

**A SINGLE PRODUCT MULTIPLE-WAREHOUSES MULTIPLE-VENDOR
INVENTORY MANAGEMENT PROBLEM CONCERNING STOCK OUTS
A CASE STUDY OF UTILITY STORES CORPORATION OF PAKISTAN**



**INDEPENDENT STUDY REPORT SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF SCIENCE IN
LOGISTICS AND SUPPLY CHAIN MANAGEMENT
INTERNATIONAL COLLEGE
KING MONGKUT'S INSTITUTE OF TECHNOLOGY LADKRABANG
2018
KMITL-2018-IC-M-002-001**

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TITLE A Single Product Multiple-Warehouses Multiple-Vendor Inventory Management Problem Concerning Stock Outs A Case Study of Utility Stores Corporation of Pakistan.

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PROGRAMME Logistics and Supply Chain Management

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ABSTRACT

This study is connected with inventory management of Utility Ghee of Utility Stores Corporation of Pakistan. The purpose of the study is to identify cause behind the problem of stock outs and to propose effective solution of inventory management of Utility brand ghee. It has been observed that company has been facing stock outs, because currently there was no proper inventory management system is in vogue. The company is having 67 warehouse all of the country, each warehouse have different level of consumption/demand. Therefore, demand for each warehouse has been analyzed. The issues regarding, procurement, pattern of demand, delay in supplies has been studied. After that, effective solution has been proposed in the light of literature review. The lead time for each warehouse has been worked out and ultimately re order point has been setup for each warehouse. Furthermore, considering the head office's perspective overall ABC classification has been made to make effective inventory management. Reorder point and ABC classification have been analyzed and compared with existing position of stocks. The results show considerable improvement that company can save upto 10 million in one month by adopting proposed method.

ACKNOWLEDGEMENT

I intend encompass my heartiest salutation to my respected advisor in lieu of endeavor put forth in accomplishment of this study. The backing and encouragement I received from Dr. Phophak was immense. His knowledge regarding Supply chain is not only theoretical but practical, and the way he acquaintance with students is very adaptive.

I am also honored to have enormous reinforcement from other distinguish lecturers during the course. Moreover, being international student in this university I have received great respect and hospitality by the KMITL Staff as well. I face no difficulty what so ever from KMITL IC staff during my studies, so they have very much right to feel proud in their contribution.

Finally, I extricate well wishes and prayers of my family, parents, relatives and friends. My accomplishment might not be plausible without their backing and constant motivation.

Muhammad Imran

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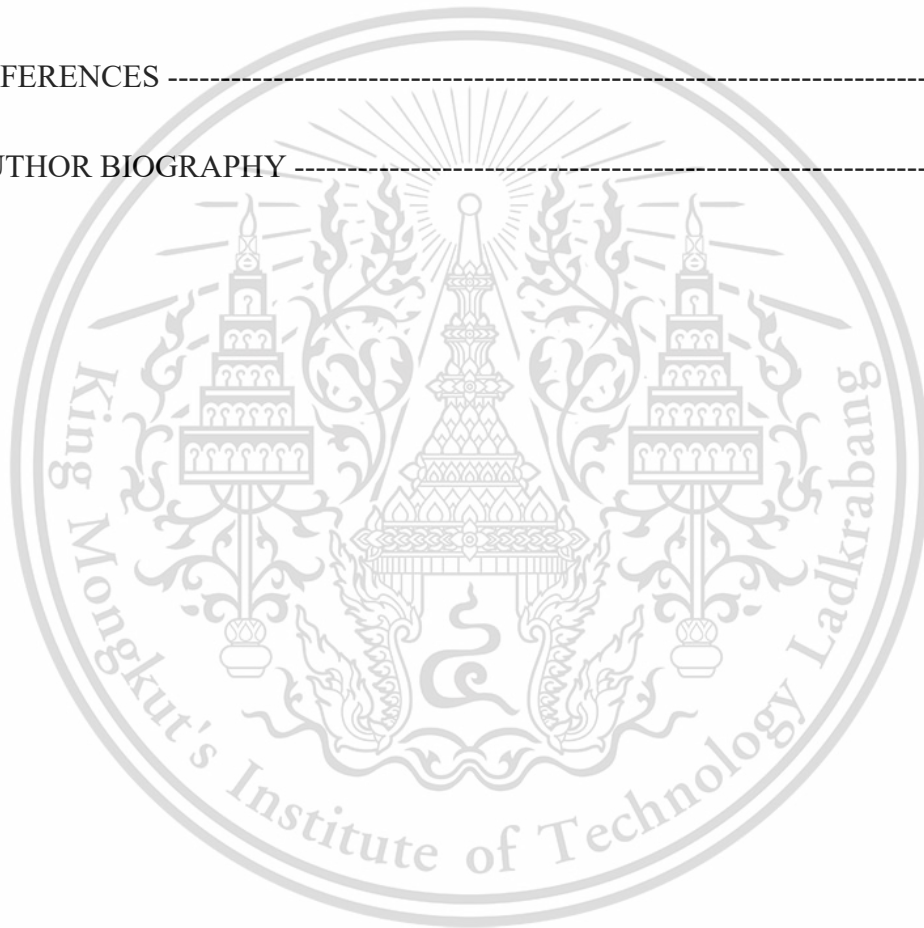
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CHAPTER 1

INTRODUCTION

1.1 Research Background

A single inventory management system requires multiple strategies to evaluate and then propose the best fit inventory management system. The complete understanding of product, sourcing and current operational practices are necessary to develop and implement suitable strategy. The multiple strategy approach enables the system to be dynamic, that empowers the managers to act timely to attain a desired service level (Dorval, Zwierzynski & Gerenser, 1999).

In the current business world where organizations are growing rapidly, operations spread widely into zones and regions of the world. Inventory management needs more standardized techniques to manage and control. The companies who fail to do so vanish from the market and there is no survival. It has been observed that in the third world countries business units are not as developed as in the developed countries. The most of the organizations run and manage by the intuition of managers instead of placement of proper business system. The inventories are being managed on day to day basis. The approaches towards inventory problems are being reactive instead of proactive. This leads to serious implications towards performance and profitability of business organizations. The big organization needs big inventory ultimately require more effective control over inventory. Therefore, it is imperative for organization to adopt best practices, impart latest knowledge and techniques in its operation management.

In connection with the subject of inventory as discussed above, a case study has been done on inventory management under the area of multiple vendors and

multiple warehouses. In this regard an organization named Utility Stores Corporation of Pakistan has been selected for the said purpose. It is a Government own autonomous body which runs chain of grocery stores all over the country (Pakistan). The company is being managed traditionally on autocratic style which results in poor performance in terms business perspective. The author took opportunity to study and identify problems in question and suggest solution regarding inventory management.

1.2 Statement of the Problem

In order to propose best fit inventory solution it is vital to identify prevailing problem. It has come out though preliminary research that company have 67 region all over the country, each region have three main warehouses which are as follows:

- a. Commodity Warehouse
- b. Branded Warehouse
- c. Utility Ghee Warehouse

This study focuses on Utility Ghee Warehouse wherein, single products i.e Utility Ghee 1kg pouch are being procured from multiple vendors and distributed to multiple warehouses. It has come out through research that most of the warehouses facing stock outs, however few warehouses are facing overstocking as well. The delay in forwarding requisition for demand by warehouse managers and delay in issuing purchase order by the Head Office result inventory problem. Therefore, purpose of this study is to dig in and find out the reason behind stock outs, delay in supplies and overstocking issues.

Consequently responding to the above issues, initial problem has been identified as there was no standard system Inventory Management system in practice.

To be more specific as there was no standards of minimum or maximum level of

inventory has been setup. There was no reorder point has been setup, there is no concept of lead time, there was no formal procurement planning and forecasting system instead only individual's intuition. It has revealed that procurement of this SKU has been done at Head Office whereas warehouse Manager based at regions forward demand and to head office without considering lead time and capacity of supply over certain period of time. The head office section of Utility Ghee collects demands/requirement from each region in written through regular mail. The main problem was being faced at this level that all 67 regions have not been forwarding their demand/requirement at the same time. Procurement Officer normally received 70% (estimated 50 region's demand) every month. Therefore for the remaining regions Procurement Officer use intuition estimation and guess to determine the demand/requirement. After deciding the total quantity for all regions the process of procurement initiates which takes 15 days up to issuance of purchase order to the vendors. After that vendor take 7 to 15 days to complete their supplies which depend upon the distance from vendor's factory to USC's regional warehouse.

1.3 Objective of the Study

Objective of this study is to conduct research in existing system of inventory management than identify the problem therein. Likewise, it also purpose of this study to propose precise solution of the particular problem and develop proper system for managing/controlling the inventory in the light of latest knowledge. Moreover, it also enlightened the management to adopt systematic approach towards inventory management. The more specific objectives are as under:

- a. Calculate or setup reorder point of 67 warehouse of the company
- b. Calculate demand/requisition and lead time for each warehouses

- c. ABC Categorization of the warehouses
- d. Identified other issues behind overall mis-management of inventory.
Moreover, provide suggestion to resolve such issues
- e. Find other related problem areas wherein research needs to carry out

1.4 Scope of the Study

The scope of this study is focus on single SKU and 67 regions of the organization. It explores the relationship between warehouse, head office and vendors. In this connection annual or monthly consumption/requirement of each warehouse will be obtained. Lead time, delivery time, stock consumption/sales will be analyzed. Existing situation of planning, coordination and forecasting will be discussed. Historical data regarding quantity demanded of region will be collected from the Head Office database/records. Moreover, Interviews, will be conducted at Head Office, Zones, Regions and Vendors.

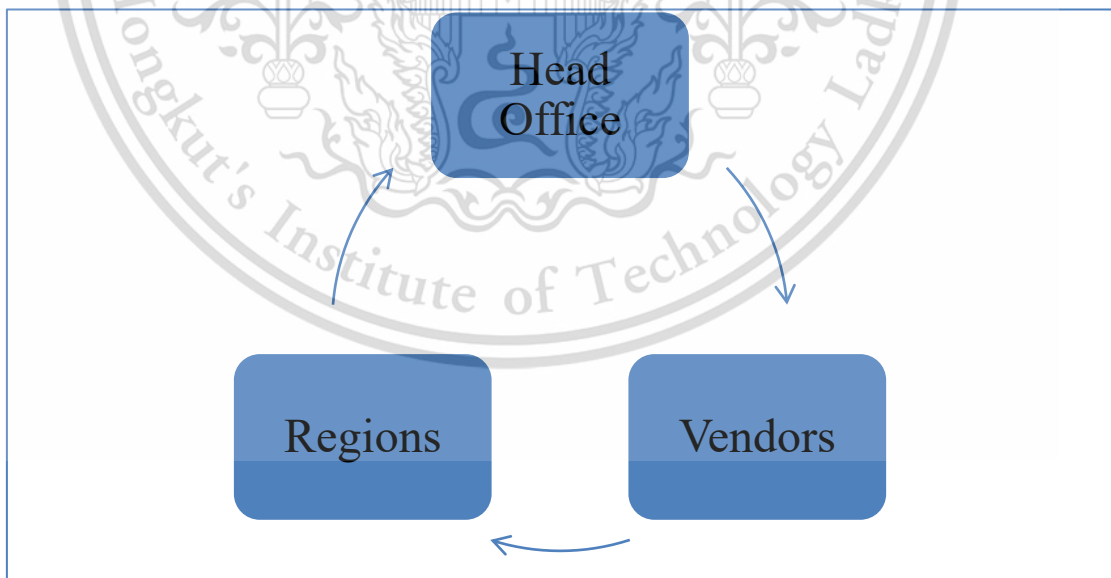


Figure 1.1 Scope of Study

1.5 Organization of Research Content

This study comprises of five chapters, the first chapter describes basic introduction, background and scope of study. The chapter two consists of literature review related with inventory management and supply chain management. The chapter three discusses about research method, how data collected, research about existing system prevailing in organization. Chapter four will have the discussion and about calculations and results of the data and chapter five will be have the conclusions and recommendations.



CHAPTER 2

LITERATURE REVIEW

In this chapter related literature regarding basic inventory management have been reviewed. The object is to find out best practices, related knowledge, and techniques which will probable best fit solution to the persisting problem in study. The attempt will be made keeping focus on basic inventory management tools in supplying chain management

2.1 Role of Inventory Management in Supply chain Management

Matthew (2014) the aforementioned reference book is through light on the basic objective of the inventory is to match demand with supply. Therefore, from the supply end managing supplier relation and from the demand end managing customer relations is very important. As the crux of supply chain management is to manage relationships. However, before managing relation with supplier it is imperative to structure internal supply chain of organization. “Perhaps the most fundamental role that inventory plays in supply chains is that of facilitating the balancing of demand and supply. To effectively manage the forward and reverse flows in the supply chain, firms have to deal with upstream supplier exchanges and downstream customer demands. This puts an organization in the position of trying to strike a balance between fulfilling the demands of customers, which is often difficult to forecast with precision or accuracy, and maintaining adequate supply of materials and goods. This balance is often achieved through inventory”.

Westford School of Management (2016) it is essential for each company to manage the inventory so that the excess stock should not be stored at the company and at the same time the demand for customers is met. The main objective inventory management is to keep the products safe. Based on the area of the store and the size of the company safety measures can be implemented for the inventory. Surveillance systems and alarms are employed for the safety check and how the materials are handled and breakages are checked during storing of the inventory.

