INVENTORY MANAGEMENT OF NEPAL OIL CORPORATION

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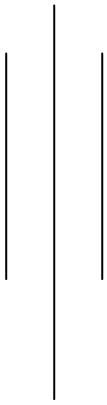
A thesis submitted to:
Office of the Dean
Faculty of Management
Tribhuvan University



In Partial fulfillment of the requirement for the degree of Master of Business Studies (MBS)

Kathmandu, Nepal
April, 2011

RECOMMENDATION

This is to certify that the thesis

Submitted by:

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Entitled

"Inventory Management of Nepal Oil Corporation"

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

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VIVA VOCE SHEET

We have conducted the viva-voce examination of the thesis presented by

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"Inventory Management of Nepal Oil Corporation"

And found the thesis to be the original work of the student and written according to the prescribed format. We recommend the thesis to be accepted as partial fulfillment of the requirement for

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DECLARATION

I here by declare that this thesis entitled **"Inventory Management of Nepal Oil Corporation "** submitted to Shanker Dev Campus, Faculty of Management, Tribhuvan University is my original work done for the partial fulfillment of requirement of the degree of Masters of Business Studies (MBS), which is prepared under the supervision of **Mrs Ruchila Pandey** Associate Professor of Shanker dev campus.

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ACKNOWLEDGEMENT

I received help in various forms from many individuals and NOC's staffs in pursuing this study and I would like to express my sincere and deepest gratitude and appreciation to them.

To my respected research advisor, Mrs. Ruchila Pandey, lecturer in Shanker Dev Campus, Faculty of Management, T.U for her invaluable and wholehearted support through out the course of study, inspite of her tight schedule . I acknowledge my deepest gratitude to Mr. Vibhas Gautam for his valuable support during my data collection, co-operation and moral support.

To my respected parents, Krishna Shrestha, Yamuna Shrestha and to my beloved husband Anil Napit for their regular support and inspiration

To my friend Sachit Babu Ghimire for his encouragement, inspiration and co-operation.

And finally to all individuals who had helped me in one way or another but whose named did not appear in this list please accept my thanks.

Finally, if any corrections has still remained in this work, I will fully feel responsible to correct it.

Preeti Shrestha

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CHAPTER I

INRODUCTION

1.1 Inventory

Inventory means the raw materials, work-in-process goods and completely finished goods that are considered to be the portion of a business's assets those are ready or will be ready for sale. Inventory represents one of the most important assets that most businesses possess, because the turnover of inventory represents one of the primary sources of revenue generation and subsequent earnings for the company's shareholders/owners. It also means a Company's merchandise, raw materials and finished products and unfinished products which have not yet been sold. These are considered liquid assets, since they can be converted into cash quite easily. There are various means of valuing these assets, but to be conservative the lowest value is usually used in financial statement.

Inventory is one of the most important assets to many organizations. Large percentage of the total capital is invested in inventory. Inventory is vital element in the efforts of the firm to achieve desired sales level

1.2 Inventory Management

Inventory management involves planning of the optimal level of inventory and control of inventory cost supported by an appropriate organization structure, which is staffed by trained persons and directed by top management. It involves both financial dimensions as well as physical dimensions and these dimensions are interrelated and can’t be looked in isolation.

(Dr Govind Ram Agrawal; Marketing in Nepal , Fundamental Management and Strategy , Educational Enterprises (p) Ltd. Kathmandu , 2000, Page 238)

Inventories form a link between production and sale of a product. The inventory exists in manufacturing and non-manufacturing organization. In manufacturing organization there are four types of inventories. First raw materials, those units that have been purchased and stored for future productions, second work in process refer semi- manufactured products. They represent products that need more work before they became finished

products for sale. Third finished goods inventories are those completely manufactured products which are ready for sale an the fourth is about supplies include office and plant cleaning material don't directly enter production.

(I.M Pandey:; Financial Management , Vikash publishing House Pvt. Ltd ., New Delhi , 1994 , page 755)

In case of trading concern inventory will comprise only finished goods or stock in trade owned by it for sale to customers in the normal course of business.

(S.P Jain and K.L Narang,. Financial and Management Accountancy, Kalyani Publishers , New Delhi , 1993 Page 68A)

Thus management should pay adequate attention to the inventory management to reduce the cost of production (manufacturing), sales (non – manufacturing) and working capital requirements. Inventory should be maintained in appropriate quantity as to avoid both under stock and over stock situation. For this purpose, inventory management is necessary it is because the aim of inventory management is to avid excessive and inadequate level of inventories and to maintain optimal level of inventory for the smooth production and sales operation. Therefore Inventory management is primarily concerned with minimizing cost of investment in inventory, cost of maintaining desired level of inventory and minimizing total

cost of inventory. Both the physical as well as financial dimension of inventory should be effectively managed. Thus the real task of

Top management lies in formulating the plans and policies that will lead to optimal inventory investment for attainment of desired objectives.

The growing number of corporations in Nepal is facing problem of inventory management. Due to lack of proper inventory policies, there are many corporations where large amount of capital has been blocked up and very little measures have been taken to manage the inventory decisions models and techniques that have so far developed.

Manohar Krishna Shrestha; Financial Management Accountancy , Kalyani Publishers , New Delhi , 1993 Page 68 A

The area of inventory Management covers the establishing time schedules, procedures and a lot sizes for new order, determining minimum safety levels and co-ordination of sales facilities, arranging the receipt, disbursement and procurement of materials, developing the forms of recording these transactions, assigning responsibilities for carrying out the inventory control function and providing the reports necessary for supervising these overall activity.

SC. Kuchhal; Financial Management , Chaitanya Publishing House , Ellahabad , 1979 , Page 227

1.3 Nepal Oil Corporation Limited

Nepal Oil Corporation Ltd. (NOC) is a state –owned enterprise dealing in Petroleum products. Its main business consists of importing, storing, distributing petroleum products to meet the energy requirement of nation and realizing the need to institutionalize the supply as well as distribution of petroleum oil and lubricant products in the country. His Majesty's Government of Nepal (HMG/N) established the Nepal Oil Corporation Ltd in 2027-09-26 (1974) under the

company act 2021 (1964) as a state owned trading enterprises to fulfill the objectives as set by the fourth five year national periodic plan. The Government owns the majority of its share and four other state –owned enterprises have also made investments in NOC. They are National Insurance Corporation, Nepal Bank Limited, Rastriya/ Banijaya Bank and National Trading Limited. It was established with the authorized capital of Rs .10 million and paid of capital of Rs. 105 million. Government of Nepal owns 98.36% of its share and rest is contributed by four other state owned enterprise s, namely Rastriya Banijya Bank. Shareholder Chart.

In the very beginning, the trading activities of NOC were started by storing two products in two drums under the leadership of late Mr. Subarna Bikram Thapa appointed by Government of Nepal. His persistent endeavor to develop NOC had resulted more than 30000 Kilo liters (KL) of storage facilities for petroleum products in different regions of Nepal.

Nepal, being one of the land locked countries of the South –Asia has to depend on India for the supply and distribution of various petroleum products as the eastern, southern and western part of the country is attached to India. The prospect of crude oil exploration in Nepal has not yet been proved a feasible one. So the entire national demand is met by import alone. From the very beginning of NOC's trading activities, a special and long term supply arrangement is made with Indian Oil Corporation Ltd. (IOC), leading national oil company of India having more than 55% of market share.

NOC headquartered in Kathmandu, has over the years expanded and now has 5 regional offices, Branch Offices, Fuel Depots, with total existing storage capacity of 71558 kiloliters (KL) and employing 411 permanent work forces. The highest policy making and controlling body of NOC is Board of Directors. The Board is represented by all the shareholders.

Currently the Managing director (MD) who is also the member secretary of NOC Board has the overall responsibility for the day to day operations besides the chairmanship of NOC Board. The highest policy making and controlling body of NOC is its Board of Directors. The operations of NOC are coordinated by DMD.The pricing of major petroleum products like MS, HSD, SKO, and LPG needs the approval from the government of Nepal. It has a vision of an integrated oil energy corporate body under the national leadership with a strong commitment to meet people's expectation maintaining ecological balance. Its mission to generate /develop /establish a strong corporate identity as a premier energy supplier to the people for their utmost satisfaction.

Nepal is becoming more dependent on oil for meeting its energy requirement. The demand of petroleum products like MS, HSD, SKO ATF and LPG is about 1.2 million ton (MT) per annum with annual increase by 20%. Petroleum products constitute about 11% of total energy consumed in Nepal. The nearest port in India is Haldia (Kolkata) which is about 900 km from nearest international border. The transportation from nearest sea port to Nepal is the main constraint for import of POL from the third country. All the petroleum products consumed in Nepal are procured and imported from India's Indian Oil Corporation (IOC) less than five years of Contract Agreement signed on 31st March 2007. NOC uplifts petroleum products as per its requirement from IOC's 6 nearest refineries and depots situated in eastern and northern part of India. The transportation from IOC locations to NOC depots and to retail outlets is done by Tank trucks. To meet the increasing demand, a MOU between IOC and NOC for the construction of cross border Petroleum product pipeline from IOC's depot to NOC's depot in the central region is under way.

Objectives of NOC

- To manage for the import of petrol, diesel, kerosene, lubricants, grease aviation fuel, etc and other oils from different countries of the world.

- To complete the job mentioned above, manage for necessary place and technical assistance for the construction of storage tanks.
- To obtain the sole agency and distribution ship of different countries for the marketing of petroleum products in Nepal.
- Import crude oil from different countries and refine the crude oil either in association with other foreign oil companies or setup own refinery.
- To setup industries for the exploration of oil and gas reserves of the country.
- To manage for the storage facilities of imported petroleum products in the country.
- To manage the supply and distribution of petroleum products in the country either by own arrangement of tank trucks or through private parties as per the requirement
- To work on the other supporting activities required to fulfill the objectives of NOC.
- To establish other subsidiary companies and invest either in and or the business.

NOC is the key supplier of energy in the country; it supplies petroleum products to meet a significant part of energy requirements of the people. Energy is an essential requirement of life and development process. So as a premier energy supplier, NOC is fully aware of the growth trend and changing consumption pattern in the energy sector. It has geared its institutional resources in the past to meet its requirement and it will expand and strengthen its capacity to meet the needs of future. With the advancement of air and road transport and industrialization, the demand of petroleum products has gone increasing. Due to the storage of firewood for fuel and rapid urbanization have also increased the demand of petroleum products.

The objective of the corporation is to ensure smooth and uninterrupted distribution of petroleum products in the kingdom by negotiating with the petroleum exporting countries buying from the soft market. The refined petroleum fuel bought from oil-exporting countries is transported to the seaports of the Indian border. Thus imported oil is given to Indian Oil Corporation (IOC) on the condition of receiving the same amount in the Nepalese Border. And imported oil is distributed throughout the kingdom by agent or by corporation used to buy the petroleum products directly from international companies. In the agreement between Nepal and Indian Oil Corporation It has been decided to import the fuel through different gates located in indo-Nepal on the basis of product exchange system.

After, its establishment, NOC got monopoly in the import and distribution of Petroleum Products, thus till this date NOC is an only one company dealing in major petroleum products in the country.

Different kinds of petroleum products have been imported for domestic use, air service, industries and transportation. Among them the cheap fuels like Kerosene, Diesel, Petrol and Aircraft fuel (ATF) come to the front. Besides Light Diesel Oil, corporation also supplies Furnace Oil and Cooking Gas (Liquefied Petroleum Gas or LPG)

NOC has invested to establish several companies in Nepal. Nepal Lube Oil Limited, Bitumen and Barrel Industries, Gorakhkali Rubber Udhyog are shared by NOC. NOC is involved indirectly to Lube Oil. While importing petroleum products, realizing the price in International markets, NOC has followed certain system. Making agreement with Indian Oil Corporation in the import of petroleum products is mainly for storing the petroleum in spare stores located at Indian seaport. The petroleum product imported in this way is supplied to the common people all over the kingdom through the dealers, branches and sub branches.

The main function of NOC is to purchase and sale the petroleum products for its regular supply. It is most necessary to keep the petroleum products in stock. For

this purpose it is essential to build storehouses in different places. Up to now the corporation has the capacity of keeping petroleum products to meet the demand for 35 days.

1.4 Organization Structure of NOC

The purpose of Organization structure and assignment of authority is to establish a framework within which objectives of the enterprises may be attained in a coordinated and effective way on a continuing basis. The scope and interrelationship of the responsibility of each individual manager are specified.

To increase managerial and operational efficiency practically all enterprises, expect the very smallest ones, should be structurally, disaggregated into organizational sub units .The manager of each sub unit should be assigned specific authority and responsibility for the operational activity of the sub units.

The organizational structure of the corporation is presented in appendix 1.

1.5 Inventory Management in Nepal Oil Corporation

In the NOC, inventory refers petroleum products, which are kept for sale to its customer. The Petroleum products include Super Kerosene Oil (SKO), High Speed Diesel (HSD), Motor Spirit (MS) and Aviation Turbine Fuel (ATF)

The Inventory management is the integral part of NOC. The proper inventory management system is necessary in NOC for avoiding both the excessive and inadequate level of inventories and to maintain sufficient inventory for smooth sales operation and efficient customer service.

In the NOC, the inventory management is the process of purchasing, store, keeping, selling, distribution, and controlling of petroleum fuels to achieve the corporation’s objectives with integrity, efficiently and economically through effective implementation of Nepal Oil Corporation’s policies.

1.6 Statement of the problem

Most of the Nepalese corporations are the victim of the unscientific inventory management system. It is one of the most important cause's to impact adversely to the profit of these Corporations. In the context of inventory management Dr Govind Ram Agrawal quoted "Management experts claims that inventory management in Nepal is probably the weakest aspect of management. The tools and techniques for controlling inventory have not been applied in Nepalese enterprises for controlling their physical as well as financial dimensions."

Dr Govind Ram Agrawal; Op Cit page 239

In Nepalese enterprises whether a public or private sector, top management do not play significant attention towards the financial function and they make their scope very narrow. Like that of marketing function. As a result the financial resources are squandered inefficiently with apparent wastage which leads to high cost, lower quality and gross inefficiency. Most of the financial management in public enterprises do not pay enough attention to planning their times is spent on doing routine accounting words and less importance is given to financial matters such as management of working capital , preparation of financial plans, capital budgeting etc.

Vijaya K.C ; The Role Financial Managers in Nepalese Corporation , Curriculum Development Center , Kathmandu , 1988 page 48

The basic problem of the study is to examine the inventory management system that is exercised by the Nepal Oil Corporation Ltd. Effective and efficient inventory management system can only yield expected profit of the corporation. The suitable adaptation of inventory level is crucial for an organization. It should be balanced in such a way that should neither excessive inventory results, the unnecessary tie up the firm's funds and loss of profit, excessive carrying cost and risk of liquidity. Whereas the inadequacy of inventory causes, either production

holds up or failure to meet the demand of customer. Hence question of the study arises what should be the optimal level of inventory?

Various tools and techniques have been developed for the systematic and scientific inventory management system to handle inventory management problem. Now question arises whether or not the corporation is following these tools and techniques?

The turn over indicates the speed with which assets are being converted or turn over into sales. It measures the relationship between sales and assets. The high turn over shows favorable financial position of the corporation and the low turn over means unnecessary blocking up capital such situation affects the operational efficiency of the Corporation. So the next problem is that the Corporation properly utilized its assets in terms of inventory turn over?

1.7 Rationale of the Study

Inventory management is one of the most important functions in any organization. Without any effective and efficient inventory management, no organization can achieve its goals. Appropriate inventory management helps to avoid unnecessary investment in inventory on the other hand neglecting the management of inventories will be jeopardizing corporation's long run Profitability and may fail ultimately. A slight change in the cost of inventory will bring a great change in firm's profitability; reduction in inventory cost may result in high profit and so on.

Petroleum products are the basic sources of energy. The effectiveness of NOC seems when it can manage the inventories of this energy. But most of the Nepalese organizations are failing to manage their inventories properly. NOC is not free from these weaknesses. This study has attempted itself to concentrate on the problems faced by NOC in the areas of inventory management. It is anticipated that this study help to solve the problem faced by NOC and eliminate the obstacles in the inventory management.

1.8 Objectives of the study

The prime objective of this study is to explore the inventory management system of NOC.

To attain these objectives, the following specific objectives are set.

. To study the present practice of procurement, storing, sales and distribution system of NOC

. To determine the inventory ratio of NOC.

. To examine the relationship between actual purchase and Closing Stock.

. To examine the relationship between actual Sales and Closing Stock

. To examine the targeted sales and actual sales and its progress.

. To examine the targeted purchase and actual purchase and its progress.

. To identify the quality control and quality awareness of NOC.

. To provides suggestion on the basis of above study and findings.

1.9 Limitations of the study

The study has been conducted as a partial fulfillment of the requirements of the master degree in business studies. Therefore the study has following limitations.

.Time and resources for the studies are the major limitation.

.The comprehensibility and the accuracy of the study are based on the data available from the management and various published document of NOC.

.As a study is only on in inventory management of petroleum products of NOC, so the results are thoroughly applied in all types of trading corporations.

.Central office of NOC denied to provide the data based on monitory value, so all the data are presented in quantity.

