



*Improving Inventory management at SUR Construction  
Company*

*By*

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*A thesis project paper submitted to the Department of  
Management, College of Business and Economics, in Partial  
Fulfillment of the Requirements of Executive Masters of  
Business Administration (EMBA),  
Addis Ababa University*

*June 2016*

*Addis Ababa, Ethiopia*

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*Addis Ababa University*  
*College of Business and Economic*  
*Department of Management*

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Masters of Business Administration (EMBA)*

**Approved by Advisors and Board of Examiners:**

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## ***DECLARATION***

*I declare that the work done in the research project entitled “Improving Inventory management at SUR construction Company” is my original work . This work has not been previously submitted for any higher institution for any diploma, degree or other similar work.*

*Declared by*

*Beyene Gashu* \_\_\_\_\_ *June 20, 2016*

*Student*

*Signature*

*Date*

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## ***DEDICATION***

*To:*

*My Loving Wife Chuchu Bekelle and*  
*My Dear daughter Mariamawit Beyene*





## ACKNOWLEDGEMENT

*My sincere gratitude goes to the almighty God for giving me the strength and the knowledge to carry out this research. I would also wish to thank my family, colleagues, and coworkers at AAiT for their patience, support, encouragement and understanding during the period of carrying out the study. I want to say thank you Mr. Munhong, Yim, Managing Director of AAiT, AAU for his generous sponsoring and permission of study leave.*

*My appreciation also goes to my advisor Dr. Mohammed Seid (PHD), Chairperson, Department of Management, Addis Ababa University for the guidance and support he provided me to complete this research successfully.*

*I wish to recognize and give gratitude for the support I received from Sur Construction Staff and management member who fill questionnaire and assisted me to analyze the data and guided me in writing the research. My sincere appreciation goes to the Ato Zemenfes, DGM; Ato Berhnau, IPC Head; Ato G/Medihn, Logistic service head for providing me with critical information that was relevant to the study.*

## **Abstract**

The objective of this study was to analyze the inventory management practices in the organization in order to identify the inventory management challenges and its contributing factors for challenges and recommend solutions for improvement. It was carried out using case study at Sur Construction Company. In this organization, stocks outs, rush ordering, unplanned and urgent purchasing items observed frequently while high non-moving and obsolescence was available as a problem. In this research sample of 120 employees was in used by purposive sampling technique and the return rate was 98 which is 82% response rate. Questionnaires, interviews, and secondary data from reports and internet was used as data collection instrument, analyzed by Microsoft excel software applying descriptive statistics.

According to these data, the overall inventory practice was not effective; and the major inventory management challenge was the availability of item on time in complete set. The finding shows that the main contributing factor for this problem was staff capacity having skill gap and awareness in implementing inventory management technique. Accordingly, staff development and capacity enhancement strategy including training, empowerment and motivation scheme design was recommended.

**Key Words:** Inventory, Construction, Obsolescence, Staff capacity

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of Study

Inventory, also known as stock, is the stored accumulation of transformed resources in a process, usually applies to material resources but may also be used for inventories of information; inventories of customers usually queues. Inventory is stock of materials, spare parts, goods, and items to facilitate operation and satisfy demands including idle resources (Schroeder, 1993:580). It may include materials, money and facilities. Inventory and its management is typical part of any type of organization irrespective of manufacturing, service or construction industries in either of business or non business entities and it plays vital role in any types of organization which may accounts major parts of assets.

Therefore, inventory management is essential ingredients for construction industries. This industry is flourishing in Ethiopia with vast amount of investment including inventory in materials, spare parts and supplies. According to the government's reports construction sector in Ethiopia contributes around 5% GDP and projected to grow about 12% -20% (MoUDC, 2013; MoUDC, 2014; Ethiopian Economic Association, 2008:233-321). In construction, inventory items are major inputs and the critical element for processing its business. Managing this inventory and delivering the materials as required is the influential segment for the success of the company. However, practical and detail research about implementation of inventory management technique in the construction companies in Ethiopia, to the knowledge of this researcher, was limited.

Therefore, assessing the inventory management practice in this area will add value for the thriving construction industry in Ethiopia as well as globally. Hence, this research paper assess the inventory management practices and its problems, and recommends solution by undertaking a case study in SUR construction Company which is among the leading private construction organization in Ethiopia. Consequently, analyzing the reasons behind these problems and exploring managerial solutions is the issue and justification for this project.

## 1.2 Problem Statement

Sur Construction Company was established and functioning for more than twenty years in the business environment, especially in construction industries. It carried out huge and various types of projects and business which having more than 2billion birr worth of business. It achieved also 690Million birr annual turnover. It has more than 1000 equipments and more than 16000 diverse staff (<http://www.sur.com.et>).

According to the preliminary survey undertaken at the company, there are ample amount of stock, especially spare parts that was increasing from year to year. While high stocks outs, rush ordering, unplanned and urgent purchasing items observed frequently. On the other hand, high non-moving and obsolescence stocks were frequently observed. Having these experience and resource by the company, it usually rent and lease construction equipments, and working capital problem was one challenging issue in the organization. Excess levels of dead stock inventory items especially obsessive amount of spare parts that have huge amounts of money was available in the warehouses for years. Analyzing the reasons behind these problems and exploring solutions are important.