Keskinocak (2011), the article referred review and it describes the importance of inventory management. In this connection, author emphasis on tool which helps to manage inventories. However this is 2nd step the organization under study is unaware of the basic tools of inventory like lead time, ordering cost, holding cost, minimum maximum inventory and EAQ. Therefore, this study helps to make proper inventory structure which can be further translate into IT setup or automation.

Feng (2014), in article that if organization does not have proper inventory management system than it is most than you may find the gap between supply and demand which ultimately result in stock out and excess inventory.

Freeland (2008) it has been discussed in the said paper that managing inventory is foremost important element in improving profitability of organization. “Inventories account for a significant percentage of the current assets of companies in industries ranging from hospitals and restaurants to manufacturing, wholesaling and retailing firms. So, managing inventories is often the key aspect of improving a firm's working capital position and its return on assets”

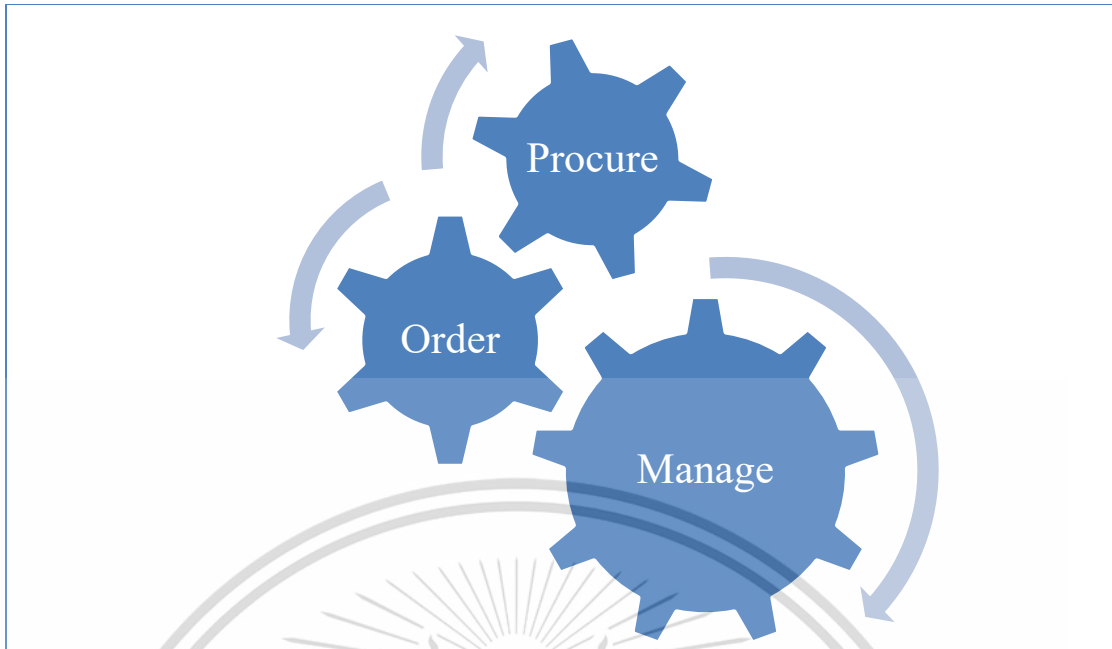


Figure 2.1 Inventory Management Process

2.2 Logistics

If the inventories are being under discussion than it is natural to discussed the logistics. In the past the word logistics come under lime light during the World War II where military used this term in movement of their troops and ammunion. Currently it is quite well know and considered as greater version of transportation, hence now transportation is considered as part of logistics. Alongside that some of the scholars ponder that inventory is a portion of the logistics subject.

White (2015) explained that Logistics is as sum of Supply chain plus material and plus distribution. Logistics is physical movement of products from source to the end user. Furthermore confusion in understanding about logistics and supply chain management has been discussed and supply chain referred as “Supply Chain Management deals with the management of materials, information, and financial

flows in a network consisting of suppliers, manufacturers, distributors, and customers" (Lee, 2015).

William (2016) discussed in article named Industry Star Solution about Logistics & Inventory Management. It has been defined the logistics as the detail coordination of a complex operations involving many people, facilities, and supplies. Although this definition is true, logistics has taken on a new meaning in today's digital world. Logistics can alternatively be explained as the detailed coordination of information, physical, and financial flows to and from trading partners and consumers. Each contains their own set of supporting activities and personnel to carry out those activities, but one cannot function without the other.

Inventory management is certainly a function of logistics but the influencers impacting inventory extend beyond the logistics network. Inventory requires a capital investment to build and stock finished goods. However, inventory is essential as the time a consumer is willing to wait for a product may be much less than the time it takes to manufacture the product and then ship the product to the customer needs location. Inventory management considers a number of complex variables including; risk, lead time, cost, location, transport, and service levels.”

In order to manage inventory and logistics the emphasis is on the system thinking, supply chain partnering, and business process improvement. However, it is also enlightened that beside these techniques, organization must closely look into its logistics and inventory management operation in order to improve its gain by adopting best fit solution.

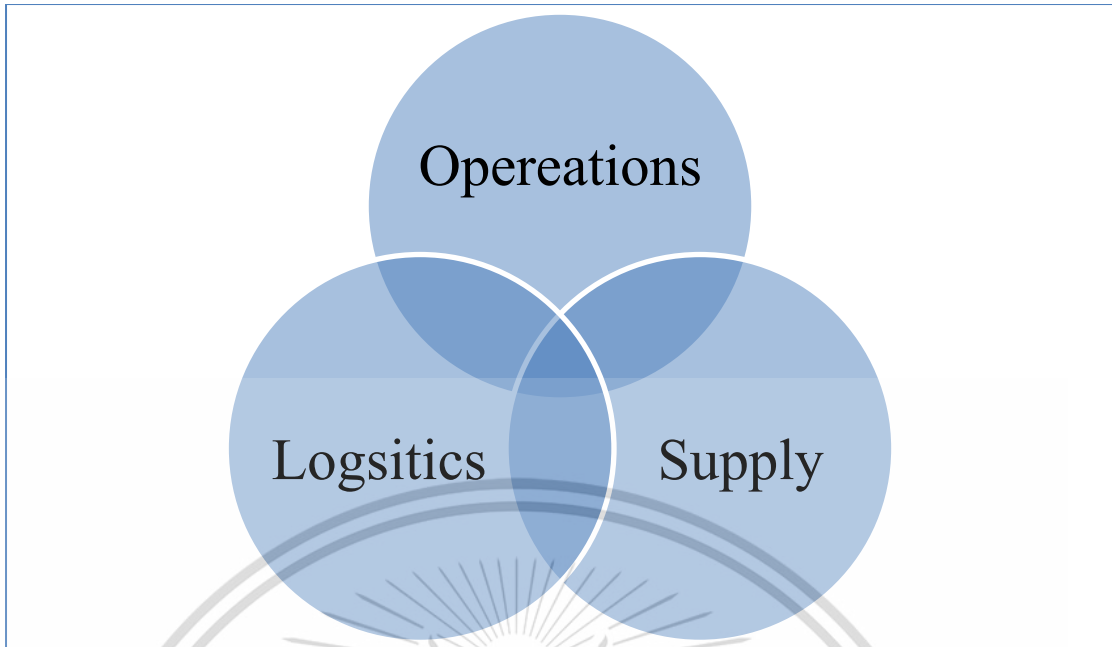


Figure 2.2 The Logistics Process

2.3 Supply Chain Management and Inventory

Supply Chain Management is now days very famous among the business world. Schoolers defined this in various ways, although there is slight variation in semantics, its largely understood that it's basically managing relationships with your supplier and customers.

Kabossa (2012) explained that the supply chain as it is to creating links between supplier, customer and other related department in order to efficiently manage the flow of goods and information. In this paper, the examples have quoted about eminent organization that implemented supply chain management theories in their organizations and got benefits i. e General Electric, Dell, Cisco and Ford.

James (2012) viewed that there are various definitions prevailing in the souk and there is different understanding regarding supply chain and supply chain management both among the practitioners and academia. Bridge Field Group (2006)

defines Supply Chain as “a connected set of resources and processes that starts with the raw materials sourcing and expands through the delivery of finished goods to the end consumer”.

The slender metamorphosis in concept of supply chain and supply chain management has been debated, where it has revealed that nodes between sourcing of product to delivery of product are the components of supply chain, however, controlling core part of these components and reduce unnecessary part is considered as supply chain management.

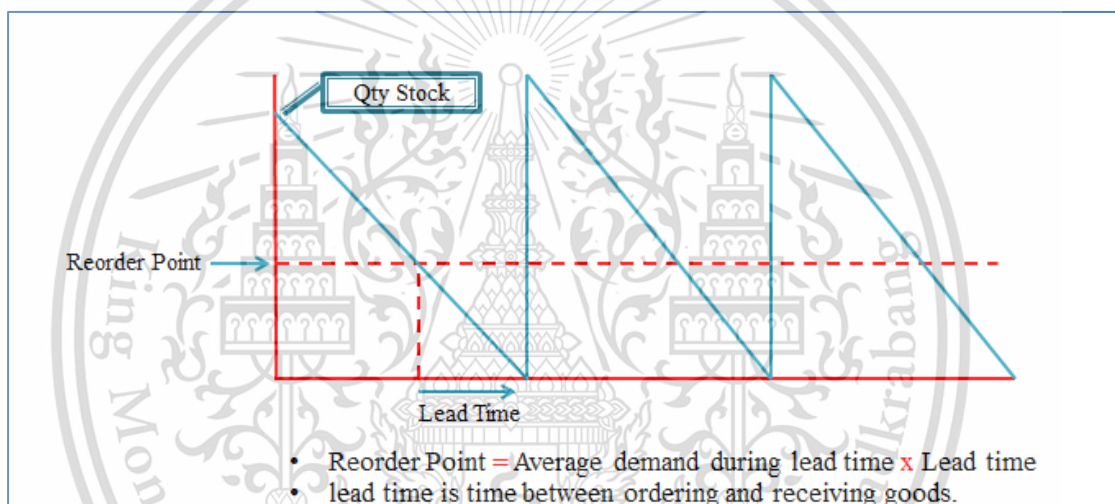


Figure 2.3 Reorder Point

Source: Stevenson, W. J., & Hojati, M. (2007). *Operations management* (Vol. 8). Boston: McGraw-Hill/Irwin.

Meng (2006) argued in the paper that with regards to supply chain management mostly researches are being done on information flow, planning and operation management, and Inventory management. Therefore inventory is integral part of the supply chain hence managing inventory is considered as managing supply chain. The research conversed about the bullwhip effect and just in time concept which is related to inventory. The effective control over inventory saves stock outs which result in perpetual gain for the organization.

2.4 Inventory and Inventory Management

Tersine (1994) discussed that in retail industry, inventory is that items which procure and kept for sales to customer. However there are many types of inventories, raw material inventory, and work in process inventory finished goods inventory. Moreover inventory at warehouse and inventory stores/outlets which readily available for sales.

Stevenson (2014) explained that the major source of revenue is come from the inventories. It is second most liquid asset after cash for any organization. The issue and concept related to the inventory must be taken care and should be well managed for instance, stock out must be avoided, and excess inventory must be avoided. Because inventory carries holding cost order cost, lead damages, expired and spoliation of stock. Therefore in order to effective inventory control system is necessary for organization where in organization bear lowest cost and get maximum gain by avoid aforesaid cost and losses.

The author describes the requirement of effective inventory management that there must be tracking of the inventory on hand and on order. Moreover, there should be proper demand forecast system, lead time must be understood and known, inventory related costs must be know. Above all there should be classification system of inventory as per their sales, area regions.

2.5 Periodic and Perpetual inventory

Martin (1992) enlightened that in counting of inventory/stock there are two systems explained by the author one is periodic counting system wherein products are physically accounted for. The second is Perpetual System which refers to continues tracking and counting of stock as when in or out. It is quite logical to understand that

perpetual system give more affluence to control or track the inventory variation however under certain circumstances it is impossible to adopt perpetual system.

The problem in this case study is the same as the organization using periodic inventory system wherein sock is being counted physically after every three months. However, for product under query, the casual daily stock position has been recorded.

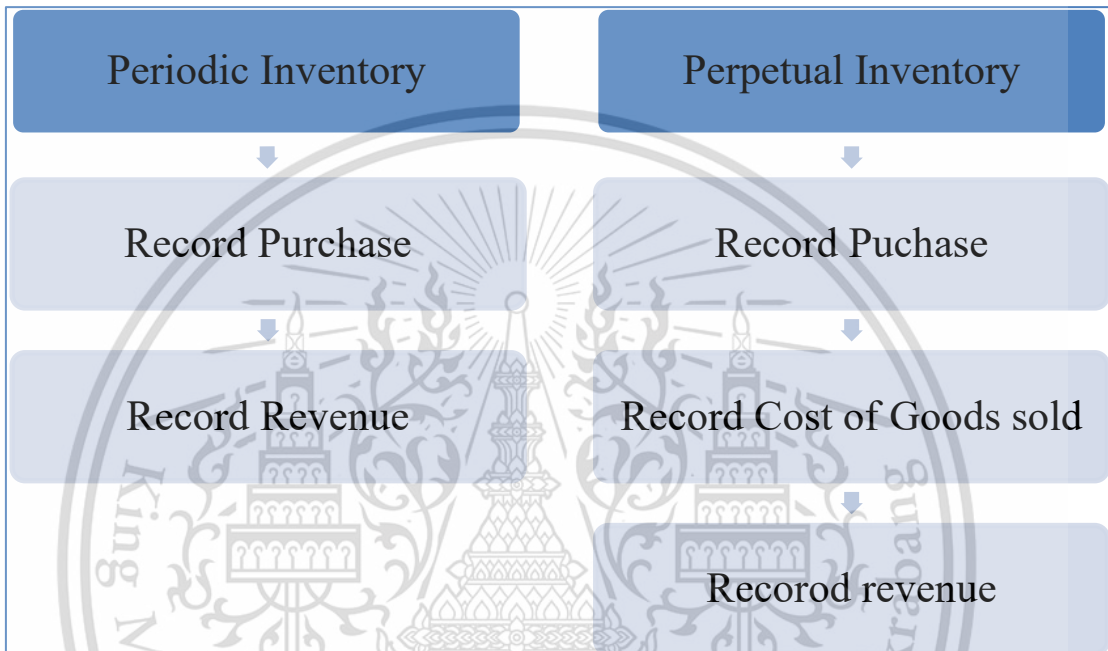


Figure 2.4 Periodic and Perpetual

2.6 Demand Forecast and Lead Time Information

Stevenson (2014) defined that preferably exact demand for product is needed from the customer to delivery of stock but most of the time precise demand cannot be available. Consequently, reliable demand forecast is desirable, moreover, it is also necessary to have knowledge of delivery and dispatch time. This time is called lead time, it defined as “the lead time is a time between ordering and receiving goods”.