.This study covers a span of five years starting from the fiscal year 2004/2005 to 2008/2009

2.0 Chapter Scheme

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

Chapter 1: Introduction

.It includes introduction of Inventory, Inventory Management, Nepal Oil Corporation, Statement of problem, and Objectives of the study, Rational of the study and limitations of the study.

Chapter 2: Review of Literature

.This chapter consists of the conceptual framework about inventory management system and also review of related works done.

Chapter 3: Research methodology

.It deals with Research design, Nature of data, Data collection procedure and analytical techniques.

Chapter 4: Data presentation and Analysis

.This chapter analyses the data and interprets the result so obtained.

Chapter 5: Summary, Conclusion, and Suggestion

.It summarizes the result of analysis and offers suggestive framework.

CHAPTER II
REVIEW OF LITERATURE

2.1 Theoretical Consideration

Every Organization should maintain optimum level of inventory to run their production and sales smoothly. Establishing optimum level of inventory is very difficult task for the organization because errors in establishing inventory level can lead either to loss in sale or to excessive cost leading to bad impact on profit.

Any procedure that allows a firm to achieve a given sales volume with a lower investment in inventory will increase the rate of return and hence, the value of the firm. However, the action to reduce the inventory investment can also lead to loss in sale due to stock out or to costly production slowdowns. Manager must maintain inventory at level which balance the benefit of reducing the level of investment against the costs associated with lowering inventories.

A limited number of research are found to be conducted in the field of inventory management and control system but the inventory management and control system of Nepal Oil Corporation has not been studied yet and they have not enough idea about what inventory management actually is?

How the mismanagement of inventory increases the cost of petroleum products and how excessive and inadequate level of inventory impact the organization sales procedure.

2.2 Types of Inventory

The principle types of inventory held by an organization are as follows:

I) Raw material

II) Work in progress (WIP)

III) Finished goods

IV) Supplies

I) Raw Materials

Raw materials are those inputs that are converted in to finished products through the manufacturing process. Raw materials inventories are those units, which have been purchased and stored for future production

IM Pandey; Op. Cit. Page 755

Material used in factory are traditionally, classified as direct material and indirectly material. Direct material is generally defined to include all material and parts that are integral part of finished product and their contribution can be directly identified. Indirect material is generally defined as material used in manufacturing process as supporting material only. Nepal Oil Corporation is trading concern organization so it has not recorded any kind of raw material inventory.

II) Work in Process

Work in process represents the semi finished goods they include those materials that have been committed to production process but have not yet been converted in to finished goods.

S. P Jain and KL Narang; Op. Cit. Page III 109

Separating the materials which is semi finished goods and which are not is very difficult because the same material may be used as work in process as well as finished goods in other industry it depends upon nature of production. The Nepal Oil Corporation has not recorded any kind of work in process inventory.

III) Finished Goods

The finished goods inventory represents products that are ready for sale. For these items, the production process is complete.

JF Weston, S Bisley and bisley and E.F Brighham; Essential of managerial Finance , The Dryden press , USA 1996 , Page 426

Firms carry finished goods to ensure that order can be filled when they are received. If a firm did not have finished goods inventory it would have to wait for the completion of the production process before inventory could be sold thus demand could not be satisfied when it arrives. When demand arrives and there is no inventory to satisfy that demand a stock out exists and the firm might lose the demand to competitors perhaps permanently.

So stock of finished goods is required for smooth marketing operation of Nepal Oil Corporation to sell these products which are given below:

1. Liquefied Petroleum Gas (LPG)
2. Motor Spirit (MS)
3. Aviation Turbine Fuel (ATF)
4. Super Kerosene Oil (SKO)
5. High Speed Diesel (HSD)
6. Light Diesel Oil (LDO)
7. Furnace Oil (FO)
8. Methanol Turbine Oil (MTO)
9. Hexane
10. Jute Bashing Oil (JBO)
11. Power Boost Methanol (PBM)

IV) Supplies

Firms also maintain the fourth kind of inventory i.e. of supplies. Supplies include office and plant cleaning material (Soap, broom etc) oil, fuel, lights bulbs and the like these material do not directly enter production, but are necessary for

production process. Usually these supplies are small part of the total inventory and do not involve significant investment.

IM Pandey; Op Cit . page 755

2.3Purpose of Inventory Management

Even though the inventory of material may be described as an idle resources, as it is not meant for immediate use as it is necessary to maintain some inventories. On the other hand, shortage of inventories or stock outs may results stoppage of the factory losing a customer or the market thus adequate inventories are required for

Lallan Prasad and AM Banarjee; Poduct Management , Sterling Publishers pvt Ltd New Delhi,
1985, Page 343

.Avoiding interruption in production owing to stock out.

.Adequate customer service.

.Taking advantage of longer production runs.

.Utilizing price discounts normally associate with bulk purchasing.

.Making possible economies in transportation cleaning and forwarding charges.

.Servicing as a buffer in case of finished products.

.Providing flexibility in production plans.

.To even out the workloads on the shops in the face of fluctuating demand.

.Lower borrowing and credit for lack of funds.

.Maintenance of inventories that cost money by way of expenses incurred on ware house facilities, breakage, wastage, equipment, personal insurance charges against fire, pilferages, obsolesces, deterioration etc.

2.4 Inventory Costs

The goal of the inventory management is to provide the inventories for sustaining operation at the lowest possible cost. The first step in inventory management is to

identify all the costs involved in purchasing and maintaining inventories typical costs associated with the inventories are described below:

2.4.1 Carrying Costs / Holding Costs

Total Carrying Costs generally increases in direct proportion to the average amount of inventory carried .Inventory carried in turn depends upon the frequency with which orders are placed.

J.F. Weston, S Bisley and E.F. Brigham ; Op. Cit . Page 428

The cost associated with having inventory which includes storage cost, insurance cost of tying up fund, deprecation cost and so on. These costs generally increases in proportion to the average amount of inventory held.

To illustrate it a firm sells S unit per year and if it places equal order N times per year then Q=A/N unit will be purchased with each order. If the inventory is used evenly over the year and if no safety stock are carried then the average inventory A will be.

Average inventory = A= unit per order /2 =(S/N) /2 =Q/2

Defining the annual percentage carrying costs as C, annual total carrying costs (TCC) as the percentage carrying costs C times , price per unit PP times the average inventory in units A.

Total Carrying Costs (TCC) = C*PP*A=C*PP*Q/2

Carrying costs are described as below:

(I)Capital Cost / Opportunity Cost

This consists of expenses raising funds (interest on capital) to finance the acquisition of the inventory. If funds were not locked up in inventory, they would have earned returns. This is opportunity cost of funds or financial cost component of the cost.

MY Khan and SP Jain; Op . Cit Page 728

Funds associated with inventories are not available for others uses, therefore an opportunity cost is determined by the alternative use to which the funds could be put. For example : from the alternative uses if firm can earn 10% return then the capital cost of inventory is 10%.

(II)Handling Cost

The size of consignments and the material handling facilities in the store determines these cost up to a certain level of inventory size the per unit handling cost decreases with the increases in size of inventory , but beyond that level the per unit handling cost starts increasing

Bs Goel; Production Management , Pragati Prakashan ,Meerut , 1992 , Page 279

(III)Storage Cost

The cost associated with maintenance of inventory is storage costs. These include expenditure made in inventory staff, expenditure on providing various facilities like heating , Lighting , floor space, shelves and racks, bins and containers material handling equipment's and other provisions for safe and proper storage of items . These costs generally depend upon the volume to value ratio of an item

Ibid. Page 278

(IV)Spoilage and Shortage Cost

Many products deteriorate over time in storage. The precise nature of the deterioration various from product to product but whatever the causes, it represents reduction in company's assets and such is a cost of holding inventories. This is termed as a spoilage cost. Sometimes spoilage and shortage cost may increases because of shrinkage and pilferage of inventory.

Solemn Ezra; The Theory Of Management , New York Colombia , 1995 , Page 34

(V)Depreciation Cost

In every organization the value of the capital investment decreases with time. Thus, there is a tendency among organization to reduce its capital investment on machines and other equipment. The depreciation costs are thus reduced. Naturally the desired among of production with reduced number of machines can be obtained by running the machines in slack period thus increasing the size of inventory,

(VI) Insurance and Taxes

Many of the goods in inventory requires insurance and it should be included in inventory holding cost whether out side, insurance is carried or inventory is self insured . The cost of this insurance will vary according to the size and the value of inventory. Some countries levy Inventory taxes for example on various data's through the year. The inventory a firm has one hand those data's the higher their tax will be. Where such tax is in effect prudent inventory management may dictate periodic reduction in inventory to coincide with the data's on which the assessment are made.

John F Megee; Guides To Inventory policy , II Havard business Reviews , 1990 , Page 44

(VII) System Cost

Another type of Inventory Carrying Cost, which is associated with the administration of inventory system, is known as system cost. These costs incurred for gathering information, supervision, and physical stock checking and maintaining the record keeping equipment cost. It is difficult to determine whether these expenses will be high or low expect by making a comparison amount actual

inventory system.**G Hading and TM Whitin ; Analysis Of Inventory System , Englewood diffs New Jersey Printer Hall Page 17**

2.4.2 Ordering Costs

It is assumed that carrying cost are entirely variable an increases in direct proportion to the average size of inventory.

JF . Weston, S Bisley , EF Brigham ; Op . Cit . Page 429

For example the cost of placing and increasing an order generally interoffice memos, using fax transmission or long distance telephones calls and taking delivery –essentially are fixed regardless of the average size of an inventory.

Ordering cost are the cost involved in placing and receiving an order or purchased items . The expenses involved in this cost are:

.Purchasing requisition

.Purchase Order

.Transport and Insurance

.Receiving and Inspection

.Store placement

.Accounting and Control

Ordering cost increases with the number of orders; thus more frequency in inventory acquired, higher the firms ordering cost. On the other hand if the firm maintains large inventories levels there will be a few order placed and ordering cost. On other hand if the firm maintains large inventories levels there will be a few order placed and ordering cost will be relatively small. Thus ordering cost decreases with increasing size of inventory.

The fixed costs associated with ordering inventories as O and if we place N orders per year, the total ordering cost is given as,

Total ordering cost = TOC=o*N =O (S/O)

Here TOC= Total ordering cost

O= Fixed cost per order

N=Number of order placed per year

Q= Inventory Quantity for each order

2.4.3 Stock out Costs

Stock out Cost is associated with demand. The depletion in stock results in stock results in loss of sales or backorder costs. When sales are lost due to stock out, the firm loses both the profit margins on unmade sales and its customer's goodwill. If customer uses another business else where , future profit margin may also be lost and back order cost is needed to convince customers to use again after inventories have been replenished .Back order cost includes loss of good will money paid to re-order goods and notification to customers when goods arrive.

Everette , Adams , Jr . Ronald J; EBERT , Production And Operation Management , Prentice Hall of India Pvt . Ltd . New Delhi , 2000 pg 462

2.5 Inventory Cost Control

Dr. Govind Ram Agrawal has stated that the process of inventory cost control consists of

1. Predetermining the standards for each item inventory both in terms of cost and quantity, the establishment of standard specifications for material is the staring point in cost control.
2. Measuring Actual performance of each item of inventories both in term of cost and quantity.

3. Comparing actual performance with standard to isolate variance, analyzing variances as to their incidences and causes.
4. Taking corrective action to eliminate variance

Most of the inventories costs are controllable cost all aspect of inventory management material planning , purchasing , receiving store keeping ,issuing are the primary areas of controlling cost .Control can also be effectively exercised on acquisition , holding and stock out costs of inventory.**Dr Govind Ram Agrawal ; Inventory Cost Control (Management Day Sovenir , Production Management)Gandhi Bhawan Ktm .2004**

There are several ways to achieve cost reduction through inventory management
1) Incurring loss expenditure on purchased materials and services by
a) Reducing cost of purchased items by a continuous search for materials, which are cheaper, more reliable in quantity and obtainable from sources, which facilitate smooth, delivery.
b) Using less material per unit of production or increasing yield and reducing waste.

2) Reducing cost of storage including interest on capital invested, space, insurance and handling by proper inventory control.

3) Reducing the cost of acquisition and procession of material by a) Reducing cost buying i.e., reducing the administrative costs associated with securing materials. b) Effective receiving banding and storage operation.

4) Reducing the cost of being with out by providing for continuity of supply.

Pushka r M Bajracharya and Durgesh Kumar Shrestha ; production Management , Nutan Printing Press 1998 Page 41

2.6 Inventory Management Techniques

A primary objective of the firm is the maximization of wealth. To achieve this objectives firm should maintain optimum level of inventory could be set on the basis of trade –off between cost and benefit to maximize the owner's wealth. To manage inventories efficiently and effectively answer should be sought to the following question

I) How much should be the order?

II) When should it be ordered?

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

2.6.1 Economic Order Quantity

One of the major inventory problems to be resolved is how many inventories should be added when inventory is replenished. in other words, while purchasing raw material or finished goods, the question to be answered is how many inventories should be bought in one lot under one order on each replenishment ? Should be quantity implies a higher average inventory level, which will assure

Buying in large quantity implies a higher average inventory level, which will assure

i) Smooth production /sales operation and

ii) Lower ordering or set up costs.

This is however will involve higher carrying cost. On the other hand, small order would reduce the carrying cost of the inventory by reducing the average inventory level but the ordering cost would increase, as there is a likely hood of interruption in the operations due to stock outs. A firm should place neither too large nor too small orders. On the basis of a trade –off between benefit derived from the available of inventory, and the cost of carrying that level of inventory appropriate or optimum level of the order to be placed should be determined.

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

MY Khan And S.P Jain , Op .Cit page 734

EOQ refers to that level of inventory at which the total cost of inventory comprising acquisition /ordering /set up costs and carrying cost is minimal.

Assumptions

The EOQ model is intuitively attractive because it minimizes the total cost associated with the inventory replenishment in applying the model however there are some important assumptions.

Elood S Buffu, Rakesh K Sarin ; Modern production / Operation Mangement , john Lazley And Sons (Asia) pvt. ltd. Page 124

i) Average demand is continuous and constant represented by a distribution that does not change with time. Therefore if, there is significant trend or seasonally in the average annual requirements this model is not appropriate.

ii) Supply lead – time is constant. Although this assumptions may be reasonable in many situation supply lead –time are quite variable. The result of variable lead time is that the receipt of the order produces excess inventory when lead time are

longer than expected. The basis model is not appropriate when lead times are variables.

iii) This is independence between inventory items. The EOQ model assumes that the replenishment of one inventory of one inventory items. The assumptions are valid in many instances but exceptions arise when sets of supply items are completed together by a common productions plan.

i) Purchase price and cost parameters are constant.

ii) The order of the EOQ is equal to the EOQ is equal to the delivery quantities. If delivery lots are smaller, the average inventories in the EOQ model are not valid.

These are various ways of dealing with the effect of these assumptions.

Approaches

The EOQ model can be illustrated by i) The long Analytical approach of trial or Errors Approach ii) Formula Approach and iii) Graphical Approach

I) Trial and error Approach

A firm has different alternatives to purchase its inventories. For instances it can buy its entire requirements in one single lot at the beginning of the inventory planning period. Alternatively, the inventory may be produced in small lots periodically, say weekly, monthly, quarterly and so on. If the purchase is made on in one big lot, the firm's average inventory holding would be relatively large. High average inventory would involve high carrying cost. On the other hand low inventory holdings are associated with high ordering cost. The trail and error approach for the determination of EOQ uses different permutation and combination of lots of inventory purchases so as to find out the least offering and carrying cost combination. In other words, according to this approaches the

carrying and ordering cost for different sizes of order to purchases inventories are computed and the order size with the lowest totals cost (ordering plus carrying) of inventory is the economic order quantity.

II) Formula Approach

The trial and error or long analytical approach is somewhat tedious to calculate the economic order quantity. As easy way to determine, EOQ is to use the order Formula –Approach.