## 1.3 Research question

1. What are the inventory management practices in the company?
2. How are inventory management systems and techniques applied?
3. What inventory management challenges are confronted the organization?
4. Are there staff development and capacity gap available to manage inventory of the company?

## **1.4 Objective of the study**

The purpose of this dissertation was to assess the practical application of inventory control theory and techniques in the construction company by undertaking a case study.

### **1.4.1 General Objective**

The general objective of this research was to assess the inventory management practice, investigating the major challenges and generating viable solution to the identified inventory management problems in the construction company.

### **1.4.2 Specific Objective**

The specific objectives of this research projects are the following.

- a. To review the inventory management practice of the company
- b. To assess how inventory systems and techniques are applied in the organization
- c. To examine inventory management challenges influencing the company performance
- d. To investigate the major contributing factor for inventory management inefficiency
- e. To appraise management and staff capacity contribution for inventory management efficiency of the company

## **1.5 Scope of the Study**

The stocks and other materials are available and managed at various places depending on the projects operation, including Addis Ababa head office and Mekelle. The scope of this research study is focused geographically inventory operation mainly at central office and Mekelle main store and distribution center. There are more than eight major categories of items managed by the company, and this study focuses on spare parts inventory management.

Item requirement for construction process are managed by material requirement planning and inventory planning system, both have their own system and procedures. Therefore, this research focuses on only on the practice of inventory planning and control technique. Hence, inventory items managed by material requirement planning techniques and production scheduling tools are outside of the scope of this study.

## **1.6 Limitation of the study**

The company has more than thirty thousand line items of inventory. Detail assessment of all these categories of items by using longitudinal data was not undertaken at full scale. In addition, some staff and management member of the company were not willing to provide the necessary information by formal interviews and questionnaires.

# CHAPTER TWO

## REVIEW OF LITERATURE

### 2.1 Inventory Management Theory

#### 2.1.1 Introduction

Inventory can be stock of materials, spare parts, fuels, lubricants, oils, general stationary & goods, tires and other items, which will smooth the progress of operation and satisfy demands. Inventory can also embrace idle resources, inventories of information, customers. Inventory can be stocks of small items like pencils, bolts, clips, nuts up to large items such as machines, construction equipments, trucks, cars, airplanes, etc (Schroeder, 1993:580).

The roles of supply chain management in construction involve controlling stocks or inventory in order to optimize company resources that include materials, money and facilities. Inventory management is the major part of supply chain management and common in most industry including construction sector. Inventory management involves both management science and operations management discipline (Winston and Albright, 2009:739; Magad and Amos, 1999:13).

#### 2.1.2 Types of inventory

##### 2.1.2.1 Buffer inventory

Buffer inventory is also called safety inventory. This is inventory of extra stock hold for demand and /or lead time fluctuation. Its purpose is to compensate for the unexpected fluctuations in supply and demand. This is minimum level of inventory to cover against the possibility that demand will be greater than expected during the time taken to deliver the goods. It can also compensate for the uncertainties in the process of the supply of goods into the store, perhaps because of the unreliability of certain suppliers or transport firms.

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According to Toomey, (2000:3) inventory planned and carried as safety stock serves as a buffer covering demand fluctuations and supply error including quality /capacity problems.

#### *2.1.2.2 Cycle inventory*

Cycle inventory occurs because one or more stages in the process cannot supply all the items it produces simultaneously. Cycle inventory or lot sizes (Toomey, 2000:2) only results from the need to produce products in batches and the amount of it depends on volume decisions. Inventory that occurs when one stage in a process cannot supply all the items it produces simultaneously and so has to build up inventory of one item while it processes the others is cycle inventory.

#### *2.1.2.3 De-coupling inventory*

Wherever an operation is designed to use a process layout, the transformed resources move intermittently between specialized areas or departments that comprise similar operations. Each of these areas can be scheduled to work relatively independently in order to maximize the local utilization and efficiency of the equipment and staff. As a result, each batch of work-in-progress inventory joins a queue, awaiting its turn in the schedule for the next processing stage.

This also allows each operation to be set to the optimum processing speed (cycle time), regardless of the speed of the steps before and after. Thus, de-coupling inventory creates the opportunity for independent scheduling and processing speeds between process stages. Therefore, de-coupling inventory is the inventory that is used to allow work centers or processes to operate relatively independently.

#### *2.1.2.4 Anticipation inventory*

This is an inventory due to goods purchased in anticipation of price increases. It can be used to cope with seasonal demand and it was used to compensate for differences in the timing of supply and demand. Rather than trying to make the product (such as chocolate) only when it was needed, it was produced throughout the year ahead of demand and put into inventory until it was needed.

Anticipation inventory is most commonly used when demand fluctuations are large but relatively predictable. It might also be used when supply variations are significant, such as in the canning or freezing of seasonal foods. It is generally Inventory that is accumulated to cope with expected future demand or interruptions in supply.