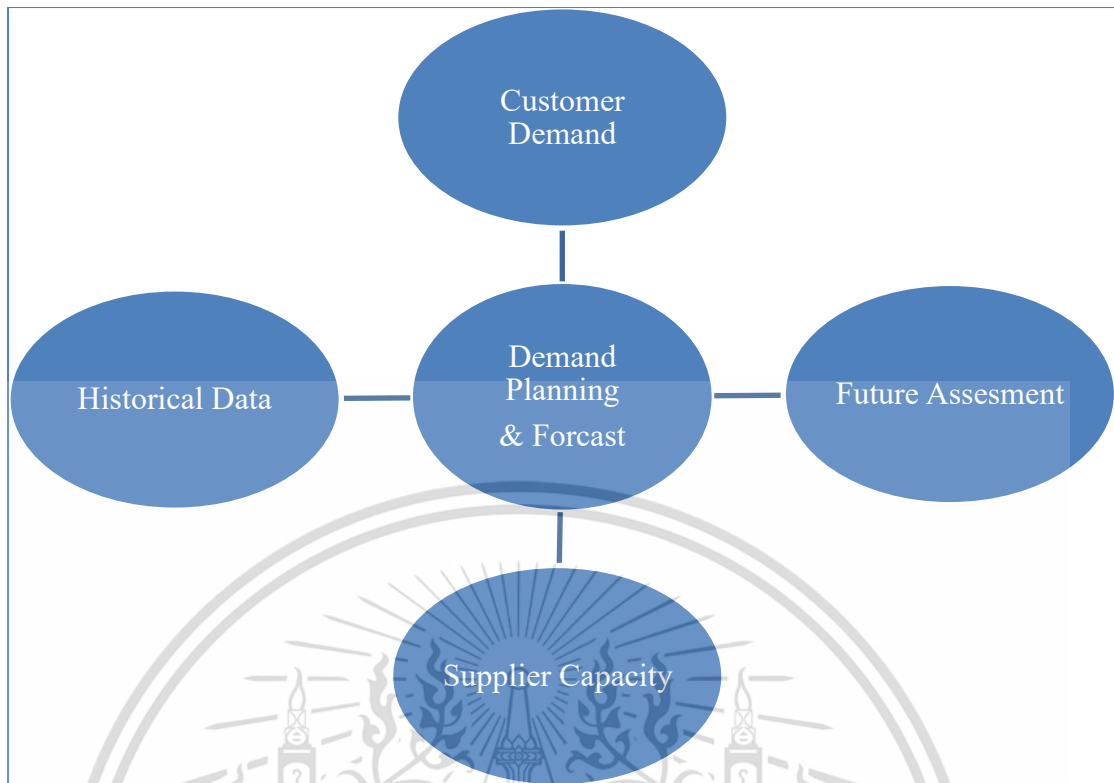


Figure 2.5 Demand Forecasting Flow

2.7 Inventory Cost

There are different costs involved with inventory, like purchase cost, holding cost, ordering cost, opportunity cost, financing cost and stock out cost. From these cost some are being articulated as under:

2.7.1 Holding cost

Paul (2012) stated that holding cost is designated in the article financing cost storage cost as rental of warehouse, insurance, cost leakage /damage etc. Holding cost can increase with increase of inventory. It can be calculated with estimated per unit cost multiplied with total number of unit in hand.

2.7.2 Ordering Cost

This cost starts from buying decision to purchase order and goes until the stock received. In this, administration cost like documentation, bidding arrangement, bidding expense if any, stationery cost, telephone, internet consultancy etc. Moreover,

the transportation loading unloading installation cost if any also included in ordering cost.

2.7.3 Stock out Cost

If the certain product is not available for sale at point of sale so amount profit which loses by the organization is called stock out cost. Stock out cost not only the amount of profit but it sometime effect the image of organization, impression of customer about the organization will also effect in future sales loss. If supplies are delayed and customer is no more interested to buy that product than there will be excess stock which increase holding cost as well. Particularly in this case study same thing has been experienced by the store managers, as if stock not arrived in the first dates of month than stock will be not liquidated up to the next month's first dates.

2.8 ABC Classification

ABC classification method is quite concrete and easy to implement. During process of classification beside financial concerns some other aspect like lead time, operational constraint can also be considered (Flores, Olson & Dorai, 1992).

Although many writers of Inventory management conferred about the inventory Management with ABC classification but there is no static inception separately for categorization. The methods of ABC classification can be altered as per objective and conditions.

The ABC classification method derived from Pareto's rule, wherein, it has been explained that some time item have less proportion in terms of quantity but gives higher proportion of sales. This also known as 80/20 rule which shows that 20% products have 80% share in the sales and 80% stock give only 20% sales (Ultsch, 2002).

It pertinent to mentioned that this classification suggests to make category among the various product but in this study the product under research is single but warehouses involved in this are 67 wherein the author use this ABC concept with slight change and apply to the warehouses instead of products. ABC category of warehouses will be made according the sales/demand/requirement of the each warehouse/region.

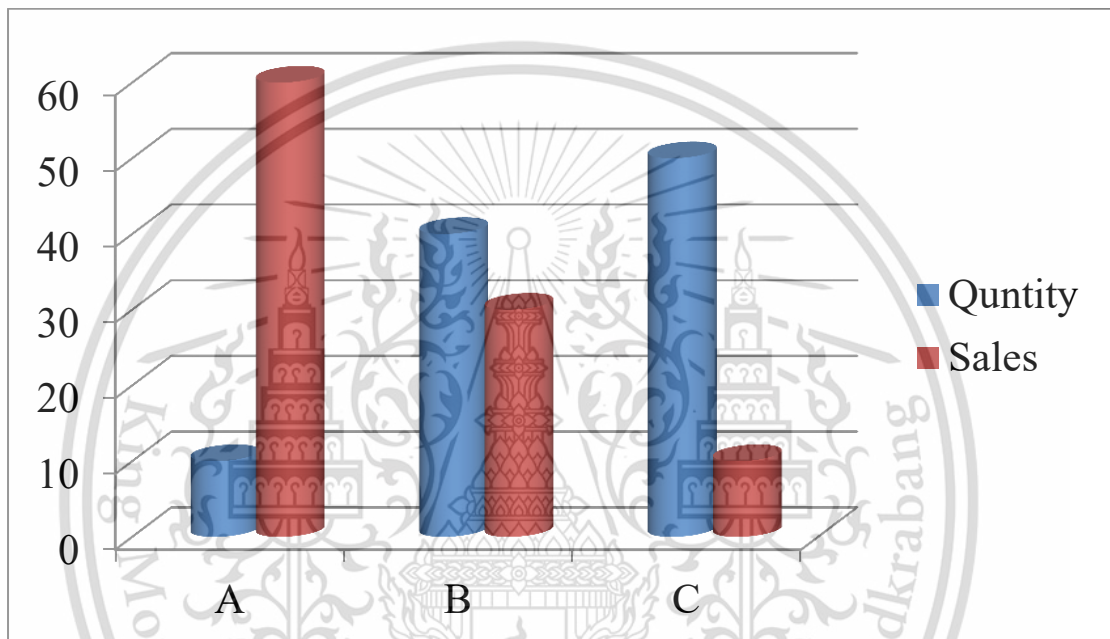


Figure 2.6 ABC Classification

2.9 Economic Order quantity

Economic Order Quantity is defined as the optimal quantity of orders that minimizes total variable costs required to order and hold and hold inventory.

Stevenson (2014) put forth that it is basically set the quantity of order between two extrema cost of inventory i.e Holding Cost and Ordering cost. Because large quantities is being ordered then there must be increase holding cost on the other hand if purchase order issued in small quantities then there obvious chance for increase in ordering cost. Beside this, some assumption must be met to follow EOQ model.

- a. There should be signal product.
- b. Demand requirement must be known preferably annual.
- c. Knowledge of lead time.
- d. Every order received in one delivery.
- e. There should not be any discount in quantity of order.

The under persuasion have meet certain condition as stated above like for instance, here product is single, annual demand is known however, it is not evenly spread all over the year. Moreover, there is no quantity discount but order in different delivery. The Economic Order Quantity can be calculated as $\frac{\sqrt{2DS}}{\sqrt{H}}$ where D represent for annual demand and S reprsest for ordering cost and H is stands for holding or carrying cost. However, the total cost is the sum of carrying cost and ordering costs. The optimal point is that where carrying cost and ordering cost become equal.

2.10 Reorder Point (ROP)

After knowing the quantity how much to order than it is pertinent that warehouse Manager or Store Manager must know the point or position when purchase order must be issued. There are some points which keep in mind while setting up reorder point, which is as under:

- a. Variable Demand.
- b. Lead time and standard deviation of demand must be known.
- c. The consumption during the lead time.
- d. The degree of sock risk acceptable.

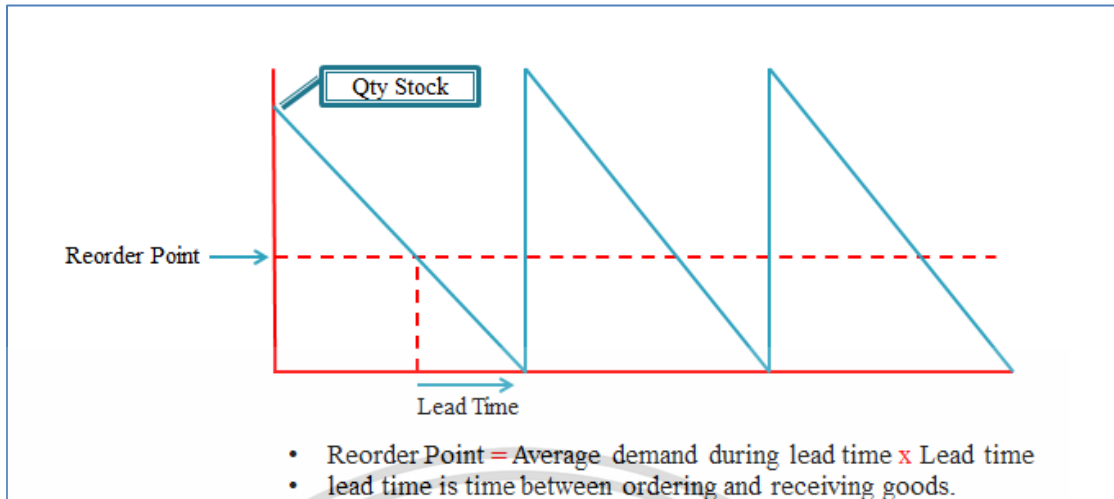


Figure 2.7 Reorder Point

Source: Stevenson, W. J., & Hojati, M. (2007). *Operations management* (Vol. 8). Boston: McGraw-Hill/Irwin.

$$\text{ROP} = \text{Expected demand during lead time} + z \sigma \text{LT} \quad (1)$$

Where,

z = Number of standard deviations

σLT = The standard deviation of lead time demand

If only demand is variable than formula will be

$$\text{ROP} = \text{Average Demand} \times \text{Lead Time} + Z \sigma d \sqrt{\text{LT}} \quad (2)$$

If only lead time is variable, then the reorder point is

$$\text{ROP} = d \times \text{LT} + Z d \sigma \text{LT} \quad (3)$$

Where,

d = Daily or weekly demand

LT = Average lead time in days or weeks

σLT = Standard deviation of lead time in days or weeks

2.11 Minimum Maximum Inventory

William J Stevenson (2014) this inventory management system is also in practice where the minimum quantity is set considering the lead time for

replenishment. The maximum inventory level is the level which equal to the re order quantity plus minimum inventory. This system of inventory is very convincing for the study in hand as there are various warehouses involved in buying.

2.12 Fixed Order Internal

Stevenson (2014) this model is widely in practice in retail industries where order placed for replenishment at fixed internal, daily, weekly or monthly. The demand is quite variable in this context. The order size also usually fixed the time period of demand is depend on sales if the sales are high than order may be issued early and vice versa. This method also in line with the current study but we need to match the how much to order and when to order.

