordered can be solved by the EOQ technique. It always tries to balance the ordering cost and holding cost. The relationship between the ordering costs and carrying costs is called cost factor.

In our analysis we wish to determine the optimal order quantity for a particular time of inventory given, its forecasted usage, ordering cost and carrying cost. Ordering means either the purchase of the items or the production. Assume, for the moment that the usage of a particular items of inventory is known with certainty. This usage is steady throughout the period of time being analyzed. In other words, if usage is 2,600 items for a six months period, 100 items would be used each week. Although, EOQ,

model can be modified to take account for increasing and decreasing overtime. We shall not get into these types of complexity.

We assume that ordering cost 'O' is constraint regardless of the size of the order. In the purchase of materials or other items these costs represent the clerical costs involved in packing an order as well as certain cost of receiving and checking the goods once they arrive. For finished goods inventories, ordering cost involve scheduling a production run for in transit inventories, ordering cost are likely to involve nothing more than record keeping. The total ordering costs for a period is simply the number of orders for that period of items multiply by the cost per order.

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

If the usage of on inventory items is perfect steady over a period of time question of safety does not arise. Where average inventory in units can be expressed as $Q/2$ total inventory cost then are the carrying cost plus

ordering cost or $T \times \frac{A}{Q} + O \Gamma \frac{Q}{2} + C$

$$\text{Optimum Quantity (Q)} = \sqrt{\frac{AO}{C}}$$

Where,

Q = Optimum quantity

A = Annual requirement

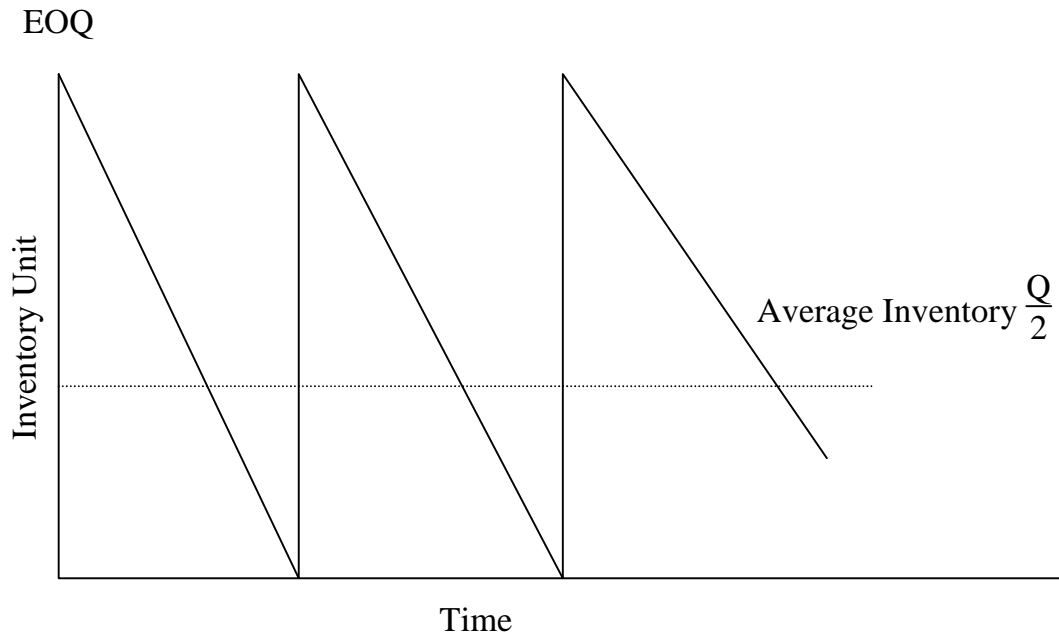
O = Ordering cost

C = Carrying cost

It indicated that Q is the quantity (in unit) order and is assumed to be constant for the period. This problem is to illustrate in this figure although the quantities demanded, is a step function. We assume for analytical

purpose that can be approximated by a straight line. We see the zero inventories always indicate that further inventory must be ordered.

Figure No. 2.2
Graphic Inventory Model



EOQ can be determined by three approaches

-) Formula approach,
-) Trail and error approach and
-) Graphical approach

Formula Approach

This method, we calculate EOQ by following formulas.

From Economic Order Quantity Statement, we have

Total ordering cost = Total carrying cost

Total ordering cost = Number of orders × Ordering cost per order

$$= \frac{\text{Annual Requirement}}{\text{Order Size}} \times \text{Ordering Cost per Order}$$

Symbolically,

$$\text{Total Ordering Cost} = \frac{A}{Q} \times O = \frac{AO}{Q}$$

Again, Total carrying cost = Average quantity × Carrying cost per unit

$$= \frac{\text{Ordering size}}{2} \times \text{carrying cost per unit}$$

Symbolically,

$$\text{Total carrying cost} = \frac{Q}{2} \times C = \frac{QC}{2}$$

Now, we have

$$\frac{AO}{Q} = \frac{QC}{2} \dots \text{Total ordering cost} = \text{Total carrying cost}$$

$$\text{OR, } Q^2C = 2AO$$

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

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

Where,

EOQ = Economic Order Quantity

A = Annual Requirement

O = Ordering cost per unit

C = Carrying cost

Trial and Error Approach

By this method we can calculate EOQ following steps:

Table No. 2.1

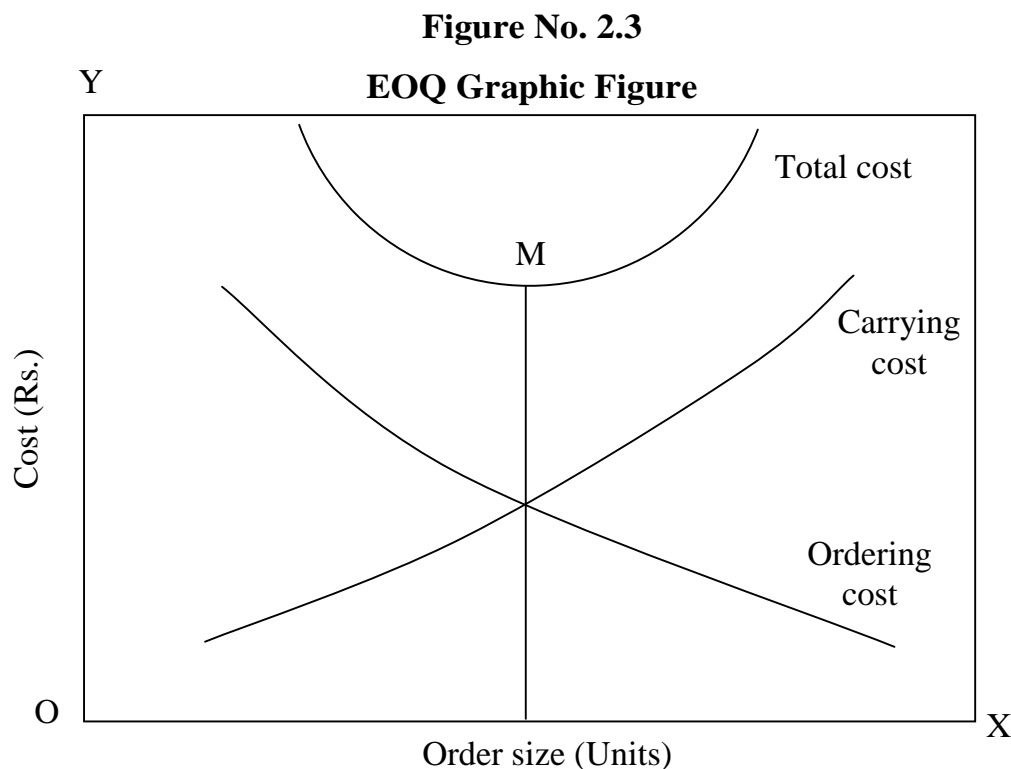
Calculation of EOQ by Trail and Error Method

Step 1	To estimate number of order
Step 2 Order size	<u>To find out order size</u> Order size = Annual Requirement/No. of order
Step 3 Average Quantity	<u>To find out the average quantity</u> Average quantity = order size /2
Step 4 Carrying cost	<u>To find out the carrying cost</u> Average quantity × Carrying cost per unit
Step 5 Ordering cost	<u>To find out the ordering cost</u> Number of orders × Ordering cost per order
Step 6 Total cost	<u>To find out the total cost</u> Carrying cost + Ordering cost

This approach indicates from which point has the minimum total cost, when the ordering cost is equal to carrying cost.

Graphic Approach

Total ordering cost curve is increased with the no of orders increase but it reduces the carrying and vice-versa. Addition of ordering cost curve and carrying cost curve represent the total cost. The point where the total cost curve is minimized represents the EOQ.



In the above figure, OX shows order size and OY shows the total cost if order size is increasing no. of order is decreasing, so the ordering cost curve is decrease and just opposite carrying cost curve is increasing. The total cost is the summation of carrying and ordering cost. Total cost is minimized at M.

Although EOQ is easier, techniques to solve the problem of how much to purchase at once but it has limitations/assumptions they are:

- Uniformity of demand,
- Instantaneous supply,
- No consideration over discount factor and
- Stable demand

Generally, inventory management covers the function of:

- Purchasing
- Store keeping
- Issuing and Pricing

2.7.2.1 Purchasing

Purchasing is the most important function of material management as the moment an order is placed for the purchase of materials, a substantial part of the company's finance is committed which affects cash flow position of the company. Purchase management plays important role in the manufacturing companies. The process of inventory management begins with purchasing. Firm should purchase raw materials, supplies at the right time with good quality of right quantity and with cost effectiveness.

Purchase management should be effective otherwise, it hampers in the quality of production and cost of the product. Scarcity of raw materials also hampers in production, so, purchasing department should take greater responsibilities. The department should analyze the existing procurement policy and should tune with the overall organizational objectives and policies. Efficiency of any business depends upon having materials, supply and equipment available in good price. Purchasing, therefore, should be carefully planned for effective inventory management.

Objective of Purchasing are:

The reasonability of the purchasing department is to buy materials of the right quality at the right time, at the right price from the right source with delivery at the right place.

The following are the main objectives of the purchasing:

-) Procurement of required quality and quantity of materials at their best price, not necessary the lowest price.
-) Procurement of materials, which best suit the product and the purpose for which they are intended.
-) Purchasing for the time ultimately been a schedule, sufficiently in advance of the demand of the production department so that the production work shall not suffer due to lack of materials.

-) Buying the quantity, which is neither too much that involves belonging of capital nor too little that holds up the regular supply for production.
-) Improvement of product with reference to quality and the distribution by means of selection of adequate materials.
-) Maintaining continuous supply to insure production schedule at a minimum investment.
-) Avoidance of duplication of materials, leaving to waste of materials and equipment.
-) Maintenance of company competitive position in the market by the customer having company's quality standards in accordance with the demand of customer.
-) Creation of goodwill for the company through dealing with suppliers.
-) Developing, full-operation and co-ordination and maintenance of internal relationship among various department of the company.

The main objective of the purchasing should be uninterrupted and smooth production to provide regular service to the customers at possible cost.

2.7.2.2 Store Keeping

The best method of maintaining materials properly is store keeping. Store keeping is the aspect of inventory control, which is concerned with the physical storage of goods. The responsibilities of store keeping management are to receive materials, to protect them in storage from unauthorized removal, to issue the materials in the right quantities at the right time in the right place and provide these services promptly and at least cost.

Store keeping refers to the safe custody of all materials stocked in stores for which the store keeper acts as a trustee. It simply means that the materials are to be stored in stores in such a manner that there is least possibility of theft, fire, damage and they may be easily located and issued whenever required for use.

Store keeping embraces all the activities right from the receipt of supplies of raw materials, spare parts, equipment, their proper storage and issue to used department. This also includes the storage of finished product before dispatch to dealers. These activities involve maintenance of proper records of all the transactions.

The importance of store keeping has not been properly recognized by the manufacturing organizations so far. Many organizations spend lavishly on machines and wages while store keeping is ignored and stores are not in proper place and condition. Storekeepers are also not paid attention in comparison to others in similar status. All these causes are responsible for wrong or short issue. Loss of stock of raw materials unexpectedly running out of stock and preparation or correct vouchers all these lead to theft and pilferage of stock and delay in production.

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

Objectives of store-keeping are

The Major objectives of store-keeping 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 at all items when properly authorized.
-) Facility ordering of required materials
-) Minimizing the inventory holding cost

To achieve the above objectives, a firm generally used bin card and store ledger as a store controlling devices.

2.7.2.3 Issuing and Pricing

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

2.7.3 Re-order Point

The problem, how much to order is solved by determining the economic order quantity. The economic ordering discussed above assumptions but sometimes these are found to be unrealistic because in real word situation there should be gap between the time of placing order and the receipt of the delivery. This time gap can be due to delay in transportation, loading and many other factors, which are beyond control.

If order is placed when the stocks are over, then other is always a chance that the firm may suffer the situation of shortage. Another alternative is to place the order before the stock is completely exhausted i.e. to order in advance is a difficult exercise. If an order is placed too early then it may result in pilling up of inventory for the longer period and it is placed too late then this may result in shortage. Both these situations are not in the interest of the firm. The problem it is known as 'what to order' and is very important for the organization in other words the choice of appropriate point at which an order to replenish the inventory is of great significance. The level of inventory at which re-order should be placed is known as known as re-order and re-order point. (Goyal, 1992) To determine the re-order level under certainty, following factors should be taken in to account.

- The time intervening between the date of order of goods and the arrival of supplies,

- The average quantity consumed with in stipulated them period and
- The margin of safety.

The ordering level revised from time to time on consideration of the exigencies relating to supplies of a demand of goods. (Goyal, 1992)

Under certainty situation, re-order point is simple that inventory level which will be maintain for consumption during the lead-time.

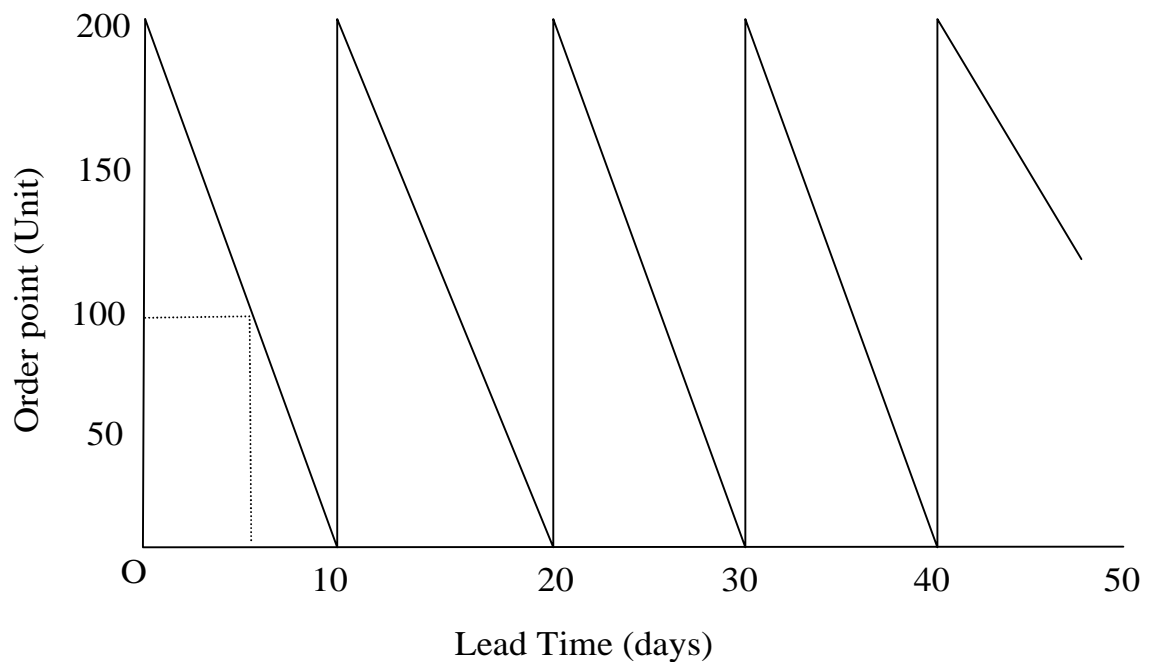
Re-ordering point is calculated as following formulas.