#### *2.1.2.5 Pipeline inventory*

This is inventory in transit. Pipeline inventory exists because material cannot be transported instantaneously between the point of supply and the point of demand. If a retail store orders a consignment of items from one of its suppliers, the supplier will allocate the stock to the retail store in its own warehouse, pack it, load it onto its truck, transport it to its destination and unload it into the retailer's inventory. From the time that stock is allocated (and therefore it is unavailable to any other customer) to the time it becomes available for the retail store, it is pipeline inventory.

Pipeline inventory also exists within processes where the layout is geographically spread out. For example, a large European manufacturer of specialized steel regularly moves cargoes of part-finished materials between its two mills in the UK and Scandinavia using a dedicated vessel that shuttles between the two countries every week.

All the thousands of tons of material in transit are pipeline inventory. The inventory that exists because material cannot be transported instantaneously is pipeline inventory.

#### *2.1.2.6 Spare parts Inventory*

In the construction industry, huge amount of money is invested on Capital equipments such as earth moving machineries, dump trucks, vehicles and other equipments. Spare parts are parts of such machineries and equipments for maintenance to reduce down time (Saxena, 2003:221).

## 2.2 Empirical Evidence

Inventory management involves in manufacturing, service or construction industries that play vital role in any types of organization. Inventory management is a vibrant function performed in every organization to satisfy demand requirements with finest operating and inventory costs to achieve profitability of business.

Items stocked as inventory is usually related to the nature of the business undertaken by the organizations. The inventory management operation involves the activities of maintaining optimum stock or inventory in the warehouse to satisfy customer demand. These items of inventory can be independent demand or/and dependent demand inventory items (Kotler and Armstrong, 2012:360-362).

Material inputs for construction can share large parts, nearly, 30%-70% of total project construction costs (Donyavi and Flanagan, 2009; Patel and Vyas, 2011)).The value of inventory may accounts 10%-55% of total capital investments (Magad and Amos, 1999: 103). Spare parts are among the inputs in the construction sector.

Spare parts are vital processing inputs for construction industry that should be managed properly. To make equipments and machineries operational and sustainable in the construction projects life, stocking sufficient amount of spare parts in the store is necessary and advisable.

However, making such equipments operational for long time is difficult due to the challenging nature of maintenance and spare parts management of these equipments to achieve its organizational objectives effectively.

According to Gopalakrishman and Banerji (1997:213-214), Spare parts expenditure and inventory may account for 2%-5% of total projects, 10%-15% cost of equipments, 40% of working capital, 60%-80% of maintenance expenditure, 25%-65% of total inventory items, and. Slow moving and non moving spare parts can be account 15%-40%. These figures shows considerable attention should be given for spare parts management.

Spare parts have peculiar features than other stocking inventory items (Gopalakrishman and Banerji, 1997:232-233; Narayan and Subramanian, 2008:170). Accordingly, the most common features of spare parts in the construction industry can be summarized as follows.

- i. It is challenging to determine future requirement and its lead time is usually long
- ii. It is increasingly used with age of machineries and equipments
- iii. There is a tendency of overstocking or excess stock and obsolescence
- iv. It is difficult to standardize due to large variety, interchangeability, and dynamic technology that results model change instantly.
- v. It is not possible to control them by the usual inventory control technique as several departments are involved in the controlling function
- vi. Spares are critical from operational point of view, and its stock out cost is may be greater than the spare parts price.

## 2.3 Conceptual Framework

There are diverse objective of inventory control that involves having items needed while reducing overstocking, reducing holding costs, economic buying including discounts(Saxena, 2003:1980). According to Wild (1997:6) inventory control function has to optimize concurrently with Customer service (demand satisfaction in quantity, quality and time), Operation costs minimization and Inventory cost reduction.

### 2.3.1 Objective of Inventory

#### 2.3.1.1 Availability of items with complete kit and quality, and Service Level

The challenging issues in inventory management is that reducing inventory investment and increasing service level like 98% by safety stock mechanisms (Toomey, 2000:4).

Service level is related to satisfying customer requirements by making items available on demand that can be measured as demand satisfied or request responded divided by total demand with the subsequent practical procedure.

$$Availability = \frac{\text{Demand Satisfied}}{\text{Total Demand}}$$

These can be calculated based on the types of demand using either items or orders supplied from total requested.

$$Availability = \frac{\text{Total Number of items delivered}}{\text{Total Number of items Requested}}$$

This type of service level measurement is used for each item requirement analysis of item by item demand satisfaction considering that each item requirement is critical and complete to fulfill the demand.