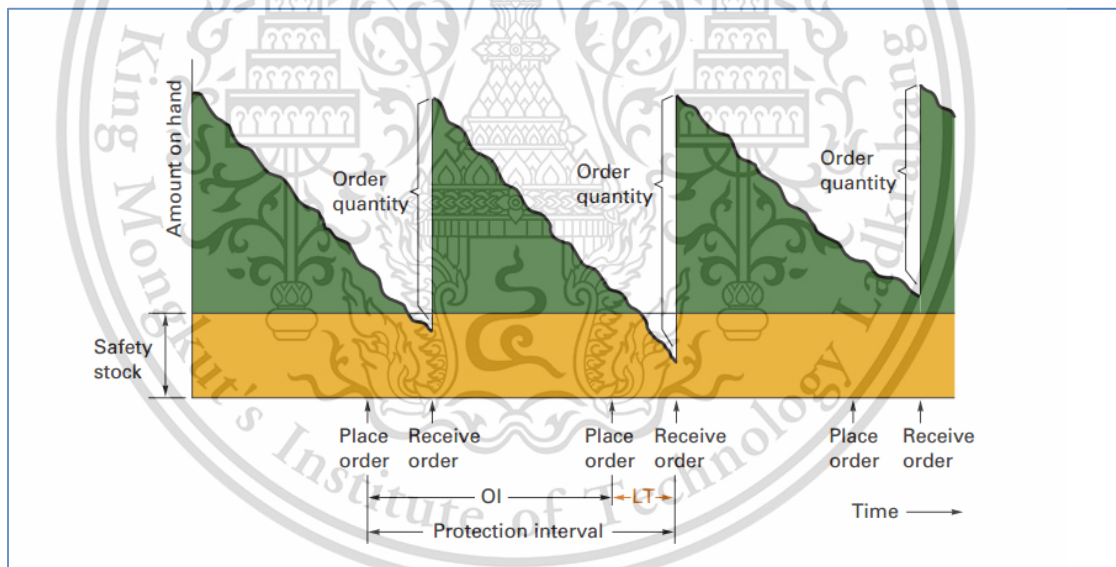


Figure 2.8 Fixed Order Intervals

Source: Stevenson, W. J., & Hojati, M. (2007). *Operations management* (Vol. 8). Boston: McGraw-Hill/Irwin.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction of company

The brief introduction of the organization is stated in following table.

Table 3.1 Utility Stores Corporation

Utility Stores Corporation of Pakistan	
Type	Retail Stores/Consumer Goods
Predecessor	Staff Welfare Organization Stores
Founded	1973
Head Office	Islamabad, Pakistan
Outlets	5,491 outlets all over Pakistan
Area Served	67 Regional Warehouses under 9 Zones
Employees	14,500

3.2 Company Background

Utility Stores Corporation of Pakistan (USC) operates retail chain stores throughout Pakistan providing basic commodities to general public at rates which are lower than the open market. Utility Stores Corporation is a semi-autonomous Corporation governed by Board of Directors and headed by a Managing Director. The basic objectives are as under:

- To protect the real income of the people by selling essential consumer items at prices lower than those prevailing in the open markets.
- To act as a price moderator in the market and deterrent to profiteering, hoarding and black marketing by the private sector.

3.3 USC Special Role Time To Time

- Food security during crisis. (Provision of basic Food Items to effecters during natural disasters)
- Intervention in market through sale of subsidized items
- Government's Relief Package's e.g. Ramadan Package



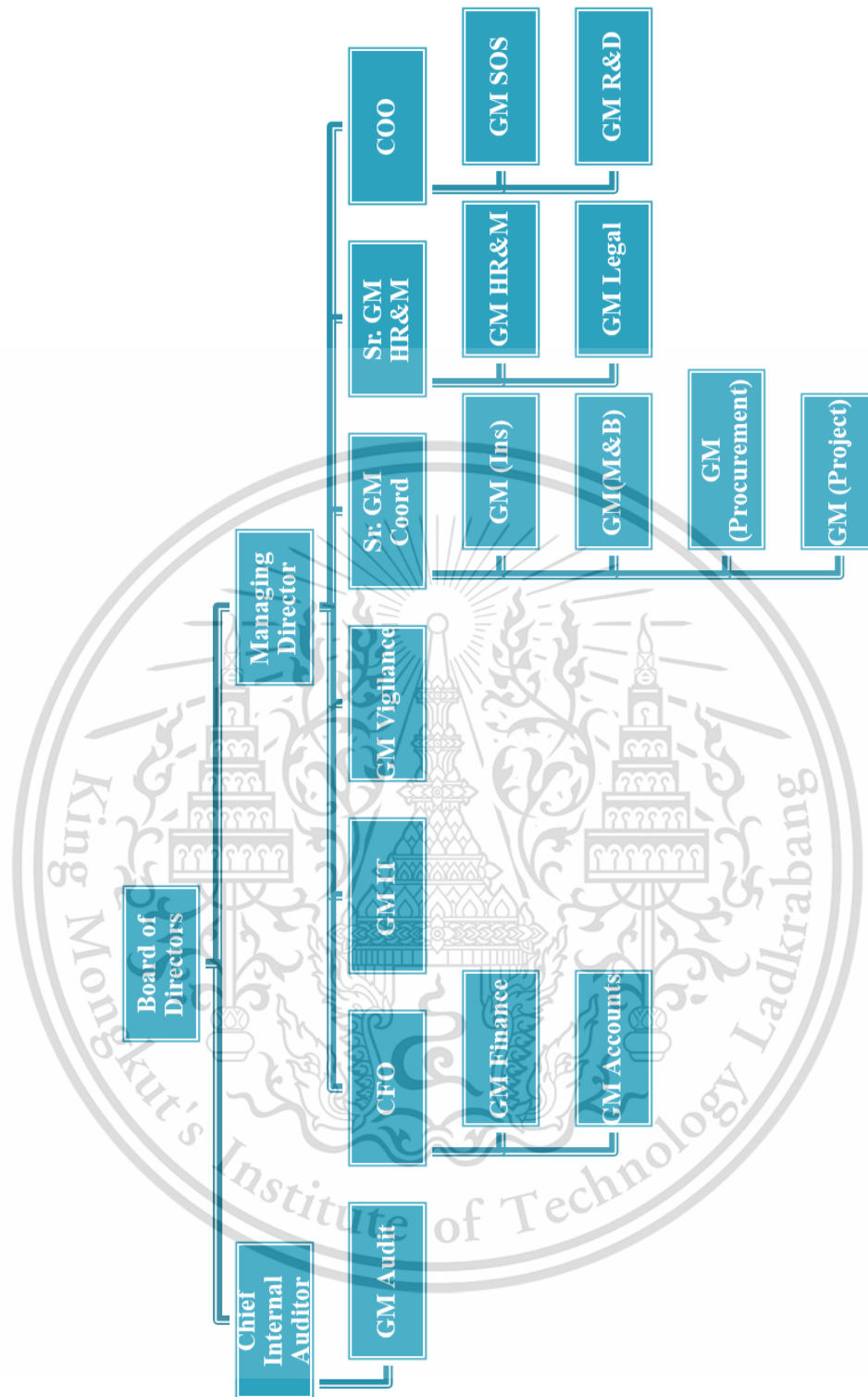


Figure 3.1 Organization Chart

Source: Utility Stores Corporation of Pakistan, retrieved on Feb 16, 2018 from the <http://www.usc.org.pk>

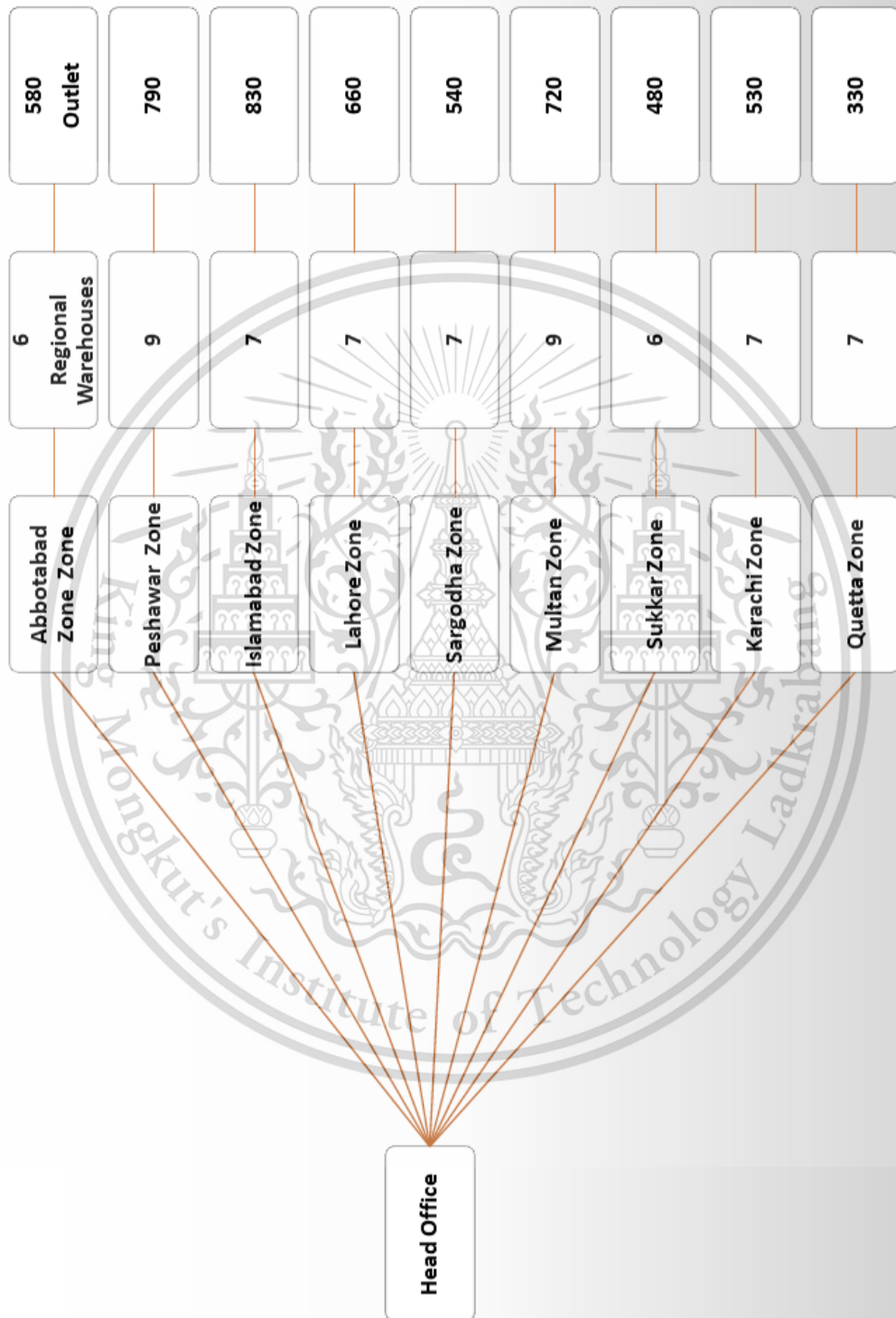


Figure 3.2 Regions and Zone Chart

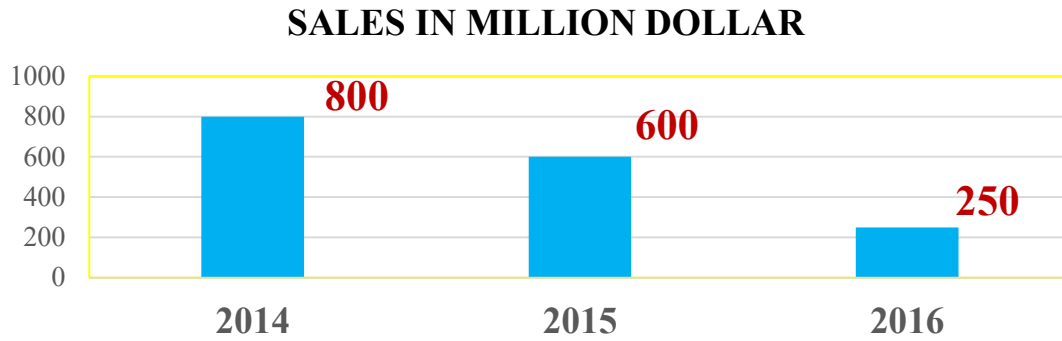


Figure 3.3 USC Sales Graph from 2014 to 2016

Source: Utility Stores Corporation of Pakistan, retrieved on Feb 16, 2018 from the <http://www.usc.org.pk>

3.4 The Research Methodology

The research methodology adopted in this case study is “theoretical approach”. The study focused operational issues concerned single product with multiple warehouses and vendors. In order to conduct this study, author collected information from management and staffs via interviewing some questions. This case study comprises three parts; the first part belongs to getting information through interview. The second part is to get data related with demand and lead time for each warehouse. In third part result will be compared before and after situations.

3.5 Interviews

The focused group of procurement managers of head office and zonal managers, and warehouses manager of various regions has been selected regarding interviews. In this connection essential questions which have been asked are as under:

1. What is the status of head office and regional office in connection with operation regarding Utility Ghee?

2. Who is responsible for procurement, payment and distribution?
3. What is procurement and distribution process?
4. How many suppliers involved, how to hire supplier?
5. How purchase order is being issued?
6. What is the existing method for issuance of purchase orders?
7. How much quantity is procured and when to procure?
8. What is current inventory monitoring and control system?
9. Current Re Order Point, Minimum stock level in any?
10. Minimum and maximum stock setup if any?
11. Current inventory costs, ordering cost, carry cost and stock out cost.
12. Usual inventory level, and how often stock out occur?
13. Demand calculation method?
14. Question regarding ABC, Lead time, demand for each region.

Beside above some other questions has been asked which relates with some other inventory issues at warehouses like, leaked/damaged stock, physical handling of inventory.