Re-order level = Lead time × Daily consumption

Re-order level = Maximum consumption × Maximum lead time

Re-order level = Minimum level + (Lead time × Daily consumptions)

Figure No. 2.4
Re-ordering Point Under Certainty



In our example, the re-order point is computed under the assumption of certainty. It is difficult to predict usage and lead-time accurately. The demand for material may fluctuate for day by day or from week to week. Similarly, the delivery time may be different from the normal lead-time. If the actual usage increase or the delivery of inventory is delayed, the firm

can face a problem of stock out. The stock out can prove to be costly for the firm. Therefore, in order to guard against the stock out, the organization with a policy of safe guarding their interest. These uncertainties maintain the level inventory at some desired minimum level. This minimum level of inventory to cover some unforeseen and uncalled for situation is known as 'safety.' Alternatively a safety stock can also be defined as the average stock available in inventory when the fresh supply arrives.

Factors affecting choice of safety stocks are :

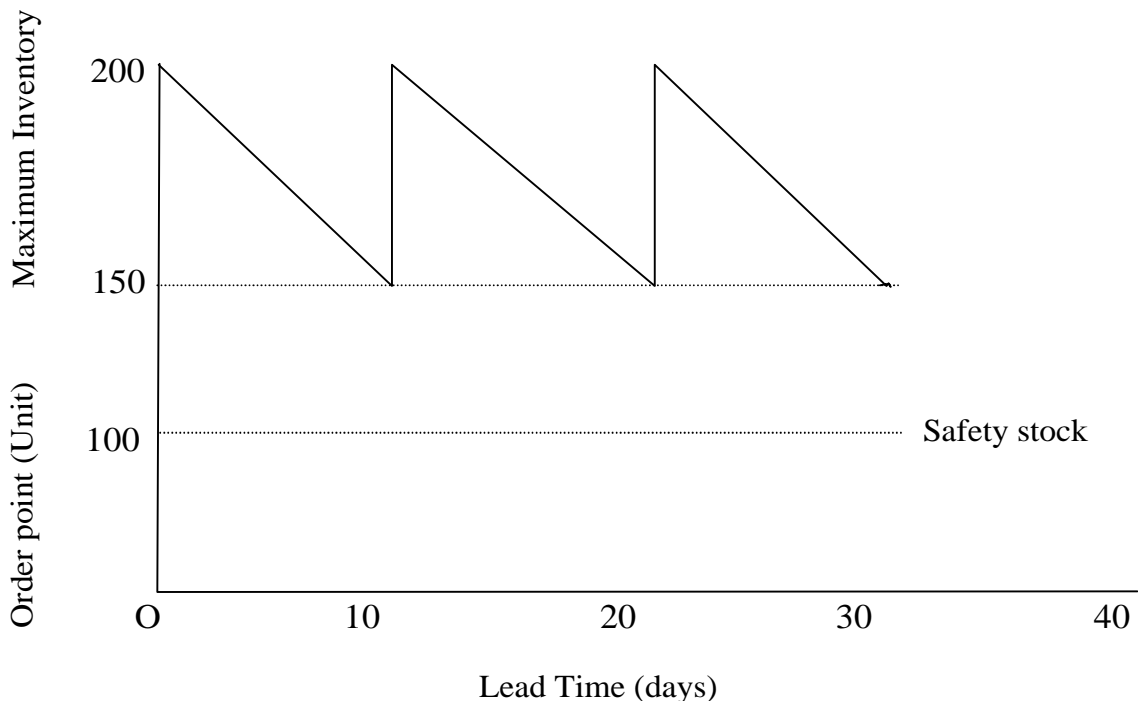
- Uncertainty in demand,
- Degree of insurance of any item,
- Uncertainty in lead time and
- Size of the batch

Assume in the previous example the reasonable expected stock out is 10 units per day. Thus safety stock is maintained which is as follows:

$$\begin{aligned}
 \text{Re-order point} &= \text{Safety Stock (Daily Consumption} \times \text{Lead Time)} \\
 &= 5 \text{ days (20 units} + 10 \text{ units)} \\
 &= 150 \text{ units}
 \end{aligned}$$

Figure No. 2.5

Re-order Point Under Uncertainty



I) Situation, where demand rate various

Safety stock = (lead time) × (maximum demand rate - average demand rate)

II) Incases where both lead time & demand are fluctuating:

Safety stock = (maximum lead time × maximum demand rate) - (average lead time × average demand)

III) Incase of lead time varies & demand rate is uniform

Safety stock = (maximum lease time - average lead time) × demand rate

The proper amount of safety stock to maintain depends on several things. The greater the cost of varying inventory, the more costly it is to maintain a safety stock, all other things being equal. Determination of the proper amount of safety stock involves balancing the probability and cost of a stock-out against the cost of carrying enough safety stock to avoid this possibility. Ultimately, the questions reduce to the probability of inventory stock out that management is willing total rate. (Goyal, 1992)

Stock Level

This stock keeps tracks of the goods help by the firms the issuance of goods and the arrival of orders. It is prepared for recording as well as accounting of goods in stock. Thus, this stock helps to maintain the record of inventory at appropriate level.

For simplicity the stock level are divided in following headings.

Maximum Stock Level

The maximum level represents that level of stock above which the stock should not be allowed to rise. This level is to be fixed keeping in mind unnecessary blocking of capital in stocks.

The quality is fixed so that there may be on over stocking. It is computed as:

Maximum Stock Level = Reorder level - (Minimum Usage - Minimum Delivery Time) + Re-order Quantity

The maximum stock level is fixed by taking into account the following factors:

- Amount of capital available for maintaining stocks,
- Go-down space available,
- Rate of consumption of the material during the lead-time,
- The time lag between indenting and receiving of the material,
- Possibility of loss in stores by deterioration and evaporation and
- Cost of maintaining stock.

Minimum Stock Level

It is that level below which the inventory of any item should not be allowed to fall. It is known as safety stock. The main object of fixing this level is to avoid unnecessary delay or amputation of production due to shortage of materials.

It is computed as

Minimum stock level = Re-ordering level - (Normal consumption × Normal re-order period)

In fixing this level the following factors are taken into consideration.

- Lead time, i.e. time lag: between indenting and receiving of material,
- Is the time required replenishing the supply?
- Rate of consumption of material during the lead-time and
- Nature of the material: minimum level is not required in case of a special material, which is required against customer specific order.

Danger Stock Level

Generally this level is fixed below the minimum level and represents the stage where immediate steps are taken for getting stock replenished. In some cases, danger level of stock is fixed above the minimum level but below the re-ordering level. (Sahajahan, 1997)

It is computed as follows:

Danger level = Normal consumption × Maximum inventory period

Average Stock Level

It is the average level of stock that should be maintained throughout the year. Average stock is the cost of storage departments. (Sahajahan, 1997)

It is computed as follows:

$$\text{Average stock level} = 1/2 (\text{Maximum} \times \text{Minimum})$$

2.7.4 ABC Inventory Analysis

In a large manufacturing company where stocks of direct materials and component parts consist of thousands of different items, companies find it useful to divide materials, parts, supplies and finished goods into sub-classifications for purposes of inventory control. Many business firms have introduced a system of analyzing stocks by value categories known as "ABC analysis". Under this method, inventory items are ranked according to investments in each item in the inventory. The large value items are grouped together into one class for inventory control purposes. The lowest value items are grouped into another class and those items which are of intermediate value are grouped into a "middle" classification. High value items are labeled "Class A", middle value items, "Class B", and low value items, "Class C". This division reflects the concept that it is uneconomical to spend the same effort on all items. As the items are classified in the important of their relative value, this approach is known as proportional value analysis (PVA). As in most activities, a small part of the total inventory makes up greater part of the total investment. (Magee, 1985).

The firm keeps various items in inventory. All items in the inventory cannot be treated easily. They are differ in value and can follow a selective control system. A selective control system is the ABC analysis. The group "A" item consists of highest rupee value item. "B" item consists of middle rupee value and "C" item consists of lowest rupee value item. (Pandey, 1993)

All items in stock are listed in order of descending values showing quantity held and the corresponding value of the materials (See Table 2).

The percentages given in Table 2 are only guidelines and are subject to change according to prevailing circumstances and choice of management.

Table 2 shows that only 20% of the items represent 72% of the total costs.

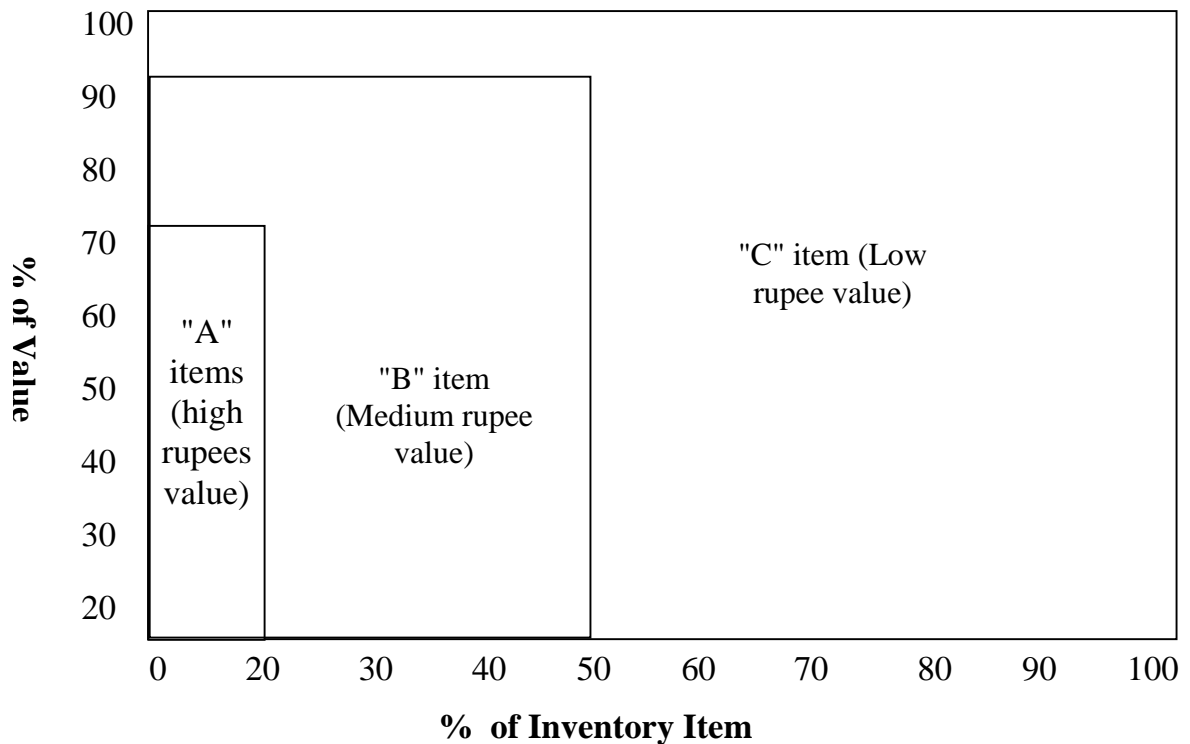
Table No. 2.2
Stock Analysis Under ABC

Class	Items		Investment	
	No. of items	Percent of total items	Total cost	Percent of total
A	20,000	20%	2,88,000	72%
B	30,000	30%	76,000	19%
C	50,000	50%	36,000	9%
	1,00,000	100%	4,00,000	100%

The items under Class A are subject to greater continuous control and planning than are the items under other categories. The Class A item account for high annual consumption costs and correspondingly high investment in inventories. Because of high investments in Class A items, there would be frequent ordering and low safety stocks. This also assumes that the cost of placing and following up orders is relatively low in comparison with the cost of carrying excess inventories. A number of things can be done to reduce inventory of 'A' items. For example, A items can generally be ordered for specific runs, the economic order quantity could be applied; local suppliers could be asked to stock supplies so that delivery time can be shortened. On the other hand, where the total annual purchase cost is relatively low as in the case of Class C items, there will be less frequent ordering and higher safety stocks. Items in Class C receive the least amount of control and should be under simple physical controls such as the two-bin system with safety stocks.

A graph can be prepared to show quantity and amount of items in different categories in descending order of value (Fig. 2.6).

Figure No. 2.6
Classification of Items According to ABC Analysis



Class 'A' items which represents only 20% of amount of quantity for over 72% of the total value in Rupees. The opposite relation holds for category 'C' where 50% of total amount in quantity. Category 'B' occupies the middle place items. A and B are jointly represent about 50% of the total units and 91% of the investment. More than half of the total units are item 'C' represent merely 9% of the investment. The highest control should be exercised on item 'A' in order to maximize the profit on its investment. In case of 'C' simple control will be sufficient. High rupees or value is treated most carefully at first time.

An example of the treatment that would be given the three dimensions is,

Item "A": In item "A", the economic order quantities are carefully calculated for each time. The uses rate and the procurement costs are reviewed continuously with each other. Tight inventory control should be maintained.

Items "B": In item "B", the economic order quantities are developed periodically. Normal inventory control is exercised.

Items "C": In item "C", the specific order quantities are not made. Roughly estimate the inventory or the quantities that will be sufficient for long period are ordered. Inventories are checked physically once in every six months or every year to determine if new order should be placed.

2.8. Inventory Control

As the term inventory control has two functions, which are quite different but related to each other only in that they both required the maintenance of adequate record of inventories as well as receipt and issues. These functions are accounting control and operating control.

- 1) Accounting control of inventories is concerned with the safeguarding of the following: Taking property in the form of raw materials, work-in-progress and semi-finished as well as finished products, and the proper recording of receipt and consumption of materials as well as flow of the goods through the plant in to finished stock and eventually to customers.
- 2) Operating control of inventories is concerned with maintaining inventories at the optimum level keeping in view the operational requirements and financial resources of the business.

Every organization holds inventory at necessary level. Under and over stocking of an inventory is evil for business. Therefore, inventory control may be defined as the planning, ordering and scheduling of materials used in the manufacturing process. It is possible to exercise control over the three types of inventories recognized by accountant i.e. raw materials, work-in-progress and finished goods.

2.8.1 Benefits of Inventory Control

The Primary purpose of holding inventories is to meet the demand from indenters or users. The simplest way of satisfying user is to hold large amount of stocks. However, holding large stocks means high inventory

carrying charges (such as storage and deterioration expenses) and possible losses caused by price declines. Similarly, shortages in inventories interrupt production, making machines and employee idle and causing sales loss. Hence, there is need of for inventory control or that is sometimes termed as ‘inventory planning’.

It would be appropriate to mention that effective inventory control/planning system secures various benefits to the concerned business unit. Some of the important benefits of inventory control system are as follows:

- Ñ It enables the material to be procured in economic quantities i.e. it obtains economics through a reduction in needless variety of items carried in stock.
- Ñ It acts as a cushion against an unpredictably high rate of usage.
- Ñ It eliminates delays in production caused by the non-availability of required materials.
- Ñ It works as a check on the over accumulation of inventories and thereby results in minimum investment consistent with production requirements.
- Ñ It reduces inventory losses caused by inadequate inspection of incoming materials and losses due to obsolescence, deterioration, waste and theft while in storage.
- Ñ It ensures proper execution of policies covering procurement and use of materials. It also facilitates timely adjustment with changing conditions in the market.

It also serves, through ‘balance of store’ records, as a reliable basis for production planning and preparation of financial reports.

2.9. Inventory System

An organization keeps different types of items in inventory to meet its needs. In order to know the concept of inventory and its application in our

real practice, it will be better to be clear about the inventory system concepts.

The concept inventory system can be broadly viewed as follows.

a) Multi-stage Inventory

When parts are stocked at more than one point of the sequential production process, there are multi-stage inventories, these parts must eventually come together into finished goods.

b) Multi-echelon inventory

Multi-echelon inventories are inventories of products at the various levels, or echelons, in the distribution system. In other words, it deals with the management of inventories at different points, such as factory, warehouse, retailer and customer, of distribution system.

2.9.1 Inventory control procedure

There are various inventory management systems. They are used to follow according to adequate need of control over each inventory item and ensuring accuracy of stock on hand. The following are some controlling systems.

1. Fixed order- sizes system

Fixed order sizes system is a fixed quantity of good is ordered whenever inventory decrease below to predetermined level. The time between ordered varies with the demand rates but the size of the order remains constant. In practice, fixed- order-size systems are generally called perpetual inventory system.

2. Two-Bin system

The two bin system an application of the fixed order size approach is one of the oldest inventory system, where all materials of given type is the second is put into use and replacement order for a fixed amount is dispatched immediately.

Interval system, periodic reviews of inventories are made at which time they are restored to some predetermined optimum level, no running records of daily inventory activities are kept.