The economic order quantity can be calculated by the following equation

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

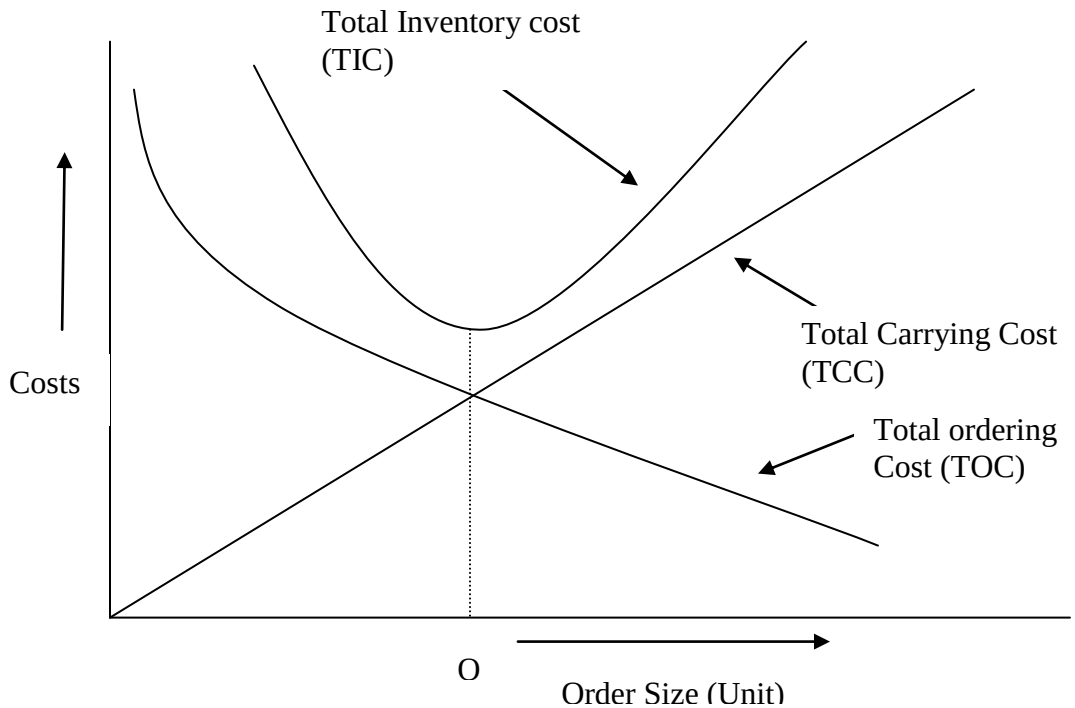
Where, S= Total inventory requirement in unit

O= The ordering cost per unit

C=The carrying cost per unit

III) The Graphic Approach

Figure No: 1



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

figure costs carrying, ordering and total are plotted on vertical axis and horizontal axis is used to represent the order size. The carrying cost increases as the order size because on an average a large

Inventory level will be maintained and ordering cost decline with increase in order size. The behavior of total cost line noticeable since it is a sum of two types of costs that behave differently with order size. The total cost decline in the first stage, but they start rising when the decrease in average ordering cost is more than offset by the increase in carrying cost.

IM Pandey; Op .Cit . Page 762

The Economic order Quantity occurs at the point Q where the total cost is minimum. If the order size is increased, carrying cost exceeds ordering costs that are saved. Thus, the firm operating profit is maximized at point Q.

2.6.2 Re- Order Point / Re – Order Level

The EOQ provides an answer to the question; how much inventory should be order to procure inventory management is covered under the order to procure inventory be places? This aspect of inventory management is covered under the order point problem.

The re – order point is stated in terms of the level of inventory at which an order should be placed for replenishing the current stock of inventory. In other words re-order point may defined as that of inventory when fresh order should be placed with the suppliers for purchasing additional inventory equal to the economic order quantity.

MY Kahn And S.P Jain; Op.. Cit; page 735

It is based on the following assumptions.

1) Constant daily usage of inventory

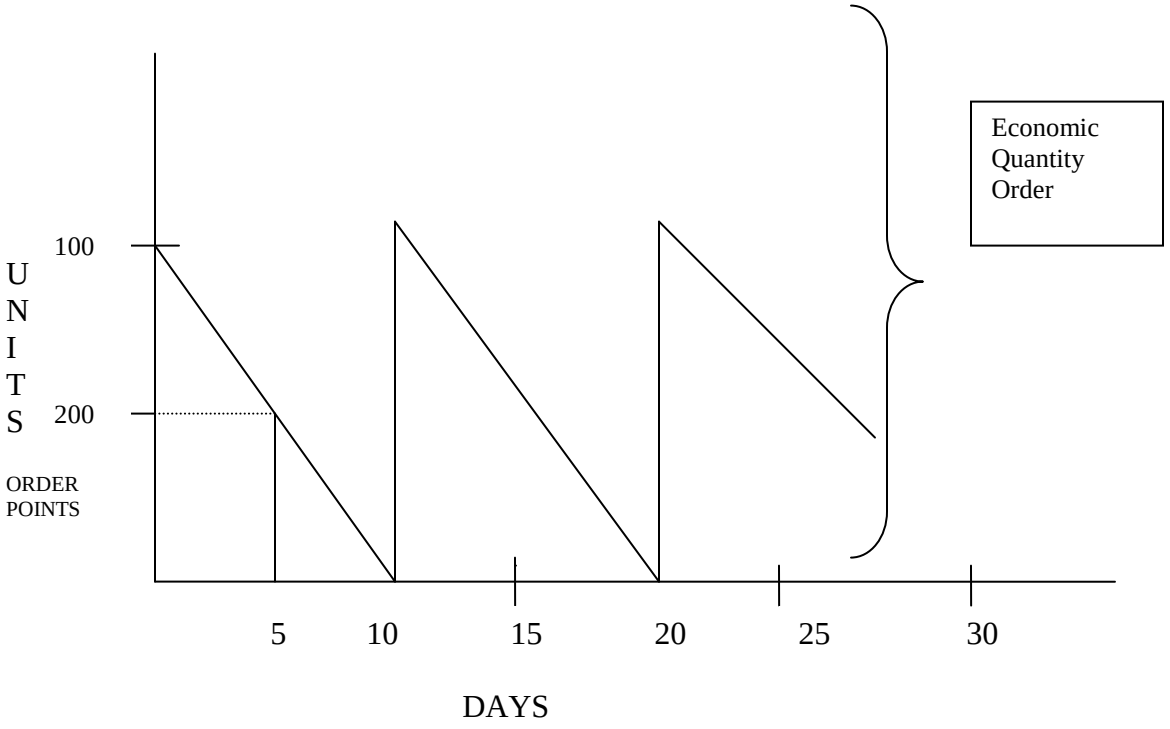
2) Fixed lead time

Suppose demand for inventory is known with certain but that it takes 5 days before an order an order is received. The EOQ of the firm is 200 units resulting in order being placed every 10 days.

If the usage is steady the firm now would need to order 5 days before it ran out of stock or at 100 unit of stock on hand. The re= order point is 100 unit when the new order is received 5 days later, the firm will just have exhausted its existing stock. This example of an order point is illustrated in figure.

Figure No : 2

Reorder point when lead Time is certain



The reorder point = lead time x average usage of inventory

The term lead -time refers to the time normally taken in receiving the delivery of inventory after placing order with the suppliers. It covers the time span from the point when a decision to place an order for the procurement of inventory is made to the actual receipt of the inventory by the firm. The average consumption means the quantity of inventory consumed daily we can there fore define reorder point as that inventory level which should be equal to the consumption during the lead time.

2.6.3 Goods in Transit

If a new order must be placed before the previous order is received, a good in transit inventory will build up. Goods in transit are goods that have been order but have not been in received.

J.F Weston, S. Bisley and E.F Brighham ; Op . Cit. Page 434

A good in transit inventory will exist if the normal delivery lead time is longer than the time between orders. Re- order point is calculated as follows.

Re- order point =Lead time *Average Usage – Goods in transit

2.6.4 Safety Stock or Buffer Stock

The Re- Order point could be computed under the assumption of certainty. It is difficult to predict usage and lead –time accurately. The demand for material may fluctuate from day to day or from week to week. Similarly the actual delivery time may be different from the normal lead time.

If the actual usage increases or the delivery of the inventory is delayed, the firm can face a problem of stock out.

Therefore the firm would be well advised to keep a sufficient safety margin by having additional inventory to guard against stock out situation such stocks are called safety stock. This would act as a buffer or cushion against a possible shortage of inventory caused either by increased usage or delayed delivery of inventory. The safety stock may, then be defined as the minimum additional inventory to serve as a safety margin or buffer of cushion to meet an unanticipated increased in usage resulting from an unusually night deem and or an uncontrollable late receipt of incoming inventory.

MY Khan And SP Jain ; Op .Cit . Page 739

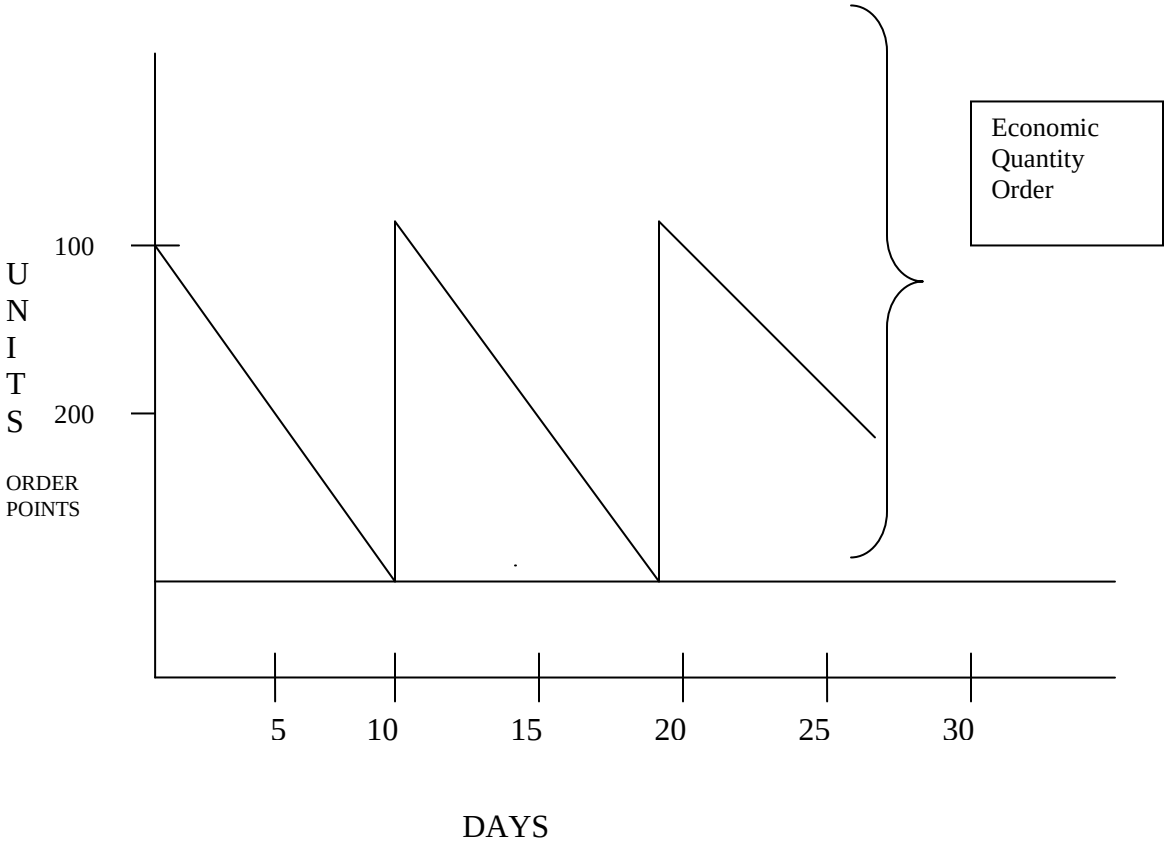
The safety stock involves two types of costs: (1) Stock –Out and (ii) Carrying cost. The job of the financial manager is to determine the appropriate level of safety stock on the basis of trade off between these two types of conflicting cost. The exact quantity of safety stock of an item depends upon its lead time and usage variation. It also depends upon its importance in the process, which may be measured in terms of stock out costs.

Pushkar M Bajracharya and Durgesh Kumar Shrestha; Op . Cit Page48

When demand for inventory is uncertain as well as lead time, a safety stock becomes advisable .The concept have is illustrated in figure. In the upper panel of the figure it can be seen that what would be happen expected demand of 200 units every 10 days and lead time of 5 days is to occur. Note that with a safety stock of 100 units, the order point must do set at 200 units of investor on hand as opposed to the previous 100 units. In other words the order point determines the amount of safety stock held.

Figure No:3

Reorder point when lead Time is not certain



2.7 Stock Level Sub System

This stock level sub system keeps track of the goods held by the firm the issuance of goods and the arrival of orders. It is prepared for re- ordering as well accounting of goods in stock. Thus this stock level sub system helps to maintain the records of inventory at appropriate level.

John J Hampton ; Financial Decision Making Concepts , Problem and Cases , Prentice Hall of India Pvt . Ltd ., New Delhi , 2004 Page 56

For simplicity the stock level are divided into following heading.

1) Maximum Stock Level

This Level indicates the quantity above which stock should not be allowed to be kept. The purpose of keeping this level is for saving the company from the disadvantage of overstocking.

2) Minimum Stock Level

This represents the quantity below which stock should not be allowed to fall. The main purpose, this level is to ensure that production is not held up due to shortage of any material.

3) Danger Stock Level

This means a level at which normal issue of material are stopped and issues are made only under specific instructions.

2.8 Inventory Re-Order System

The supply situation is dynamic changing at all times; therefore re-order level and safety level should be reviewed i.e.; continuous monitoring. The following methods are used to review the various levels.

SC Kuchal ; Financial Management Analytical And Conceptual Approach , Chaitanya Publishing house, University Road , Allahabad , 1980, Page 130

I)Two Bin System

In this system the stock of each item is separated in to two piles, bins or groups. At the first a sufficient supply is kept to meet current demand over a designated period of time. In second, safety stock is available to meet the demand deriving the lead –time necessary to fulfill the order when the first bins stock has been exhausted, re-order occurs and the stock in the stock in the second bin is used to cover the requirement.

II) Mini Max System

This is one of the oldest methods and is still a delay in use for each type of inventory maximum level is set that demand safely required to prevent out of stock conditions. The minimum level also governs the ordering point. In order of sufficient of size is placed to bring inventory to the maximum point when the minimum level is reached.

III) Order Cycle System

In this system periodic reviews are made of each items of inventory and order are placed to restore stock to prescribed supply level. The frequency of reviewed generally depends upon the critically of the term for instances the critical items may require relatively short review cycle. On the other hand the lower cost non-critical items may require relatively short review cycle. On the other hand the lower cost non critical items are given longer review cycle since stock out would be less costly. At each review date the required amount is ordered to bring the inventory to the predetermined supply level.

IV) Statistical Inventory Control System

A number of firm with widely spread distribution system find the use of mathematical model and electronic pattern inventory location and levels that best reconcile consideration of customer service, manufacturing and distribution cost and inventory turnover. Thus mathematical Approaches have been developed to help inventory management decisions, on the us more operation research affair have been devoted to controlling the inventories than to any other problem area in business and industry.

2.9 Inventory Control

Inventory control keeps track of inventories. It is observed that too much or badly balanced inventories are all to be avoided because they cost too much or badly balanced inventories are all to be avoided because they cost too much on many counts. Too much leads to undue carrying charges in the form of taxes, insurance, storage, obsolescence and depreciation and undue proportion of total working capital is invested in them. "Too little implies of too frequent ordering, loss of quantity discounts higher transportation charges, and stock out costs. The balance between "too much and too low cab be done by means of effective inventory control.

Inventory control is the technique of maintaining stock keeping items (item that is completely specified as to size, shape etc.) at the desired level, whether they be raw- materials, goods in process or finished product.

B.S Goel Op .Cit. Page 268

2.9.1 **Selective Inventory Control ABC Analysis**

Usually a firm has to maintain several types of inventories. It is not desirable to keep same degree of control on all the items. The firm should pay maximum attention to those whose value is the highest. In other word the firm should focus on the most importance item in the inventory.

The ABC Approach divides this list in to three grouping by value A item constitute roughly the top of 15% of the items, B items the next 35% and C items the last 50% .

Chase and Aqilans "Production Operation Management" Fourth Edition 1995 IRWIN page 481

The typical exhibition of ABC analysis is given below.

Table No: 1

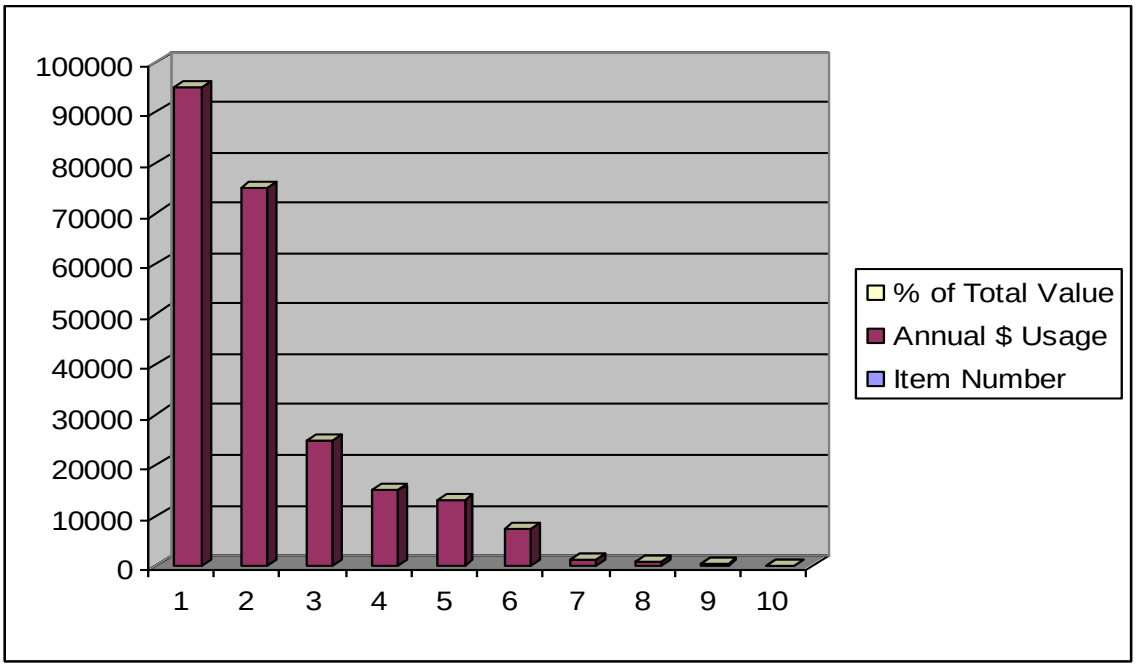
Value Analysis of ABC Grouping

Item Number	**Annual $ Usage**	**% of Total Value**
22	95000	40.8
08	75000	32.1
27	25000	10.7
03	15000	6.4
82	13000	5.6
54	7500	3.2
36	1500	0.6
19	800	0.3
23	425	0.2
41	225	0.1
Total	**233450**	**100%**

The observation above shows that the A item includes 20%, B 30% and C 50% of the total items

Figure No:4

Graphical Presentation of ABC Analysis



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So the result of this segmentation is shown in table no.2 as below.