On the other hand, demand analysis can be traced based on total order delivery measurement. This measurement can be used especially for bulk customer requirement that can be evaluated in the following formula.

$$\text{Availability} = \frac{\text{Total Number of complete orders Supplied}}{\text{Total Number of Orders}}$$

In addition, inventory level decision or performance of each item can be evaluated by analyzing of stock cover and stock turnover of the company adopting the following formula (Wild, 1997:39).

$$\text{Stock cover} = \frac{\text{Current Stock X 52}}{\text{Forecasting Annual usage}}$$

The stock cover can be used with ABC classification to determine stock level. For A items 1-4 weeks, for B items 2-8 weeks and for C items 3-20 weeks of stock cover is recommended (Wild, 1997:41).

$$\text{Stock turnover} = \frac{\text{Value of Annual usage}}{\text{Value of Stock}}$$

The stock turnover or stock turn shows the period that the current stock can be used in the year while stock cover illustrates how long the available current stock can be used. Stock turnover depends on historical data and used for financial reporting. Stock cover depend on annual usage with forecast modification is used for inventory management techniques (Wild, 1997:40).

The measurement criteria for inventory level should be defined depending on the rationality to operational requirements, backorder treatment and customer management policy.

Therefore, establishing common understanding and goals to assess service level is necessary for both the customer and serving units (Wild, 1997:18-20).

### *2.3.1.2 The Cost of items*

Many inventory decision problems demands understanding of inventory cost structure. There are various costs considered in inventory management (2007: 373; Saxena, 2003:210).

Therefore, various categories of inventory costs are noted depending on the issues considered in inventory management.

For instance, Magad and Amos (1999:112-113) classify inventory as fixed inventory costs, variable costs, direct inventory costs, overhead costs, order cost, carrying cost, capacity associated cost, stock out cost, transportation/pipeline cost, and hedge costs.

The cost of inventory of a given product is sum of the inventory costs of all parties in the supply chain which is the process from raw materials through the final product available to the end user and with linkage of all supplier users involved in the process (Toomey, 2000:1).

#### *2.3.1.2.1 Item costs*

Item cost is the cost of the product in buying and/or producing individual inventory items and is usually expressed as a cost per unit multiplied by the quantity procured (Schroeder, 1993:584). This cost consists of purchase costs from suppliers, freight cost, custom duties for item, and insurance cost from supplier to buyer's warehouse.

#### *2.3.1.2.2 Ordering costs*

This cost usually consists of costs related to processing the order. These are the costs associated with placing orders or processing request, negotiating and expediting delivery cost, salary & benefits procurement staffs, receiving and utility expense (Gopalakrishman and Banerji, 1997:235; Magad and Amos, 1999:113; Saxena, 2003:210-213; Schroeder, 1993:584).

When orders are manufactured, ordering costs embraces set up costs, which is the cost to make ready the machinery, equipment, or process for use or operation and it comprises time and labour to clean, change tools (Heizer and Render, 2008:490; Schroeder, 1993).

This is fixed cost, which does not depend on number, or amount of items ordered or produced but the cost per unit decreases as larger volume ordered increase. The number of orders affects it.

Advertising and follow up costs are major ingredients of ordering costs. Segregating variable and fixed costs in the ordering cost is usually intricate activity, and it varies from organization to organization estimated from US\$5-15 (Saxena, 2003:214; Winston and Albright 2009:741).

#### 2.3.1.2.3 Carrying Costs

This is the cost of holding or keeping inventories for a period, and hence called holding cost. These can be financial holding costs and non-financial costs. The costs frequently appeared in this category can be the cost of borrowing or interest or cost of capital or opportunity cost for investment which is variable costs of holding costs.

Other carrying costs in this category are warehouse operation costs, insurance & security, salary & statutory payments to stores and verification personnel, taxes and obsolescence (non-salable or lose it freshness) or loss, stationery & documentation charges for stock management, computer usage in stores, price erosion and revaluation, and risk costs.

It is usually hidden cost and usually understated by companies (Toomey, 2000:1; Magad and Amos, 1999:113; Heizer and Render, 2008; Saxena, 2003:210-214; Schroeder, 1993:585; Gopalakrishman and Banerji, 1997:235-236; Winston and Albright, 2009:741).

Carrying cost is usually expressed in percentage. For instance, 20% annual carrying cost means that it will cost 20 cents to hold \$1 item cost of an inventory for a year. Heizer and Render (2008:234) shows various elements to be addressed in holding costs in the following tables.

**Table 2-0-1 Determining Inventory holding costs**

| <b>Category</b>  | <b>Cost ( and usage)<br/>a percent of<br/>Inventory Value</b> |
|--|---|
| <b>Housing Costs</b> (building rent or depreciation, operating cost, taxes, insurance)                       | 6 % ( 3-10%)  |
| <b>Material Handling cost</b> (equipment lease or depreciation, power, operating cost)                       | 3 % ( 1-3.5%)   |
| Labour cost(receiving, warehousing, security)  | 3 % ( 3-5%)   |
| <b>Investment costs</b> (borrowing costs, taxes, and insurance on inventory)                                 | 11 % ( 6-24%)   |
| <b>Pilferage, scrap, and Obsolescence</b> ( much higher in rapid-change industries like PCs and cell phones) | 3 % ( 2-5%)   |
| <b>Overall carrying cost</b>   | <b>26 %</b>   |

Adapted from Heizer and Render, 2008: page [490](#)

In practice, inventory holding costs vary depending on the business from 15% up to 40%, and a further analysis of investigation should be undertaken if it goes beyond such ranges (Heizer and Render, 2008:490; Schroeder, 1993:585; Gopalakrishman and Banerji, 1997: 236; Narayan P. and Subramanian J. 2008:).