The status of the inventory is known only at the time of the review, which may take place weekly monthly, quarterly or yearly that are commonly called periodic inventory system.(Star and Devid, 1977)

3. Cardex File System:

A cardex file system is a manually operated inventory system, in which inventory card represents each stock item with transaction kept on the cardex. When transaction sales the entry, with corresponding date is recorded. When physical inventories are taken cards are adjusted to show current inventory levels.

4. Management Accounting and production information control system (IBM's MAPICS).

It is an IBM's computerized common data base system and manufacturing for implementation of planning. Key models to control are product data management, production costing and control applications.

Inventory management application reduces times, increase overall plant capacity, and reduces investment stock and space improves customer service and provides inventory data and reports.

2.10 Inventory Reports

Inventory reports main objectives are management for exercising effective inventory control and appropriate decisions. Inventory reports serve as means of communication usually in the written form of facts relating to inventory which from all level of management brought attention who can use them to take suitable action for the purpose of inventory control.

Purpose of inventory report is to achieve the result of inventory control. It is difficult to give the design of inventory reports, which will be inventory

reports suitable for all organizations. Design inventory reports should be according to the individual requirements of the organization.

General inventory reports prepared are given the table:

Frequency	Style of Reports	Sent to	Contents	Purpose of Report
Weekly	Material usage and waste report	Works manager	Actual quantity of material used against standard quantity specified	Controlling use of materials and elimination of excessive wastage, scrap, spoilage defectives
Monthly	Material price variance report	Purchase manager	Comparison of actual prices of materials with standard prices of materials for quantities purchased	Watching efficiency of the purchase department and trend of price movements
Monthly	Purchasing report	Purchase committee	Comparison of actual purchase consumption and stock figures	Determining the result of the policies decide upon
Special	Inventory report	Top management	A study of slow moving stock, dominant stocks and absolute stock	Controlling investment in materials
Special	Physical verification	Storekeeper	Discrepancy between physical and book balance	Controlling storage of materials
Special	Materials shortage report	Top management	Cost of idleness due to stoppage of production for want of material	Avoiding stoppage of production due to shortage of materials

Source: *Bulletin of RDL 1992.*

2.11 Review of Related Studies

There are many researchers for the study of inventory management in Nepalese perspective. In the sector of public & private enterprises some researcher study on the manufacturing public enterprises and some researcher study on the trading enterprises. This previous studies cannot be ignored because they provided the foundation to the present study, so that the continuity of research is ensured by linking the present study with the previous research studies.

Review of literature is the available literature in owns field of study. The literature study provides the researcher with the knowledge of the status of their field of research. The library is rich storage for all kinds of published materials including thesis, dissertations, business reports and government publications. The purpose of literature review is to find out what research has been conducted in owns chosen field of study and what remains to be done. It provides the foundation for developed for testing. The literature survey also minimizes the risk of pursuing the dead ends of research.

In this study, attempts have been made towards the review of literature regarding inventory management. Review of dissertation, Articles and Magazines are done for study of inventory management and control.

2.11.1 Dissertation Consists of Various Studies About The Inventory Management and Control.

Their findings and recommendations are presented as follows:

1. Bindo Raj Thapa (2005) "Inventory Management System of Royal Drugs Limited

Thapa has made study about inventory management system of Royal Drugs Limited. Mainly this study focused on the problems of inventory management and control system of Royal Drugs Limited objectives are as follows:

-) To identify the present position of inventory of Royal Drugs Limited.
-) To analyze the inventory management of Royal Drugs Limited.
-) To provide suggestion based on the analysis.

Major Findings are as follows:

-) Com. has not conducted any ABC analysis at the period of this research.
-) When and how much to order is estimated haphazardly by the Royal Drugs Limited. In other wards, a purchase quantity made by Royal Drugs Limited differs from year to year and are not in EOQ.
-) The Royal Drugs Limited has established a separate unit for management of inventory although the separate unit is unable to management the inventory.
-) The company has been able to produce goods quality medicine because of its quantity control.
-) Company's production is not regularly and decreasing order.
-) Annual purchase made by company differs from year to year and highly fluctuated.

Recommendations:

-) The drugs company should not define its goals and objective clearly with regards to minimized inventory costs. Company has store only with store keeper and store officer. There is need of separate management department.
-) Company should not use any kind of scientific tools and techniques so that there cost is maximized. Scientific inventory management. Techniques are EOQ, reorder level, safety stock and lead time. It should not be identified properly and lack of safety stock. Its bad impact from one month before company's production breaks for few days.
-) Company has not categorized its raw materials inventory in A, B, & C group at present. Its result company is bearing the maximum loss. Company categorized A, B & C till 2050 and that time company's financial condition was considerable.

-) In a simple way bin card should be used to manage inventory. This card includes the name of items, quantity and unit price, quantity issued and balance of stock.
 -) Material purchase system using EOQ method is best for company to make production target oriented.
- 2. Dinesh Kumar Pant (1999): Impact of Inventory of Over the profit (A case study of Gorkhapatra Corporation)**
Finding in his study and given recommendation is as below:

Findings:

-) Gorkhapatra corporation has not been used the optimal inventory level i.e. EOQ to procure the required inputs.
-) Inventory turnover is flexible over the study period and net profit margin is inconstant in various years.
-) Return on total assets is more flexible in previous but slightly consistent in later year.
-) Regression and correlation analysis has shown the positive relationship between the inventory, costs and profit as per the analysis done.
 - Correlation analysis has shown both the independent variable have highly positive relationship with the dependent variable profit as indicated by the correlation coefficient 0.87 and 0.827
 - Coefficient of regression shows the linear relationship between inventory cost and material cost.

Recommendation

-) The corporation needs to apply the appropriate tools and techniques of inventory management for maintain optimal level of inventory thereby reducing ideal lost at minimum possible level as it has the direct impact over the profit.
-) Gorkhapatra Corporation should adopt the reliable procurement procedure important materials with the help of good purchase plan to avoid the possible crisis of stock out.

-) The formality of making decision regarding the tender procedure a placing the order should be shortened to increase its competitiveness.
-) The corporation should maintain its own warehouse as it has been suffering form the higher amount of holding cost for leasing the warehouse of outside parties even thought it has adequate land and other resources necessary for its arrangement.
-) The recruitment and selection procedure of qualified personnel handling the inventory should be unbiased on the basis of which the corporation will be able to acquire the efficient technician's regular training on inventory and store management should be given.
-) The vision of top authority should be clear for solving the problems appeared in course on inventory management system (Pant,1999)

3. Indra Shrestha (2000): Inventory management of manufacturing industries in Nepal (With special reference to quick foods)

Indra Shrestha has made a study as inventory management of manufacturing industries in Nepal (with special reference to quick foods.)

His major findings and recommendations are as below.

Findings

-) The selling price of noodles (Thai Foods) was constant for the fiscal year 2051/056 but cost price of Noodles was increasing from year to year with different rate. There is no correlation between selling and cost price because if cost price increases the selling price should also increase.
-) The selling price and cost price of cheese ball was increasing from year to year. There is highest degree of correlation between cost price and selling price. The company has not classified its inventory for the purpose of control and equal attention for the entire inventory hold in the store but they are using bin card for inventory.

-) When and how much to order is estimated haphazardly by Thai foods and quick Foods P. Limited different from year to year and are not in economic order quantity.
-) This purchase made by company is increasing from previous year to this year. It shows good production of company
-) The company has maintained safety stock but company is not using re-order level for when to re-order.
-) Raw material turnover ratio of some inventories is increasing year to year and some are fluctuating year to year but this ratio was satisfactory.

Recommendations

From this study following suggestions have been suggested.

Record keeping system should be scientific. It means the company should define its goals clearly with regards to its input and output separately i.e. the quantities, time period should be specified. So factory can locate the post records. It is also helpful for researchers.

Some raw materials were imported from Japan, New Zealand, Singapore, India, Korea and China. This should be discouraged and alternative should be searched within the nation as possible.

In case of Thai foods the cost of price of Noodles for the five, fiscal year 2051/052 to 2055/056 is increasing but selling price is constant i.e. some price for five fiscal year. If cost price increases then selling price should also proportionally increase for good profitability.

Thai foods and quick Foods P. Ltd was not conducted the ABC analysis. The company should follow scientific tools and techniques i.e. economic order quantity and economic lot size formula which help to reduce the relevant total cost for manufacturing the product. The output obtained from quantitative analyzes results the lowest cost and consumer can use with low cost than company can increase their selling.

4. Kashi Joshi's Study (2001)

He studied on topic of inventory management of Herbs Processing and Production Company Ltd. He found the following problems the area of inventory management in HPPCL like.

-) What types of inventory problems do they face?
-) Do they have any plan for inventory?
-) What are the bases of such plan?
-) Are there any plans and policies to increase profit reduce expenditure through improving size of inventory in future, if yes what, if no. why?

He set some objectives, which are given below:

-) Identify present position of inventory in HPPCL.
-) What types of problems faced by HPPCL in the management cost and profit that should be identified.
-) Provide the appropriate recommendation and suggestion improvement of inventory management in HPPCL on the basis of above study and findings.

He concluded after study, if the company wanted to be success, it was necessary to apply the theoretical and practical methods in collection, production, distribution management, marketing, proper remuneration and rewards and punishment etc. The company had given extra facilities and inspiration to the farmer to produce the raw materials to reduce the loss of inventory expenses. Transportation high change and loss of company would reduce if the company were able to fulfill desired rased materials from private resources.

5. Krishna Narayan Shrestha (2000): Inventory management in Royal Drugs Company limited

Krishna Naraya Shrestha has made a study which is concerned that in what extent the company is applying the inventory management techniques to minimize the cost of inventory which directly affect the price of Drugs.

His major findings and recommendation are as below:

Findings

-) Required raw material for the production of different types of Drugs are imported by the company from India, China and other third world countries on global tender agreement.
-) The company has purchased some material from other than listed supplier and producers of the company.
-) The company has purchased some material at higher price although there is the possibility of purchasing at lower price.
-) The company has purchased more raw material than requirement.
-) The valued of closing inventory of raw material is in increasing from year to year.
-) The company has not determined the re-order level, maximum stock level and minimum stock level
-) The company has not following scientific inventory management technique i.e. economic order quantity model for purchasing different types of raw materials.
-) The company has prepared purchase budget of raw material but it is highly differ from the actual purchase
-) The investment of inventory stock of RDL is large and the value of inventory stocks is in increasing from year to year.
-) The company has not applied ABC analysis technique to control the various types of inventory in the store.
-) The company's purchase position of different types of material is highly differing from year to year.

Recommendation

-) Purchase plan should be prepared of different types of raw material with the proper cooperation among the planning, purchasing storing, and production, marketing and sales department to avoid the excessive investment on inventory.

-) The popular scientific inventory management techniques should apply by the company for purchasing varieties types of raw material so as to maintain optimum level of inventory and to minimize the total inventory cost i.e. carrying and holding cost.
-) The selective inventory model should apply by the company for control the inventories in the store. ABC analysis divides the inventory into three groups i.e. ABC according to their usage values helps to apply proper degree of control for different group of inventory minimize the investment on inventory and minimize the cost of storage.
-) Minimum, maximum and recording level for each type of material should be fixed by the company to avoid the over stocking of different types of material.
-) The recruitment and selection procedures of efficient personnel handling the inventory should be unbiased on the basis, which the corporation will be able to acquire the efficient and skilled technician, and require giving regular training about on inventory management.
-) For the timely procurement and supply of inventory items, reliable supplier should be selected and RDL should impose appropriate actions to them if they follow against the term and condition.
-) The frequent change in top level management creates the unstable environment in the company, which leads the company backwards so the post of general manager should be professionalized.

6. Laxmi Pandey (2000): Inventory management:

(A case study of Gorkhapatra Corporation.

Laxmi Pandey had also studied about the inventory management of Gorkhapatra Corporation, On her study the following major findings and recommendations are as follows.

Findings

Major finding in her study are tentative solution for the question about how much to buy and when to order and buy to maintain proper balance of inventory to fulfill the corporation's requirement.

Recommendation

Following recommendations are given by Laxmi Pandey on the basis of her study.

-) Corporation should follow the EOQ model for minimizing the inventory cost.
-) To maintain the inventory smoothly, ABC classification should adopt by the corporation.
-) Ledger cards can be used by the corporation to manage inventory. It contains the column for inserting the data or order and its receipt with date and quantity issued and sold. In this card, name of the item number, unit price, usage rate, supplier's name the percentage of carrying cost and the ordering cost should be maintained.
-) The scarp material (unsold stock or wastage) should be recycled with in the corporation, so that, cost of some possible extent can be cut-down. Hence, the corporation should setup the recycling sector.
-) For getting skilled technicians, the process of recruitment and selection should be unbiased.
-) Record keeping system should be scientific, so that, the corporation can locate the past records which are also helpful for the researcher.

7. Liladhar Dhital (1995): Inventory Management.

(A case study of Nepal Food Corporation)

Findings in his study and given recommendation are as below:

Mr. Liladhar Dhital has conducted the research work on the topic of inventory management (A case study of Nepal Food Corporation). The main objectives focused by him were to analyze the various related variable, like purchase, sales demand and food quota of Nepal Food

Corporation and to find out their trends. The nature of data used was both primary as well as secondary. The primary data were collected through interview

With personal observation, the secondary data were collected from the unpublished and published materials such as journals, articles and books concerned with respective corporation.

Mr. Dhitaxl has pointed out some conclusion based on major findings.

Under food grains purchasing the domestic purchase is more fluctuated one greater than import. Primary market purchase is made the paddy, maize, wheat, pulse but rice is purchased only in open market. The relationship between edible cereal production and requirement is negative etc.

8. Narayan Bahadur Karki (1999) has studies on the “Inventory management and control of **Sajha Swasthya Sewa**” for his degree thesis some major points started by Karki are reviewed below.

-) The main objectives of the study are to analyze the present system of inventory management in Sajha Swasthya Sewa. This study is based upon quality as well as price aspect.
-) To access the types of inventory maintained in Sajha Swasthya Sewa.
-) To examine the techniques being employed to manage the inventory in Sajha Swasthya Sewa.
-) To suggest proper inventory model to Sajha Swasthya Sewa based on the analysis.

From the analysis and interpretation of available data the following Mr. Karki has made conclusions as the major findings is derived;

-) The purchase quantities made by the organization differ from year to year are not in economic order quantity.

-) In Shaja Swasthya Sewa the economic order quantity model is not applied and the organization has maintained the safety stock which is highly fluctuated and estimated roughly.
-) The organization has not categorized its inventory for the purpose of control and paid equal attention for the inventory held in the store.
-) The annual target made by the organization differs from year to year and highly fluctuated.

On the basis of analysis and the conclusion, the following recommendation have to improve the state of affair of existing inventory management system of Sajha Swasthya Sewa has been forwarded,

-) The organization should define its goals and objectives clearly with regard to its inputs and outputs separately.
-) The organization should follow the quantitative models because with the application of economic order quantity formula and economic lot size formula or selling/distribution the total relevant costs for both can be minimized.
-) Sajha Swasthya Sewa is not adopting the ABC analysis, so the organization should categorize its inventory.
-) Ledger card can also be used to manage inventory in a simple way.
-) The frequently changing the board member including chairman and General Manager has been found as disturbance for the effective management.

9. Ram Bahadur Rawal Kshetry (2003): Inventory Management

(A case study of Agriculture Inputs Corporation with special reference to chemical fertilizer in Kathmandu valley)

-) The procurement procedure followed by the corporation are i) estimation of requirements ii) inviting tender iii) evaluation of bids iv) placing the order v) dispatch orders to clearing and forwarding agency.

-) Except global tender are procure the fertilizer through negotiation, through assistance from donor countries and agencies, through agreement of government.
-) There are 196 institutional and Pvt. Dealers to chamalie the fertilizer to the farmers in Kathmandu valley but they don't get adequate fertilizers, as they need to distribute.
-) The education level of farmer in Kathmandu valley is poor for right mix of fertilizers to be used in farm. They are following urea only, which lead the problem of inventory management.
-) In AIC targeted supply of fertilizers and actual supply various largely every year. So, it the case with Kathmandu valley also? The most important aspect of inventory management is to match the regular supply, demand and purchase of inventory components. If supply targeted supply don't match each other then there would be either under stock position or over stock position.
-) There is rate problem due to dependence on foreign country, in accessible memorable roads for hilly regions of Nepal have created inventory management problem. However, there is no such problem in Kathmandu valley
-) For the efficient management, the AIC has not taken any measure regarding the improvement of its inventory management practices. AIC don't take any action on supplier who delays supply of ordered fertilizers.
-) In the conclusion, AIC is applying scientific techniques of inventory management, which is the most crucial point in AIC. Despite it there are several internal and external causes not to be used scientific techniques but AIC is neglecting the inventory management almost completely. This is the matter of misfortune to the corporation, to farmers, as well as to the nation as a whole.