Table No. 2

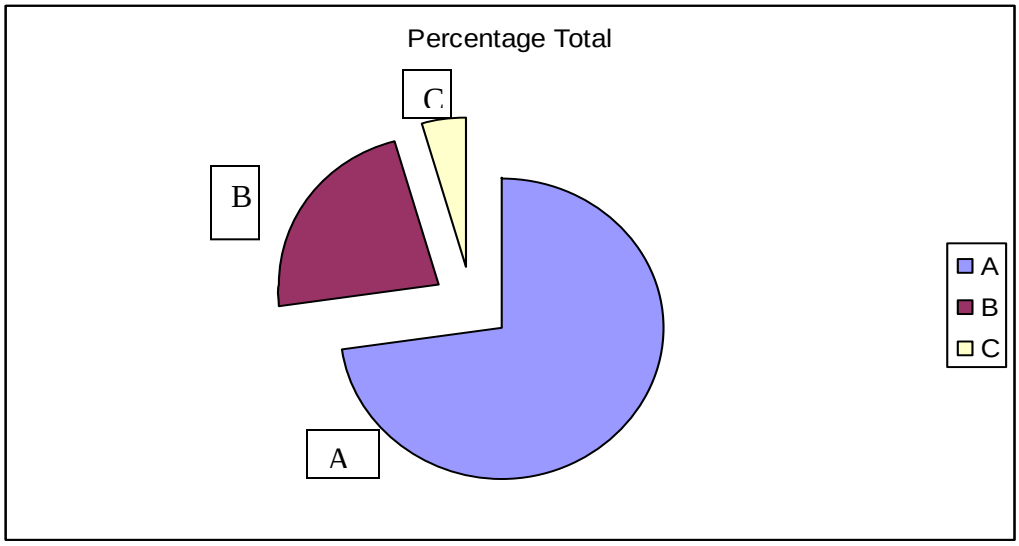
ABC Grouping of Inventory

Classification	Items number	Annual dollar Usage	Percentage Total
A	2,268	170000	72.9
B	27,03,82	53000	22.7
C	54,36,19,23,41	10450	4.4
Total		**233450**	**100%**

The Graphical presentation of above exhibit is given below

Figure No:5

Graphical Presentation of ABC Analysis



Control for class A Items: The item included in group A involve the largest investment or the highest value item. Therefore inventory control should be most rigorous and intrusive and the most sophisticated inventory control technique should be applied to these items.

Controls for class C Items: C Group consists of items of inventory, which involve relatively small investments although the number of item is fairly large. The items deserve minimum attention or the routine control should be adequate for these items.

Control for class B items: B items falls in between these two categories. It deserves less attention than A but more than C. So it requires reasonable attention of management

2.10 Inventory Valuation

In any organization different goods are purchased at different time at different price rate but the problem emerged to identify the position of current assets of the organization. How to assign value to these goods, the problem is commonly determined by using three methods.

1) FIFO METHOD (First in First out Method)

In this method corporation dispose oldest material first and ending inventory consist the most recently purchased items. In other words the inventory is valued at the unit cost of most recently purchases. The FIFO method is applicable to the corporation dealing i such commodities having no fluctuation.

2) LIFO METHOD (Last in First out Method)

In this method, the material remained on hand as a closing inventory and assigned the cost of oldest purchased price. Industry need LIFO inventories valuation in the shelter its profit from taxes in the present period of rising inflation.

3) Weighted Average Method

This method assumes that goods are removed from the beginning inventory and purchase group is proportion to the number of unit in these groups. This method is widely used by organization that holds item in inventory for long period of time.

2.11 Meaning of Purchasing

In simple words purchasing means procurement of goods and services from some external agencies. Wasting explains that "Purchasing is a managerial activity that goes beyond the simple act of buying. It includes the planning and policy, objectives covering wide range of related and completely included in such activities are the research and development required for the proper selection of materials and sources from these materials may be brought.

J.H Wasting; Purchasing Management , John Weely And Sons J . Inc., New York , 1976, Page 5

Purchasing is an enterprises has now become a specialize function. It was experienced that by giving the purchase responsibility to a specialist, the firm can obtain greater economies in purchasing.

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

2.11.1 Objectives of Purchasing

The objectives of purchasing should conform to overall objectives of the organization. it is one activity where reasonable economics can be accomplished . In the other words of J.H Wasting "Objectives of the purchasing department is to buy the right amount of the right kinds of goods from the right supplier at the right time and at right prices.

Ibid . page 15

Again he said that the objectives of sound purchasing are the avoidance of duplication, waste and obsolesce with respect to the various items purchased. A financial objective of sound purchasing is the development of internal relationship that led to understanding and harmony among the various organizational units with the company.

Ibid Page 9

Similarly Gupta states that "The responsibility of the purchasing department is to buy materials of the right quantity at the right price from the right sources with delivery at the right places. This is the way of stating the objectives of sound purchasing.

LN Gupta ; Cost Account , Kitab Mahal 15 THorn Hill Road , 12th Edition , Allahabad , 1984 , Page 579

The following are the main objectives of the purchasing.

- Procurement of required quality and quantity of materials at the 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 time ultimately be a schedule sufficiently in advance of the demands of the production department so that the production department so that the production work shall not suffer due to lack of material,

- Buying the quality which is neither too much that involves belonging of capital, nor too little that holds up the regular supply for productions.

- Improvement of product with product with reference to quality and the distribution by means of selection of adequate material.

- Maintaining continuity supply to ensure production schedule at a minimum investment.

- Avoidance of duplication of material, leading to waste of materials and equipment.

- Maintenance of company competitive position is the market by having company's quality standards in accordance with the demand of the customer.

- Creation of goodwill for the company through dealing with suppliers.

- Developing fullest co-operation and co-ordination and maintenance of internal relationship among various department of the company.

2.11.2 The Purchasing Cycle

The placing of a purchase order is only the beginning of the process. To run quickly through the entire process, the purchasing department first review requisitions placed by other functional area of the firm to ascertain it they are authorized. Needed item are properly checked and see if available cheaper material could do the job. Before writing the order however, purchasing must select suppliers on the basis of price and the quality and delivery schedule of their product. Purchasing then records the supplier's acknowledgements of receipt of orders and conform the shipping dates. When the material is received, purchasing records its arrival and check to see if there are shortages or defects in it. It checks purchase invoice and forwards them to accounting with an authorization for payment.

Thus the cycle completes beginning from the placing of purchase order and ending at he suppliers reviewed. If the material is to be purchased, the item should be used continuously, the cycle moves again and again. To support the cycle, in such a situation, the lead –time should be calculated the activity should be initiated accordingly.

2.11.3 Purchasing Approach

Under the purchasing approaches there are various purchasing methods, which are described below.

Leonard I. Garrett And Milton Silver , Production Management Analysis , Harcourt Brace Jovanovich , inc . New York , 1986 Page 374

I)Hand to Mouth Buying

Under this Approach material are purchased to meet immediate needs only. This approach is followed when the market price of the required material is above average , likely to fall or the actual requirement of the company I uncertain the objectives of this approach is to minimize inventory loss due to fall in prices.

II) Averaging Down

This approach of purchasing aims to obtain the benefit of price dips. In other words purchasing is down in every price falls. If handled successfully it is possible to keep the cost below the average market price.

III) Forward Buying

When the purchased forecasts his future needs and purchases the required goods in economic quantities to meet those need this policy is forwarded. When prices relatively stable overtime or when only moderate prices increases can be anticipated then this approach is often used. This approach is used to take advantage of economical large volume purchases.

IV) Speculative Buying

Under this method, purchase is made in excess of needs of the items when a market price is low. This purchasing helps the company to save money in purchasing and to generate profit on sales. Hence speculative buying seeks to make a possible profit by purchasing materials in anticipation of price rises.

V)Reciprocal Buying

According to this approach, the firm agrees in to a contract to buy and supply materials from each other. It is difficult to set a hard and fast rule as to the advisability of such agreement.

VI)local Buying

Sometimes, through uneconomical, materials are to purchased from Local supplier's .Especially in the area where degree of industrialization is low, this is done to build good public image

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2.12 Review of previous related thesis

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

Basnet (1999) has conducted the research work on the topic of **Inventory Management : A Case Study of Himal Cement Company Limited (HCCL)** His main objectives are

- To find out present inventory position of HCCl
- To find out inventory management techniques used by HCCL
- To provide optimum suggestion regarding inventory management of HCCL.

The major findings of his studies are

- He found out that HCCL is not applying the different methods or techniques

- There is no proper and up to date improvement in inventory against system in HCCL

Dhital (2001) has conducted the research work on the topic of **Inventory Management : A Case study of Nepal Food Corporation** .

The main objective of his study are :

- To highlight the NFC's policies and objectives functions and activities
- To analyze the various related variables like purchase, sales, sales food quota of HCC.

The major findings of his study are:

- Under food grains purchasing, the domestic purchasing are more fluctuated and of greater importance.
- The relationship between edible cereal production and requirement is negative.
- The total food grains quota is fluctuated in year after year because of production fluctuation in Nepalese kingdom.

Limbu, (2007) had conducted the thesis on **inventory management : A case study of Salt Trading organization** , submitted to faculty of management T.U.

Objectives of this study are as follows:

- To examine the practice of inventory management functions
- To analyze the position of inventory levels and its trend.
- To analyze relationship of inventory within net sales, net profit, purchase and interest expenses.

Major findings of this study are as follows:

- Corporation is applying techniques of inventory management like ABC analysis and EOQ analysis; however it is found ineffectively and unsystematically applied.

- Inventory to total assets ratio are not consistent over the study period.
- The inventories to net sales ratio of the last two years have been increased because of decrease in net sales.
- The inventories to current assets ratio of the last two years have been increased because of decrease in net sales.
- The ratio in between inventories and net profit are fluctuating trend but the ratio is more in last two years.

Gaire, (2009) had conducted the thesis on **Inventory Management of Bottlers Nepal Limited** ,submitted to the faculty of management of T.U.

The objectives of this study are:

- To study the practice of inventory management bottlers Nepal ltd. (acquisition of raw materials , storing of goods and issuing of goods)
- To analyze the position of inventory level and its trend in different periods of operation.
- To analyze the relationship between the factors like net profit, sales, purchase. etc.

Major Findings of this study are:

- The inventories maintained are of different types and there is a huge fluctuations of inventories from period to period, in some fiscal year the firm has not maintained some inventories.
- Raw material occupies the largest portion of the inventories of each inventories type where finished goods occupy the least portion on total.
- Inventories to total assets ratio, the ratio are not consistent , through there is not a huge fluctuation
- The inventories to total current assets ratio is negative due to negative current assets.

- The purchase has increased for the first year and onwards has a fluctuating trend. CV of purchase is higher than inventories which show that variability of purchase is higher than inventories.
- The trend of net sales and purchase move in the same direction for the 1st year but he purchase has decrease though sales have increased for the one year and onwards have a fluctuating trend in corresponding year. The CV of purchase is also to that net sale.

Dhakal (2009) has conducted a thesis on the topic of **A study on Inventory management and control system of royal drugs Ltd**, Along with the aforesaid objectives of the following are specific objectives that have been embodies in this study:

- To assess the type of inventory maintained on the royal drugs ltd.
- To examine the techniques employed to manage inventory in royal drugs ltd.
- To suggest proper inventory model to royal drugs ltd based on analysis.

Major Findings of this study are as follows:

- Chemical materials are overstocking.
- The packing materials were not managed efficiently.
- Inadequate level of finished goods.
- Stock items were not classified properly
- They have not recognized the minimum stock and record level.

Some of studies have been conducted in the subject of inventory management. Some studies will be reviewed in this chapter.

Dr. Govind Ram Agrawal (1980) management experts claims that inventory management in Nepal is probably the weakest aspect of management . The tools

and techniques for controlling inventory has not been applied in Nepalese enterprises for controlling there physical as well as financial dimension.

K Gopal Rao and N.V.S JagMohan Rao(1981) observed that for the efficient management of inventory, there is the need of tackling the human element in the third world country like Nepal. They have suggestion to orienting the attitude of the staffs towards material cost because lack of knowledge and carelessness, which were the responsible of this management of inventory.

Puskar Bajracharya (1983) has conducted his conducted his study on management problem in public sector manufacture enterprises in Nepal. One of the important finding was the inventory management suffer from lack of planning high carrying cost, poor recording and stores management and virtual absences of controlling system.

Maniklal Pradhan(1985)Journal on Management states that inventory management is to discover and maintain the optimal level of inventory investment and minimizing the cost of inventory, So, the physical and financial dimension of inventory should be effectively managed. If the top management cannot be managed effectively, these will be an adverse affect upon profits, which is main goal for maximizing the profit of a modern company.

Unpublished articles about Inventory Management

Rudolfmangenoldy(2010) Importance of Good Inventory Management, Business

Efficient Inventory management is crucial in today's business world to run a profitable business . Understanding your company's current supply of inventory is crucial in keeping up with the demand of your business's customer base. In order for your business to successfully keep track of these factors it's vital that you have

an excellent inventory management system in place. Most people associate inventory management tools with simply having a barcode scanner and may be just a barcode printer that will enable you to keep track of certain products.

Gideon Hillman (2010) Ware house and Inventory Optimization Combats against Recession, Strategic planning

A key factor for minimizing costs and maximizing operational effectiveness in the future economic climate is an effective logistics, warehouse and inventory management strategy .Many companies, regardless of industry sector have survived the recessions to date through drastic cost cutting exercises frequently having reduced the workforce and either closing or " mothballing " manufacturing and production facilities. This strategy is often borne out of necessity and has the immediate short term benefits in terns of cost reduction and this raises two questions." What else can you do to improve your cost base? " and with evidence in some sectors that worst is behind us " How should you be planning not only to recover but also to grow and become stronger than you were before the economic downturn ?" That is not to say that the recession is over, nor will there suddenly be a sharp rise in demand, but planning hoe to react to economic recovery and capitalize in every opportunity as and when it arises is crucial.

Sonam Black Soft (2011) Inventory Management Software, Technology

Web based Inventory Management Software control system integrates the business of a large organization in software which enables you to manage your business from any part of the world. It has separate modules for inventory management, bill of materials, work orders sales/ order processing, accounts receivable, account payable, requests for quotes and purchase orders. Inventory POS system. Black Soft Web Based inventory management Software and Web based POS Software allows retailers to maintain absolute control over sales and

inventory while presenting an easy customer checkout with point of sale (POS), it is a great solution for both your sales counter and telephone order desk. Web based Inventory management System inventory control has the following additional features: Analyses inventory levels, allocates stock plan purchases and allocates deliveries accordingly. Provides powerful search facility using item code , has an extensive serial number tracking system along with the expiration codes. The batching rules assists in controlling inventory levels and identification of each stocked item. It also does price protection, lot tracking, stock transfer, multi level categories, serialized inventory and Audit Trail for inventory adjustments. Web based inventory System helps to midsize companies and organizations to create, process and track purchases.

lance Thorington (2011) Software Inventory Management ,Article Marketing

There seems to be a larger number of systems and software for business these days that may not help out in all of the right ways. Company owners these days are implementing software inventory management and reaping a number of great benefits. Those who are in search of a way to keep track of not only all of the product on the shelves but the sales as well , should start looking through this guide and find out about the top benefits of this particular management option right now. Doing the entire inventory by hand is considered to be a very prehistoric method of counting and keeping track of everything.

2.13 Research Gap

Various Studies were made relating to inventory management of different organization and are available in different libraries but review of literature indicates that there are few studies related to inventory management in this organization. The studies has focused on the trend of sales, trend of purchase relationship between sales and closing stock, between purchase and closing stock

and analyze the optimal level of inventory. Various aspects have been analyzed in previous studies but has not been explored the inventory management to that depth till now even through it has been studied partially only. The latest data has been used in this study. Previous studies are focused in other inventory management system. These types of studies which shows relationship with each other was not done yet. 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

3.1 Introduction

Research methodology is the way to solve systematically about the research problem.

C. R kothari Research Methodology, Methods And Analysis ,, Hilly eastern Ltd . New Delhi, Page 254

It is the process of arriving at the solution of the problem through the planned and systematic dealing with collection, analysis and interpretation of facts and figures. The major objectives of this study are to analyze the inventory management of NOC.

For the purpose of achieving the objectives the following research methodology has been proposed. This includes research design, nature and sources of data, data collection procedure and Presentation and analysis techniques.