3.6 The Basic Operational Structure

The above diagram shows the very basic operations and relations as to how the organization is being functioned. The head office here is depicted being centralized system of procurement and payments. The Head Office issue purchase order to suppliers/vendors who then execute supplies to regions. Apparently, it looks quite smooth system but actually it is not because there are 67 regions (cities) and hundreds of suppliers involved.

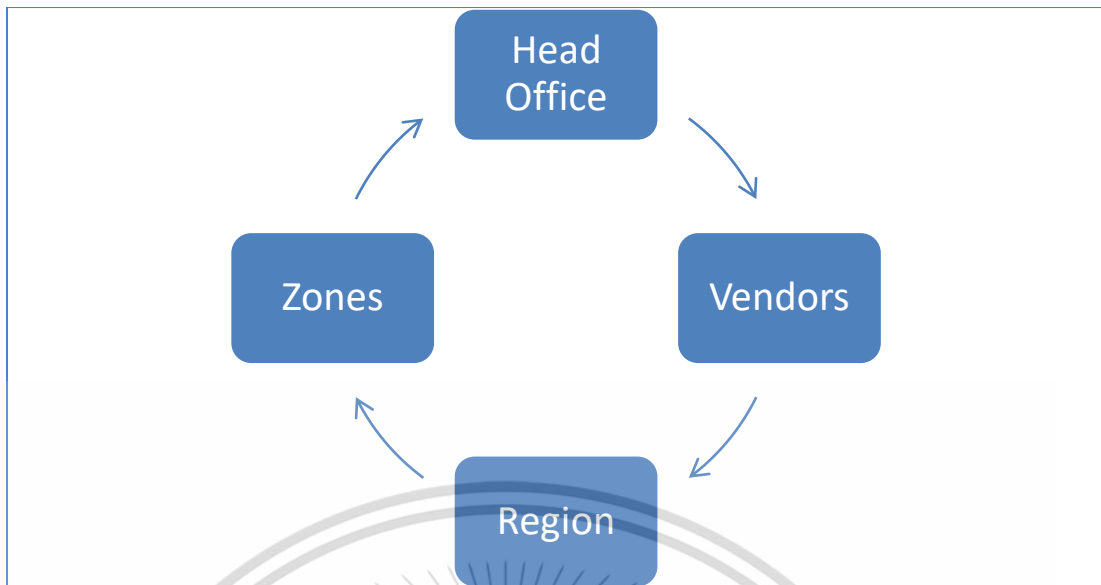


Figure 3.4 Basic Operational Flows

The figure 3.4 is showing the structure of regions and zones, function of head office, regions and vendors will be discussed in next section in detail.

3.7 Issuance Demand from Regions

After interviewing the procurement officer at head office it has been revealed that currently the monthly demand/requirement is being raised by the each warehouse Manager. The warehouse manager uses intuition to for calculation of demand after that the same requisition sends to Head Office. There are no such guidelines as when to issue requisition/demand towards head Office for next supplies. There is no concept of lead time, re order point, minimum stock and maximum stock. Generally Warehouse Manager instructed to calculate their demand on monthly basis and send requisition toward head office monthly basis but no specific dates have been set. It has been discovered during interviews that each warehouse manager has its own way of working. There is no set criterion for timing of demands, lead time, etc. It has been

also revealed that some warehouse managers wait up to the limit when there is no stock, and then demand/requisition was raised.

Hence there was no concept of lead time, no guidance of maximum and minimum stock or when to order how to order. Ordering cost not known however, holding cost 1% of the product value which estimated Rs.1.10 per unit

3.8 Receiving of Demand and Issue Purchase Order from Head Office

It has been revealed during interview that the project section at head office level deals with the item of Utility Brand Ghee. The concerned procurement officer is key person who coordinate between warehouses and suppliers. The demands are being complied at head office on monthly basis which received through regular mail or Email. Although, this is a routine work of every month but still there is no discipline. The demands from regions always late, moreover, delay from few regions lead to delay for other regions. The head office cannot initiate procurement process without receiving demand from all regions. However, after compilation of demand, bidding processing initiates which take 7 to 15 till the issuance of purchase order to concern suppliers. The organization being a government organization, may not be opt direct procurement. Therefore, it is required to hire vendors by publishing advertisement in press every year and then every month bids call from the prequalified supplier for the demand received from regions. This process also cause of delay which ultimately effect whole supply chain. The regions face stock out, suppliers face pressure from head office for early supplies. Therefore it is imperative to appropriate management system so that all aforementioned issues may be resolved permanently.

3.9 Supplier Vendors

After receipt of purchase order at vendor's end, the suppliers start their supplies within two days. It has been revealed during research that there are 10 to 15 suppliers on average involved in supply of stock around 9000 M-Ton monthly. The time given to suppliers as per rules is 15 days, moreover, each supplier have different capacity and different quantity of purchase orders. For instance one supplier gets the order for 20 regions for 1500 M-Ton then it is required to complete in 15 days. If the other supplier get purchase order for 200 Tons the time is remain the same upto 15 days. While dispatching supplies the vendors set their own priority for each region as there is no particular time line given in purchase order for each region. The suppliers issue stock to those regions first that nearer to the factory and bear less transportation charges. They tend to ignore those regions that situated in far northern parts of country. The norther regions face more stock outs as compare to the regions which situated central and southern parts of the country. There is no visibility stock tracking and no proper mechanism of coordination after issuance of purchase order. The regions remain unaware of stock in transit. The names of suppliers are as under:

Table 3.2 List of Vendors

S.No	Name of Mills
3	M/S Al Wakeel Ghee and Oil Industries Hasanabadal (North)
2	M/S Associated Industries Ltd Nowsherha (North)
13	M/S Azhar Corporation Faisalabad (Central)
16	M/S Chitral Oil Industries Lahore (Central)
14	M/S Fahad Hamad Ghee Industries Pvt Ltd Karachi (South)
17	M/S Faisalabad Oil Ref Karachi (South)
11	M/S Habib Oil Mills Pvt Ltd (south)
4	M/S Hafeez Ghee & General Mills, Multan(Central)

Table 3.2 List of Vendors (Continue)

5	M/S Hafeez Iqbal Oil/Ghee Mills (North)
7	M/s IFFCO Pakistan Karachi (South)
18	M/S Ikram Yaqoob Pvt Ltd Karachi (south)
15	M/S Inam Ghee Industries Lahore (Central)
10	M/s Khadija Edible Oil Mills Pvt Ltd (South)
19	M/S Lal Ghee Industries Peshawar (North)
1	M/S Majuid Oil Refinery Karachi (South)
21	M/S Oil World Pvt Ltd Karachi (South)
22	M/S Pracha Textile Mills (Ghee Unit) Karachi (South)
12	M/S Qamar Oil Mills Lahore (Central)
20	M/s Sohail Ghee Mills Industries Haripur (North)
6	M/S Waheed Hafeez Ghee Industries (North)
9	M/s Yaqoot Oil Processing Mills Karachi (South)
8	M/S Zakariya Enterprises Muzafarghar (Central)
21	M/S Zanib Ghee and General Mills Multan (Central)

3.10 Research Analysis/Fishbone

The problem in question regarding inventory and cause behind the issue is hereby explained by the Fish Bone Diagram.

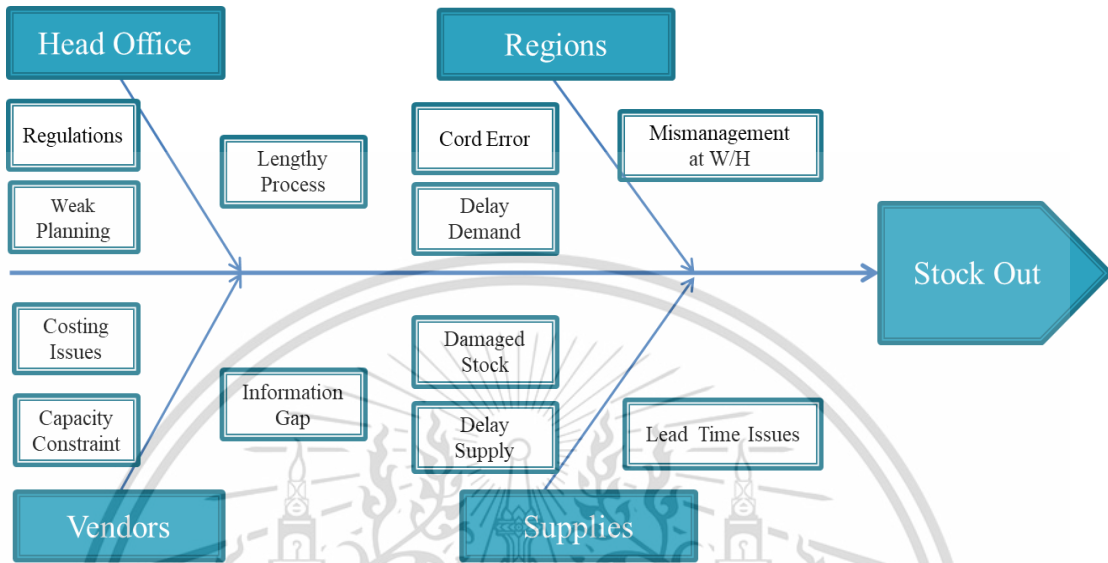


Figure 3.6 Fishbone Diagram

3.11 Lengthy Buying Process

It has been come out that there is lengthy buying process involved which spread up to 15 days which will also cause of effect on inventory. In this it has been come out that Head Office collects demand from each region almost every month but with no specific date set. After compilation of demand from each region bids called from the suppliers which take minimum 3 to 4 days, after opening of bidding the minutes is prepared and signed from the several Generals Managers of the committee and Ministry of Industries. This will take additional 7 to 10 days. Therefore it is proposed that management should look into it and reduce this buy proper procurement planning.

3.12 Purchase Order Terms Regarding Lead Time.

The purchase at present, have not contained any lead time or time schedule that what is time for delivery for each region, however there is general time of 15 days has been given to complete the supplies. Therefore, it is essential to ad lead time for each region so that delay in supplies may be avoided.

3.13 Calculation of Demand at Regional Level

It has been observed in study that demand calculation method was not systematic. Currently, intuitive method has been adopted by each warehouse manager. It is therefore, it is proposed that demand must be calculated considering the historical data, lead time, time of demand, hence follow proper reorder point of calculation of demand.

3.14 Delay in Submission of Demand from Regions

Since there is no proper system has been established therefore some of the regions delayed to submit their demand requisition which will also cause to delay in overall procurement decision. It is proposed that head office must issue strict policy instruction regarding submission of demand so that all regions must remain on the same level of operational spectrum.

3.15 Lack of Coordination

The lack of coordination has been found among regions and between vendors and head office which also cause of delay and ill planning. In order overcome this issue a training session must be initiated jointly for warehouse managers, vendors and head office management.. Information regarding future demand, prevailing inventory

level must be shared with the vendors accordingly vendors needs to share their supplying capacity and if there is any gap that need to be fill accordingly.

3.16 First in Firs out Method at Warehouses

It has been also observed that physical handling of stock is quite poor beside that FIFO method has not been used due the reason huge leakage damage and expired stock laying at warehouses. Therefore it is required to take action regarding this situation and set proper policy regarding handling of inventory by adopting FIFO method. It has also observed that report of daily inventory position have also included damage stock which must be excluded from the fair stock. The leaked damage stock should be shown in separate report so that decision making will not effect at Head Office level while controlling and reviews stock position.

3.17 Clearing of Leaked Damaged Expired Stock

As discussed above that it is also great cause of concern that has been shown by Warehouse Managers. The vendors are bound as per agreement to replace the stock leaked during transits or expired laying at warehouse. It has been informed that vendors always have in conflict regarding lifting and replacement of such stock. The vendor's representatives generally are not willing to cooperate in this regard and the management control also very poor. The vendors are of the view that they are not bound to clear expired stock because its responsibility of warehouse manager to adopt FIFO. Most of stock gets expired due to the negligence of the Warehouse Manager, moreover issue regarding leaked damage stock is that some of warehouse managers involved in mal practice and they deliberately cut the packs and claim damages from the vendor.

Under such circumstance, it has been proposed by the author that, penalty must be imposed on warehouses managers regarding expired stock, however, regular leakage/damaged must be compensated at set percentage given to warehouse managers which should around 1% to 2%. In this way amount of leakage/damaged may easily recovered from the vendors from their invoices. The warehouse manager will be more vigilant in handling the stock when it is known that they may not be compensated more then set percentage. Moreover, the head office management also provides proper racks and device proper physical handling system at warehouses to avoid such loss.

3.18 Late Supply to Northern Regions

It has been revealed that the regions situated at northern part of the country facing more delay from the vendors even after issuing of orders. During investigation from the vendors it has been come out that vendors avoid northern regions because it causes more transportation charges and more leakage during transit. Moreover, transportation service provider also not available for such regions in time. During winter season due to snow falling land sliding also accord which also cause of delay.

Solution will be suggested in this regard in the next para of transportation.