Suggestions:

-) AIC should make an effort to match the targeted demand and actual supply to overcome to overstocking position or under stocking position or out of stocking position of inventory.
-) For the timely procurement and supply of the inventory items AIC should not depend on the other sources except through global tender because this source is more reliable, economic considering of season to be required of chemical fertilizers, lead-time, transportation, time process to be taken by tender, tender should be called.
-) According to provides valuable information to the decision makers this can serve the controlling function and important function of management if records and classified properly, costing of different factors related to inventory of AIC requires sound classification and definitions of activities.
-) They should attempt to use the scientific models like economic order quantity (EOQ), ABC analysis, reorder point etc. So that inventory problems whether it is the over stock, under stock, out of stock will be solves. As a result AIC can delivery the regular supply of chemical fertilizer to farmer at the right time.

10. Suraj Sigdel (2002): Inventory Management of “Agriculture Inputs Corporation Regarding Chemical Fertilizers and Seeds”

Findings

-) The major procurement procedures/ ways are through inventing global tender negation, through aid/ assistance from donor agencies/ countries and through negotiation/ agreement of two governments.
-) AIC procure of collect seeds from external as well as internal sources.
-) walls of warehouses are built with bricks of stone as available locally, with cement building.

-) AIC does not have adequate fleet of trucks. So in most cases transport companies under contractual agreement carryout this job.
-) AIC is not using scientific models of inventory management.

Recommendation

-) To avoid the problems of over stocking of chemical fertilizers and seeds. AIC should consider these points;
 - a) Target should be realistic.
 - b) Target should be with the capacity of being fulfilled.
 - c) If AIC is able to hold only optimum level of ending stock the locked up capital will be reduced.
 - d) AIC should develop appropriate standard record keeping system of ending stock.
-) Before calling global tenders, seeds growers' season of requirement, lead time and means of transportation should be considered.
-) Numbers of warehouses should be made according to the area and consumption of chemical fertilizers and seeds, which will make the distribution of fertilizers easier.

2.11.2 Review of Article and Institutions Report

Some articles are revised with related to inventory management and control
These are under

Dr. G.R. Agrawal has made study relating to the Nepalese public enterprises stated that inventory management is the weakest aspect of management in Nepal. The tools and techniques for controlling inventory has not been applied in Nepalese enterprises for controlling their physical as well as financial dimensions (Agrawal, 1980)

Rao and N.V.S. Jagmohan Rao also observed that for the efficient management of inventory. There are the needs of tackling the human element in the third world country like Nepal. They have suggested to orienting the attitude of the staffs towards material cost because lack of

knowledge and carelessness which were the responsible of this management of the inventory. (Rao, K. 1981)

A study relating to Nepal Transport Corporation concerning with aspects has been made by **CEDA**. One of the major finding was that thought inventory management of this factory is rather simple but due to the mismanagement of stocking of the spare parts that hampered the smooth operation of the enterprise. (CEDA, 1973)

Another significance study relating to agriculture tools factory has been conducted by **CEDA** was that the ratio of inventory to sales give more frustrate picture as the sales could not go with inventory or vice versa (CEDA, 1974)

A comprehensive study of Bansbari Leather and shoe factory,' conducted by **Corporation Coordination Council** in which it was found that inventory planning is out of scope of concerning this factory. Because of this, some of that the materials are not available some are not procured in time resulting in the bottlenecks in the smooth flow of production function. (CCC, 2033)

Industrial Service Center has conducted a study regarding the performance of Biratnagar Jute mills Ltd. Some of the major finding of this study was that store keeping and control stock level of various item are not fixed up, goods received not normally entered with goods received notes along with quality verification. Bin cards are not mentioned and stock ledgers are not kept up to date (I.S.C, 2036). Leather

Bajracharaya, Puskar made the study about the inventory management of GPS came to conclusion that the procedure of recording stock out cost and back order cost of the corporation was very poor no techniques of inventory management is possible to apply to calculate one of the major decision when to buy. If no concrete steps are taken with regard to recording and maintaining to proper data, future researcher would not able to predict the reorder point properly. Thus, the real situation of the operation of the

corporation regarding its inventory managing system could not be found (Bajracharya, 1983)

Center for Economic Development and Administration Center has conducted a study on management problem in public sector manufacture enterprise in Nepal. One of the important findings was the inventory management. Suffer from the lack of planning, high carrying cost, poor recording and stores management and virtual absence of controlling system. (CEDA, 1974)

Referring the above given facts and figures, it is implied that most of the Nepalese manufacturing concerns are not that much serious regarding the inventory and material management. It also shows that there is not comparative study. Public manufacturing as well as trading companies are not applied the inventory model effectively. that is why the company has been success to achieve their targets.

Most of the researchers in Nepal, in the field of inventory management are focusing on only scientific technique for the inventory management. Researchers recommend only EOQ technique to reduce total cost. In context of Nepal political instability, strike and various abnormal cases arrives time to time so all of the PEs must consider this factor too and hold inventory. In my view not only scientific technique are applicable in Nepal but also consider about the abnormal cases and manage the inventory properly for regular production and regular supply to customer.

2.12 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. The data used in the previous study is few years but 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. 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 National Trading Ltd. and Herbs Production and Processing Company 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 III

RESEARCH METHODOLOGY

The success of a work largely depends upon the way it is performed the processes involved throughout the whole work need to be systematic for the achievement of the objectives. Since research is a scientific discipline, it deserves much more attention on the part of researcher. A systematic study needs to follow a proper methodology to achieve the predetermined objectives. “Research methodology is a way to systematically solve the research problem”. It is the process of aiming at the solution of problem through the planned and systematic dealing with collection, analysis and interpretation of fact and figures.

) This chapter deals with research design, sources of data, population and sample size, data gathering procedure and data analysis tools to fulfill the above mentioned objectives.

3.1 Research Design

Research design is the plan, structure and the strategy of the investigation conceived so as to obtain answer to research questions and to control variance.

The research design of this study is descriptive as well as analytical. The study is primarily based on secondary data. However, primary data can also be used. Primary data are mainly collected through questionnaires, direct interview from officers and non-officers of the companies.

3.2. Nature and Source of Data

The nature of data of this study has been primary as well as secondary.

- a) **Primary Data:** - primary data are original data gathered by the researcher for the research work at hand. Thus, these data are collected for meeting the specify objectives of the study. Primary data has been collected through questionnaire, interviews and observation.
- b) **Secondary Data:** - secondary data are often in the form of published data. Secondary source refers to those for already gathered by others. The sources of secondary data can be divided into two groups: internal and external. The internal secondary data are found within the company where as external secondary data are collected from sources outsides the company.

3.3. Data Gathering Procedure

In order to collect the required data from the official records of both "National Trading Limited and Herbs Production and Processing Company Limited" the researcher has visited there personally. Similarly, personal observation, informal discussion, interview with the officials, collect the data from journals, magazines published, financial statement and annual reports has been carried out to collect data at first hand. Regarding the primary sources, personnel observations and personal discussion methods are used.

3.4 Presentation and Analysis of Technique and Tools

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

3.4.1 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, and coefficient of variance have been used.

A) 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, Karal people co-efficient 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

3.4.2 Financial Tools

A) Percentage Analysis

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

$$\text{Annual Percentage Change} = \frac{\text{Amount of This Year} - \text{Amount of Last Year}}{\text{Amount of Last Year}}$$

B) ABC Analysis :

This technique is used to identify various items of inventory for the purpose of inventory control. In this analysis, we divide the inventory items into three group A, B and C. According to investment and valuable inventories are classified A, B and C groups.

C) EOQ analysis

The economic order quantity may be defined as that level of inventory order that minimize the total cost associated with inventory management.

- a) Formula method
- b) Table method
- c) Graph method

D) Different Turnover ratios (Inventory Turnover ratio, R.M turnover ratio, FG turnover ratio etc.)

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

The basis objective of this study is to analyze the present problems of inventory management and control system of National Trading Limited and Herbs Production And Processing Company Limited on the basis of the analysis and diagnosis of the collected data to provide the suggestions and recommendation to National Trading Limited and HPPCL. For this purpose ABC Analysis, EOQ Analysis, Safety Stock Analysis, Re-Order Level Analysis and Trend Analysis have done.

4.1 ABC Analysis

4.1.1 National Trading Limited

According to the concept of ABC analysis, the item of goods with regarding to three purchase department of NTL are divided ABC on the basis of usage value and volume as shown in table below.

Table No. 4.1
Classification of Goods of NTL

Division	Good Items
A	Rice mill, power teller, machine, food processing, bicycles, water pumps, noodles making, tools
B	Various Liquor (vodka, xxx Rum, Back piper, Red level, Tiya mariya Jose etc.)
C	Blanket, Sugar, Electric Fan, Sport Goods, DAP fertilizer, TV, Rice Cooker, Vacuum Cleaner Tea etc.

Source: National Trading Limited, Teku

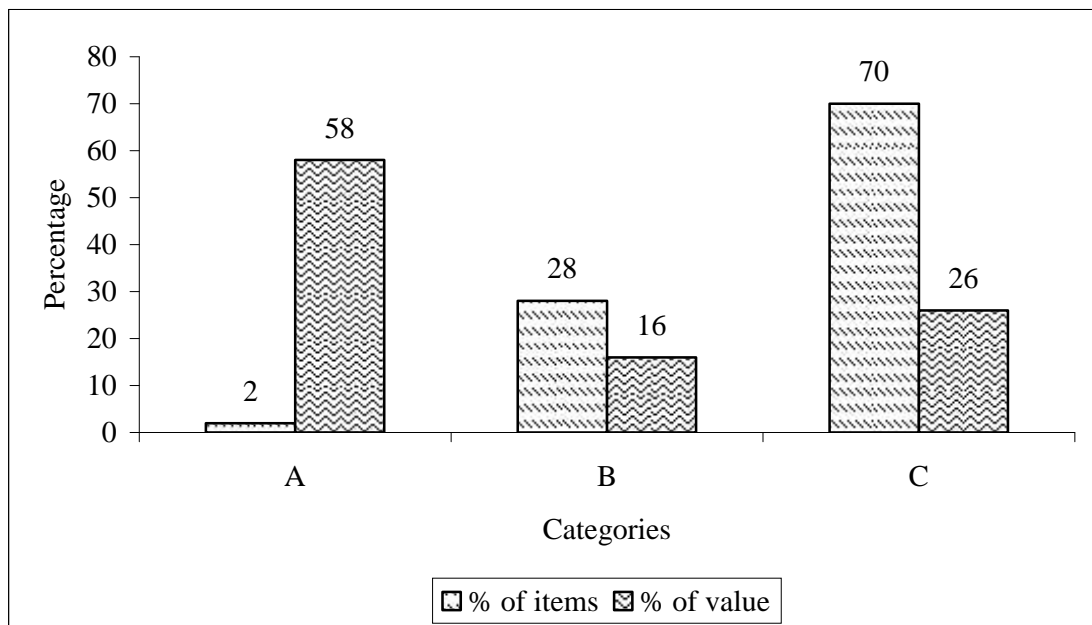
According to the concept of ABC Analysis, the item of goods with regarding to three purchase department of NTL are divided ABC on the basis of usage value and volume as shown in table below

Table No. 4.2
ABC Classification of NTL

Category	Items (Units)	% of items	Value (Rs.)	% of value
A	505	2%	164300000	58%
B	8465	28%	45000000	16%
C	20990	70%	72950000	26%
Total	29960	100%	282250000	100%

Source: National Trading Ltd. Teku.

Figure No. 4.1
ABC Analysis NTL



Source: Table No. 4.2

The table and graphic presentation indicate that "item A" form a minimum proportion 2% units of all items, but represents the highest volume 58% total cost on the other hand "item B" consists 28% of total volume but only 16% of total value. Similarly, "item C" consists maximum 70% of the volume but least 26% of total value. This division of goods items reflects the concept of inventory control according to their volume and cost but the company spends the same effect on all items. Since it is clear that a strict control should be exercised on "item A" in order to minimize inventory

control cost and less control "item C & B respectively. On its investment "item A" should be traced first and most carefully, in case of "item B" simple control will be sufficient.

4.1.2 HPPCL (Herb Production and Processing Company Limited)

According to the concept of ABC analysis, the item of good with regarding to three purchase department of HPPCL are divided ABC on the basis of usage value and volume as show in table below.

Table No. 4.3
Classification of Goods of HPPCL

Division	Goods Item
A	Artemisia Oil, Anthopogon Oil, Camomile Oil, Cinnamomum Leaf (Tejpat) Oil, Juniperberry Oil, Jatamansi Oil, Xanthoxylum Oil, Texus Resin, etc.
B	Calamus Oil, French Basil Oil, Kachur Oil, Lemon Grass Oil, Palmarosa Oil, Wintergreen Oil, Dill Oil, Shilajit Processed etc.
C	Citronella Oil, Eucalyptus Oil, Mehtha Arvensis Oil, Mentha Spicata Oil, Sugandh Kokila Fixed Oil, Turpentine Oil, Rosin, Matricaric Flower etc.

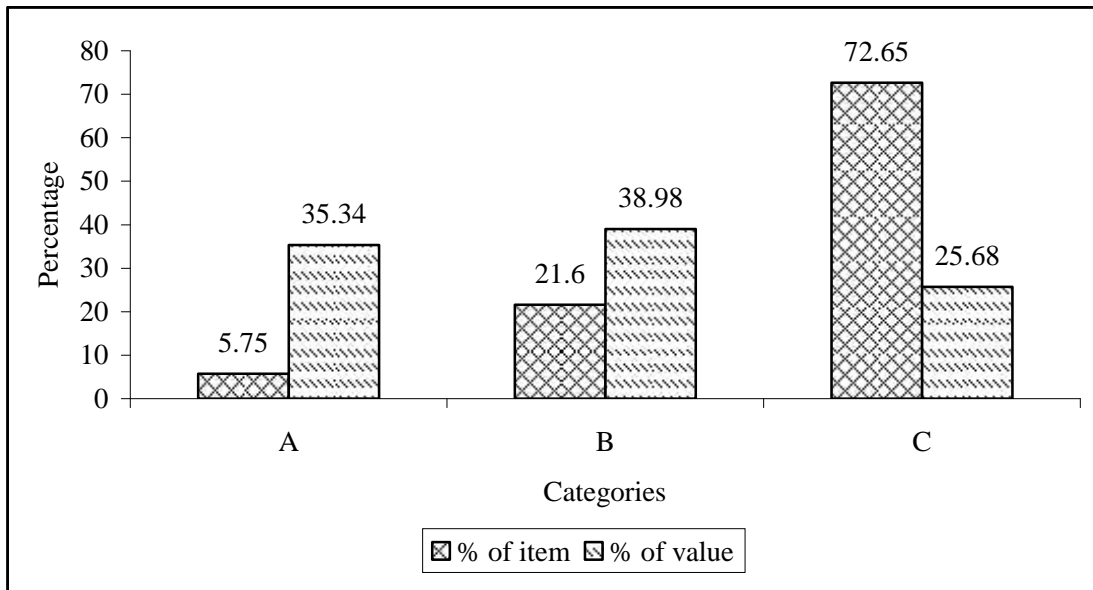
Table No. 4.4
A, B, C Classification OF HPPCL

Categories	Item (kg)	% of item	Value (B)	% of value
A	289	5.75	2273109	35.34
B	1085	21.60	2507435	38.98
C	3650	72.65	1651364	25.68
Total	5024	100.00	6431908	100.00

Source: Herbs Production and Processing Company Limited, Koteshwor.

It can be presented simply and clearly by figure:

Figure No. 4.2
ABC Analysis of HPPCL



4.2 Economic Order Quantity Analysis

4.2.1 National Trading Limited

1. Cleaned Water Pump

(A) Optimum Order Level (By Formula Method):

Based on the company records, the following data are available,

Annual Demand (A) = 160 units

Total Amount tied up = Rs.2,46,400

Ordering Charges

Transportation Charge = Rs.70

Bank charge and commission = Rs.25

Telephone, Fax, Interest = Rs.10

Total ordering cost = Rs.105

Carrying /Holding Cost

Insurance Charges = Rs.150

Holding Charges = Rs.100

= Rs.250

$$\text{Carrying Cost per unit} = \frac{250}{160} = 1.5625$$

- (i) By fitting the above mentioned data into Economic Order Quantity Formula, we get

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2AO}{C}} \\ &= \sqrt{\frac{2 \times 160 \times 105}{1.5625}} \\ &= \sqrt{21504} \\ &= 147 \text{ (Approx.)} \end{aligned}$$

It indicates that if the company seeks to minimize the total cost by compromising the carrying cost and ordering cost, the EOQ should be 147 units of cleaned water pump.