#### 2.3.1.2.4 Stock out cost

This is costs occur when stock is unavailable to customer demand and it usually appear as costs of insufficient supply in the short run which may result in loss of good will(image) as opportunity loss by backorder which in turn reduces sales and profits in the future . It manifests the economic consequences of running out of stock.

Therefore, it is shortage or penalty cost. To protect good will almost any possible action to avoid customer complain by excessive expedition, penalty, purchasing by highest possible price from substitute or competitors that may increase costs of the company operations.

Apparently, calculating stock out cost is challenging, almost impossible task except by indirect method such as service level, for instance satisfying demand on time by 98% (Magad and Amos, 1999: 113; Schroeder, 1993:585; Gopalakrishman and Banerji, 1997: 236; Winston and Albright, 2009:741).

### 2.3.1.2.5 Other costs

There are other various elements of inventory costs such as Price discount costs, Working capital costs, Obsolescence costs, Operating inefficiency costs, Hedge Costs, etc. These can be considered in the calculation of inventory costs depending on the magnitude of the value and issues.

Price discount costs are offered as discounts on the normal purchase price for large quantities and impose extra costs for small order.

Working capital costs is related to the paying our suppliers and receiving payment from our customers that associates with interest we pay to the bank or borrowing firms for borrowing it or the opportunity costs of not investing it elsewhere.

Obsolescence costs arise due to ordering large quantities than demand and stored long time as inventory that become obsolete (in the case of a change in fashion, for example) or deteriorate with age (in the case of most foodstuffs).

Operating inefficiency costs consists of capacity costs such as leveling production, hiring and firing employees with their training and overtime payments in comparable to just in time inventory management.

Inventory which may not be necessary immediately can be added by purchasing considering or to avoid inflation and price fluctuation in the future (Heizer and Render, 2008). The increases costs of inventory that can be noted as hedge cost (Magad and Amos, 1999:113).

To sum up, inventory involves three basic costs such as carrying/holding costs, ordering/transaction costs and shortage/stock out costs.

### ***2.3.1.3 The Time of availability of item (Lead Time and stock levels)***

Lead-time is the time that elapses between the recognition of the need and fulfillment of that demand. This is the time taken to make the items available from the requisition up to making ready to use. Lead-time may fluctuate due to various reasons. There is a direct relationship between lead-time and inventories. Lead-time consists of internal and external lead-time.

The internal parts of lead time that comprises pre-order lead time and post receipt lead time may include processing the request and ordering including specification development, review of availability or balance, requisition preparation, sourcing of suppliers, tendering, and analysis of the offer, negotiating ,ordering, receiving and inspection.

The external lead time ranges from manufacturing or making ready for delivery, delivering, testing and installation or stocking to the warehouse venue.

Therefore, the factors influencing lead-time can be managed by organizations internally and cautious analysis of the provisions of the agreements on the supplier.

## **2.3.2 Factors for inventory**

There are various factors influencing effectiveness of inventory management. These can be customer interest fluctuates, poorly defined responsibility of stock controller and its capacity, planning inventory for future operation, company strategy in inventory management systems and modernization of technology. The following variables can affect inventory management effectiveness.

### ***2.3.2.1 System, Policy, modernization, staff and user capacity***

Various factors affect the stocking of spare parts. Failure analysis system, maintenance management policy, machinery and equipment purchasing strategy, the nature of equipment and its items, proximity of the supplier, legal matters, financial and administrative factors can be consider in spare parts stocking decision (Saxena, 2003:222-226).

The company strategy and policy regarding inventory operation, system and procedures adopted, data management system and policy, capacity of staff, management as well as user department are determinant factors in inventory management operations (Magad and Amos, 1999:48; Winston and Albright, 2009:741; Wild, 1997:10-15).

According to Magad and Amos (1999:105) inventory management involves policy or procedures establishment, situation analysis for various inventory conditions since inventory management is the significant operation management functions since it compact huge investment, affects customers and it rivet in all business operations.

Large amount of inventory of spare parts are stocked as obsolescence for long period due to various reasons. Proper provisioning of equipment purchasing with adequate forecasting spare parts requirements in the future is the corner of stone of inventory investment control. This planning function usually fails due to that the user or requesting personnel are ignorance of equipments' spare requirements.

The other reason for obsolescence is sudden phasing out of the equipments and its supplier. Standardization and record problems, forecasting error, overstocking by fear, and offshoot bulk purchasing may contribute for obsolescence spare parts (Gopalakrishman and Banerji, 2013:373; Saxena, 2003:26; Narayan P. and Subramanian J. 2008:17).

According to Toomey (2000:52), inaccurate records impede the inventory reliability. Organizing and empowering the inventory functional unit is also another paramount factor (Dobler and Burt, 1996:178; Magad and Amos, 1999:48; Saxena, 2003:183-196).