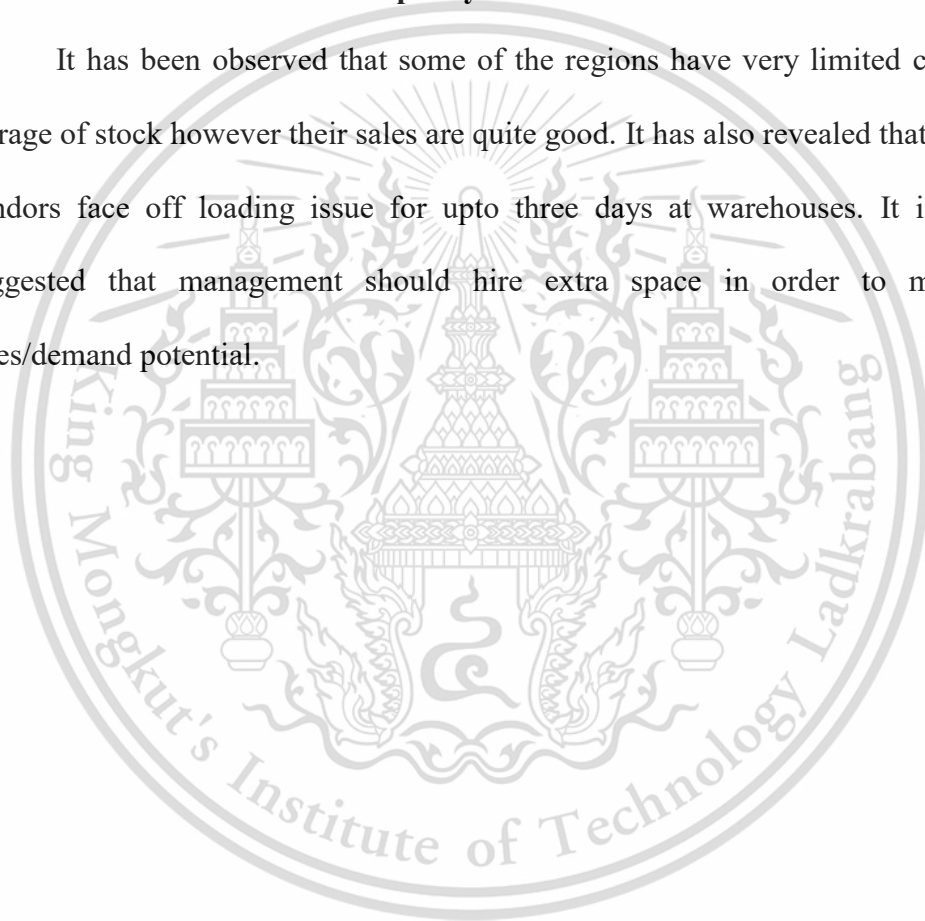
3.19 Transportation

Transportation/logistics cost issue is not only problem for northern regions this also one reason of delay in supplies for other regions. It has revealed that purchase price for product is the same for each region but vendors located in different location. Therefore transportation cost born by the vendors is varies. The author proposed that transportation must be paid by the company instead of vendors. However, later on

transportation cost must be proportionately divided and recovered from the vendors. In this way vendors will not be bothered about near or far, high or low transportation cost. Moreover, third party logistics facility can also be imparted to improve overall logistics system. This will enable to reduce lead time ensure smooth and timely supply to regions.

3.20 Capacity Issue at Warehouses

It has been observed that some of the regions have very limited capacity for storage of stock however their sales are quite good. It has also revealed that some time vendors face off loading issue for upto three days at warehouses. It is therefore suggested that management should hire extra space in order to match their sales/demand potential.



CHAPTER 4

ANALYSIS AND DISCUSSION

4.1 Data Collection

The data regarding demand history of Utility Ghee of 67 regions for the seven month (July 2016 to Jan 2017) has been collected. 1000kg = 1 ton

Table 4.1 Data collected regarding utility ghee as quantity demanded by the regions from July 2016 to Jan 2017

S.No	Regions	19 th Jan-17	08 th Dec-16	22 nd Nov-16	04 th Oct-16	21 st Sep-16	24 th Aug-16	18 th Jul-16
1	Abbotabad	200	200	100	300	200	150	100
2	Gilgit	70	100	100	50	100	100	100
3	Haripur	60	100	50	80	70	100	40
4	Manshra	300	60	180	300	50	100	100
5	Battagram	100	200	200	100	150	100	50
6	Muzafarabad	10	30	30	30	30	20	30
7	Arja(MZD)	40	10	10	10	30	10	10
8	Swabi	500	400	290	250	190	00	150
9	Skardu	70	50	50	100	50	20	20

Above table 4.1 shows the, quantity demanded by the regions from head office, each column have quantity in metric ton on concern date. The above dates also representing the purchase order date, moreover, it is also to clarify that this date is final compilation date of quantity demand by region. The above table 2 show only detail of demand of one zone having 7 regional warehouses however detail of all regions will be given in forthcoming tables later.

4.2 Inventory Level When Purchase Order Issued

The table 4.2 stock status report has been obtained from the organization's data base which is dated 05 October 2016. It is pertinent to mentioned here that this is also the date of purchase order issued by the head office. The comparison will be made after the data analysis of proposed solution with this position that how this study have impact on existing inventory.

Table 4.2 Zone wise/ regions wise stock status report as on 16th October 2016.

S.No.	Zone	Region	Utility Ghee (Qty In M-Ton)
	ABBOTTABAD		
1		Abbottabad	16.087
2		Gilgit	02.091
3		Haripur	05.665
4		Mansehra	10.647
5		Muzaffarabad	44.011
6		Skardu	11.714
7		Swabi	03.104
		Total:	93.319
	ISLAMABAD		
8		Islamabad	08.662
9		Attock	07.497
10		Chakwal	26.002
11		Rawalpindi-I (N)	11.036
12		Rawalpindi-II (S)	30.389
13		Gujrat	13.523
14		Jhelum	10.666
		Total:	107.775
	LAHORE		
15		Lahore(N)	10.849
16		Lahore(S)	09.203
17		Gujranwala	18.349
18		Okara	02.977
19		Sahiwal	04.152
20		Sheikhupura	03.037
21		Sialkot	70.357
		Total:	118.924
	PESHAWAR		
22		Peshawar (S)	23.048
23		Peshawar (N)	04.235
24		Bannu	15.939

Table 4.2 Zone wise/ regions wise stock status report (continued).

25		Kohat	05.357
26		Mardan	01.158
27		Chitral	78.278
28		D.I.Khan	42.522
29		Upper Dir	21.128
30		Swat	39.219
		Total:	230.884
	MULTAN		
31		Multan	02.605
32		Bahawalpur	01.650
33		Bahawalnagar	18.817
34		D.G.Khan	09.834
35		Khanewal	03.914
36		Layyah	18.958
37		Vehari	47.978
38		Muzaffargarh	62.506
		Total:	166.262
	SARGODHA		
39		Sargodha	02.219
40		Faisalabad	32.287
41		Jhang	59.736
42		Khushab	36.608
43		Mianwali	01.195
44		T.T Singh	54.051
45		M.B.Din	03.598
		Total:	189.694
	KARACHI		
46		Karachi (N)	21.269
47		Karachi (S)	06.172
48		Badin	22.727
49		Hyderabad	23.187
50		Mirpur khas	26.828
51		Nawabshah	06.740
52		Gawadar	09.762
		Total:	116.685
	SUKKUR		
53		Sukkur	35.296
54		Shikarpur	01.675
55		Larkana	01.295
56		R.Y.Khan	03.880
57		Ghotki	03.712
58		Dadu	03.084
		Total:	48.942
	QUETTA		
59		Quetta	25.625
60		Khuzdar	11.557

Table 4.2 Zone wise/ regions wise stock status report (continued).

61		Loralia	26.879
62		Noshki	26.253
63		Pishin	01.145
64		Sibbi	02.120
65		Qilla Saifullah	00.702
		Total:	94.281
		G.Total:	1166.766

It can be observed from the table 4.2 that there are various regions where inventory level is almost zero. For Example, Gilgit, Swabi, Attock and Islamabad regions are less than 10 Ton. At serial No. 2 Gilgit Region the stock level is showing only 02 M-Ton, whereas the lead time calculated for Gilgit region at an average 10 days. Likewise there are other regions where stock position is quite weak. This data will be compared after proposed calculation of Re Oder Point for Each Region.

4.3 Calculation and Results

The forthcoming table 4.3 contains calculations regarding reorder point of each region. This also shows the zone wise and overall position of inventory at the time of purchase order and at the time of demand requisition submitted by warehouse managers. The reorder point has been calculated by taking into account average daily demand during lead time. For this purpose example for one region Abbotabad is being explained below:

Average Monthly demand of Abbottabad Region = 150 M-Ton

Daily demand of Abbottabad Region $150/25$ (days) = 6 M-Ton

Average Lead Time (Factory to Region) = 8 days

Reorder (6x8) = 48 M-Ton

Reorder Point for submission demand request:

Here Lead time has been added by 15 more days which management takes to complete the bidding procurement process. After adding 15 days the reorder point for demand request for region will be $6 \times (8+15) = 138$ M-Ton. Moreover, lead time has been calculated as travel time from Karachi (port) to Abbottabad City (1575 Km), it includes the time from receiving order to preparation of stocks as 3 days. The travel time is to 4 days plus one extra day for unforeseen or delay element. Hence total lead time for Abbottabad Region is 8 days. Likewise lead time, average demand, and reorder point has been calculated for each in below mentioned below.

Table 4.3 Region wise calculation of reorder point

1	2	3	4	5	6	7
Name of Regions	Average Monthly Demand (M-Ton)	Lead Time from mill to region (In days)	Lead time demand to Purchase order (In Days)	Total lead time (In Days)	Re Order Point at Warehouse (M-Ton)	Reorder Point for Head Office (M-Ton)
Abbotabad	150	08	15	23	138	48
Gilgit	94	10	15	25	94	38
Haripur	74	08	15	23	68	24
Mansehra	244	08	15	23	225	78
Battagram	137	08	15	23	126	44
Muzafarabad	30	10	15	25	30	12
Arja(MZD	19	10	15	25	19	7
Swabi	271	08	15	23	250	87
Skardu	54	10	15	25	54	22
Attock	107	07	15	22	94	30
Chakwal	138	07	15	22	121	39
Gujrat	66	07	15	22	58	18
Islamabad	193	07	15	22	170	54

Table 4.3 Region Wise Calculation of Reorder Point (Continued).

Jehlum	60	7	15	22	53	17
Rawalpindi	117	7	15	22	103	33
Rawalpindi N	105	7	15	22	92	29
Badin	19	3	15	18	13	2
Gawadar	27	4	15	19	21	4
Hyderabad	36	3	15	18	26	4
Karachi (N)	26	3	15	18	19	3
Karachi (S)	46	3	15	18	33	5
Mirpur Khas	33	3	15	18	24	4
Nawabshah	36	3	15	18	26	4
Gujranwala	154	7	15	22	135	43
Lahore (N)	321	6	15	21	270	77
Lahore (S)	343	6	15	21	288	82
Okara	207	6	15	21	174	50
Sahiwal	293	6	15	21	246	70
Sheikhupura	277	6	15	21	233	67
Sialkot	210	6	15	21	176	50
Bahawalnagar	467	5	15	20	374	93
Bahawalpur	281	5	15	20	225	56
DG Khan	286	5	15	20	229	57
Khanewal	217	5	15	20	174	43
Layyah	166	5	15	20	133	33
Multan	344	5	15	20	275	69
Rahim Yar	106	5	15	20	85	21
Muzaffarga	133	5	15	20	106	27
Vehari	389	5	15	20	311	78
Bannu	279	7	15	22	245	78
Dera Ismail	291	7	15	22	256	82
Kohat	247	7	15	22	217	69
Mardan	269	7	15	22	236	75
Peshawer (N)	383	7	15	22	337	107
Swat	221	8	15	23	204	71
Upper Dir	19	8	15	23	17	6
Chitral	109	10	15	25	109	44
Khuzdar	23	5	15	20	18	5
Qila Saif	41	5	15	20	33	8

Table 4.3 Region wise calculation of reorder point (Continued)

Loralai	21	5	15	20	17	4
Nushki	17	5	15	20	14	3
Pishin	34	5	15	20	27	7
Quetta	71	5	15	20	57	14
Sibi	43	5	15	20	34	9
Faisalabad	324	5	15	20	259	65
Jhang	154	5	15	20	123	31
Khushab	144	5	15	20	115	29
MB ddin	151	5	15	20	121	30
Mianwali	260	5	15	20	208	52
Sargodha	266	5	15	20	213	53
TT Singh	219	5	15	20	175	44
Ghotki	41	4	15	19	31	7
Larkana	49	4	15	19	37	8
Shikarpur	37	4	15	19	28	6
Dadu	24	4	15	19	18	4
Sukkur	114	4	15	19	87	18
Total=	10528	0	0	0	8881.1	2564

The first column shows the name of regions and the 2nd column has been calculated as average demand. The 3rd column is representing lead time (Time from factory to regional warehouses). 4th column shows the time taken buy head office for procurement after receiving demand requisition from regions. The 5th column is sum of column 3rd and 4th being the total lead time for warehouse from issuance of demand requisition till the stock received or start receiving. The 6th column shows the Re Order Point for warehouse. The 7th column has been worked out for Head Office as stock with actual lead time.

The reorder point for warehouse has been calculated by considering the total lead time “buying time at head office” and time from factory to warehouse i.e after

issuance of purchase order. At this level warehouse Manager should issue demand requisition to head office. Moreover, the reorder point for head office is the time to ensure issuance of purchase order.

4.4 ABC Classification

It has learned that there are 67 warehouses involved and each has different level of consumption than it has been realized by the author that there is need to categorize warehouses according to their demand. In the light of literature, ABC classification has been made that enable to control inventory and also help to understand the stock position at various time and level. This step of scrutiny will have significant impact on procurement planning and decision making. Accordingly, from the data, following results has been derived and the table 4.4 for the working of ABC calcification.