Number of order should be placed in a year can be calculated by using the

$$\text{Formula: } \frac{A}{\text{EOQ}} \text{ i.e. } = 1.088$$

That indicates NTL should placed its order at once.

(B) Optimum Order of Inventory (Tabulation Method)

By the tabulation method, the EOQ for cleaned water pump can be calculated as follows:

Table No. 4.5
Economic Order Quantity and Water Pump

No. of orders	Order size	Average Inventory	Carrying cost (Rs.)	Ordering cost (Rs.)	Total cost (Rs.)
1	2	$2 \div 2 = 3$	$3 \times 6 = 4$	$1 \times 0 = 5$	$4 + 5 = 6$
1	160	80	125	105	230
2	80	40	62.5	210	272.5
3	53.33	26.67	41.67	315	356.67
4	40	20	31.25	420	451.25
5	32	16	25	525	550

Where,

$$\text{Average Inventory} = \frac{\text{Order size}}{2}$$

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

$$\text{Ordering cost} = \text{No. of order} \times \text{Ordering cost per order}$$

$$\text{Total cost} = \text{Carrying cost} + \text{Ordering cost}$$

From the above calculation, it is clear that by the use of tabulation method, the minimum cost of cleaned water pump is Rs.230, where the total orders cost Rs.105 and carrying cost Rs.125 respectively. The number and order is 1 times.

The company should order cleaned water pump once in a year to minimize the total cost. If it orders twice a year the total cost will increase. From table, we can conclude that when company order twice a year then the cost is increased by Rs.42.5. Therefore, when the number of order increases the total cost will also be increases.

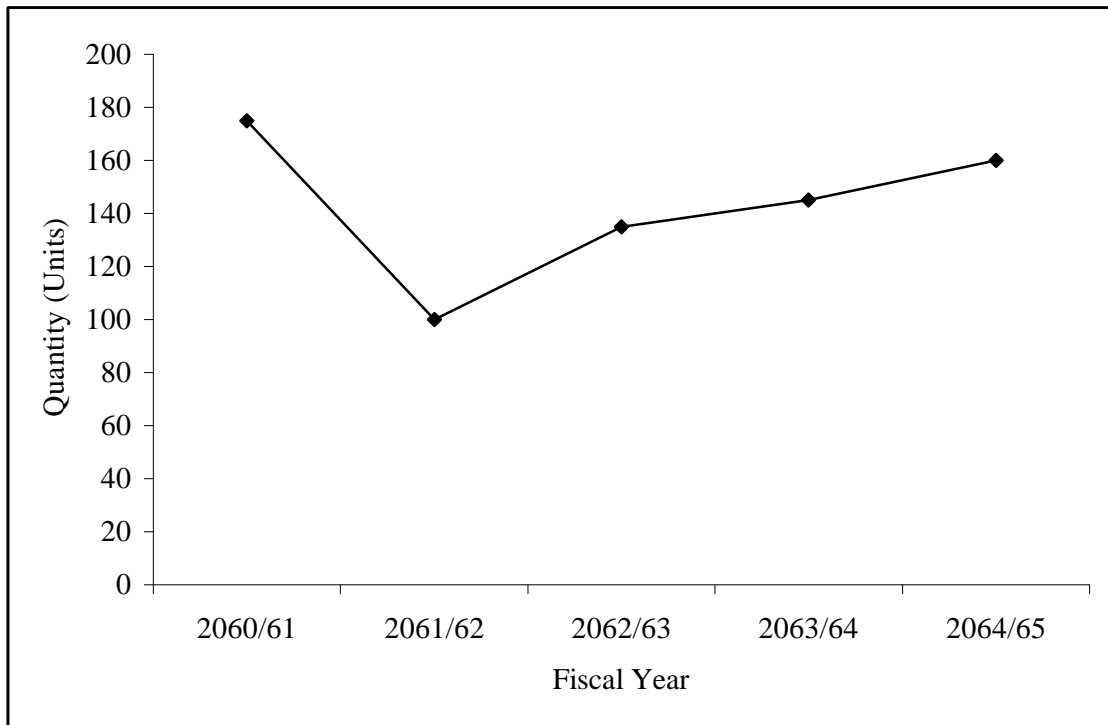
(C) The company's annual demand of the cleaned water pump is given below:

Table No. 4.6

Annual Demand for Water Pump

Fiscal year (B.S.)	Quantity unit
2060/61	175
2061/62	100
2062/63	135
2063/64	145
2064/65	160

Figure No. 4.3
Annual Demand of Water Pump



The analysis shows that annual demand of cleaned water pump is reduced in fiscal year 2061/62, but it is growing from this year. It would be due to environmental effect such as increase in construction of building and most people used cleaned water pump.

(D) Re-order Level and Safety Stock of Cleaned Water Pump

Re-order is that level of inventory the firm places an order with the suppliers for purchasing additional inventory equal to economic order quantity when the inventory reaches the reorder point. To analyze the reorder point of cleaned water pump on the basis of lead time, safety stock and daily usage rate, we can use following procedure.

Table No. 4.7

Safety Stock, Lead time, Daily Usage Rate and Reorder Level

Fiscal year	Usage rate (Units)	Lead time	Lead time × Usage rate	Stock days	Safety stock (Units)	Safety stock days lead time	ROP
1	2	3	4	5	2×5 = 6	3+5 = 7	4+6=8
2060/61	0.486	15	7.29	4	1.944	19	9.324
2061/62	0.277	15	4.155	4	1.108	19	5.258
2062/63	0.375	15	5.625	4	1.5	19	7.125
2063/64	0.403	15	6.045	4	1.612	19	7.657
2064/65	0.444	15	6.666	4	1.776	19	8.442

Where, Usage rate = $\frac{\text{Annual consumption}}{\text{No. of days in a year}}$

No. of days in a year assumed 360 days

Reorder point = Usage rate × (Lead time + Safety stock)

Lead time is assumed 15 days on the basis of replay of respondents.

The company don't consider the good in transit due to lead time is less than order frequency.

This table includes calculation of ROP with safety stock. NTL need cleaned water pump with 19 days safety stock all the day. In year 2064/65 NTL has procure 160 units of cleaned water pump with no. of order 1 time. According to ROP, the company should placed an order when 19 days consumption remains balance i.e. 8.442 units.

(2) Various Liquor

(A) Optimum Order Level (By Formula Method):

Based on the company records, the following data are available,

Annual Demand (A) = 16000 liters

Total Amount tied up = Rs.27520000

Ordering Charges

Transportation Charge	= Rs.3000
Bank charge and commission	= Rs.1500
Telephone, Fax, Interest	= <u>Rs.200</u>
Total ordering cost	= Rs.4700

Carrying /Holding Cost

Insurance Charges	= Rs.2000
Administration	= Rs.1200
Order Charges	= <u>Rs.800</u>
Total Carrying Cost	= 22000
Carrying Cost per unit	= $\frac{22000}{1600} = 1.375$

(i) By fitting the above mentioned data into Economic Order Quantity

Formula, we get

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2AO}{C}} \\ &= \sqrt{\frac{2 \times 16000 \times 4700}{1.375}} \\ &= 10458.57 \sim 10459 \text{ (approx.)} \end{aligned}$$

$$\text{No. of order} = \frac{A}{\text{EOQ}} = \frac{16000}{10459} = 1.53$$

Above calculation indicate that, to obtain the minimum total cost, the company should order 10459 liters at a time and over the year the company should order 2 times in a year.

(B) Optimum Order of Inventory (Tabulation Method)

By the tabulation method, the EOQ for various liquor can be calculated as follows:

Table No. 4.8

Economic Order Quantity of Various Liquor

No. of orders	Order size	Average Inventory	Carrying cost (Rs.)	Ordering cost (Rs.)	Total cost (Rs.)
1	2	$2 \div 2 = 3$	$3 \times C = 4$	$1 \times O = 5$	$4 + 5 = 6$
1	16000	8000	11000	4700	15700
2	8000	4000	5500	9400	14900
3	5333.33	2666.67	3666.07	14100	17766.67
4	4000	2000	2750	18800	21550
5	3200	1600	2200	23500	25700

The table shows that, the minimum cost of various liquor is Rs.14900, where the total ordering cost and carrying cost are Rs.9400 and Rs.5500 respectively, the number of order is 2 times. If the company orders except two times in a year, the cost will increase. Therefore, the company should purchase the various liquor twice a year to minimize its cost.

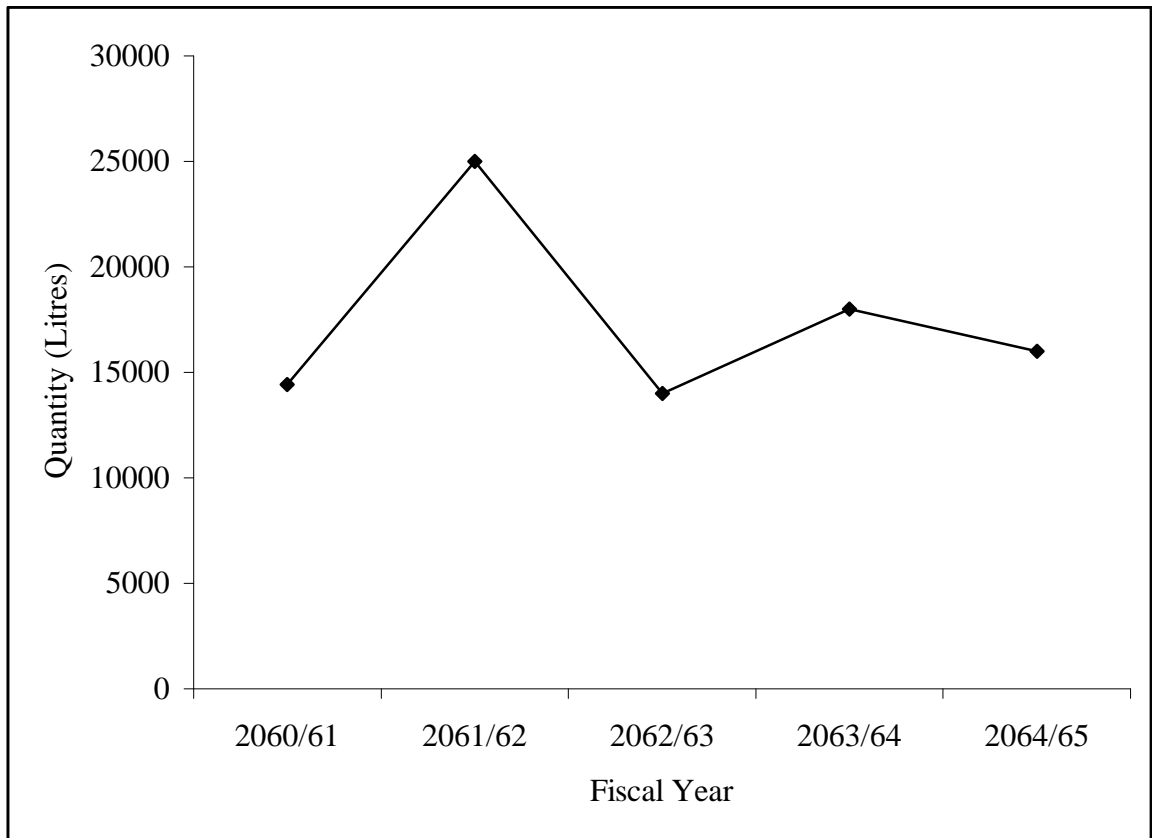
(B) The trend of annual demand made by the company for the various liquor is given below:

Table No. 4.9

Annual Demand for Various Liquor

Fiscal year (B.S.)	Quantity (liters)
2060/61	14412
2061/62	25000
2062/63	14000
2063/64	18000
2064/65	16000

Figure No. 4.4
Annual Demand of Various Liquor



From the table and figure, the annual demand is on the basis of roughly estimate. The demand of various liquor for different year is difference due to unsystematic purchase plan of company. The company should be make systematic plan of various liquor.

(D) Reorder Level and Safety Stock of Various Liquor

NTL procure various liquor 16000 liters in a year. The policy of company's is to maintain 15 days for lead time and 5 days minimum balance of safety stock.

Table No. 4.10**Daily Usage, Lead Time, Safety Stock and Re-order Point**

Fiscal year	Usage rate (Units)	Lead time	Lead time × Usage rate	Stock (Stock days)	Safety stock (Units)	Safety stock +Lead time	ROP
1	2	3	4=2×3	5	2×5=6	3+5=7	4+6=8
2060/61	40.00	15	600.00	5	200.00	20	800.0
2061/62	69.44	15	1041.60	5	347.20	20	1338.8
2062/63	38.89	15	583.35	5	194.45	20	777.8
2063/64	50.00	15	750.00	5	250.00	20	1000
2064/65	44.44	15	666.60	5	222.20	20	888.8

This table includes calculation of ROP with safety stock. NTL need various liquor with 20 days stock all the day. In year 2064/65 NTL has procure 1600 Liters of various liquor with number of order 2 times. According to ROP, the company should placed an order when 20 days consumption remains balance i.e. 888.8 units.

(3) Sugar**(A) Optimum Order Level (By Formula Method):**

Based on the company records, the following data are available,

Annual Demand (A) = 120 Tons

Total Amount tied up = Rs.4800000

Ordering Charges

Transportation Charge = Rs.14000

Bank charge and commission = Rs.1800

Telephone, Fax, Interest = Rs.700

Total ordering cost = Rs.16500

Carrying /Holding Cost

Insurance Charges = Rs.18000

Administration = Rs.5000

$$\begin{aligned} \text{Other} &= \underline{\text{Rs.10000}} \\ \text{Total Carrying Cost} &= \text{Rs.33000} \\ \text{Carrying Cost per ton} &= \frac{33000}{120} = 275 \end{aligned}$$

(i) By fitting the above mentioned data into Economic Order Quantity

Formula, we get

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2AO}{C}} \\ &= \sqrt{\frac{2 \times 120 \times 16500}{275}} \\ &= 120 \text{ tons (approx.)} \end{aligned}$$

Above calculation shows that, if the company seeks to minimize the total cost, the optimal order should be 120 tons. The number of order size for the sugar can be calculated by using formula.

$$\text{No. of order} = \frac{A}{\text{EOQ}} = \frac{120}{120} = 1$$

(B) Optimum Order of Inventory (Tabulation Method)

By the tabulation method, the EOQ for sugar can be calculated as follows:

Table No. 4.11
Economic Order Quantity and Sugar

No. of orders	Order size	Average Inventory	Carrying cost (Rs.)	Ordering cost (Rs.)	Total cost (Rs.)
1	2	$2 \div 2 = 3$	$3 \times C = 4$	$1 \times 0 = 5$	$4 + 5 = 6$
1	120	60	16500	16500	33000
2	60	30	8250	33000	41250
3	40	20	5500	49500	55000
4	30	15	4125	66000	70125
5	24	12	3300	82500	85800

Where,

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

$$\text{Carrying cost} = \text{Average inventory} \times \text{Carrying cost per ton}$$

$$\text{Ordering cost} = \text{No. of order} \times \text{Ordering cost per order}$$

$$\text{Total cost} = \text{Carrying cost} + \text{Ordering cost}$$

From the use of tabulation method, the lowest minimum cost of sugar is Rs.33000 where the total ordering costs and carrying costs both are equal to Rs.16500. The number of order is 1 times. This is the best possible number of order, where the total cost is minimum with minimum equal ordering and carrying cost.

If the company purchase or order two times in year, ultimately it increase the total cost. So, it will better to purchase one time over a year.