3.2 Research Design

"The formidable problem that follows in the task of defining the research is the preparation of design of the research project, popularly known as research design.

J.R Pathak; management Dynamics , Volume Two , 1982 Page 221

The research design is the plan structure and strategy for investigation of the facts in order to arrive at conclusion. The plan is the overall scheme of programmed of the research, it includes and outlines of what the investigator will do from writing the hypothesis and their operational implication to the financial analysis of data.

Howad K Wolf And Prem . pant ; Social Science Research And Thesis Writing , Sewa printing Press , kathmandu , 1997 page 46

Research is systematic search for knowledge it application of scientific methods to the study of universe.

This study entitled " Inventory management of Nepal Oil Corporation " deals with procurement , sales and distribution procedure , trends of sales and purchases and present practice of inventory management of Nepal Oil Corporation , which are the variables under the study . So the descriptive research will be applied as research design.

3.3 Nature and Sources of Data

Both primary and secondary data have been used in this study. Primary data are based on interviews as well as unstructured dialogues and discussions with staff of Nepal oil Corporation. While secondarydata have been collected from the following sources.

1) Published and Unpublished documents related to NOC
2) Books , articles , magazines and official records of NOC

3.4 Data Gathering Procedure

Data gathering procedure, which is most important part of the research, consists of obtaining information from some body's hand. It is therefore very difficult activity of the whole research process. Researcher has made frequent visits to central office of Nepal Oil Corporation in order to collect the required data from officials. Published and unpublished documents, books articles, magazine and the official's records are the main sources of secondary information. While the primary sources consisted are interviews, dialogues and discussions with concerned parties.

3.5 Presentation and Analysis Techniques

Inventory management involves determining how many inventories to hold? When to place order? How many units to order at a time? In order to achieve the organization‘s goal there is a need of effective inventory management system. In this study, data collection from various sources is managed, analyzed and presented in proper tabular formats and diagrams are interpreted and explained wherever necessary. The techniques here included are statistical and inventory management techniques. The statistical and mathematical methods that have been employed are percentage, Graph, Time Series Analysis, Karl Pearson’s coefficient of correlation. And the inventory management techniques are applied in this study is Economic Order Quantity, Reorder Level, Inventory Turnover Ratio and ABC analysis.

CHAPTER IV

Data Presentation and Analysis

4.1 Introduction

The basic objectives of this study have already been mentioned in the first chapter. The inventory management aspects have been discussed in the "Review of Literature "in the "research Methodology" necessary tools and techniques have been employed for the accomplishment of prescribed objectives.

In this chapter effort have been made to process the obtained data and analyses and interpret them. The available data are presented in table and graph and they are analyzed with the help of statistical, mathematical and inventory management tools and are finally interpreted to explore the fact. In this study it will be explained of four petroleum products they are High Speed Diesel (HSD), Super Kerosene Oil (SKO), Motor Spirit (MS) and Aviation Turbine Fuel (ATF)

4.2 Procurement Procedure of NOC

During Indo- Nepal impasses in 1989/90, Nepal Oil Corporation (NOC) had very hard time. It had to meet the national requirements of various petroleum products as India had discounted the supply to Nepal. NOC imported small cargoes of kerosene, petrol, aviation fuel and diesel mostly in term contracts from third country suppliers and store them in some tanks at Badge, near Calcutta. The products were then taken Nepal by tank lorry shipments under NOC's own arrangement and risks.

Later on when the trade and transit issue between Nepal and India was normalized NOC and IOC (Indian Oil Corporation) reached an agreement on 30th June 1990 for the supply of various petroleum products to Nepal. This agreement is reviewed in every 5 years.

On the basis of agreement, Nepal Oil Corporation imported kerosene and diesel cargoes of 30000 MT (+/-10%), as per IOC's demand and fulfilled the national requirement of different petroleum products from the various IOC depots across Indo-Nepal border. Incorporating the changes for some matters, following to the NOC reviewed this agreement on 27th June 1995. Currently, NOC is getting different petroleum products against bulk import from IOC under this agreement. The agreement expires on 26th June 2000**. (Source: NOC Limited)**

The agreement signed in 1995 allowed NOC to discharge the cargo at Paradip as a first discharge port to lighter vessel suitable for discharges at Haldia. Earlier to 1996 both HSD (High Speed Diesel) and SKO (Super kerosene Oil) cargoes used to get discharged at Madras and Haldia. Initially in 1996 only the diesel cargoes used to go to Paradip post was upgraded for SKO cargoes had to go to SKO in the beginning of 1997 , the detention charge of our cargoes had considerably reduced vis-a via the long queue which normally would prevail at madras.

(Source: NOC Limited)

In recent year, Nepal Oil Corporation has purchase 24 Cargoes and provided to IOC. One cargo means30000 metricTones (+/--10%). Among 24 cargoes 12 are SKO and12 are HSD.

Petrol and aviation fuel come under kerosene cargoes and price is determined on the basis of average weight with refinery differential (+/-) of imported kerosene. Furnace oil and light diesel come under diesel cargoes and price is determined on the basis of average pricing of Furnace Oil in Singapore and Arabian Gulf Plant on the date purchased. On the other hand, since Indian also purchase furnace oil from APM (Administered Price Mechanism), IOC adds profit margin in that price while determining the rate of furnace oil it exports. So furnace oil becomes slightly expensive then rate of APM.

In case of LPG the price is determined on the basis of CIF (Cost Insurance and Freight Charge), Price in average cost of LPG and then Railway freight (notionally) wharfage, and landing cost in transporting to Barauni and per Metric Ton rate of Barauni refinery is determine don the basis of proposed marketing and profit margin . Finally such rate is equated with net cost of imported kerosene and diesel cargo. **(Source: NOC Limited)**

4.3 Process in Procuring Cargo

NOC procures diesel and kerosene cargo under the direction of Governing Board of NOC .IOC suggest buying cargo for every three months to NOC announces Global tender and asks offer from importer of mailing list in Telex. Now there are 26 companies in mailing list. Definite periods are not valid. Such period is of 24 hours and the telex room is sealed for that period. In the eve of that period representative of ministry of supply and concerned representative of NOC sign in two telex roll and the next signature is taken at the bottom of the telex roll after opening of the seal. The original copy of telex roll is kept safely. The Governor Board decides about procuring in the date offer received and the committee must decide immediately as the validity as very short in the offer.

Payment for cargo to IOC is done as follow:

A) 50% amount after 5 days of cargo received.

B) Rest after 50 days of B/L (Bill of Landing) date.

(Note: payment is done on Indian Currency at Exchange rate of state bank of India on the date of Cargo unloads) **(source:NOC Limited)**

Purchasing is the procurement of goods and services from external agencies which plays significant role on earning of profit of an organization. The following table shows the comparative statement of annual purchases of petroleum products from FY 2004/2005 to FY 2008/2009

Table No:3

Trend of Purchase

In kilo liter

S. N	Types of Products	Year and Respective Percentage										
		2004/05	%	2005/06	%	2006/07	%	2007/08	%	2008/09	%	Total
1.	Petrol	76097	9.22	81817	11	98435	13.17	101624	14	128372	14.46	486345
2.	Diesel	308076	37.33	292381	40	299419	40.05	303212	41.78	489219	55.09	1692307
3.	kerosene	231463	28.05	225007	30	192576	25.76	152168	20.97	77799	8.76	879013
4.	other Petroleum	209584	25.40	70146	9.3	63650	8.51	68534	9.44	74306	8.37	486220
5.	LPG IN MT	-		81005	9.7	93562	12.51	96837	13.34	115813	13.04	387217
6.	Other (FO,LDO,MTO)	-		-		-		3248	0.47	2568	0.28	5816
	TOTAL	825220	100	750356	100	747642	100	725623	100	888077	100	3936918

The table above shows that the total purchase from FY 2004/2005 to 2008/2009 is 825220, 750356, 747642, 725623, 888077, Kilo liter respectively and 3936918 KL in the total of all total of past five years purchase. In fiscal year 2004/05 purchase of MS is 76097 Kl , 308076 of HSD ,231463 of SKO ,209584 of other petroleum which is the proportion of 9.22% of MS37.33% of HSD, 28.05% of SKO, 25.40% of other petroleum . likewise in 2005/2006 81817 KL of MS ,292381KL of HSO, 225007 Kl of SKO,70146 of other petroleum , 81005 kl of LPG which is in the proportion of 11%, 40%, 30%, 9.3%, 9.7 respectively were purchased. In 2006/2007 98435 of MS ,299419 Kl of HSD ,, 192576 KL of SKO , 63650Kl of ATF, 93562 KL of LDG in MT, which is in the proportion of 13.17%, 40.05%, 25.76%, 8.51%,and 12.51% respectively.

In 2007/2008 101624 of MS, 303212 of HSD, 152168 of SKO , 68534 of ATF ,96837 of LPG in MT , 3248of other (FO,LDO, MTO) in the proportion of 14%,41.78%,20.97%,9.44%13.34%and 0.47% other (FO,LDO, MTO) respectively. And In 2008/2009 128372 of MS ,489219 of HSD, 77799 of SKO ,74306 of ATF , 115813 of LPG in MT, 2568 of other (FO,LDO, MTO) in the proportion of 14.46%, 55.09%, 8.76% , 8.37%, 13.04%, 0.28% respectively.

4.4 STORAGE FACILITY

Storing is the backbone of inventory management , of course , no storage no inventory management .Good storage helps to maintain the quality of the goods, smoothness is sales , facilitate production process, provide well service to customer and grasp the opportunity.

While discussing locations, size etc of the store a number of factors is taken in to consideration as follows:

- Value of stock transaction
- Type of stock Volume of stock to be held at any one time
- Amount of handling , re-handling and extent of transport involved
- Security
- Safety Requirement

The increase in storage capacity over the years in line with the growth in the demand of petroleum products is quite impressive. The present storage capacity of 71558 kiloliters is, however, just enough for 15 days national sales based the projected sales for 2009

To maintain the same level of storage facilities, currently it is working towards developing storage facilities for petroleum products to meet the demand of at least

30 days. The current storage capacities in different regions of the country are as follows:

Table No: 4

Storage Capacity in different regions

In kilo liter

Location	Petrol	Diesel	Kerosene	Jet A1	Total
Kathmandu	1870	8400	4960	7710	22940
Amlekhgunj	1960	16100	5580	0	23640
Biratnagar	560	8510	2180	280	11530
Janakpur	30	140	70	0	240
Bhairawaha	140	3055	394	60	3649
Pokahara	350	2280	760	64	3454
Nepalgunj	140	1520	1520	280	3460
Surkhet	0	0	45	60	105
Dhangadi	85	1590	760	45	2480
Dipayal	0	15	45	0	60
Total	**5135**	**41610**	**16314**	**8499**	**71558**

The extra storage capacity tanks ahs been already constructed in Amlekhgunj , Thankot, , Tribhuwan Airport (Sinamangal) with the loan of Asian Development Bank (ADB) . Among these newer storage facilities for petroleum products Amlekhgunj , Thankot and Airport have already become operated.

4.5 Selective Inventory Management: ABC Analysis

Usually a firm keeps several types of inventories. Every item in an inventory should not be treated with equal attention. This technique is based on assumption

that a firm should not exercise the same degree of control of all items of inventory. The items, according to this system, are categorized into three classes A, B and C. The items included in group A involve the largest value. Therefore the most rigorous, intensive and sophisticated inventory control techniques should be applied to these items. C items represent relatively least investment and would be under simple control. B items fall in between these two categories and required reasonable attention of management.

The ABC analysis concentrates on high value items and also known as control by important and exception (CIE). As the items are classified according to the importance of their relative value

Better control is possible. This approach is also known as proportional value analysis (PVA) or stock control according to value method.

Most of the Nepalese organization does not apply the scientific tools and techniques and NOC is not an expectation to this. NOC has made various kinds of products inventory, which differ in value and can follow a selective control system for the appropriate preservation of different products. However researcher has classified the items according to the consumption value in the following way.

Table No : 5

Selective Inventory Control of ABC Analysis

In kilo liter

	Petrol		Diesel		Kerosene		Others		Total	
Fiscal Year	Sales	Sales %	Sales	Sales %	Sales	Sales %	Sales	Sales %	Sales	Sales %
2004/2005	75989	9	315368	38	239328	28	208069	25	838754	100
2005/2006	80989	12	294329	44	226637	34	68320	10	670275	100
2006/2007	101911.81	15	306687.21	46	197849.54	29	68334.85	10	674783.41	100
2007/2008	100842	16	302706	48	155215	25	71782	11	630545	100
2008/2009	124169	17	466468	64	70089	9	71483	10	732209	100

The above table shows that the item of diesel has the highest consumption ranging from 38% to 64%. It has the lowest consumption of 38% in FY 2004/2005, While 64% is the highest proportion of FY 2008/2009. It is categorized as A. Similarly Sales proportion of kerosene varies from 9% to 34% and it is categorized as B. Comparatively share value of petrol is very low these are various from 9% to 17%. Above analysis provides Guidelines for corporation to categorize the Diesel as A to maintain Strict control in order to minimize inventory loss and to maximize profitability on its investment. This items should be treated first and move carefully. The moderate control mechanism should apply for kerosene items that falls under B group. Minimum attention can be made for petrol and other petroleum liquid lying under C.

4.6 Distribution System of Petroleum Products

Distribution and sale of ATF is solely done by the corporation as it requires very stringent quality control measures. Sale of all other products is done by retail dealers numbering approximately 2500 through out the Nation. Approximately 70% of all petroleum products are consumed in the Central Regions

The product is transported from the depots to the retail dealers by tank truck. The number of transporters throughout the Nepal is 494 and the number of tank trucks so engaged is 1180 including (Nepali, Indian and Adhoc Transporter).

To ensure quality of the products reaching the customers, in case of MS and HSD only, two samples of each products are drawn, one sample is kept safety at the dispatching location and the other one is in the custody of retail dealer and regular monitoring of the quality of the products are performed by means of surprise checks and for this purpose lab van is being used.

Such surprise checks are conducted by a committee comprising of the following representatives:

- One from the Consumer Forum.
- One from the Bureau of Standards and Weight and measures
- One from the Dealer's Association.
- Two from NOC.

Any retail dealers found to be selling out substandard products are penalized as per the existing rules and regulations.

To meet National requirement in easier and fastest way following Indo Nepal border areas have been used for distribution of petroleum products for different regions.

The region wise demand of NOC is met through the purchase of petroleum products from the IOC depots, Terminal and Refinery located near the border with Nepal.

For Eastern Region	Barauni Refinery
For Central Region	Raxaul Depot
For Western Region	Betalpur Depot, Mugalsari Termianl
For Western Region	Allahbad Terminal, Gonda Depot
For Far Western Region	Banthara Depot

In order to sell and distribute various petroleum product through out kingdom of Nepal the five regional branches have been established in Biratnagar, Birgunj, Siddhartah Nagar, Nepalgunj and Dhangadi representing eastern, Central, Western, Mid-western and Far Western region respectively . There are Central Fuel Depots in Kathmandu and Amlekhgunj and Branches Depots in Birtamod , Surkhet , Dang and Dipayal , Whereas aviation fuel is distributed by NOC itself NOC provides aviation fuel for National and International flights from Kathmandu and Aviation fuel for Internal flights is provided from Biratnagar , Pokhara , Bhairahawa, Nepalgunj, Surkhet and Dhangadi also.

In order to check the possible shortage of petroleum product through out the Kingdom NOC has manage to provide necessary fuel through their distributors on the basis of demand and necessity of petroleum product in different regions. **(Source: website of NOC Limited)**

In this way petroleum has been distributed in five development regions. Especially, hilly districts and inaccessible districts are beyond from the access of dealers. Tanker is the only way to provide petroleum product through out the kingdom. Especially there is urgent need of alternative means for transportation of petroleum product from India because Nepal often suffers oil crisis.

On the other hand the demand of LPG (Liquefied Petroleum Gas) used for household (cooking) , commercial and industrial purpose is increasing day by day . In this context NOC has been providing LPG through different Gas Authorities through put the kingdom. LPG is currently imported from Barauni Refinery of IOC but incase of technical break down Nepal suffers LPG crisis. There has not been conducted any studies so as to access the quantity of demand for LPG in order to enable oil authorities to supply required products. At present vehicles running from LPG is reported to have crossed

1000 marks and the monthly Gas consumption by these vehicles is well above 400 tones. Due to unavailability of Auto Gas (virtually same as LPG but with some specification), some running on fuel quotas of cooking Gas. There is not clear demarcation of the purpose. This is essential because the subsidy in LPG is basically meant to support

households.