### *2.3.2.2 Standardization, codification, Classification and Specification of Inventory*

#### *2.3.2.2.1 Standardization and Codification*

There are usually ample amount of items (usually more than 10000 line items) in organizations (Saxena, 2003:215). Similar items that have the same or similar functions or that can be interchangeable used in the operation can be named differently (for instance for one line item 111 different names) that causes excess stock in the company.

Therefore, to reduce inventory costs and to achieve optimum value, standardization and codification of items used for easy reference to users and inventory management is important.

Codification is using numbers, alphabets or both for similar single items to facilitate grouping of similar stock items that classify major and subgroups.

The standardization and codification contributes in managing inventory by categorizing items. Therefore, proper and well-defined classification, standardization and codification of inventory are useful for inventory and backorder reduction.

These all can produce inventory catalogue, which can be used for medium of communication and to avoid duplicate record (Dobler and Burt, 1996:178; Gopalakrishnan and Banerji, 1997: 238-239; Journal of Marine Science and Technology, Vol. 17, No. 4, pp. 264-276 (2009):275).

Organizations adopt various methods of codification depending on their interest and organizational functions. Scholars suggest various codification systems such as Numeric code, Mnemonic code, consonant code, alphanumeric code.

Numeric code, which center on the nature of the items than its function purpose, can use seven or ten digit system to represent class, subclass, kinds, types, sizes and minor variations. Mnemonic code uses alphabet system that is recommended for short list due to its overlapping limitations. Consonant codes uses alphabet excluding vowels and usually adopts abbreviations of the items. Alphanumerical code uses the combination of alphabet and numeric.

Standardization is a general agreement of models for items created and used by various interest groups to achieve uniformity and reduction in variety. It is determining the size, quality, weight other characteristics of the product based on its purpose. Standards can be engineering standards, government standards, industry standards and company standards. It is common in total quality management that is also important for inventory items to simplify and reduce variety of items in duplication of stock items.

Variety of reduction in Standardizations is possible by determination of the frequency of use and preferred number system. This standardization has several advantages.

1. Helps to understand customer requirements
2. Large quantity order process is possible and better discounts can obtain
3. Processing time can be reduce
4. Less storage space
5. It can reduce the rate of obsolescence
6. Spare parts management for fewer items is easy

However, standardization may not be effectively adopted for items defined by various shape, decorative, patents, secret or special design and requirements (Saxena, 2003:183-196).

#### 2.3.2.2.2 Classification of Inventory

Various items in organization are classified into some category to simplify their management. This classification is usually undertaken by considering their similarity, application, and their product nature. Classifying inventory items has a number of advantages. Saxena (2003:171-172) enumerates the following advantages of inventory classifications.

1. Review of Stock items is easily done separately for each class
2. Requisition and purchase follow up for each class is possible
3. budgetary control for each class can be managed effectively
4. pooling of similar items for price discount is possible
5. duplication of items similar nature can be reduce
6. it helps for logical codification of items in maintaining records

Classification of inventories depends on the operational functions of the organization .This inventory type arrangement in particular category depends on the types of the business involved in the operations. Specific items classified in one category in manufacturing cannot be the same as in the supplier's classification.

In addition, classification and categorization of inventory types differs in the authors dimension and interest. For instance, according to Saxena (2003:173) inventories are divided into three categories such as regular inventory (incorporates capital equipment, tools, furniture, spare parts, consumables materials), in process inventory, and finished goods inventory.

There are familiar classifications of inventories that can be the flow of materials into, through, and out of production, which is familiar in processing industries. The regular types of inventory in this classification are raw materials, work-in-process inventory, finished goods inventory, distribution inventories, and maintenance, repair & operational supplies as MRO (Arnold, Chapman, and Clive 2008:256; Magad and Amos, 1999:108; Keizer and Render, 2008; Saxena, 2003:171-176).

### *2.3.2.3 Application of Inventory control Technique*

Inventory items should be seriously managed because of its sensitivity. Ordering, receiving from internal or external customers, replenishment of the stocks, storing, dispatching, etc affects inventory management since it either deplete the inventory or overstock inventory. Inventory management is involves planning and controlling from input to outputs in achieving and satisfying to customer demand. In theory, there are diverse tools and techniques (Saxena, 2003:199) to reduce inventory costs and optimize inventory management.

The inventory management tools are stock level such as minimum, maximum, safety stock determination, lead time analysis, value engineering, vender development & rating, forecasting, service level analysis, ordering determination of EOQ, ABC Analysis, VED Analysis, codification & simplification on inventory(including standardization, variety reduction, and classification), inventory reports (Magad and Amos, 1999:117; Gopalakrishman and Banerji, 1997: 236; Saxena, 2003:199).

### 2.3.2.3.1 Inventory Analysis Technique

The most common item analysis are ABC (20-80% Analysis), VED (Vital, Essential, and Desirable), FSN (Fast, Slow, Non-moving), SDE (Scarce, Difficult, and Easy), GOLF (Government, Ordinary, Local, and Foreign), SOS (Seasonal, Off seasonal), XYZ (the inventory value of items stored), and HML (High, Medium, Low) analysis (Saxena, 2003:227-228).