(c) The trend of annual demand made by the company for the sugar is given below:

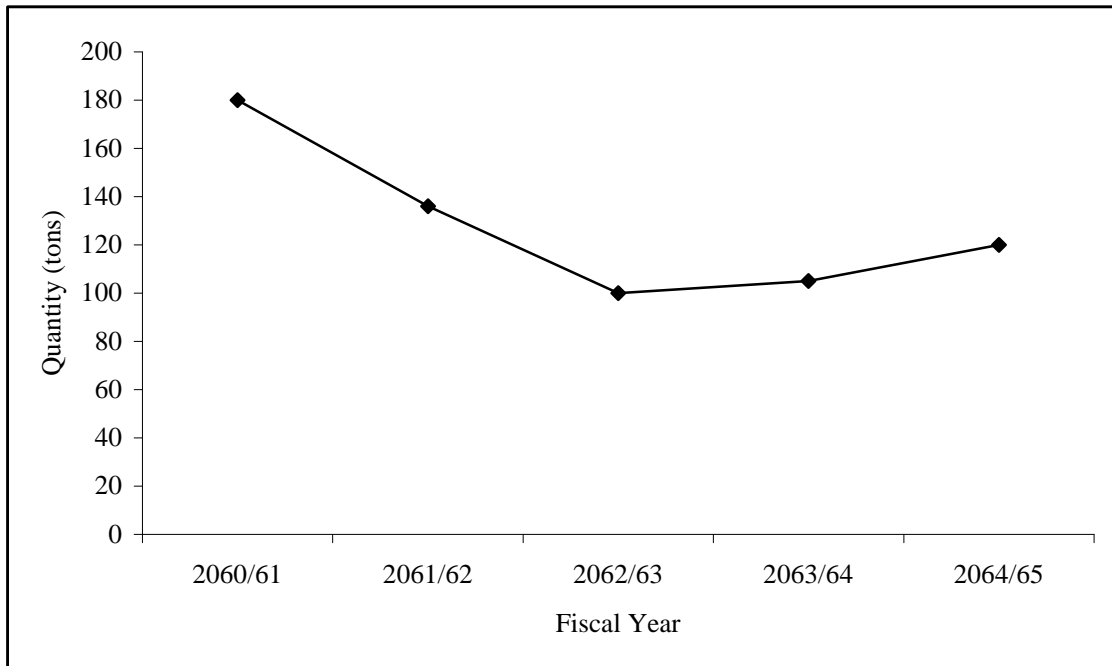
Table No. 4.12

Annual Demand for Sugar

Fiscal year (B.S.)	Quantity demand (tons)
2060/61	180
2061/62	136
2062/63	100
2063/64	105
2064/65	120

The graphic representation of annual demands of sugar can be shown as below:

Figure 4.5
Annual Demand of Sugar



From above table and figure, the annual demand of sugar is reduced up to the year 2062/63, due to political conflict in the country. But, now it is growing on slowly with stopped the conflict in the country. The company should formulate plans and policy about when and how much to buy the inventory.

(D) Reorder Level and Safety Stock of Sugar

Table No. 4.13

Calculation of Daily Usage, Lead Time, Safety Stock and Re-order Point

Fiscal year	Usage rate (Units)	Lead time	Lead time × Usage rate	Stock (Stock days)	Safety stock (Units)	Safety stock + Lead time	ROP
1	2	3	4=2×3	5	2×5=6	3+5=7	4+6=8
2060/61	0.50	2	1.00	2	1	4	2.00
2061/62	0.37	2	0.74	2	0.74	4	1.48
2062/63	0.27	2	0.54	2	0.54	4	1.08
2063/64	0.29	2	0.58	2	0.58	4	1.16
2064/65	0.33	2	0.66	2	0.66	4	1.32

Where,

$$\text{Usage rate} = \frac{\text{Annual consumption}}{\text{No. of days in a year}}$$

$$\text{Re-order point} = \text{Usage rate} \times (\text{Lead time} + \text{Safety stock})$$

Lead time is assumed 2 days on the basis of replay of respondents.

From the table, in a year 2064/65, NTL has to procure 120 tons of sugar with the number of order 1 times. Also, NTL need minimum balance at re-order point 1.32 units for all the days in a year.

(4) Rice Cooker

(A) Optimum Order Level (By Formula Method):

Based on the company records, the following data are available,

Annual Demand (A)	= 2000 units
Total Amount tied up	= Rs.2250000

Ordering Charges

Transportation Charge	= Rs.3500
Bank charge and commission	= Rs.1800
Telephone, Fax, Interest	= <u>Rs.200</u>
Total ordering cost	= Rs.5500

Carrying /Holding Cost

Insurance Charges	= Rs.13500
Administration	= Rs.1600
Other	= <u>Rs.900</u>
Total Carrying Cost	= Rs.16000

$$\text{Carrying Cost per unit} = \frac{16000}{2000} = 8$$

- (i) By fitting the above mentioned data into Economic Order Quantity Formula, we get

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2AO}{C}} \\ &= \sqrt{\frac{2 \times 2000 \times 5500}{8}} \\ &= 1658.31 \\ &= 1659 \text{ units (approx.)} \end{aligned}$$

Above calculation shows that if the company seeks to minimize the total cost, the optimal order should be 1659 units. The number of order size for the Rice cooker can be calculated by using formula,

$$\text{No. of order} = \frac{A}{\text{EOQ}} = \frac{2000}{1659} = 1.21$$

(B) Optimum Order of Inventory (Tabulation Method)

By the tabulation method, the EOQ for Rice Cooker can be calculated as follows:

Table No. 4.14
Economic Order Quantity of Rice Cooker

No. of orders	Order size	Average Inventory	Carrying cost (Rs.)	Ordering cost (Rs.)	Total cost (Rs.)
1	2	$2 \div 2 = 3$	$3 \times C = 4$	$1 \times O = 5$	$4 + 5 = 6$
1	2000	1000	8000	5500	13500
2	1000	500	4000	11000	15000
3	666.67	333.33	2666.67	16500	19166.67
4	500	250	2000	22000	24000
5	400	200	1600	27500	29100

Where,

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

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

$$\text{Ordering cost} = \text{No. of order} \times \text{Ordering cost per order}$$

$$\text{Total cost} = \text{Carrying cost} + \text{Ordering cost}$$

The above table shows that the minimum cost of Rice Cooker is Rs.13500, where total ordering cost and carrying cost are Rs.5500 and Rs.8000 respectively, the number of order is 1 times. If the company orders except 1 times in a year, the cost will increase. Therefore, the company should purchase Rice Cooker one time over a year.

(C) The trend of annual demand made by the company for the sugar is given below:

Table No. 4.15

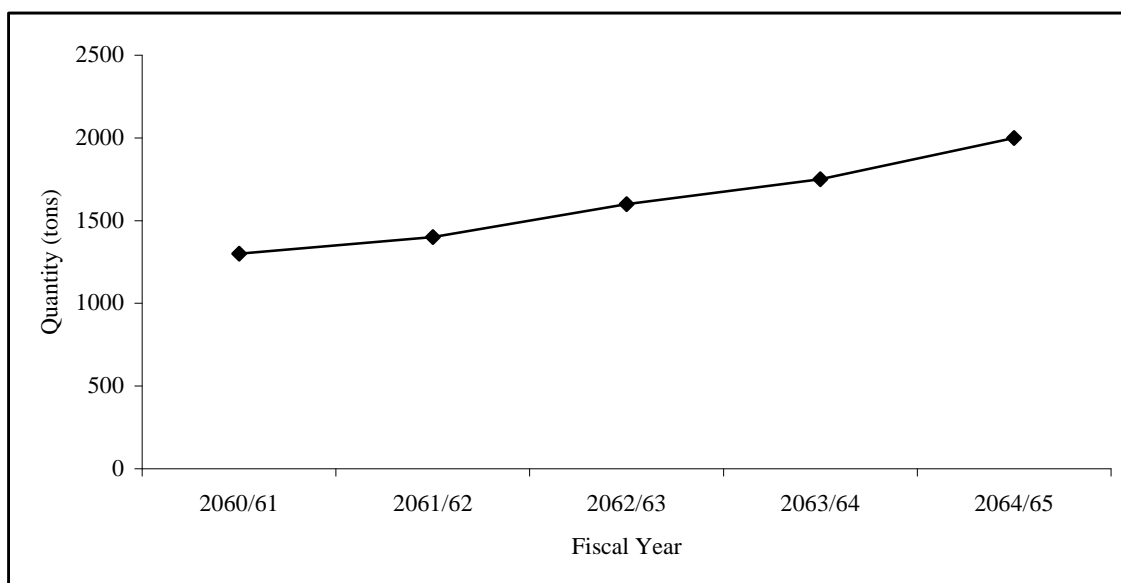
Annual Demand for Rice Cooker

Fiscal year (B.S.)	Quantity demand (units)
2060/61	1300
2061/62	1400
2062/63	1600
2063/64	1750
2064/65	2000

The graphic representation of annual demands of Rice Cooker can be shown as below:

Figure No. 4.6

Annual Demand of Rice Cooker



According to Table and Figure, the annual demand of Rice Cooker is growing in comparison of previous year. It would be due to environmental effect such as shortage and increase in price of kerosene oil and L.P. Gas, man become familiar with rice cooker.

(D) Reorder Level and Safety Stock of Rice Cooker

Table No. 4.16

Calculation of Daily Usage, Lead Time, Safety Stock and Re-order Point

Fiscal year	Usage rate (Units)	Lead time	Lead time × Usage rate	Stock (Stock days)	Safety stock (Units)	Safety stock +Lead time	ROP
1	2	3	4=2×3	5	2×5=6	3+5=7	4+6=8
2060/61	3.61	10	36.1	5	18.05	15	54.15
2061/62	3.89	10	38.9	5	19.45	15	58.35
2062/63	4.44	10	44.4	5	22.2	15	66.6
2063/64	4.86	10	48.6	5	24.3	15	72.9
2064/65	5.56	10	55.6	5	27.8	15	8.34

Where,

$$\text{Usage rate} = \frac{\text{Annual consumption}}{\text{No. of days in a year}}$$

$$\text{Re-order point} = \text{Usage rate} \times [\text{Lead time} + \text{Safety stock}]$$

Lead time is assumed 10 days on the basis of replay of respondents.

From the table, in a year 2064/65, NTL has to procure 2000 units of Rice Cooker with the number of order 1 times. Also, NTL need minimum balance at re-order point 83.4 units for all the days in a year.

4.2.1 Herbs Production and Processing Company Limited

(1) Wintergreen Oil

(A) Optimum Order Level (By Formula Method):

Based on the company records, the following data are available,

$$\text{Annual Demand (A)} = 517 \text{ kg.}$$

$$\text{Total Amount tied up} = \text{Rs.}517 \times 1210$$

$$= \text{Rs.}625570$$

Ordering Charges

Transportation Charge	= Rs3250
Bank charge and commission	= Rs.4200
Telephone, Fax, Interest	= <u>Rs.950</u>
Total ordering cost	= Rs.8400

Carrying /Holding Cost

Insurance Charges	= Rs.12000
Administration	= Rs.3800
Other	= <u>Rs.7000</u>
Total Carrying Cost	= Rs.22800
Carrying Cost per ton	= $\frac{22800}{517} = 44.1$

- (i) By fitting the above mentioned data into Economic Order Quantity

Formula, we get

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2AO}{C}} \\ &= \sqrt{\frac{2 \times 517 \times 8400}{44.1}} \\ &= 443.79 \sim 444 \text{ kg.} \end{aligned}$$

Above calculation shows that if the company seeks to minimize the total cost, the optimal order should be 444 kgs. The number of order size for the Wintergreen Oil can be calculated by using formula.

$$\text{No. of order} = \frac{A}{\text{EOQ}} = \frac{517}{444} = 1.164$$

That indicates HPPCL should place its order at once.

(B) Optimum Order of Inventory (Tabulation Method)

By the tabulation method, the EOQ for Wintergreen Oil can be calculated as follows:

Table No. 4.17
Economic Order Quantity of Wintergreen Oil

No. of orders	Order size	Average Inventory	Carrying cost (Rs.)	Ordering cost (Rs.)	Total cost (Rs.)
1	2	$2 \div 2 = 3$	$3 \times C = 4$	$1 \times O = 5$	$4 + 5 = 6$
1	517.00	258.50	11399.85	8400	19799.85
2	258.50	129.25	5699.93	16800	22499.93
3	172.33	86.17	3800.10	25200	29000.10
4	129.25	64.63	2850.18	33600	36450.18
5	103.40	51.70	2279.97	42000	44279.97

Where,

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

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

$$\text{Ordering cost} = \text{No. of order} \times \text{Ordering cost per order}$$

$$\text{Total cost} = \text{Carrying cost} + \text{Ordering cost}$$

From the use of calculation, it is cleared that by the use of tabulation method, the minimum cost of wintergreen oil is Rs.19799.85, where the total ordering cost is Rs.8400 and total carrying cost is Rs.11399.85 respectively.

If the company order two times in year, the cost will be increased by (22499.93 - 19799.85) Rs.2700.08. So, company should order the wintergreen oil once a year to minimize its cost.

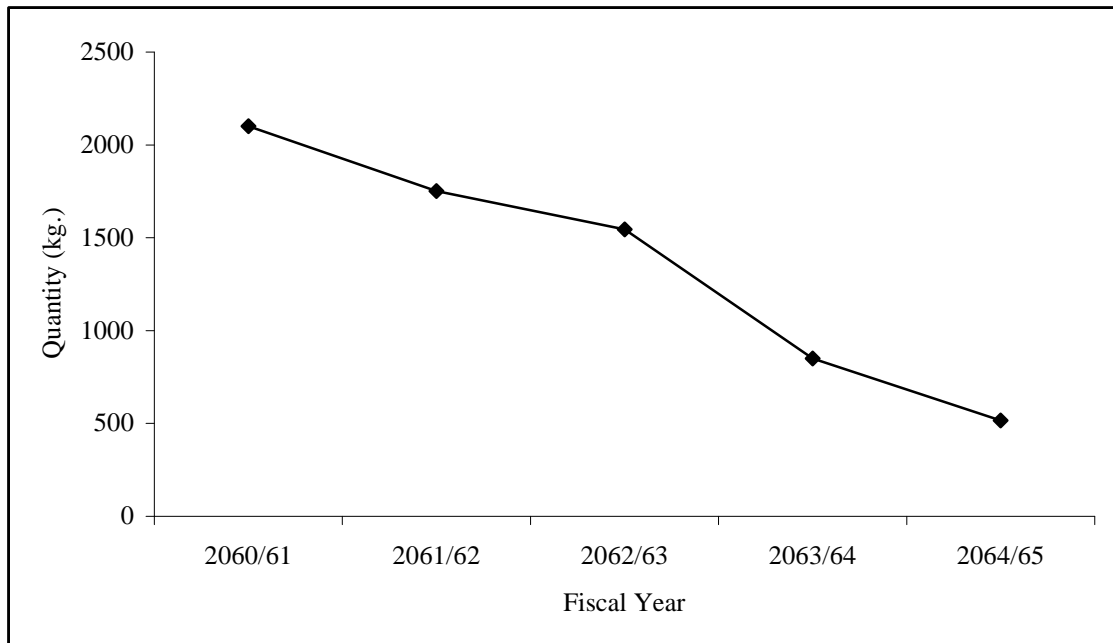
(C) The trend of annual demand made by the company for the Wintergreen oil is given below:

Table No. 4.18
Annual Demand for Wintergreen Oil

Fiscal year (B.S.)	Quantity demand (kg)
2060/61	2100
2061/62	1752
2062/63	1545
2063/64	850
2064/65	517

The graphic representation of annual demands of Wintergreen Oil can be shown as below:

Figure No. 4.7
Annual Demand of Sugar



From the table and figure, it is clear that the company has no fixed rule applied. The purchase made by the company is haphazard. It does not follow according to the EOQ model. The annual demand of Wintergreen Oil is respectively decreasing in corresponding latest year. It would be happen because in general, increase in price of goods forced people to reduce consumption.

(D) Reorder Level and Safety Stock of Wintergreen Oil

HPPCL procure Wintergreen oil 517 liters. in a year. The policy of company's is to maintain 30 days for lead time and 5 days minimum balance of safety stock. To analyze the re-order point of wintergreen oil on the basis of lead time, safety store and daily usage rate, we can used following procedure.