4.7 Trend of Sales

A sale is an act of exchanging something for money. Nepal Oil Corporation sell its different products to its consumer. The following table shows the comparative statement of annual Sales of NOC from 2004/2005 to 2008/2009

Table No: 6

Trend of Sales

In kilo liter

Source NOC limited, Central Office

S. N	Types of Products	Year and Respective Percentage										
		2004/05	%	2005/06	%	2006/07	%	2007/08	%	2008/09	%	Total
1.	Petrol	75989	9.06	80989	10.78	101911.81	13.26	100842	13.86	124169	14.64	483900.81
2.	Diesel	315368	37.60	294329	39.18	306687.21	39.92	302706	41.59	466468	55	1685558.21
3.	kerosene	239328	28.53	226637	30.17	197849.54	25.75	155215	21.33	70089	8.26	889118.54
4.	other Petroleum	208069	24.81	68320	9.09	68334.85	8.9	68938	9.47	68935	8.13	482596.85
5.	LPG IN MT	-		81005	10.78	93562.00	12.18	96837	13.31	115813	13.66	387217
6.	Other (FO,LDO,MTO)	-		-		-		3225	0.44	2568	0.31	5793
	TOTAL	838754	100	751280	100	768345.41	100	727763	100	848042	100	3934184.41

The above table shows that in the year 2004/2005 sale of diesel is higher than other items while petrol has the least sale record ranging 315368 Kl of diesel, to 75989 Kl of Petrol .likewise in the year 2005/2006 diesel has the highest sale record of 294329 Kl while other petroleum product has the lowest record of 68320 Kl . Likewise in the year 2006/2007,2007/2008 and 2008/2009 diesel has the highest sale and other petroleum products were sold the least .The maximum number of fuel were sold in the year 2008/2009 while least was sold in the year 2007/2008 ranging 848042 Kl to 727763 Kl.

Following table shows the results of corporations operations relating to Total Sales and Total Purchase of FY 2004/2005 to 2008/2009

Table No : 7

Annual Total Sales and Purchase

In Kilo Liter

Fiscal Years	Sales	Purchase
2004/2005	838754	825220
2005/2006	751280	750356
2006/2007	768345.41	747642
2007/2008	727763	725623
2008/2009	848042	888077

Source NOC limited, Central Office

This table shows that the level of total sales is higher than total purchase but in FY 2004/2005 the purchase is higher than sales. In order to find out the nature of variability correlation and other statistical measures we have to calculate the mean, standard deviation, coefficient of variation and correlation coefficient. The detail calculation of these above figures are shown in appendix 3

Table No:8

Relationship between Total Sales and Total purchase

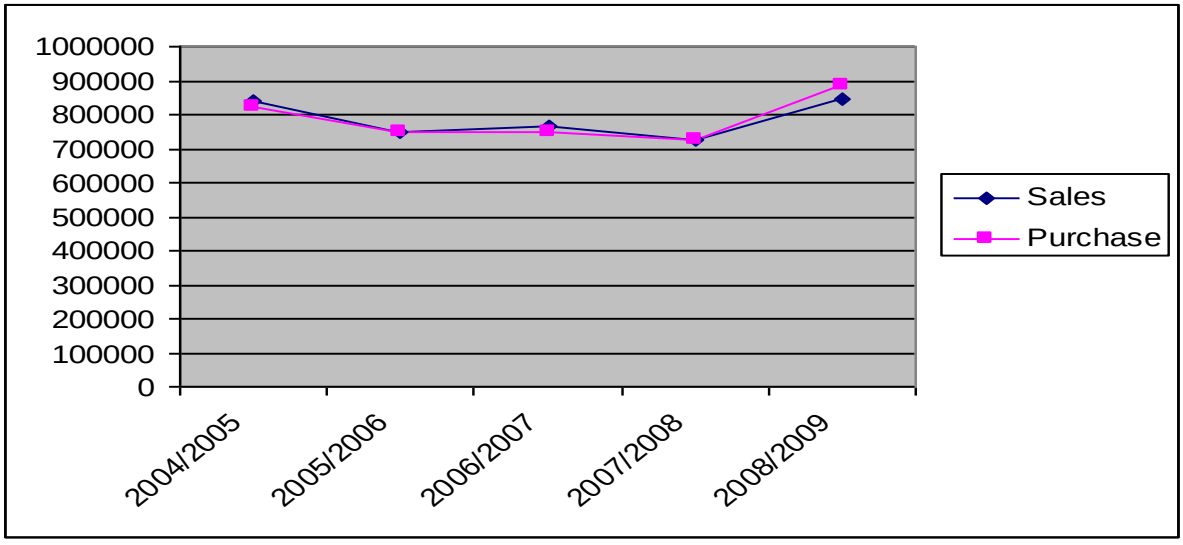
In Kilo Liter

Statistical Tools	Sales	Purchase
Mean (X)	786836.88	787383.60
Standard Deviation ,	48036	60557
Coefficient of Variation (C.V)	6.10%	7.69%

From the above table it can be analyzed that the total purchase of NOC is less stable than total sales. Hence, the coefficient of variation (C.V) of total purchase is higher than the CV of total sales. A distribution of higher CV is said to be less homogeneous or more variable than the other and series with smaller CV is said to be less heterogeneous or fewer variables than the other but the other but the difference is not so bigger. The analysis above can also be presented in graphical form as below:

Figure No: 6

Actual Total Sales and Actual Total purchase Trends



The Graphical presentation shows the gap between total purchase and sales is not large. Both actual sales and purchases are in increasing trend.

Another Statistical tool, correlation coefficient is used to analyze the relationship between actual sales and actual purchase. Actual Sales and Actual Purchase should be positively correlated. If the sales are high the purchase should be made high to meet the increasing demand. Therefore purchase is increased as sales increased. To find out such relation co relation of coefficient denoted by 'r' we can examine whether there is positive correlation between actual sales or actual purchase or not. For this purpose actual sales is denoted by x and assumed to be independent variable and actual purchase is denoted by Y and assumed to be independent variable.

The detail calculation of correlation of coefficient is shown in appendix 3. From computation we found the value of r = 0.95

The figure of the value or 'r' shows that there is positive correlation between actual sales and actual purchase. The value of r is 0.95 therefore it can be said that there is perfect correlation between sales and purchase.

The calculation of probable error of is also shown in Appendix 3. We have probable error of r= 0.02941. Correlation coefficient appeared greater than 32 times the probable error i.e. 0.95> (32 x 0.02941). It indicates that the value of 'r' is definitely significant so it can be said that actual purchase will go on same direction that of actual sales.

4.8 Inventory Turnover Ratio (ITR)

Finished goods inventory is the cushion between sales and purchase for non – manufacturing enterprises. Level of Inventory depends upon sales and purchases of goods of the enterprises. When sales exceeds purchase the inventory is used for sales and level of inventory going to be decreased and on the other hand when purchase exceeds the sales than the excess purchase is kept in to store the level of

inventory is going to be increased . A certain level of inventory is needed for smooth sales activities of enterprises.

Inventory turnover ratio is also called stock velocity turnover ratio. The inventory turnover ratio measures how quickly inventory is sold. It is a test of efficient inventory management .The inventory turnover ratio is calculated by using following formulas:

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

2) Inventory turnover = $\frac{\text{Sales}}{\text{Closing Stock}}$

Table No .9

Total Closing Inventory

In KL

Years	Closing Inventory/Average Inventory
2004/2005	18900.00
2005/2006	22973.63
2006/2007	12641.00
2007/2008	13507.00
2008/2009	25326.00

(NOC Limited)

Table No.10

Inventory Turnover Ratio

In KL

Years	Sales	Closing Stock	Inventory turnover Ratio=Sales/Closing Stock
2004/2005	838754	18900.00	44.38
2005/2006	751280	22973.63	32.70
2006/2007	768345.41	12641.00	60.78
2007/2008	727763	13507.00	53.88
2008/2009	848042	25326.00	33.48
	Average		45.044

(NOC Limited)

From the above table it is clear that the maximum turnover ratio is 60.78 times FY 2006/2007 and minimum turnover ratio is 32.70 times in FY 2005/2006. Average inventory turnover ratio is 45.044 times. It means that NOC holds 7.99 days in average (360/22.66) inventory of petroleum products. Higher ITR is the cause of increased in sales or decreased in closing stock and both. In general high ITR is better than a low ratio. It is indicator of under investment or very low level of inventory. A very low level of inventory has serious implication, It will adversely affects the ability of firm to meet customer demand an it may not cope with its requirement. That is there is a danger of the firm being out of stock and incurring high stock out cost.

The main reason to have lower inventory ratio of NOC due to the policy of corporation to maintain higher closing stock. Keeping excessive inventory involves cost items of interest on funds locked up , rental of space , possible deterioration and so on .However inventory turn over ratios various according to types of corporation , nature of products , whether it is perishable or durable etc. Corporation can find its satisfactory level of ITR Company ratio over a period of time through the trend analysis or comparing level of other firms in same types of business.

4.9 Economic Order Quantity (EOQ)

The economic order quantity is important concept which assists to solve the problem of how much to order / purchase at a time. EOQ is determined on the basis of annual requirement ordering cost and carrying cost.

In NOC, they totally ignore the concept of economic order quantity. There is no proper segregation of carrying and ordering costs and it does not have in practice of determine EOQ level.

4.10 Re Order Level (ROL)

Re- order level may be defined as that level of inventory when fresh level should be placed for replenishing the current stock of inventory. Under perfect certainty , Re- Order level can be determined on the basis of lead time , Average usage and economic order quantity but safety stock is also taken under uncertainty too calculate ROL . In NOC lead time Average usage as well as safety stock to meet the demand for 35 days.

Table No:11

Total Purchase and Closing Stock

In kilo liter

Years	Purchase	Closing Stock
2004/2005	825220	18900.00
2005/2006	750356	22973.63
2006/2007	747642	12641.00
2007/2008	725623	13507.00
2008/2009	888077	25326.00

(NOC Limited)

The Above table depicts that purchase is in random increasing and decreasing trend. From the year 2005/2006 the trend is in decreasing order, but during 2008/2009 the purchase has been increased. Likewise, in fiscal year 2005/2006, closing stock has increased, but in 2006/2007 it has decreased but 2007/2008 and 2008/2009 the trend is in increasing position.

Procurement:

Purchasing means procurement of goods and services from external parties with money. NOC has not its own sources of petroleum products so all products have to import from other counties. Similarly Closing stock means inventory at the end of the month or year. The following table shows the 5 year data's of purchase and closing stock of petroleum products of Nepal Oil Corporation.

4.11 Relationship between Actual Purchase and Closing Stock

The following table shows that the Actual Purchase and Closing Stocks statistics of petroleum Products of Nepal Oil Corporation through 2004/2005-2008/2009

Table No: 12

Relationship between Actual Purchase and Actual closing stock

In kilo liter

Statistical tools	Actual purchase	Closing stock
Mean $\overline{(x)}$	787383.6	18669.53
Standard Deviation	60557	5017
Coefficient of Variation(C.V)	7.6909%	26.87%

(NOC Limited)

From the above table it can be analyzed that closing stock is less stable than actual purchase. Actual purchase is less variable than closing stock. We have C.V of closing stock is higher than CV of Actual purchase. A distribution of higher C.V is said to be less homogenous or more variables than the other series, with smaller C.V is said to be less heterogeneous or less variable than the other.

Another statistical tool, correlation coefficient is used to analyze the relationship between actual purchase and Actual Closing Stock. Whether Correlation is positive or negative would depend upon the direction of change of the variables are varying in the same direction , i.e. If as one variable is increasing the other , on an average , is also increasing or, if as one variable is decreasing the other , on an average , also decreasing , correlation is said to be positive . If on the other hand, variables are varying in opposite direction i.e., as one variable is increasing the other is decreasing or vice versa. Correlation is said to be negative.

To find out such relation correlation coefficient is calculated by calculating the Karl Pearson's coefficient denoted by 'r' we can examine whether there is positive

relationship between Actual purchase and Closing Stock or not . For this purpose actual purchase is denoted by Y and assumed to be independent variables and closing stock is denoted by X and assumed to be independent variables and closing stock is denoted by Y and assumed to be dependent variables.

The calculation of correlation of coefficient is shown in Appendix 4, We have calculated the value of r is 0.71. The figure of the value or 'r' shows that there is the positive correlation between actual purchase and closing Stock. The help of probable error of 'r' tests the significant of 'r'. The calculation of probable error 'r' is also shown in appendix 4. We have probable error of r = 0.1495 correlation coefficient appeared greater then 4 times the probable error i.e., 0.71> (4x0.1495) .It indicates that the value of 'r' is definitely significant it means that actual purchase and closing stock varying in same directions that is increase in actual purchase makes closing stock increase . Similarly decreasing actual purchase results decrease in closing stock.

4.11.1 Relationship between Actual Sales and Closing Stock

The following table shows that the Actual Sales and Closing Stocks statistics of petroleum Products of Nepal Oil Corporation through 2004/2005-2008/2009

Table No: 13

Actual Sales and Closing Stock

In kilo liter

Fiscal Years	Actual Sales	Closing stock
2004/2005	838754	18900.00
2005/2006	751280	22973.63
2006/2007	768345.41	12641.00
2007/2008	727763	13507.00
2008/2009	848042	25326.00

(NOC Limited)

The above table depicts that sales is decreasing and increasing trend. In 2005/2006 the sales has been slowed down while in 2006/2007 the sales again up rose but in 2007/2008 the sales decreased , likewise , them sales increased in 2008/2009 in great range.

Similarly, closing stock is increased in 2005/2006 and in 2008/2009 closing stock increased in great range. But in other FY the closing stock seems to be in decreasing order.

In order to find out he nature of variability of Actual Sales and Closing Stock of different year are have to calculate the mean , standard deviation , co-variance and Correlation Coefficient . The detail calculation of these variables is presented in appendix 5

Table No:14

Relationship between Actual Sales and Closing Stock

In kilo liter

Statistical Tools	Actual Sales	Closing Stock
Mean $(\overline{x})$	786837	18669
Standard Deviation	48036	5018
Coefficient of Variation	6.10	26.89

(NOC Limited)

From the table it is observed that closing stock is less stable than actual sales. Actual Sale is less variable than Closing Stock. The Coefficient of variance of closing stock is higher than the coefficient of variance of closing stock is higher than the coefficient of variance of Actual purchase. A distribution of higher C.V is said to be less homogeneous or more variables than other series , with smaller C.V is said to be less heterogeneous or less variable than the other.

To analyze the relationship between actual sales and closing stock, correlation coefficient is used. Whether correlation is positive or negative would depend upon the direction of changes of variables. There should be positive correlation between actual sales and closing stock. In other words closing stock should increase the actual sales increase as vice versa. To find out the correlation between actual sales and closing stock we can take the help the Karl Pearson's coefficient of correlation. As a measure of intensity of degree of linear relationship between two variables Karl Pearson's developed a formula called correlation coefficient and it is denoted by 'r' . By calculating r, we can examine whether there is positive Correlation between actual sales and closing stock or not. In other words whether or not closing stock will be changed in same direction of the change in actual sales.

For the purpose of calculating r. Actual Sales denoted by X are assumed to be independent variables. The detail calculation of correlation coefficient and the probable error are shown in Appendix 5.

Appendix depicts that coefficient of correlation and the probable error of the coefficient correlation between actual sales and closing stock is 0.57 and the probable of 'r' is 0.2033 respectively. Coefficient of correlation comes 2 times more than the probable error that is 0.57> (2x0.2033). It indicates that actual purchase and closing stock varying in same directions that is increase in actual purchase makes closing stock increase. Similarly decreasing actual purchase results decrease in closing stock.

Table No: 15

Targeted Sales and Actual Sales

In kilo liter

Types	Petrol			Diesel			Kerosene			Other petrol		
FY	TS	AS	Prog%	TS	AS	Prog%	TS	AS	Prog%	TS	AS	Prog%
04/05	70500	75989	107.78	320000	315368	98.55	350000	239328	68.38	225000	208069	92.47
05/06	75000	80989	107.99	320000	294329	91.98	318000	226637	71.27	103000	68320	66.3
06/07	85900	101912	118.64	339200	306687	90.41	279400	197850	70.81	100000	68335	68.33
07/08	114000	100842	88.46	360000	302706	84.09	180000	155215	86.23	80500	72163	89.66
08/09	114000	124169	109	456000	466468	102	66000	70089	106	80300	71483	89

(NOC Limited)

According to data presentation, In case of Petrol there are targeted Sales are 70500, 75000, 85900,114000,114000 KL and Actual Sales are 75989, 80989, 101912, 100842, 124169 KL and target achieved are 107.78, 107.99, 118.64, 88.46, 109 percentage in FY 004/005, 005/006, 006/007, 007/008 and 008/009 respectively.

In case of Diesel there are targeted sales of diesel are 320000,320000,339200,360000,456000 KL and Actual Sales are 315368, 294329, 306687, 302706, 466468 KL and target achieved are98.55, 91.98, 90.41, 84.09, and 102 percentages in FY 004/005, 005/006, 006/007, 007/008 and 008/009 respectively.

In case of kerosene there are targeted Sales of 350000, 318000, 279400,180000,66000 KL and Actual Sales are 239328, 226637, 197849.54,

155215, 70089 KL and target achieved are 68.38 71.27, 70.81, 86.23, and 106 percentage in FY 004/005, 005/006, 006/007, 007/008 and 008/009 respectively. And In other petroleum product there are 225000, 103000, 100000, 80500, 80300 KL and Actual Sales are 208069, 68320, 68334.85, 72163, 71483 KL and target achieved are 92.47, 66.30, 68.33, 89.66, 89 percentage in FY 004/005, 005/006, 006/007, 007/008 and 008/009 respectively.