Table 4.4 ABC classification of warehouses

Sr.No	Name of Regions	Average Monthly Demand	Percentage of Share	Category
1	Bahawalnagar	467	4.44%	A
2	Peshawer (S)	400	3.80%	A
3	Vehari	389	3.69%	A
4	Peshawer (N)	383	3.64%	A
5	Multan	344	3.27%	A
6	Lahore (S)	343	3.26%	A
7	Faisalabad	324	3.07%	A
8	Lahore (N)	321	3.05%	A
9	Sahiwal	293	2.78%	A
10	Dera Ismail Khan	291	2.77%	A
11	Dera Ghazi Khan	286	2.71%	A
12	Bahawalpur	281	2.67%	A
13	Bannu	279	2.65%	A
14	Sheikhupura	277	2.63%	A
15	Swabi	271	2.58%	A

Table 4.4 ABC Classification of Warehouses (Continued)

16	Mardan	269	2.55%	A
17	Sargodha	266	2.53%	A
18	Mianwali	260	2.47%	A
19	Kohat	247	2.35%	A
20	Manshra	244	2.32%	A
21	Swat	221	2.10%	A
22	Toba Tek Singh	219	2.08%	A
23	Khanewal	217	2.06%	A
	Total	6893	65.47%	A
1	Sialkot	210	1.99%	B
2	Okara	207	1.97%	B
3	Islamabad	193	1.83%	B
4	Layyah	166	1.57%	B
5	Jhang	154	1.47%	B
6	Gujranwala	154	1.46%	B
7	Mandi Baha Uddin	151	1.44%	B
8	Abbotabad	150	1.42%	B
9	Khushab	144	1.37%	B
10	Chakwal	138	1.31%	B
11	W.H Battagram	137	1.30%	B
12	Muzaffargarh	133	1.26%	B
13	Rawalpindi S	117	1.11%	B
14	Sukkur	114	1.09%	B
15	Chitral	109	1.04%	B
16	Attock	107	1.02%	B
17	Rahim Yar Khan	106	1.00%	B
18	Rawalpindi N	105	1.00%	B
	Total	2596	24.66%	B
1	Gilgit	94	0.90%	C
2	Haripur	74	0.71%	C
3	Quetta	71	0.68%	C
4	Gujrat	66	0.62%	C
5	Jehlum	60	0.57%	C
6	Skardu	54	0.52%	C
7	Larkana	49	0.46%	C
8	Karachi (S)	46	0.43%	C

Table 4.4 ABC classification of warehouses (continued)

9	Sibi	43	0.41%	C
10	Ghotki	41	0.39%	C
11	Qila Saif Ullah	41	0.39%	C
12	Shikarpur	37	0.35%	C
13	Hyderabad	36	0.34%	C
14	Nawabshah	36	0.34%	C
15	Pishin	34	0.33%	C
16	Mirpur Khas	33	0.31%	C
17	Muzafarabad	30	0.28%	C
18	Gawadar	27	0.26%	C
19	Karachi (N)	26	0.24%	C
20	Dadu	24	0.23%	C
21	Khuzdar	23	0.22%	C
22	Loralai	21	0.20%	C
23	Arja	19	0.18%	C
24	Badin	19	0.18%	C
25	Upper Dir	19	0.18%	C
26	Nushki	17	0.16%	C
	Total	1039	9.87%	C
	G Total	10528	1	

The above table 4.4 is showing categorization of ABC. For this purpose, percentage of share of sales/consumption has been calculated for each region. Maximum share is 4.44% of Bahawalnagar Region on Serial No.1 whereas minimum share contributed by Nushki region which is 0.16%. Therefore, the regions having sales range @% to 4.44% is fall in Category A. Accordingly the regions sales range 1% to 2% fall in B category. The regions contribution less than 1% fall in C category.

Moreover, the contribution share of each region has been calculated by dividing the total demand all regions with average monthly demand of concerned region. In this regard example has be explained of Bahawalnagar Region, wherein

monthly demand is 467 M Ton and Total demand for all region is 10528 M-Ton, accordingly the contribution share is become 4.44% (467/10528).

4.5 Consolidation of ABC Categorization of Warehouse

The below mentioned table 4.5 is showing consolidation of ABC classification which is derived from table 4.4.

Table 4.5 Summary of ABC classification of all warehouses

Category	No. of Regions	Average Monthly Demand/Sales (Quantity in Metric Tons)	Percentage of Share
A	27 Warehouse	6893	65.47%
B	18 Warehouse	2496	24.66%
C	26 Warehouses	1039	9.87%
	67 Warehouses	10528	100%

In table 4.5 it is further consolidated that how many regions fall in category A and their total contribution in sales. It has come out that 27 warehouse fall in category A and the total monthly sales of region is 6893 M-Ton which 65.47% of the total sales/demand. Moreover, 18 warehouses fall in category B as per the calculation of table 5. The total sales of 18 regions are 2496 M-Ton which is 24.66% of the total sales. Finally in category C there are 26 regions which contribute 9.87% in total sales.

This analysis helps to improved procurement planning, because as procurement manager at Head Office has to understand that which areas needs more focused attention. The ABC categorization also show in following Pie chart (4.1)

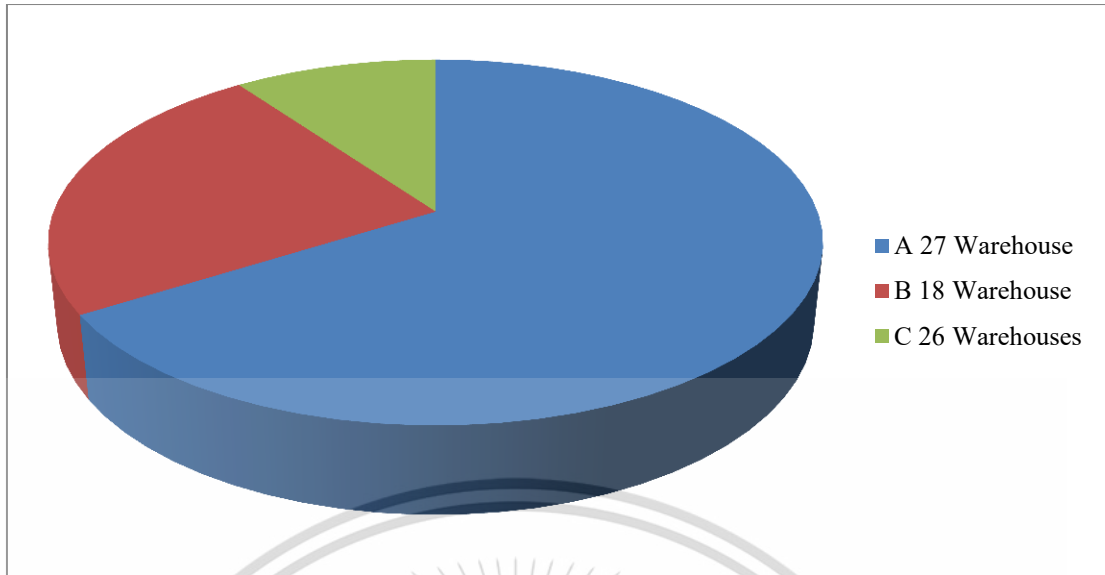


Figure 4.1 Pie Chart Show ABC Classifications

4.6 Impact of ABC Categorization on Inventory Planning and Control

After ABC categorization it is necessary to discuss its implication on procurement decision and inventory management. The following table 4.6 is showing comparison of two inventory level. The Inventory level at “standard Order Point” is being compared with the hypothetical “projected inventory” to apprehend its implications.

Table 4.6 Impact of ABC on inventory control decision

Class	No. of Regions	Average Monthly Demand/Sales	Standard Reorder Point	Projected Inventory position at any given time	Excess/Low Inventory
A	27 Warehouse	6893	1666	1000	(Low)
B	18 Warehouse	2496	653	1000	(Par)
C	26 Warehouses	1039	246	800	(Par)
Total		10528	2564	2800	Low

The above table 4.6 is showing different scenario regarding inventory level. The total projected inventory showing in column 5 row 5 is 2800 Metric Ton. If this compare to total inventory at re order point of all warehouses which is 2564 Ton. The projected inventory is 2800 is greater than the Re Oder Point (2564). If ABC categorization was not in focus then this clearly a satisfaction level of inventory.

On the other hand if ABC angle is considered, the inventory level 2800 M Ton is not satisfactory because category A showing stock level below standard i.e 666 M Ton less stock. This might be overlooked in case non availability of ABC categorization, hence, ABC leveling has significant impact on in decision making. Additionally, if loss of 600 Tons translates into “profit loss” it will become 4.2 Million in Pak Rupees which equal to 40,000 USD.

4.7 Fixed Order Interval (FOI)

As discussed in literature review that FOI system is also closely related to the inventory management at chain of stores. Therefore, considering the company’s current buying process it has also endorsed that organization may also follow the

under mention time interval for smooth functioning. The warehouse Manager must ensure to submission of demand requisition before 1st of every month for the next month. For instance, demand for the month of March must be submitted before 1st February. For calculation for demand for instance they may consider as their monthly demand, stock in hand and stock in transit if any.

For example calculation of demand requisition for Abbottabad region on 1st of every month, As the Re order Point for Abboatabad Region is 138 M-Ton, Average Monthly Demand is 200 M-Ton, The Lead time is 23 days, current stock level 170 M-tons, the daily demand 7.14 tons. If ROP stock level deducted from current stock level that become 32 Tons which may be deducted from the total normal demand requisition. So Abbottabad region may issue demand requisition for head office 168 Ton instead of 200 M-ton.

Formula for demand calculation at 1st of every Month

Projected demand for next month – (Current stock level – Re Order point (minimum stock level) + stock in transit)

$250 - (170 - 138 + 10) = 250 - 42 = 208$ demand for next month.

Since the management takes 15 days to issue purchase order and further factory/mill takes 8 days to supply stock. The existing stock of 170 plus stock in transit 10 M-ton is totaled as 180 M Ton. Accordingly, stock of 138 M-Ton will be consumed during led time and the warehouse left with 42 Tons of stock. The additional supply of 208 M-Ton will cover the demand/consumption of the next month which is estimated 250 M-ton. But currently such working has not been considered at any warehouse level therefore the organization facing inventory issues.

4.8 Stock out Loss

As revealed from the data, the total average monthly consumption of the product was 10528 M-Ton and per day consumption accordingly will be 421.12. If it has appeared that 50% warehouses is out of stock for 3 days than this loss will be exploited up to 631.68 M-Ton. The profit/loss value of this stock is Rs.4.4 million which is financially undesirable for the organization. The total worth sale of 10528 Ton is estimated to Rs.1267 million (average sale price take Rs.120 per kg).

The emphasis has been given on lead time and because it has been observed during study that delay in supplies and stock was not due to transportation issue or from factory end. Delay is caused by organizational internal procurement policy, inventory management and demand procedure, wherein no lead time consideration, no reorder point. and no ABC categories has been setup.

4.9 Procurement Planning

The demand data which has been collected from the July 2016 to Jan 2017 was showing that there was no fixed time interval for bidding and no proper planning was in vogue at Head Office for procurement. Therefore, considering the above data and information management needs to reduce buying time which is 15 days and main cause of delay and stock out. Therefore, by taking into account historical data management should go for bidding without receiving demand from each region. It is required to book the quantity in advance and then issue purchase order as per the requirement of warehouses.

4.10 Coordination and Tracking of Stock

There is dire need of strict coordination of and tracking of stock. The existing reporting system of daily inventory level has many weaknesses. Currently, the stock position figure also includes damaged stock which effect the controlling and monitoring of actual stock. Sometime physically stock is lying at warehouse but the same was not being entered in the system timely. That also shows the difference in actual and reported position of stock. The information of stock has been transmitting telephonically on daily basis which needs to be computerized. Moreover, this information flow held between Head Office and Zones but vendors are not currently in this loop. Therefore daily supply position must be obtained from vendors and they must also be informed about current stock level and vendors must also inform about future supply schedule.

4.11 The Before and After Analysis

The following data shows the difference between current and proposed stock position analysis. The table shows that how much stock loss has been suffered by the organization by not following the proposed solution. In other words it is also assume that how much company will save or gain from the proposed inventory control system.