Table No. 4.19

Calculation of Daily Usage, Lead Time, Safety Stock and Re-order Point

Fiscal year	Usage rate (kg)	Lead time (days)	Lead time × Usage rate	Stock days	Safety stock (Units)	Safety stock +Lead time	ROP
1	2	3	4=2×3	5	2×5=6	7	4+6=8
2060/61	5.833	30	175.0	5	29.17	35	204.17
2061/62	4.87	30	146.1	5	24.35	35	170.45
2062/63	4.29	30	128.7	5	21.45	35	150.15
2063/64	2.36	30	70.8	5	11.80	35	82.60
2064/65	1.44	30	43.2	5	7.20	35	50.40

Where,

$$\text{Usage rate} = \frac{\text{Annual consumption}}{\text{No. of days in a year}}$$

No. of days in a year assumed 360 days

The table includes calculation of ROP with safety stock. The company needs wintergreen oil with 35 days safety stock all the day. In year 2064/65 HPPCL has procure 517 kg. of wintergreen oil with no. of order 1 times. According to ROP, the company should placed an order with 35 days consumption remains balance i.e. 50.40 kg.

(2) Xanthoxylum Oil

(A) Optimum Order Level (By Formula Method):

Based on the company records, the following data are available,

$$\text{Annual Demand (A)} = 150 \text{ kg.}$$

$$\text{Total Amount tied up} = \text{Rs.}150 \times 4225 = 633750$$

Ordering Charges

$$\text{Transportation Charge} = \text{Rs.}250$$

$$\text{Bank charge and commission} = \text{Rs.}840$$

Telephone, Fax, Interest	= <u>Rs.150</u>
Total ordering cost	= Rs.1240

Carrying /Holding Cost

Insurance Charges	= Rs.2160
Administration	= Rs.240
Other	= <u>Rs.480</u>
Total Carrying Cost	= Rs.2880

$$\text{Carrying Cost per unit} = \frac{2880}{150} = 19.2$$

- (i) By fitting the above mentioned data into Economic Order Quantity Formula, we get

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2AO}{C}} \\ &= \sqrt{\frac{2 \times 150 \times 1240}{19.2}} \\ &= 139 \text{ kg.} \end{aligned}$$

Above calculation shows that if the company seeks to minimize the total cost, the optimal order should be 139 kgs. The number of order size for the Xanthoxylum Oil can be calculated by using formula.

$$\text{No. of order} = \frac{A}{\text{EOQ}} = \frac{150}{139} = 1.079$$

Therefore the number of order for the Xanthoxylum oil is 1.

(B) Optimum Order of Inventory (Tabulation Method)

By the tabulation method, the EOQ for Xanthoxylum Oil can be calculated as follows:

Table No. 4.20

Economic Order Quantity of Xanthoxylum Oil

No. of orders	Order size	Average Inventory	Carrying cost (Rs.)	Ordering cost (Rs.)	Total cost (Rs.)
1	2	$2 \div 2 = 3$	$3 \times C = 4$	$1 \times O = 5$	$4 + 5 = 6$
1	150	75	1440	1240	2680
2	75	37.5	720	2480	3200
3	50	25	480	3720	4200
4	37.5	18.75	360	4960	5320
5	30	15	288	6200	6488

Where,

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

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

$$\text{Ordering cost} = \text{No. of order} \times \text{Ordering cost per order}$$

$$\text{Total cost} = \text{Carrying cost} + \text{Ordering cost}$$

In case of Xanthoxylum Oil, the EOQ comes to 150 kg. Per order which gives the number of order per year is one. The number of order per year is again justified by the use of tabulation method. This is the best possible number of order, where the total ordering cost and carrying cost is minimum.

In this case, the carrying cost is Rs.1440 and ordering cost is Rs.1240 respectively gives the total cost of Rs.2680. If the company order two times in a year the cost will be increased by Rs.(3200-2680) 520. So, the company should order the Xanthoxylum Oil once a year to minimize its cost.

(C) The trend of annual demand made by the company for the Xanthoxylum Oil is given below:

Table No. 4.21

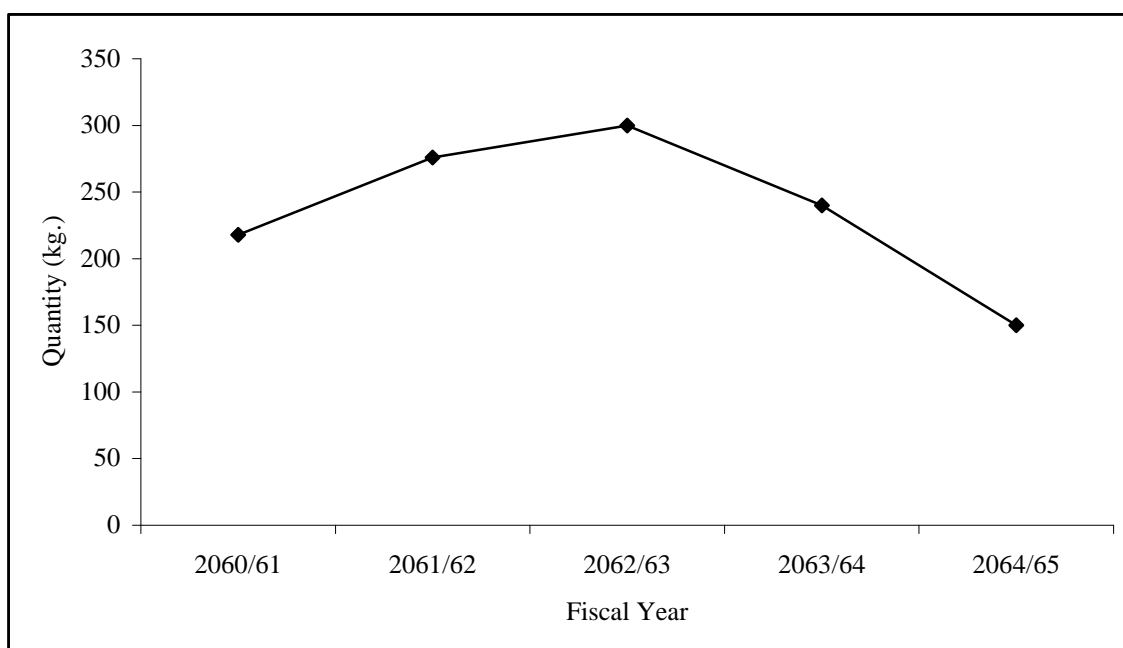
Annual Demand for Xanthoxylum Oil

Fiscal year (B.S.)	Quantity demand (kg)
2060/61	218
2061/62	276
2062/63	300
2063/64	240
2064/65	150

The graphic representation of annual demands of Xanthoxylum Oil can be shown as below:

Figure No. 4.8

Annual Demand of Xanthoxylum Oil



From the table and figure, it is clear that the company has no fixed rule applied. The purchase made by the company is haphazard. It does not follow according to the EOQ model. The annual demand of Xanthoxylum Oil is increasing up to 2062/63, than it is decreasing in corresponding latest year. It would be happened due to poor quality and less demand of product.

(D) Reorder Level and Safety Stock of Xanthoxylum Oil

HPPCL procure Xanthoxylum Oil 150 kg. in a year. The policy of company's is to maintain 15 days for lead time and practice used by the company for the safety stock its equal to 4 days consumption.

Table No. 4.22
Calculation of Daily Usage, Lead Time, Safety Stock
and Re-order Point

Fiscal year	Usage rate	Lead time (days)	Lead time × Usage rate	Stock (Stock days)	Safety stock (kg)	Safety stock +Lead time	ROP
1	2	3	4=2×3	5	2×5=6	3+5=7	4+6=8
2060/61	0.61	15	9.15	4	2.44	19	11.59
2061/62	0.77	15	11.55	4	3.08	19	14.63
2062/63	0.83	15	12.45	4	3.32	19	15.77
2063/64	0.67	15	10.05	4	2.68	19	12.73
2064/65	0.42	15	6.30	4	1.68	19	7.98

Where,

$$\text{Usage rate} = \frac{\text{Annual consumption}}{\text{No. of days in a year}}$$

No. of days in a year assumed 360 days

The table includes calculation of ROP with safety stock. The company need Xanthoxylum Oil with 19 days safety stock all the day. In year 2064/65 HPPCL has procure 150 kg of Xanthoxylum oil with no. of order 1 times. According to ROP, the company should place an order with 19 days consumption remains balance i.e. 7.98 kg.

(3) Eucalyptus Oil

(A) Optimum Order Level (By Formula Method):

Based on the company records, the following data are available,

$$\text{Annual Demand (A)} = 4680 \text{ kg.}$$

$$\text{Total Amount tied up} = \text{Rs.}4680 \times 800 = 3744000$$

Ordering Charges

Transportation Charge	= Rs.1450
Bank charge and commission	= Rs.1960
Telephone, Fax, Interest	= <u>Rs.580</u>
Total ordering cost	= Rs.3990

Carrying /Holding Cost

Insurance Charges	= Rs.10500
Administration	= Rs.2800
Other	= <u>Rs.4140</u>
Total Carrying Cost	= Rs.17440
Carrying Cost per kg	= $\frac{17440}{4680} = 3.73$

- (i) By fitting the above mentioned data into Economic Order Quantity

Formula, we get

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2AO}{C}} \\ &= \sqrt{\frac{2 \times 4680 \times 3990}{3.73}} \\ &= 3164.24 \text{ kg.} \\ &= 3164 \text{ kg.} \end{aligned}$$

Above calculation shows that if the company seeks to minimize the total cost, the optimal order should be 3164 kgs. The number of order size for the Eucalyptus Oil can be calculated by using formula.

$$\text{No. of order} = \frac{A}{\text{EOQ}} = \frac{4680}{3164} = 1.48$$

(B) Optimum Order of Inventory (Tabulation Method)

By the tabulation method, the EOQ for Eucalyptus Oil can be calculated as follows:

Table No. 4.23

Economic Order Quantity and Eucalyptus Oil

No. of orders	Order size	Average Inventory	Carrying cost (Rs.)	Ordering cost (Rs.)	Total cost (Rs.)
1	2	$2 \div 2 = 3$	$3 \times C = 4$	$1 \times O = 5$	$4 + 5 = 6$
1	4680	2340	6224.4	1590	7814.4
2	2340	1170	3112.2	3180	6292.2
3	1560	780	2074.8	4770	6844.8
4	1170	585	1556.1	6360	7916.1
5	936	468	1244.88	7950	9194.88

Where,

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

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

$$\text{Ordering cost} = \text{No. of order} \times \text{Ordering cost per order}$$

$$\text{Total cost} = \text{Carrying cost} + \text{Ordering cost}$$

From above calculation, it is clear that by the use of tabulation method, the minimum cost of Eucalyptus Oil is Rs.6292.20, which lies in the order size of 2340 kg. The number of order per year is again justified by the use of tabulation method. This is the best possible number of order, where the total carrying cost and ordering cost is lowest. If the company orders except two times in a year, the cost will increase. So, company should order the Eucalyptus Oil twice a year to minimize its cost.

(C) The trend of annual demand made by the company for the Eucalyptus Oil is given below:

Table No. 4.24

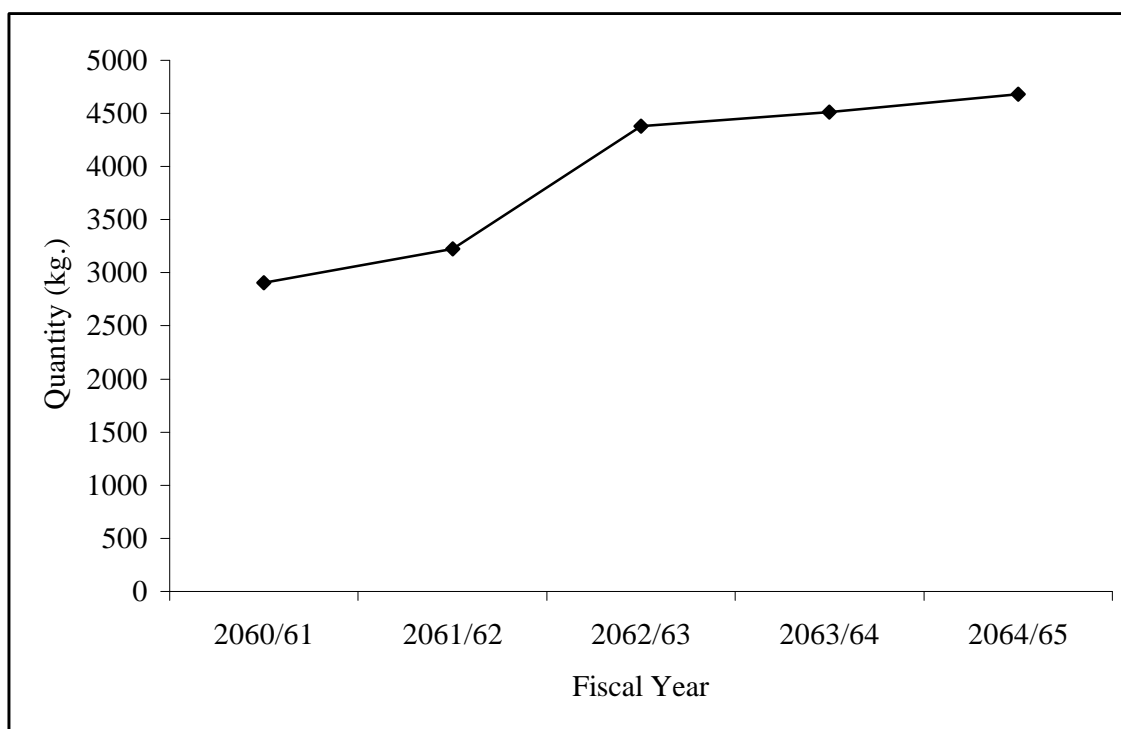
Annual Demand for Eucalyptus Oil

Fiscal year (B.S.)	Quantity demand (kg)
2060/61	2905
2061/62	3224
2062/63	4379
2063/64	4510
2064/65	4680

The graphic representation of annual demands of Eucalyptus Oil can be shown as below:

Figure No. 4.9

Annual Demand of Eucalyptus Oil



From the table and figure, the annual demand of Eucalyptus Oil is increasing corresponding latest year. It would be happen due to right demand of product.

(D) Reorder Level and Safety Stock of Eucalyptus Oil

The company procure Eucalyptus Oil is 4680 kg in a year. By the use of EOQ formula, we have computed the quantity of Eucalyptus Oil to be procured in a year 3164 kg. With the number of order per year is 2 times. The lead time for the procurement of this product is 25 days and the practiced used by the company for the safety stock is equal to 5 days consumption.

Table No. 4.25

Calculation of Daily Usage, Lead Time, Safety Stock and Re-order Point

Fiscal year	Usage rate	Lead time (days)	Lead time × Usage rate	Stock (Stock days)	Safety stock (kg)	Safety stock +Lead time	ROP
1	2	3	4=2×3	5	2×5=6	7	4+6=8
2060/61	8.07	25	201.75	5	40.35	30	242.10
2061/62	8.96	25	224.00	5	44.80	30	268.8
2062/63	12.16	25	304.00	5	60.80	30	364.80
2063/64	12.52	25	313.00	5	62.60	30	375.60
2064/65	13.00	25	325.00	5	65.00	30	390.00

Where,

$$\text{Usage rate} = \frac{\text{Annual consumption}}{\text{No. of days in a year}}$$

No. of days in a year assumed 360 days

The table includes calculation of ROP with safety stock. HPPCL need Eucalyptus Oil with 30 days safety stock all the day. In year 2064/65 HPPCL has procure 4680 kg of Eucalyptus Oil with no. of order 2 times. According to ROP, the company should place an order when 30 days consumption remains balance i.e. 390 kg.