Table No: 16

Targeted Purchase and actual Purchase

In kilo liter

Year	Petrol			Diesel			Kerosene			Other petrol		
FY	TP	AP	Prog %	TP	AP	Prog %	TP	AP	Prog %	TP	AP	Prog %
004/05	74000	76097	102.83	455000	308076	67	285000	231463	81.21	298000	209584	70.33
005/06	88076	81817	107.65	329740.61	292381	88.67	323984.16	225007	69.45	105040.43	70146	66.78
006/07	86600	98435	113.67	348700	299429	85.87	290000	192576	66.41	104000	68207.57	65.58
007/08	114004.94	101624	89.14	359981	303212	84.23	179995.27	152168	84.54	75409.18	71782	95.19
008/09	120000	128372	107	480000	482219	102	66000	77799	117	84000	76874	91.52

(NOC Limited)

The above table depicts that the targeted purchase of petrol is 74000, 88076, 86600, 114004.94, 120000 KL and the actual purchase is 76097, 81817, 98435, 101624, 128372 KL and the total target achieved is 102.83% 107.65%, 113.67%, 89.14%, and 107% in the Fiscal Year 2004/2005, 2005/2006, 2006/2007, 2007/2008, 2008/2009 respectively.

In case of Diesel, the targeted purchase is 455000, 329740.61, 348700, 359981.00, and 480000 KL and the actual Purchase is 308076, 292381.00, 299429, 303212, 482219 KL and target achieved are 67%,88.67%,85.87%,84.23% and 102% respectively.

In case of kerosene, targeted purchase is 285000, 323984.16, 290000, and 179995.27, 66000 Kl while the actual purchase is 231463, 225007, 192576, 152168, and 77799 KL and target achieved is 81.21%, 69.45%, 66.41%, 84.54% and 117% respectively.

Incase of other Petroleum product the targeted purchase is 298000, 105040.43, 104000, and 75409.18, 84000 KL while the actual purchase is 209548, 70146, 68207.57,71782, 76874 KL and the target achieved is 70.33%, 66.78%, 65.58%, 95.19%, and 91.52% respectively.

4.12 Quality Control

Quality control is a process of establishing acceptable limits of variation in size, weight and finish and so forth for products or services and of maintaining the resulting goods or services within this limit. In these days of radically changing circumstances, quality has become an overriding factor in corporate success. In order to maintain improved corporate image, responsibility in giving quality assurance has become the most important factor. The attainment of quality reputation calls for careful development and effective implementation of quality control and from quality control to quality assurance here by shifting the focus from product to process and from process to system. In this context traditional quality control system is no longer sufficient to ensure future success of one’s business.

In context of NOC it is NOC it is more relevant as at present it is having a monopolistic type of direct public concern. Tomorrow the situation may not remain as of today with the present Government policy on parallel marketing, privatization and liberalization and with tomorrow's competitive market

unionization. Those who can't deliver good services and quality will have to struggle very hard even for mere survival. Taking in to consideration of these bitters facts, NOC has already started gearing up importing and delivering up date quality products to meet consumer satisfaction.

To keep the quality of the petroleum product in predetermined specification, the quality control department has been formed by NOC. Until 2050 B.S, quality specifications for the petroleum products imported to Nepal and distributed to different parts of kingdom was not determined.

In 2050 Magh 7th a committee including the authorized representative of quality control acts. Accordance to the process, different method to check the quality of petroleum products has also been applied.

The task o quality control has become more radical to NOC as one of he reasons pointed for the pollution is the quality of the fuels. Of the better performance longevity of engine better fuel whether gasoline, diesel or any other fuel is needed. In the recent days, better performance not only relates to better combustion. The later is reflected in lesser pollution. So quality of fuel is directly of indirectly related to environment.

4.12.1. Quality Control procedure

The quality of product loaded at load port for dispatch under the terms and conditions mentioned in the accepted tender is carried out in two stages:

(I) At the load port by one of the three internationally recognized petroleum surveyors namely SGC , celebrate and say bolt. The complete quality survey report/result is then reported to NOC who is the owner of the cargo. After thoroughly checking of the results by the corporation's supply department, the result is then passed on to Indian Oil Corporations (IOC). Who in rush goes through the test results comparing the results with that of tender specification and test methods and id found satisfactory informs NOC for clear acceptance of the results . Upon

completion of voyage the cargo vessel anchor at the specified Indian ports where the vessel is scheduled to be berthed and decanted in then shore storage tanks.

(II) At the unloaded port prior to unloading the vessel the product under goes quality control checks and quality verification by the disport survey, already appointed to act on behalf of NOC. Only after being assured with the survey results for quantity and quality the product is accepted and decanted in the shore tanks by IOC.
Under the provision made in existing contract agreement between NOC and IOC. IOC takes up the entire product and IOC pays the cargo value back to NOC. At the time and manner indicted in the contract document.

The product is dispatched from IOC's refinery destined to be delivered to NOC is first reached to IOC's respective full terminates located near the Indo –Nepal boarder . NOC arranges for placement of its tank Lorries at these terminals for loading the required grade of petroleum product. After completing the loading of the tank Lorries the quality of the product is ascertained by checking the composite density range and the corresponding loading temperature of the product loaded. And the same in indicated is dispatched invoice and the same time 2 copies of sample are drawn out of the loaded tank and sent to the respective unloading (receiving) depot for necessary verification and formal receiving of the product from the transporter.

At the receiving location the density and the temperature of the product transported by the tank lorry is checked and noted. Individual chamber wise sample of the product is also taken from the lorry. The density observed at both the dispatching and receiving location is converted into 15 c and the difference is observed. In case of gas alive distillation test is also carried out in the laboratory on the sample to ascertain the initial and final boiling point and recovery at different stages of heating ranges. The final boiling point (FBP) of these two

samples and density difference range of (+/-) 0.0025 and final boiling point range within (+/-) 4 taken as instrument error and altitude variation. However, if the difference tends to exceed than the concerned dealer / transporter is penalized as per the prevailing penal clauses indicated in quality control manual and quality control regulation of NOC.

NOC head office based laboratory is equipped with necessary facility for testing quality standards of petroleum products. Laboratory testing is regularly carried out and the quality norms are strictly adhered to. NOC has arranged a mobile van to check and maintain the quality of petroleum products. NOC has reactivated its quality control squad and the squad frequently goes for surprise check, take the samples, analysis them and cites the cheater. The squad often reads about certain petroleum pumps which have been penalized by the corporation. Under the penalty provision of its regulations, fuel supply to a dealer may be suspended for six months, the dealer may be fined up to Rs100000 and the dealership may be revoked. The denial supply approach may not effectively curb the wrong practice. Mixing kerosene to petrol has been reported to be the popular. The colorless kerosene mixes well with petrol and adulteration is not visible .It is an accepted fact that so long as there is a significant difference in price of the petroleum products and poorer mechanism to detect adulteration , this type of act will happen to prevent this, NOC has introduced blue dyed kerosene in the market.

In order to ensure quality of petroleum products, NOC has established separate quality and pollution control department in higher level. This department will introduce the concept of quality in all aspects of NOC’s services organization function, continuing to apply rigorous quality standards of its products.

4.12.2 Quality Awareness

The main areas of concern of NOC are fuel conservative, safety, quality and pollution control. In the area of fuel conservation, consumers are more or less conversant with the idea, and follow the guidelines contained therein. In the area of safety measures all possible steps are being taken to educated the people related with petroleum business and in case of the depots of NOC and storage facilities of the retail dealers , it ahs been mandatory to follow the safety guidelines . With the relatively recent realization of global warming, pollution and its resultant adverse effects on the health of the population, the major area concern is quality and pollution control.

Coming nearer to home, the main area of concern from the perspective of the corporation is that, in spite of the level best efforts on the part of the corporation a significant level of air pollution has been contributed by vehicular emissions. To safeguard the health of the population, especially that of children, NOC has already made arrangements to supply the unleaded petrol in the kingdom of Nepal and has been controlling the adulteration by joining hands with other concerned government bodies.

With the help of IOC, NOC has been able to train its employees in the field of quality and pollution control, stock loss control, fire and safety precautions during operations, engineering matters, as well as in the detection, control and counter measures against adulteration and required laboratory test procedures and methods.

Maintaining the same standard of petroleum products in every stage of operations and distribution is a prime concern of NOC. To ensure the prime concern of NOC and thereby control pollution, a separate Quality and Pollution Control Department has been set up. Its head office based laboratory is equipped with necessary facilities for testing of quality standards of petroleum products.

Laboratory testing is regularly carried out and quality norms are strictly adhered to NOC has arranged some mobile vans to check adulteration and maintain the standard of petroleum products available in the market.

4.12.3 Major Findings

On the basis of data presentation and their analysis the most remarkable findings related to this study have been presented below:

1) The present practice of petroleum fuel import of NOC basically from two major systems. i.e.; import of bulk cargo vessel of gas oil (High Speed Diesel) and kerosene from spot markets from overseas international supplier under international telex bidding and import of entire varieties of petroleum fuel of different application from IOC under periodic contract basis.

2) The annual sales and purchase trends of the Corporation differ from year to year and it is in increasing trends it is due to higher demand and corporations store keeping policy.

3) The calculated Karl Pearson's coefficient of correlation is 0.99. Which is greater than 6 times of the probable error? This signifies there is perfect relationship between these two variables.

4) NOC has depots and dealers to distribution the fuel for their consumer but they are concentrates in urban area not in remote area. So the people of remote and rural areas are not getting sufficient oil products.

5) Variance between estimated closing stock and actual closing stock varies largely in every year. This is due to normal and abnormal losses.

6) Closing stock of any firm is direct indicator of capital tied up. If closing stock is huge more capital is locked unnecessarily which could have been used productivity some where else. There is no uniformity in closing stock of NOC, which is one of the reasons for cost increment.

7) In the Nepal Oil Corporation the Economic Order Quantity model is not applied, now the corporation has maintained the safety stock for 35 days. The safety stock is estimated roughly. Therefore it is found fluctuating.

8) Problem of storage capacity also persists. Although storage capacity has been increases year to year but it is not adequate in emergency period.

9) The company has not categorized its inventory for the purpose of control and paid equal attention for all inventories held by corporation.

10) The Nepal Oil Corporation has been established higher level of separate quality and pollution control department in order to ensure quality of petroleum products. This separate unit is not completely successful to control the quality of petroleum products.

11) There is not cost classification system. So there is difficult to determine the ordering a carrying cost.

12) Scientific tools and techniques are not applied by Nepal Oil Corporation in order to forecast purchase and sales it is prepared on ad hoc basis.

13) Level of closing stock increase or decrease on the basis of level of sales , purchase, store keeping policy of the corporation.

14) In the conclusion, NOC is not applying scientific techniques of inventory management. This is most crucial point in NOC despite it there are several internal and external causes not to be used scientific techniques but NOC is neglecting the inventory management completely. This is a matter of misfortune to the consumer as well as the nation as whole. Due to the inadequacy of proper storage and rapid increase in fuel price, poor distribution system, low quality of fuel products consumer bear the burnt of shortages and high price. With a monopoly that cannot deliver and a rebellious dealers association, Nepalese pay the price of ineffective market monitoring and management , adulteration and artificial shortage of fuel.

Chapter V

SUMMARY, CONCLUSION AND RECOMMENDATION

4.13 Summary and Conclusion

Nepal Oil Corporation is one of the largest public enterprises in the kingdom of Nepal. It was established in 2027-9-26 under the company act 2021, as a state owned trading enterprises to fulfill the fourth five years national periodic plan objectives. It has been supplying continuously vital commodity to the general public, industries, aviation field and development project of the nations and this has been making significant contribution to the economic development of the country.

Since Nepal has no sources of petroleum products of its owns, all products have to be imported from foreign countries. Different kinds of petroleum products have been imported for domestic use, industries and transport. Among them the cheap fuel like kerosene, diesel, petrol and aviation fuel comes to the front besides light diesel oil , furnace oil , cooking gas(LPG) have also been supplied by the corporation.

Initially it acted only dealer of foreign countries but in 1972 (2029) it entered the business of importing petroleum oil and lubricant products on its own , Heralding a new phase in the history of petroleum oil and lubricant business in the country. For our three decades, NOC is the only one supplier of petroleum products in the country. Supply and distribution of lubricant is hand over to private sector in 1989. The Government adopted a policy of allowing private sector organization to enter this business. NOC, however still remains the only on importer of major petroleum products in the country.

Most of the manufacturing and trading company invests a huge amount of capital in the form of inventory. NOC also invest a huge amount of capital in the form of inventory, the concept of inventory management is almost void in NOC, and they are not applying the scientific techniques of inventory management, which is the short sight, unskilled, inexperience, inability and unknown manner of management aspect.

The basic problem of this study is to examine the inventory management system that is exercised by the Nepal Oil Corporation. The main objective of the study is to know the present situation and to identify the problem of inventory management faced by Nepal Oil Corporation and provide suggestion on the basis of study. For this purpose the researcher interviewed with officials and observed the inventory system personally.

All the collected data and facts are analyzed on the basis of inventory management theory with the help of trend analysis, Karl Pearson's correlation coefficient, probable error, ABC analysis, inventory turnover ratio and variance analysis.

1. The purchase plan depends upon the sales plan but the plans are made on adhoc basis.

2. One of the important aspects of management is to match the regular supply, demand and purchase of inventory components if supply does not match each other then there would be either stock out position or overstock position. In NOC target supply (sales) and actual supply varies in every year.

4.14 Recommendation

Most of the things about inventory management and introduction of this study have been already been presented in the first chapter. In the second chapter the

available literature on inventory management are reviewed. Moreover research methodology is described in the third chapter. All the available data are presented and analyzed in the fourth chapter relating to inventory decision by sorting out issues of inventory management of the corporation.

In this concluding chapter an attempt has been made to present summary, major findings and recommendation.

This study is a small part to fulfill the partial requirement of master degree. Analyzing available data some findings were extracted. Based on the major findings it may not be appropriate to make some suggestions. Although these suggestions may not be adequate and could very easily give negative reflection but it is hoped that these suggestions will help improving to the management of the corporation and other concerned offices, institutions and individuals.

1) The objective of inventory management system is to control the inventory and to minimize the variation between target sales and actual sales and target purchase and actual purchase. This helps to increase profitability. NOC should make an effort to minimize such variation to over come the over stock position or out of stock position of inventory. For this purpose NOC should use scientific tools and techniques to forecast purchase and sales.

2) The need of increment in import of petroleum products via Raxaul has now been essential to meet the demand. But it is impossible due to narrow road, traffic, strikes or geographic terrain. So there is urgent need of complete route for easy transportation. For this purpose, there should be a improved product pipe line from Raxaul to Amlekhgunj to avoid possible difficulties .

3) The open boarder line between Nepal –India and the difference in price of petroleum products between two countries has increased the unauthorized

infiltration of petroleum products. So the determination of price should be done according to petroleum price in India.

4) It can't be denied that proper selling of available goods in large quantity is a challenging task for every organization. The monopolistic business of NOC is only concentrated in urban areas. Therefore the rural people are forced to use alternative means. So the NOC should give attention in extending its service to the remote area as well.

5) The variation between estimated closing stock and actual closing stock is very large. The reasons may be due to normal loss like (shrinkage, normal leakage, working loss etc) and abnormal loss like (mishandling, accident and improper management etc.) NOC should effort to analyze and diagnose the abnormal losses in order to place the proper management.

6) There is massive increase in demand of petroleum products i.e.; is nearly 14/16% per year. However the storage capacity is just enough for fulfill of demand of 15 days. It is expected that the demand will be double in 5-6 years. So NOC management should give adequate attention to expansion of storage capacity, also existing capacity should be repaired and fully utilized.

7) NOC should attempt to use –scientific models like economic order quantity (EOQ), ABC analysis, Re – order level etc. So this will help solving the inventory problem such as over stock, under stock or out of stock will be solved. As a result NOC can deliver the regular supply of petroleum fuels to the consumer at a right quantity as a right quantity as reasonable price and at a right time.

8) With the rising concern for the environment, Nepal Oil Corporation should tighten up its system and should be more concern with the fuel qualities. The

inspection of the corporation should be active more than ever and as frequent field visit in the length and breadth of the country in quality monitoring of the petroleum fuels should be performed.

9) For the effective reimplementation of quality system, fine operative distribution system, transportation of LPG gas, effective market management of aviation fuel, and to make competitive market of petroleum fuels, NOC should make a policy for the involvement of private sector.

10) Every organization /public enterprises should be allowed to function according to its own internal mechanism. The undue involvement and direct instructions from ministers and top level officers offsets to achieve the organizational goals. These kinds of involvement should strictly be avoided.

11) Accounting provides valuable information to decision makers. This can serve the controlling function an important function and important function of management. If costs are classified properly by account section, would certainly enhance the efficiency of NOC.

12) NOC should deal with the dealers association of Nepal and end their war so that consumers would not bear the burden of shortage and poor distribution. NOC must check for the ineffective market monitoring and management , adulteration and artificial shortage of fuel.