**Table 2-0-2 Classification of items and its criteria (Adapted from Saxena, 2003 page 228)**

| no. | Classification                             | Criteria   |
|-----|--|--|
| 1   | ABC  | Annual value of consumption of the item.               |
| 2   | VED(Vital, Essential, Desirable)           | Criticality of the spares for operation of the machine |
| 3   | FSN(Fast, slow and Non moving)             | Frequency of issue of the item from the stores         |
| 4   | SDE(Scarce, Difficult, Easy to obtain)     | Availability of the spares                             |
| 5   | GOLF(Government, Ordinary, Local, Foreign) | Sources of supply                                      |
| 6   | SOS(Seasonal, Off-seasonal)                | Seasonal Availability                                  |
| 7   | HML(High, Medium, Low)                     | Unit price of material                                 |
| 8   | XYZ  | Inventory value of the items stored                    |

These techniques of analysis usually are not used individually. They are usually used in combination and various decision criteria are used. For demonstration purpose, the classical inventory analysis which is ABC analysis will be presented in next section

#### 2.3.2.3.1.1 ABC Analysis

This is 80-20 rule or pareto's law (Wild, 1997:29). This is categorizing of item elements into A-B-C Class where A usually consists of 10% of line items with 70% the total value of items, B-Items contribute 20% of line items with 20% of total consumption, and C-Items contribute 10% of the total consumption which accommodates 70% of the line items.

It has the following steps of calculation (Saxena, 2003:215).

1. Calculate annual usage in units for each item for the past years.
2. Calculate the annual usage in currency for each item
3. Multiply the annual usage in units with its value to get annual usage for item (i.e. multiply values obtained in step 1& 2).
4. Sort the annual usage value from the highest to the lowest for ranking
5. Arrange the items in the inventory by cumulative annual usage currency value and determine its percentage

Table 2-0-3 Determination of Ranks by annual Usage value (Adopted from Saxena, 2003:216)

| Item no | Average usage(units) | Unit Cost | Annual usage | Rank |
|---------|----------------------|-----------|--------------|------|
| 1.      | 45                   | 4         | 180          | 6    |
| 2.      | 120                  | 10        | 1200         | 3    |
| 3.      | 16                   | 30        | 480          | 4    |
| 4.      | 180                  | 8         | 1440         | 2    |
| 5.      | 80                   | 3         | 240          | 5    |
| 6.      | 1632                 | 5         | 8160         | 1    |
| 7.      | 60                   | 2         | 120          | 7    |
| 8.      | 15                   | 4         | 60           | 9    |
| 9.      | 12                   | 6         | 72           | 8    |
| 10.     | 12                   | 4         | 48           | 10   |

Table 2-0-4 ABC Ranking (Adopted from Saxena, 2003:217)

| Item no. | Annual usage value | Cumulative Annual Usage value | Annual Usage Percentage | Category |
|----------|--------------------|-------------------------------|-------------------------|----------|
| 1.       | 8160               | 8160                          | 68                      | A        |
| 2.       | 1440               | 9600                          | 80                      | B        |
| 3.       | 1200               | 10800                         | 90                      | B        |
| 4.       | 480                | 11280                         | 94                      | C        |
| 5.       | 240                | 11520                         | 96                      | C        |
| 6.       | 180                | 11700                         | 97.5                    | C        |
| 7.       | 120                | 11820                         | 98.5                    | C        |
| 8.       | 72                 | 11892                         | 99.1                    | C        |
| 9.       | 60                 | 11952                         | 99.6                    | C        |
| 10.      | 48                 | 12000                         | 100                     | C        |
| Total    | 12000              |                               |                         |          |

Table 2-0-5 ABC Category Summary (Adopted from Saxena, 2003:216)

| Category | Item#          | % of items in inventory | Usage Values in the category | % Usage Values in the Category |
|----------|----------------|-------------------------|------------------------------|--------------------------------|
| A        | 6              | 10                      | 8160                         | 68                             |
| B        | 4,2            | 20                      | 2640                         | 22                             |
| C        | 3,5,1,7,9,8,10 | 70                      | 1200                         | 22                             |
| Total    | 10             | 100                     |                              |                                |

A items should be given due attention in terms of cost and quantity.

This classification does not include non-moving items, non-stock items, tools and safety items. It is constructive to include all items in the inventory management systems for managing and monitoring purpose.

The principles and classification can be extended to more classification with ABC classification by adding Z for non-stock items, F for fixed classification of tools & safety materials, O or X for non-moving items depending on the volume or turnover of items in the organization (Wild, 1997:37-38).

#### 2.3.2.3.2 Stock Level Decision

In normal circumstances, inventory should not fall below or above minimum and maximum level respectively. There will be a danger of if the inventory falls beneath minimum and excess stocking will be avail for stocks above the maximum that usually results in non-moving or slow moving items as well as obsolescence inventory items.

Safety stock is maintained to protect stock out and the level of safety stock is determined based on the level of safety in percent. Reorder point is an important element in determination of stock level. Reorder point is dependent on lead-time. In practice, the nature of inventory control models is dynamic.