Table 4.7 Comparison of inventories “Before and After”

1	2	3	4	5	6	7
S.No	Name of Regions	Lead Time (Days)	Inventory Level P.O Issued (M-Ton)	Standard Reorder Point (M-Ton)	Difference	Stock out loss @ Rs.7000 Per Ton (Pak Rupee)
			(Before)	(After)	Improvement	
1	Abbotabad	08	16.087	48	32	223,391.00
2	Gilgit	10	02.091	38	36	249,363.00

Table 4.7 Comparison of inventories “Before and After”

3	Haripur	08	05.665	24	18	126,745.00
4	Manshra	08	10.647	78	68	472,671.00
5	Battagram	08	00.000	44	44	307,200.00
6	Muzafarabad	10	44.011	12	-32	-224,077.00
7	Arja(MZD	10	00.000	07	7	52,000.00
8	Swabi	08	03.104	87	84	586,272.00
9	Skardu	10	11.714	22	10	70,002.00
10	Attock	07	07.497	30	23	157,521.00
11	Chakwal	07	26.002	39	13	88,186.00
12	Gujrat	07	13.523	18	5	34,139.00
13	Islamabad	07	08.662	54	45	317,366.00
14	Jehlum	07	10.666	17	6	42,938.00
15	Rawalpindi S	07	11.036	33	22	152,348.00
16	Rawalpindi N	07	30.389	29	-1	-6,923.00
17	Badin	03	22.727	02	-20	-143,489.00
18	Gawadar	04	9.762	04	-5	-37,934.00
19	Hyderabad	03	23.187	04	-19	-132,309.00
20	Karachi (N)	03	21.269	03	-18	-127,283.00
21	Karachi (S)	03	06.172	05	-1	-4,804.00
22	Mirpuir Khas	03	26.828	04	-23	-160,196.00
23	Nawabshah	03	06.740	04	-2	-17,180.00
24	Gujranwala	07	18.349	43	25	172,557.00
25	Lahore (N)	06	10.849	77	66	464,057.00
26	Lahore (S)	06	09.203	82	73	511,579.00
27	Okara	06	02.977	50	47	327,161.00
28	Sahiwal	06	04.152	70	66	462,936.00
29	Sheikhupura	06	03.037	67	63	444,341.00
30	Sialkot	06	70.357	50	-20	-139,699.00
31	Bahawalnagar	05	18.817	93	75	522,281.00
32	Bahawalpur	05	01.650	56	55	382,450.00
33	DG Khan	05	09.834	57	47	331,162.00
34	Khanewal	05	03.914	43	40	276,602.00
35	Layyah	05	18.958	33	14	99,294.00
36	Multan	05	0	69	69	482,000.00
37	Rahim Yar Khan	05	03.880	21	17	120,840.00
38	Muzaffargarh	05	62.506	27	-36	-251,542.00

Table 4.7 Before and After Comparison of Inventory

39	Vehari	05	47.978	78	30	208,154.00
40	Bannu	07	15.939	78	62	434,427.00
41	DI Khan	07	42.522	82	39	273,546.00
42	Kohat	07	05.357	69	64	446,901.00
43	Mardan	07	01.158	75	74	518,294.00
44	Peshawer (N)	07	04.235	107	103	720,755.00
45	Peshawer (S)	07	23.048	112	89	622,664.00
46	Swat	08	39.219	71	32	221,467.00
47	Upper Dir	08	21.128	06	-15	-106,296.00
48	Chitral	10	78.278	44	-35	-241,946.00
49	Khuzdar	05	11.557	05	-7	-48,899.00
50	Qila Saif Ullah	05	00.702	08	7	52,086.00
51	Loralai	05	26.879	04	-23	-158,153.00
52	Nushki	05	26.253	03	-23	-159,771.00
53	Pishin	05	01.145	07	6	39,985.00
54	Quetta	05	25.625	14	-11	-79,375.00
55	Sibi	05	02.120	09	6	45,160.00
56	Faisalabad	05	32.287	65	32	226,991.00
57	Jhang	05	59.736	31	-29	-202,152.00
58	Khushab	05	36.608	29	-8	-54,256.00
59	MB ddin	05	03.598	30	27	186,814.00
60	Mianwali	05	01.195	52	51	355,635.00
61	Sargodha	05	02.219	53	51	357,467.00
62	Toba Tek Singh	05	54.051	44	-10	-72,357.00
63	Ghotki	04	03.712	07	3	20,416.00
64	Larkana	04	01.295	08	6	45,335.00
65	Shikarpur	04	01.675	06	4	29,875.00
66	Dadu	04	03.084	04	1	5,612.00
67	Sukkur	04	35.296	18	-17	-119,072.00
	Total					9,801,273.00

The table 4.7 shows the comparison of before and after position wherein it has come out that previously, the management issued purchase order when stock level reached to 1132 Metric Ton. The position of each warehouse also shows that the stock

was quite less when the purchase orders have been issued which caused the stock out loss. However, after implementing the proposed system of reorder point the table shows the significant improvement. The total improvement has been calculated around Rs. 9.8 million approx. In future if the company adopted the proposed solution and issue purchase order at calculated reorder point, it will save or gain Rs.9.8 million.

The following graph 4.2 is showing the comparison of stock level before the proposed solution and after.



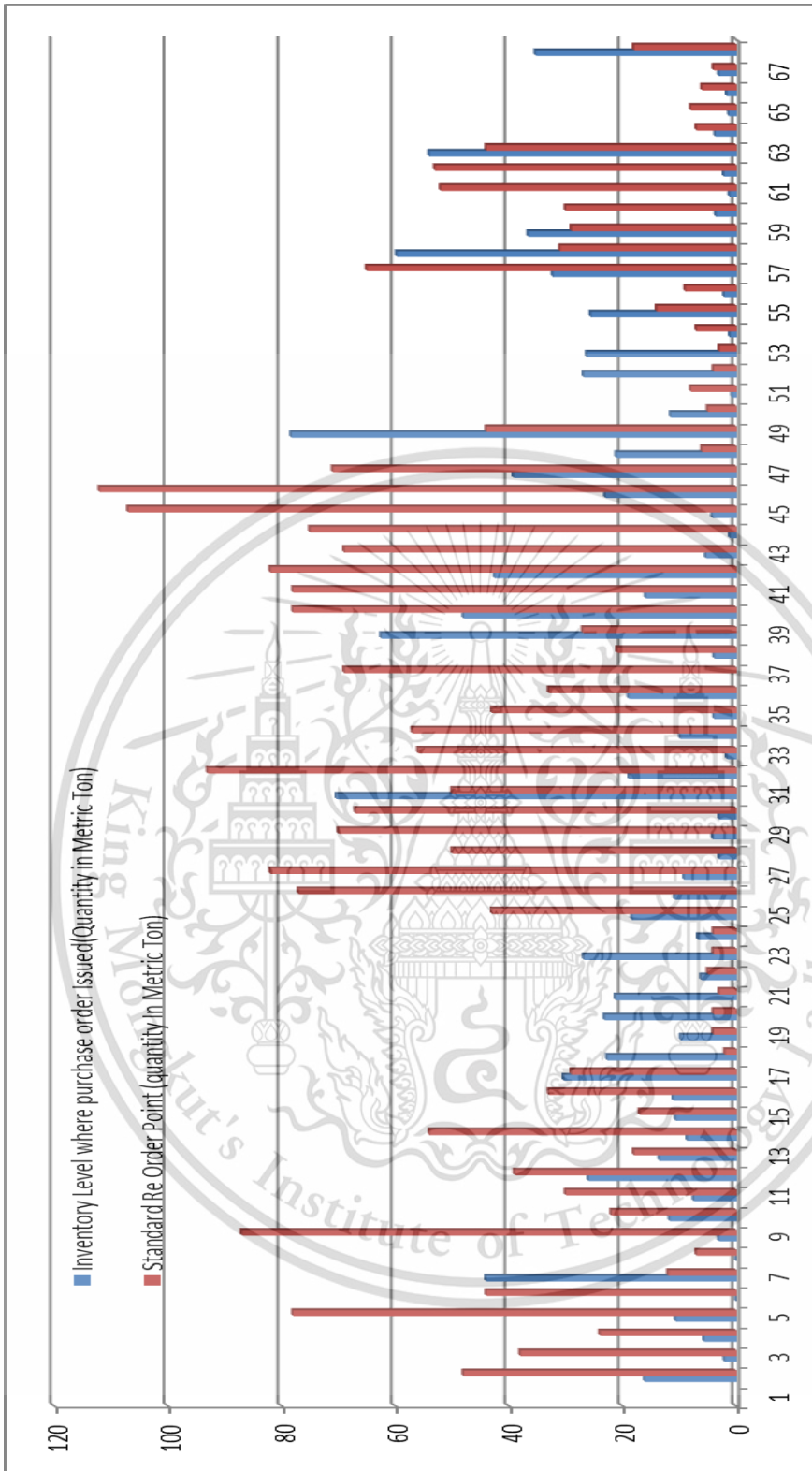


Figure 4.2 Graph of Inventory Comparison Before and After

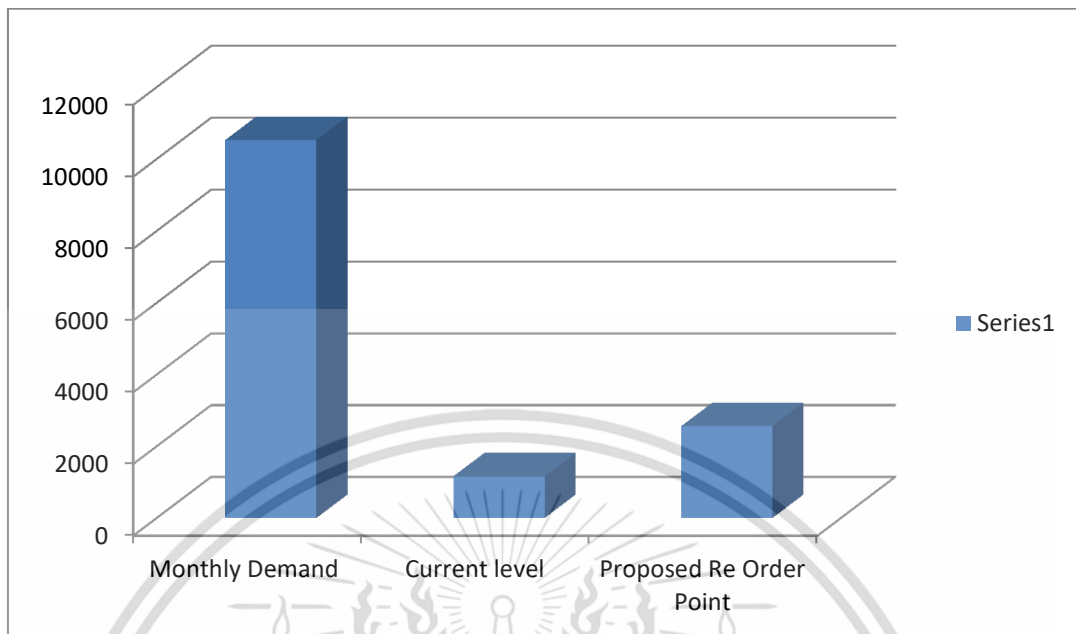


Figure 4.3 Graphs for Current Level Inventory Vs Proposed Inventory Level

The above graph shows total average monthly demand of all regions, current level of stock where purchase order have been issued and proposed level of reorder Point.

4.12 Summary of Before and After Analysis

The following table (8) contained summarized view of before after position of inventory management of organization.

Table 4.8 Summary of Before After Analysis

Subject	Before	After
Reorder Point	There was no reorder point has been set up, warehouse managers were working on their experience and raised demand/requirement for buying to head office on monthly basis without consideration of held stock and lead time.	The reorder point has worked out. This serve as controlling tool for inventory management on daily basis. This enables all warehouses to be on same page and on safer side always.
ABC Categorization	There was no classification of warehouses. There was absence of established standards to monitor inventory position. Procurement decision was not synchronized with consumption/sales of each warehouse.	ABC categorization has been worked out. The comparison has also shown the positive result in inventory control. monitoring of inventory have been improved
Stock Out loss	There are stock out found at different warehouse at different point but the loss in terms sale of these item has not been considered	Stock out loss has worked out and can be controlled by adopting new proposed solutions.
Procurement Planning and purchase order	The data/information revealed that there was no proper planning for procurement and issuance of purchase order.	Proposed solution will help to portray clear picture in question, therefore, proper planning can be made to achieve the desired goals and objective
Lead Time	The 67 regions spread across the countries therefore lead time for each regional warehouse is varies. At present there was no formal lead time set and followed by the regions and by the head office	Lead time for each region has been calculated which enables to work out demand in time. Moreover, this will also serve as standard if supplied delayed more than the prescribed time

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This study was aimed to find out problem regarding inventory management, specifically, as the company has been facing issues regarding stock outs. It has been found that there were stock outs because of ill planning, lack of coordination, and lack of understanding regarding lead time and there was no reorder point has been set up for the stock at each warehouse. Consequently, in the absence of uniform system each warehouse manager has been managing their stocks at their own intuition and experience, hence, lead to huge difference between inventories lying and various regions. Moreover, by fishbone diagram the study also discussed other related delinquents facing by warehouse managers at various regions, accordingly suggestion have been provided to eliminate such snags.

The feasible solution has been proposed to stream line demand and supply. The reorder point has been worked out for each region and then it has also been compared with the prevailing situation of stock. This enabled to understand the factual apprehensions with solid argument. ABC classification of the warehouses gives insight that the management must take prudent decision. It has been determined that out of 67 warehouse 27 Warehouse fall in category “A” which have segment of 67% of total sale. Therefore, inventory of position of these warehouses must be monitored cautiously. The second priority may be given to the next category “B” where numbers of warehouses are 18 and containing share 25% of sales. The last category has 26 warehouses as equaling in numbers of category A. This portion has only 10% share in sales. Therefore, if the management ponders well on category A,

even the sale lost in category C may be recovered from the category A by putting little more effort.

It is therefore confirmed that after implementing proposed solutions, decision maker will be more focused and worthwhile with less exertion. It is also established that the possibility of stock out will be effectively controlled by using proposed system.

5.2 Recommendations

This study has opened the doors for thinking and the same approach can be adopted with other SKU facing same delinquent. Therefore this study can be imitated with other merchandises of the organizations.

It has been revealed that the bottle neck problem was procurement methodology as it takes 15 days to complete procurement process. Therefore it is recommended that organization must revise procurement procedure so that regular supplying contract be made suppliers instead of monthly bidding.

It has been revealed that there is gap of communication between warehouse and head office management and among the vendors. Therefore, this gap needs to fill by disseminating the message by holding joint conference annually, where in issues regarding, leakage/damages and delay in supplies due to some other factor can be discussed.

Moreover, this very study also needs to be debated with the vendors and warehouse managers for further improvement.

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