(4) Cinnamon Leaf (Tejpat) Oil

(A) Optimum Order Level (By Formula Method):

Based on the company records, the following data are available,

Annual Demand (A)	= 137 kg.
Total Amount tied up	= Rs.137×5000= Rs.685000

Ordering Charges

Transportation Charge	= Rs.350
Bank charge and commission	= Rs.280
Telephone, Fax, Interest	= <u>Rs.150</u>
Total ordering cost	= Rs.780

Carrying /Holding Cost

Insurance Charges	= Rs.800
Administration	= Rs.360
Other	= <u>Rs.700</u>
Total Carrying Cost	= Rs.1860

$$\text{Carrying Cost per ton} = \frac{1860}{137} = 13.58$$

(i) By fitting the above mentioned data into Economic Order Quantity

Formula, we get

$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2AO}{C}} \\ &= \sqrt{\frac{2 \times 137 \times 780}{13.58}} \\ &= 125.45 \\ &= 125 \text{ kg. (Approx.)} \end{aligned}$$

It means that if the company seeks to minimize the total cost by compromising the carrying cost and ordering cost, the economic order quantity should be 125 kg. of Cinnamon Leaf Oil. Now we are able to calculate the number of order for cinnamon leaf oil per year by using the formula.

$$\text{No. of order} = \frac{A}{\text{EOQ}} = \frac{137}{125} = 1.096$$

(B) Optimum Order of Inventory (Tabulation Method)

By the tabulation method, the EOQ for Cinnamon Leaf Oil can be calculated as follows:

Table No. 4.26
Economic Order Quantity and Cinnamon Leaf Oil

No. of orders	Order size	Average Inventory	Carrying cost (Rs.)	Ordering cost (Rs.)	Total cost (Rs.)
1	2	$2 \div 2 = 3$	$3 \times C = 4$	$1 \times O = 5$	$4 + 5 = 6$
1	137	68.5	930.23	780	1710.23
2	68.5	34.25	465.12	1560	2025.12
3	45.67	22.835	310.10	2340	2650.10
4	34.25	17.125	232.56	3120	3352.56
5	27.40	13.70	186.05	3900	4086.05

Where,

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

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

$$\text{Ordering cost} = \text{No. of order} \times \text{Ordering cost per order}$$

$$\text{Total cost} = \text{Carrying cost} + \text{Ordering cost}$$

The EOQ in case of Cinnamon leaf oil is 125 kg. per order, which gives the number of order per year is 1. From the tabulation method, the number of order is also one where the total ordering and carrying cost are low.

In this case, the carrying cost and ordering cost are Rs.930.23 and Rs.780 respectively which gives the total cost of Rs.1710.23. This is the lowest possible cost. So, the company should order once in a year to reduce the total cost.

(C) The trend of annual demand made by the company for the Cinnamon leaf oil is given below:

Table No. 4.27

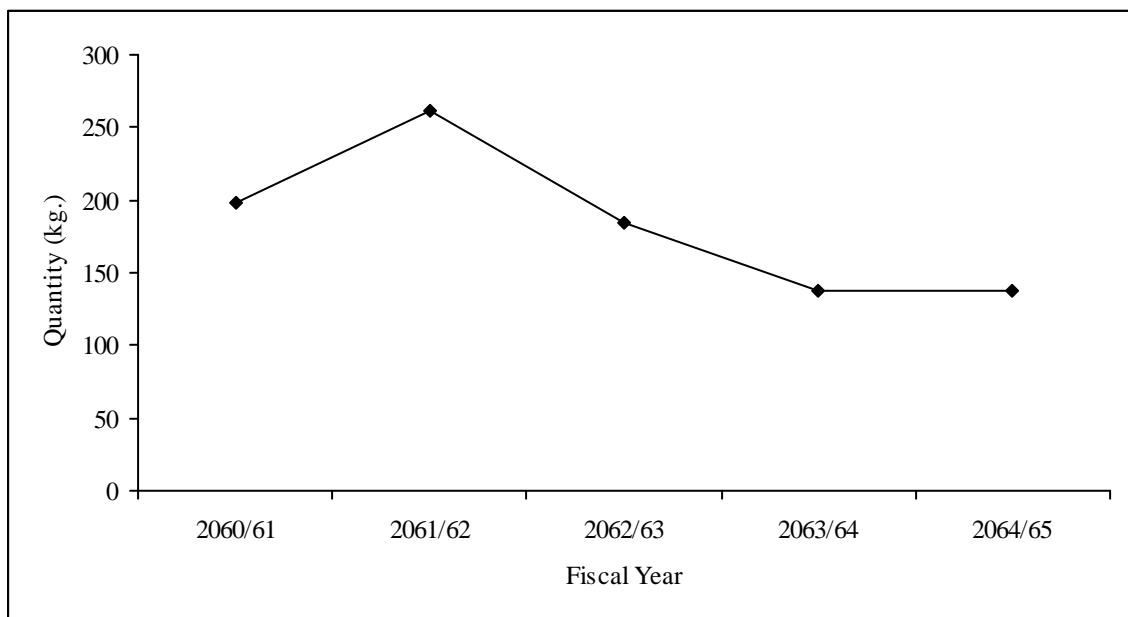
Annual Demand for Cinnamon Leaf

Fiscal year (B.S.)	Quantity demand (kg)
2060/61	198
2061/62	261
2062/63	184
2063/64	137
2064/65	137

The graphic representation of annual demands of Cinnamon leaf oil can be shown as below:

Figure No. 4.10

Annual Demand of Cinnamon Leaf Oil



From the table and figure, it is clear that the company has no fixed rule applied. The purchase made by the company is haphazard. It does not follow according to the EOQ model. The annual demand of Cinnamon leaf oil is increased and decreased by great quantity.

(D) Reorder Level and Safety Stock of Cinnamon Leaf Oil

The lead time for the procurement of this product is 10 days and the practiced used by the company for the safety stock is equal to 4 days consumption.

Table No. 4.28

Calculation of Daily Usage, Lead Time, Safety Stock and Re-order Point

Fiscal year	Usage rate	Lead time (days)	Lead time × Usage rate	Stock (Stock days)	Safety stock (Units)	Safety stock +Lead time	ROP
1	2	3	4=2×3	5	2×5=6	3+5=7	4+6=8
2060/61	0.55	10	5.5	4	2.20	14	7.70
2061/62	0.73	10	7.3	4	2.92	14	10.22
2062/63	0.51	10	5.1	4	2.04	14	7.05
2063/64	0.38	10	3.8	4	1.52	14	5.32
2064/65	0.38	10	3.8	4	1.52	14	5.32

Where,

$$\text{Usage rate} = \frac{\text{Annual consumption}}{\text{No. of days in a year}}$$

No. of days in a year assumed 360 days

The table includes calculation of ROP with safety stock. The company needs Cinnamon Leaf Oil with 14 days safety stock all the day. In year 2064/65 HPPCL has procure 137kg of Cinnamon Leaf Oil with no. of order 1 time. According to ROP, the company should place an order when 14 days consumption remains balance i.e. 5.32 kg.

4.3 Correlation between Sales and Net Profit.

4.3.1 National Trading Ltd.

Table No. 4.29

Correlation between Sales and Net Profit of NTL

Rs. in million

Fiscal year	Sales	Net Profit	X ²	Y ²	XY
2060/61	701.49	182.70	492088.22	33379.29	128162.22
2061/62	613.90	149.31	376873.21	22293.48	91661.41
2062/63	618.67	159.81	382752.57	25539.24	98869.65
2063/64	628.64	153.00	395188.25	23409.00	96181.92
2064/65	635.86	157.32	404317.94	24749.58	100033.50
Total	3198.56	802.14	2051220.19	129370.59	514908.70

Source: Annual Report of NTL

Correlation between sales (x) and Net Profit (y)

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

$$r = \frac{5 \mid 514908.70 \mid 3198.56 \mid 802.14}{\sqrt{5 \mid 2051220.19 - (3198.56)^2} \sqrt{5 \mid 129370.59 - (802.14)^2}}$$

$$= 0.95$$

Correlation (r) = 0.95

4.3.2 HPPCL

Table No. 4.30

Correlation between Sales and Net Profit of HPPCL

Rs. in million

Fiscal year	Sales	Net Profit	X ²	Y ²	XY
2060/61	341.39	30.16	116547.13	909.63	10296.32
2061/62	348.19	36.91	121236.28	1362.35	12851.69
2062/63	415.39	42.32	172548.85	1790.98	17579.30
2063/64	396.93	35.94	157553.42	1291.68	14265.66
2064/65	333.07	21.93	110935.62	480.92	7304.23
Total	1834.97	167.26	678821.31	5835.56	62297.21

Source: Annual Report of HPPCL

Correlation between sales (x) and Net Profit (y)

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

$$r = \frac{5 | 62297.21 | 1834.97 | 167.26}{\sqrt{5 | 678821.31 | (1834.97)^2} \sqrt{5 | 5835.56 | (167.26)^2}}$$

= 0.45

Correlation (r) = 0.45

4.4 Major Findings

Inventory Management planning and control are highly complicated task since it affects the profitability of manufacturing industries. The major findings out of the analysis of the inventory management National Trading Ltd. and Herbs Production and Processing Company are as follow.

- i) The inventory management and controlled tools followed by both companies are ABC analysis, EOQ and Level setting.
- ii) Purchase of inventory and goods haphazardly by the national trading and HPPCL. In other words, the purchase quantities made by the company differ from year to and are not in economic order quantity.

- iii) HPPCL and National Trading Limited also has established a separate unit for management of inventory although the separate unit is unable to manage the inventory effectively.
- iv) Both company have not categorized its inventory for the purpose of control and paid equal attention for the entire inventory held in the store.
- v) In the both company the annual demand and purchase made by company differ from year to year and highly fluctuated.
- vi) Cost related with ordering and holding inventory is not recorded separate in both companies which are recorded as a whole.
- vii) The raw materials used by HPPCL are not classified according to ABC.
- viii) Purchase of raw material in HPPCL is on the agreement and local tender basis some materials are imported and some are taken from the market with huge amount at a time.
- ix) In the company, there are different types of inventories, like RM, WIP, finished goods and stores and spare parts. For the question is asked to reveal the ranking of cost for solution of ABC analysis the company could give only the name of inventories but not specified the cost.
- x) For the question asked to HPPC about the cost of ordering and carrying, the researcher found that there is no systematic and scientific system to determine ordering and carrying cost but in NTL there is limited type of ordering and carrying cost management system.
- xi) Purchasing is the first step of inventory management of manufacturing companies. As the question was asked about the purchasing system they said that procedures are followed by HPPC. The researcher had found that the company has been following the centralize purchasing procedure and required RM and WIP materials are purchased form Nepalese and Indian's brokers.
- xii) As the question is asked to NTL about the valuation of inventories with various options, the researcher found that the pricing of issues can be

determined by value as per weighted average cost method but in HPPCL there is they were not aware about valuation of pricing the inventory.

- xiii) There are various problems faced by the manufacturing companies regarding the management of inventories. As the question asked to HPPCL about the problem faced by the HPPCL in managing the inventories, the researcher found the following major problems faced by the company while operating and managing the inventories.

Political crisis and especially Nepal Bandh, uncertainty about the future supply of materials, operation of factory strikes, fluctuation of material prices and lockout organized by different pressure groups directly affect the company and its inventory management while geographical barriers and transportation problems are other problems faced by both company.

- xiv) The company has not been adopting appropriate inventory policy because inventory constitutes the higher proportion than that of other items of current assets. The co. has not followed any type of inventory policies.
- xv) 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.
- xvi) Demand and sales of both company is very fluctuation. The main reason of such fluctuation is lack of appropriate inventory policy and ineffective demand forecast.
- xvii) The correlation between sales and net profit shows that significant relationship between sales and net profit.
- xviii) The both company have used EOQ model to manage and control of the inventory but there is not satisfactory result.
- xix) Both company have not defined its objectives clearly in terms of quantity and quality.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

There are different types of enterprises either public or private operating in the country. Among them some are running with profit and some are running in loss. So that the success of an enterprises depends upon the strength of management along with efficiency in managing the various functional aspects and modeling them to achieve the company's objectives. Management is basically concerned with getting the jobs done effectively and efficiently.

In present context, public enterprises provide the goods and services which are provided by private enterprises are more effective. Public enterprises face two types of challenges, the first one is to meet public responsibility of providing goods and services cheaply and the second one is to utilize the scarce resources more effectively. In this context, the study is concerned to appraise HPPCL and National Trading Limited examine that in what extent the company is applying inventory management and control system so as to minimize the cost, that ultimately affect the price of manufacturing goods and trading goods. Most of the manufacturing and trading company invests a huge amount of money in inventories. The expenses involve for carrying on functional associated with inventories such as purchasing, handling storage and record keeping is large. Thus in recent year, the subject inventory management has engaged the attention of management and extensive literature has evolved which encompass statistical tools like economic order quantity for how much to purchase together with the re-order point.

There are certain problems of the study. Therefore, the basis problem of this study is to examine the inventory management system practiced by the

company. The order size, carrying cost, ordering cost, safety stock are determined unscientifically by the company and is not given proper attention to the lead-time and all these functions lead to increase the total cost of the company.

Herbs Production and Processing Company Limited and National Trading Limited invest a huge amount of capital in the form of inventory. The main objectives of this study is to find out what technique have been used by the Herbs Production and Processing Company Limited and National Trading Limited to manage the inventory and provide suggestions to use the scientific technique to help in the reduction of cost and getting profit. For this purpose, the researcher interviewed with officials and observes the inventory system personally and data were collected from various sources. Quantitative tools were applied in this study to analyze the collected data.

All the collected data and facts are analyzed on the basis of inventory management theory and with the help of ABC analysis, EOQ model, and Re-order label as well as safety stock. For making certain type of inventory management decision, many mathematical tools and techniques have been available for controlling the inventory but these companies have not applied any sort of techniques for managing their inventories.

Every study has certain findings, so that, the following findings are extracted from this study about the inventory management and control of Herbs Production and Processing Company Limited and National Trading Limited.

1. Purchase of inventory and goods haphazardly by the national trading and HPPCL. In other words, the purchase quantities made by the company differ from year to and are not in economic order quantity.
2. HPPCL and National Trading Limited also has established a separate unit for management of inventory although the separate unit is unable to manage the inventory effectively.

3. In the National Trading Limited the EOQ model is not applied and the company has maintained the safety stock which is highly fluctuated and estimated roughly and HPPCL has also same condition.
4. Both company have not categorized its inventory for the purpose of control and paid equal attention for the entire inventory held in the store.
5. In the both company the annual demand and purchase made by company differ from year to year and highly fluctuated.
6. Cost related with ordering and holding inventory is not recorded separate in both companies which are recorded as a whole.
7. The raw materials used by HPPCL are not classified according to ABC.
8. Purchase of raw material in HPPCL is on the agreement and local tender basis some materials are imported and some are taken from the market with huge amount at a time.

5.2 Conclusion

On the basis of analysis of data and information collected from HPPCL and NTL separately the following conclusion have been drawn.

To meet the consumer demand production on time efficiently and effectively, the study focus the need for a good inventory system to maintain a suitable level of inventory and also control the cost for the HPPCL and National Trading Limited.

The values maintaining proper stock of inputs as well as discussed previously are necessary to know the answer about when and how much to buy. The models examples and formula as discussed previously are necessary for every manufacturing and non-manufacturing enterprise to reduce unnecessary cost incurred on ordering and carrying the inventory.

Though, these models, example and formula etc. For managing inventory are available they could not be used fully for finding out the necessary operation of the company because of the lack of adequate data. No techniques for inventory management are possible to apply to calculate one of the major decisions when to buy because of the lack of planning and unsystematic methods of recording cost. If no concrete step is taken with regards to recording and maintaining of proper data on stock out cost, carrying cost, ordering cost, price of raw material etc. Separately, future researcher would not be able to predict the re-order period and how much to maintain the safety stock properly. Thus, in the real situation of the operation of the company regarding its inventory managing system could not be found. From study and analysis of data, inventory management and control system is same.

5.3 Recommendation

On the basis of the study, the following suggestions may be recommended for consideration:

1. The both company should define its goals and objectives clearly with regards to its inputs and outputs separately i.e. the quantities, time period should be specified.
2. The most applicable model of ABC classification is another tool that can be applied for managing inventory smoothly. The classification of ABC analysis helps to know which items in inventory have higher usage value and which have not and accordingly a precise control over the items in inventory can be applied HPPCL and NTL are not adopting the ABC analysis.
3. The company should follow scientific tools and technique i.e. economic order quantity and economic lot size formula which help to reduce the relevant total cost for manufacturing product. The output obtained from quantitative analyzed results the lowest cost

and consumer can use with low cost than company can increase their selling.

4. Expert technicians are needed for the production of qualitative products and effective sales plan. So the process of selection and recruitment techniques should be unbiased.
5. To manage inventory, ledger cards can also be used by both companies. In this card the name of items, item numbers, unit price, usage rate, suppliers name, the percentage of carrying cost and the ordering cost, data of order and its receipts with date, quantity used and issues of raw materials are maintained.
6. Job evaluation should be launched in certain time interval so that the hard-working employees can be rewarded and the task avoiding once can be taken into action of both companies.
7. In case of HPPCL, the encouragement should be done to the farmers to cultivate herbs plants.
8. Record keeping system should be scientific and computerized. So that the corporation can locate the past records which are helpful for the researcher as well as concern parties of this company.
9. The vision of the top level management should be clear for solving the problems appeared in course of inventory management system.
10. The frequently changing of the general manager has also affected the management. It should create unstable environment. Therefore, the post of the manger should be professionalized and it should be far from political interfering.

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