BIBLIOGRAPHY

Agrawal Dr. Govind Ram;" *Inventory Cost Control*" (Management Day Souvenir, Production Management) Gandhi Bhawan Kathamandu 1981

Agrawal Dr. Govind Ram ," *Marketing in Nepal* "Fundamental Management and Strategy, Educational Enterprises Pvt Ltd. Kathmandu2000

Bajracharya M Puskar and Shrestha Durgesh; Kumar *"Production Management* " utan printing press Kathmandu 1988

Baral Puspa Raj,'Inventory Management "*A Case Study of Gandaki Noodles (Private)Limited* , An Unpublished Master's Dissertation , Submitted to Faculty of Management , Central Department , TU Kirtipur 1994

Buffa Elwoods , Sarin Rakesh K, " *Modern Production / Operation Management* "John Willey and Sons (ASIA) Pvt Ltd. Singapore0, 1998

Dhital Liladhar ,"*Inventory management " A case Study of Nepal Food Corporation* ,An unpublished Master's Dissertation Submitted to Faculty Of management , Central Department TU , Kirtipur ,1996

Everett Adams; TR Ronald JEBERT, "Production *and Operation Management* "Prentice Hall of India Pvt Ltd New Delhi, 2000

Ezra Solemn;" *The Theory of Financial management* "New York Colombia 1995

Garrett Leonard J and Milton Silver; "Production *Management Analysis* " Har Court Brace Jovanovich, Inc. New York 1986

Geol. B.S "*Production And Operation Management* " *Progatio Prakashan* , Meerut, 1992

Gupta L.N; "Cost account " kitab Mahal 15 thron Hill Road Allahabad,1986

Herbert J Richmond;"*Effective Inventory Management, Facts and fiction* "Financial Executive 1969

Jain SP and Narang KL; "*Financial and Management Accountancy* " Kalyani Publishers , New Delhi,1993

Kantipur Daily Newspaper

KC, Prakash, "Comparative Study on Inventory Management; "*A case study of Dabur Nepal and Uniliver Nepal Ltd*" An Unpublished Master's Dissertation, Submitted To Faculty Of management, Central Department TU, Kirtipur 2008

KC Bijaya, "*The Role Of Finanacial Managers in Nepalese Corporation* " Curriculum Development Centre Kathmandu 1988

Kothari CR "*Research Methodology* " Hilly Eastern Ltd, New Delhi,1994

Kshetri , Santosh," *A comparative study on Inventory Management of Dairy Development Corporation and Sitaram Gokul Milk Pvt Limited* "An unpublished Master's Deegree thesis, Central Department, 2008

Kucchal SC "*Financial Management* "Chaitainya Publishing House, Ellahbad 1979

Lollan PD and Banerjee AM ; " *Product Management* "Sterling publishers Pvt New Delhi 1995

Megee John F-Guides to Inventory Policy –II Harward Business Reviews USA 1990

Pandey IM ; " *Financial Management* " Vikash Publisig House Pvt Ltds. New Delhi ,1994

Shrestha Dr. Manohar Krishan *," Financial management " Theory and Practice CDC* . TU Kathamandu 1980

PokhrelDhruba Raj ;" *Inventory Management " A Case Study Of Janakpur Cigratte Factory Ltd*. An Unpublished Master's Dissertation Submitted to Faculty of Management, Central Department, Kirtipur 1992

Sharma Amrit Kumar; "*Inventory Management "A Case Study of Royal drugs Ltd*. An Unpublished Master's Dissertation, Submitted To Faculty Of management, Central Department TU, Kirtipur 1996

Thapa, Jeet Bahadur," *A case study of Udaypur Cement Industry Limited* ", An unpublished Master's Degree thesis, Central Department, 2008

Wasting JH "*Purchasing Management* " John Weely and Sons J Inc New York 1976

Weston JF Bisley S, Brigham EF." *Essential Of Managerial Finance*" The Dryden Press USA 1996

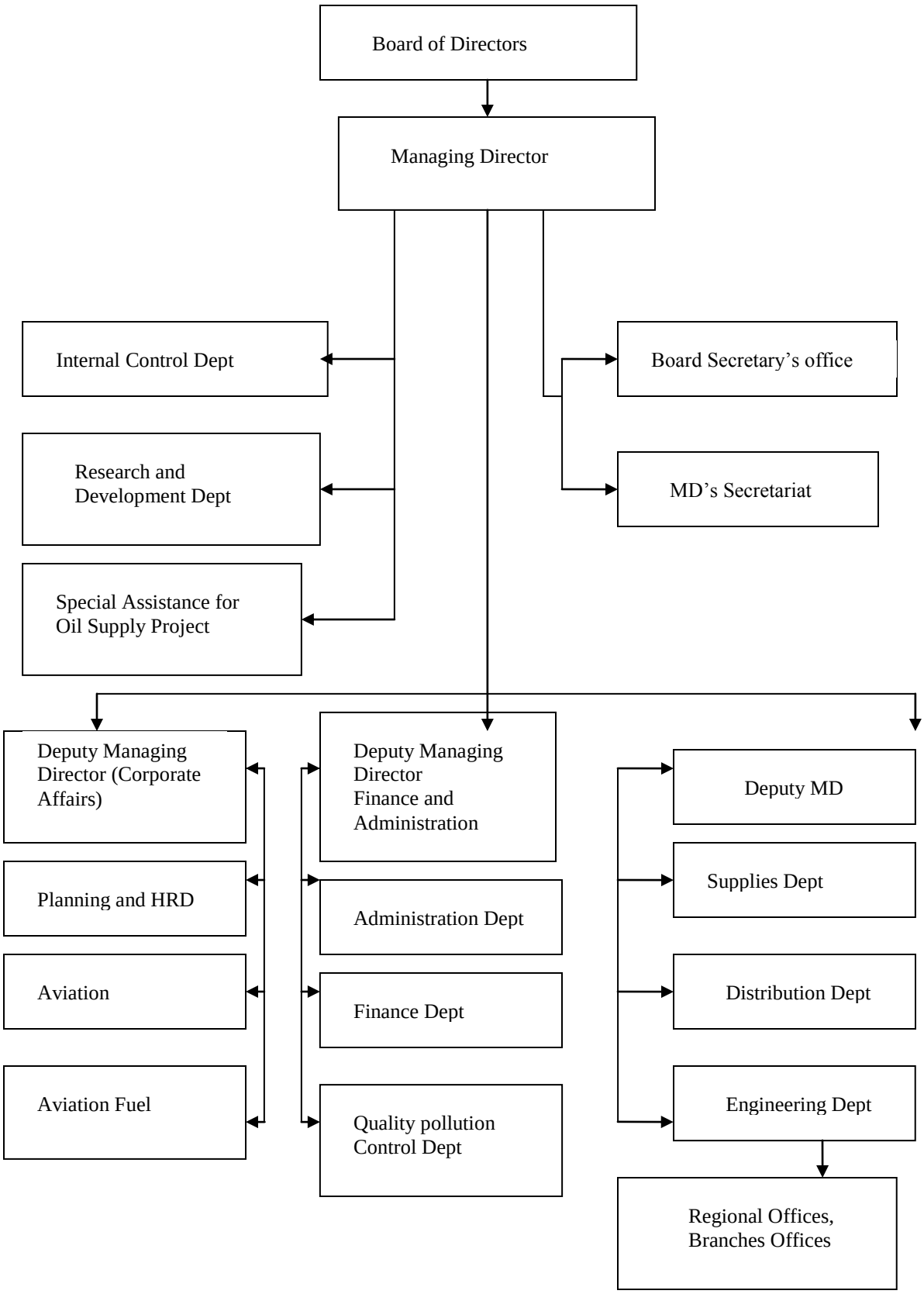
Yadav Surendra Prasad , " *Inventory Management Of manufacturing Public Enterprises* ; *A case Study of Janakpur Cigratte Factory Limited* " An Unpublished Master's Dissertation Submitted To Faculty Of management , Central Department , Kirtipur 1999.

www.dgmarket.com *www.nepaloil.com*

www.globenepal.com

www.mof.gov.np

Appendix-1


Board of Directors
Managing Director
Internal Control Dept
Board Secretary's office
Research and Development Dept
MD's Secretariat
Special Assistance for Oil Supply Project
Deputy Managing Director (Corporate Affairs)
Deputy Managing Director Finance and Administration
Deputy MD
Planning and HRD
Administration Dept
Supplies Dept
Aviation
Finance Dept
Distribution Dept
Aviation Fuel
Quality pollution Control Dept
Engineering Dept
Regional Offices, Branches Offices

Appendix-2

Petroleum products have been classified in to three groups according to their annual consumption value 'A', 'B', 'C' that ahs been shown as:

Items/Treatment	A(HSD)	B(SKO)	C(MS&ATF)
1	Maintain close Control	Maintain moderate control	Maintain close control
2	Size for the order based on calculation	Size of order based on usage	Size of order based on the level of Inventory
3	Procured from many sources	Procured from two or three sources	Procured from two sources
4	Keep records of receipt and use	Keep records of receipt and use	No record are kept
5	More effort to reduce lead time	Moderate effort to reduce lead time	Minimum effort to reduce lead time
6	Close checks on schedule revision	Some checks on changes in need	No checks against need
7	Frequent ordering	Less frequent ordering	Bulk Ordering
8	Continual expediting	Expediting for prospective	No expediting
9	Accurate forecast	Less accurate forecasts	Approximate forecasts
10	Low Safety stock for less than 2 weeks	Large Safety stock up to 2 to 3 months	Large stock for more than 3 months
11	High consumption value	Average consumption value	Low consumption Value

Appendix-3

Year	Y	Sales(X)	U=(X-X)	$U^2=(X-X)^2$	V=(Y-Y)	$V^2=(Y-Y)^2$	UV
04/05	82.522	83.8754	5.1917	26.9537	3.7836	14.3156	19.6433
05/06	75.0356	75.128	-3.5557	12.6430	-3.7028	13.7107	13.1660
06/07	74.7642	76.8345	-1.8492	3.4195	-3.9742	15.7943	7.3491
07/08	72.5623	72.7763	-5.9074	34.8973	-6.1761	38.1442	36.4847
08/09	88.8077	84.8042	6.1205	37.4605	10.0693	101.3908	61.6292
	ΣY=393.6918	ΣX=393.4184		ΣU^2=115.374		ΣV^2=183.3556	ΣUV=138.2722

X= Actual Total Sales

Y= Actual Total Purchase

For Sales (X)

(i) Mean

$$\bar{X} = \frac{\Sigma X}{n}$$

$$= \frac{393.4184}{5}$$

= 78.6837

= 786837 units

(ii) Std. Deviation (σx) $= \sqrt{1/n\ (X-\bar{X})^2}$

$$= \sqrt{1/5 \text{ X } 115.374}$$

= 4.8036

or, 48036 units

(iii) Coefficient of Variation (C.V) $= \frac{\sigma x}{\bar{X}} \times 100\%$

$$= \frac{48036}{786837} \times 100\%$$

= 6.10

For Total Actual Purchase (Y)

$$\bar{Y} = \frac{\Sigma Y}{n}$$

$$= \frac{393.4184}{5}$$

$$= 78.7384$$

$$= 787384 \text{ units}$$

(ii) Std. Deviation $(\sigma x) = \sqrt{1/n\ (Y-\bar{Y})^2}$

$$= \sqrt{1/5 \text{ X } 183.3556}$$

$$= 6.0557$$

Or, 60,557 units

(iii) Coefficient of Variation (C.V) $= \frac{\sigma Y}{\bar{Y}} \text{ x } 100\%$

$$= \frac{60557}{787384} \text{ x } 100\%$$

$$= 7.6909\%$$

iv) Coefficient of Correlation $rxy = \frac{\Sigma UV}{\sqrt{\Sigma U^2}\ \sqrt{\Sigma V^2}}$

$$= \frac{138.2722}{\sqrt{115.3740}\ \sqrt{183.3556}}$$

$$= \frac{138.2722}{10.7412 \text{ X } 13.5409}$$

` $= 0.95$

v) Pe (Probable error) = 0.6745X S.D

$$= 0.6745 \text{ X } \frac{(1- r^2)}{\sqrt{n}}$$

$$= 0.6745 \text{ X } \frac{(1- 0.9025)}{\sqrt{5}} = 0.02941$$

Appendix-4

Year	Purchase(X)	Closing Stock(Y)	U=(X-X)	$U^2=(X-X)^2$	V=(Y-Y)	$V^2=(Y-Y)^2$	UV
04/05	82.5220	1.8900	3.7838	14.3164	0.0231	0.0005	0.0874
05/06	75.0356	2.2973	-3.7028	13.7107	0.4304	0.1852	-1.5937
06/07	74.7642	1.2641	-3.9742	15.7943	-0.6028	0.3634	2.3956
07/08	72.5623	1.3507	-6.1761	38.1442	-0.5162	0.2665	3.1881
08/09	88.8077	2.5326	10.0693	101.3908	0.6657	0.4432	6.7031
	ΣX=393.6918	ΣY=9.3347		ΣU^2=183.3564		ΣV^2=1.2588	ΣUV=10.7805

X= Actual Total Purchase

Y= Closing Stock

For Sales (X)

(i) Mean

$$\bar{X} = \frac{\Sigma X}{n}$$

$$= \frac{393.6918}{5}$$

= 78.7384

= 786837 units

(ii) Std. Deviation (σx) $= \sqrt{1/n\,(X-\bar{X})^2}$

$$= \sqrt{1/5 \times 183.3564}$$

= 6.0557

or, 60557 units

(iii) Coefficient of Variation (C.V) $= \frac{\sigma x}{\bar{X}} \times 100\%$

$$= \frac{60557}{787384} \times 100\%$$

= 7.6909%

For Total Actual Purchase (Y)

$$\bar{Y} = \frac{\Sigma Y}{n}$$

$$= \frac{9.3347}{5}$$

$$= 1.8669$$

$$= 18669 \text{ units}$$

(ii) Std. Deviation $(\sigma x) = \sqrt{1/n \, (Y-\bar{Y})^2}$

$$= \sqrt{1/5 \text{ X } 1.2588}$$

$$= 0.5017$$

or, 5017 units

(iii) Coefficient of Variation $(C.V) = \frac{\sigma Y}{\bar{Y}} \times 100\%$

$$= \frac{5017}{18669} \times 100\%$$

$$= 26.87\%$$

iv) Coefficient of Correlation $rxy = \frac{\Sigma UV}{\sqrt{\Sigma U^2} \sqrt{\Sigma V^2}}$

$$= \frac{10.7805}{\sqrt{183.3564} \sqrt{1.2588}}$$

$$= \frac{10.7805}{13.5409 \text{X } 1.1219}$$

` $= 0.71$

v) Pe (Probable error) = 0.6745X S.D

$$= 0.6745 \text{ X } \frac{(1- r^2)}{\sqrt{n}}$$

$$= 0.6745 \text{ X } \frac{(1- 0.5041)}{\sqrt{5}}$$

$$= 0.1495$$

Appendix-5

Year	Sale (X)	Closing Stock(Y)	U=(X-X)	$U^2=(X-X)^2$	V=(Y-Y)	$V^2=(Y-Y)^2$	UV
2004/05	83.8754	1.8900	5.1917	26.9537	0.0231	0.0005	0.1199
2005/06	75.1280	2.2973	-3.5557	12.6430	0.4304	0.1852	-1.5304
2006/07	76.8345	1.2641	-1.8492	3.4195	-0.6028	0.3634	1.1147
2007/08	72.7763	1.3507	-5.9074	34.8974	-0.5162	0.2665	3.0494
2008/09	84.8042	2.5326	6.1205	37.4605	0.6657	0.4432	4.0744
	ΣX=393.4184	ΣY=9.3347		ΣU^2=115.3741		ΣV^2=1.2588	ΣUV=6.8281

X= Actual Total Sales

Y= Closing Stock

For Sales (X)

(i) Mean

$$\bar{X} = \frac{\Sigma X}{n}$$

$$= \frac{393.4184}{5}$$

= 78.6837

= 786837 units

(ii) Std. Deviation $(\sigma x) = \sqrt{1/n\ (X-\bar{X})^2}$

$$= \sqrt{1/5 \times 115.3741}$$

= 4.8036

or, 48036 units

(iii) Coefficient of Variation $(C.V) = \frac{\sigma x}{\bar{X}} \times 100\%$

$$= \frac{48036}{786837} \times 100\%$$

= 6.10%

For Total Actual Purchase (Y)

$$\bar{Y} = \frac{\Sigma Y}{}$$

$$= \frac{9.3347}{5}$$

$$= 1.8669$$

$$= 18669 \text{ units}$$

(ii) Std. Deviation $(\sigma x) = \sqrt{1/n \, (Y-\bar{Y})^2}$

$$= \sqrt{1/5 \text{ X } 1.2588}$$

$$= 0.5017$$

or, 5017 units

(iii) Coefficient of Variation $(C.V) = \frac{\sigma Y}{\bar{Y}} \text{ x } 100\%$

$$= \frac{5017}{18669} \text{ x } 100\%$$

$$= 26.87\%$$

iv) Coefficient of Correlation $rxy = \frac{\Sigma UV}{\sqrt{\Sigma U^2} \sqrt{\Sigma V^2}}$

$$= \frac{6.8281}{\sqrt{115.3741} \sqrt{1.2588}}$$

$$= \frac{6.8281}{10.7412 \text{X } 1.1221}$$

` $= 0.57$

v) Pe (Probable error) = 0.6745X S.D

$$= 0.6745 \text{ X } \frac{(1- r^2)}{\sqrt{n}}$$

$$= 0.6745 \text{ X } \frac{(1- 0.3249)}{\sqrt{5}}$$

$$= 0.2033$$