This is due to the changes in pattern of consumption, demand fluctuations, transportation challenge, suppliers' incentive for bulk purchasing and quantity discounts, forward buying, lead-time variability, and force major to make items available (Gopalakrishman and Banerji, 1997: 237; Saxena, 2003:199-208).

- ◆ Minimum level=reordering level-(normal consumption \* normal reordering period )
- ◆ Maximum level=reordering level+ reordering quantity ± (minimum consumption \* minimum reordering period )
- ◆ Danger level=consumption \* maximum reorder period

#### 2.3.2.3.3 Forecasting

Inventories are stocked to satisfy demand that requires appropriate forecasting and estimating the amount and timing of demand including lead-time for each item. This shows strong link between inventory management and forecasting strategy.

In forecasting there are principles to be observed to be considered. The following are common principles as outlined by Toomey (2000:29).

1. The forecasts will be more accurate for groups.
2. The forecasts will be more accurate for the short term.
3. The forecasts will be wrong.
4. The forecasts should be tested before using.
5. The forecast is no substitute for actual demand.

Demand relays on customer requirements and services which is usually related to customer relation and availability of items or services (Wild, 1997:17). Analyzing and forecasting demand is critical element in managing inventory which is usually related to tracking demand history.

Demand data will be traced in one of the following patterns (Toomey, 2000:30) which will assist in determination of forecasting techniques. These are linear pattern, Trend pattern, cyclical pattern, Seasonal pattern and Random happenings.

Therefore, the nature of demand, which is very important for demand forecasting, can be perpetual, seasonal, lumpy (highly variable), regular, terminating or derived demand.

Forecasting techniques are dependable on forecast requirements, patterns of history, and availability of data (Toomey, 2000:33). The techniques can be simple average, weighted average, moving average, exponential smoothing, seasonal indexing, focus forecasting etc.

#### 2.3.2.3.4 Inventory reliability and Service Levels

The customer or user of the inventory is major stakeholders in inventory management. For this purpose determination of service level is necessary. Customer service ratio can adopted to indicate service level in two patterns as listed below (Magad and Amos, 1999:104).

1. Make to Stock companies for manufacturing and non-manufacturing sector

Customer service ratio=Numbers of orders shipped complete ÷ total number of orders

Or

Customer service ratio=Number of line items shipped complete ÷ total number of line items

2. Make to Order companies for manufacturing industries

Customer service Ratio=Numbers of jobs shipped on time ÷ number of jobs shipped

The service level determination also requires stock out (lack of inventories), back order and safety stock analysis (Toomey, 2000:46-51). The following factors are considered in safety stock calculation.

1. The desired service level
2. The number of exposures to stock outs per year
3. The adjusted service level
4. The forecast error
5. Adjusted deviations

In determination of safety stock, comparison and decision making in the cost of holding safety stock as well as no carrying safety stock will be paramount.

## 2.4 Inventory Decisions

There are various activities of inventory management, which extends from ordering up to delivery to the customer to satisfy its demand.

The determinants of inventory can be lead-time, service level, the quantity to be order and the pattern of demands. The cycle time, availability of space for stocking, the type of product (make to stock or order), demand variability, reliability of suppliers, alternative sources, the distance from suppliers and customers can be another factors in inventory level decisions (Magad and Amos, 1999:105; Wild, 1997:38).

According to Winston and Albright (2009:741) the review system (continuous or periodic), procurement sources (producing or buying), and ordering pattern (single or multi products) are another factor for inventory model.

Therefore, managing those variables in the system involved a number of decision problems and assorted major types of decision.

There is an ambivalent attitude towards inventories. The major reason is that considerable amounts of working capital will be tied up due to high level of stocking items, and on the other hand, items held in stock could deteriorate, become obsolete or just get lost, requires valuable space in the operation.

The major issues in inventory management are increasing inventory turnover, avoiding shortage and/or excessive inventory. Therefore, the dilemma of inventory management is securing stock for smoothing of demand while minimizing the cost of inventory (Nigel Slack, Stuart Chambers and Robert Johnston, 2007: 365; Saxena, 2003:19; Wild, 1997: 77).

Therefore, there are diverse competing objective of inventory control that involves having items needed while reducing overstocking, reducing holding costs, economic buying including discounts (Saxena, 2003:1980).

The primary strategic decision is determining the items whether to stock or not to stock the item. This can be evaluated checking the demand behavior in usage pattern and its continuity, criticality of its nature, availability easily and its lead-time, the required investment and its cost (Heizer and Render, 2008:490; Saxena, 2003:197-219; Schroeder, 1993:577-583; Wild, 1997:17; Winston and Albright, 2009:740). This determines what to stock, how much and when to order.

Finally, this decision process depends on the organization operations, process and activities. The primary goal of inventory management is minimizing inventory investment while satisfying operational requirements.

Therefore, balancing all these actions either maintaining or minimizing inventories by considering time, cost, service level and profits is major challenging decision of inventory management (Magad and Amos, 1999:16-17; Toomey, 2000:4; Wild, 1997:38).

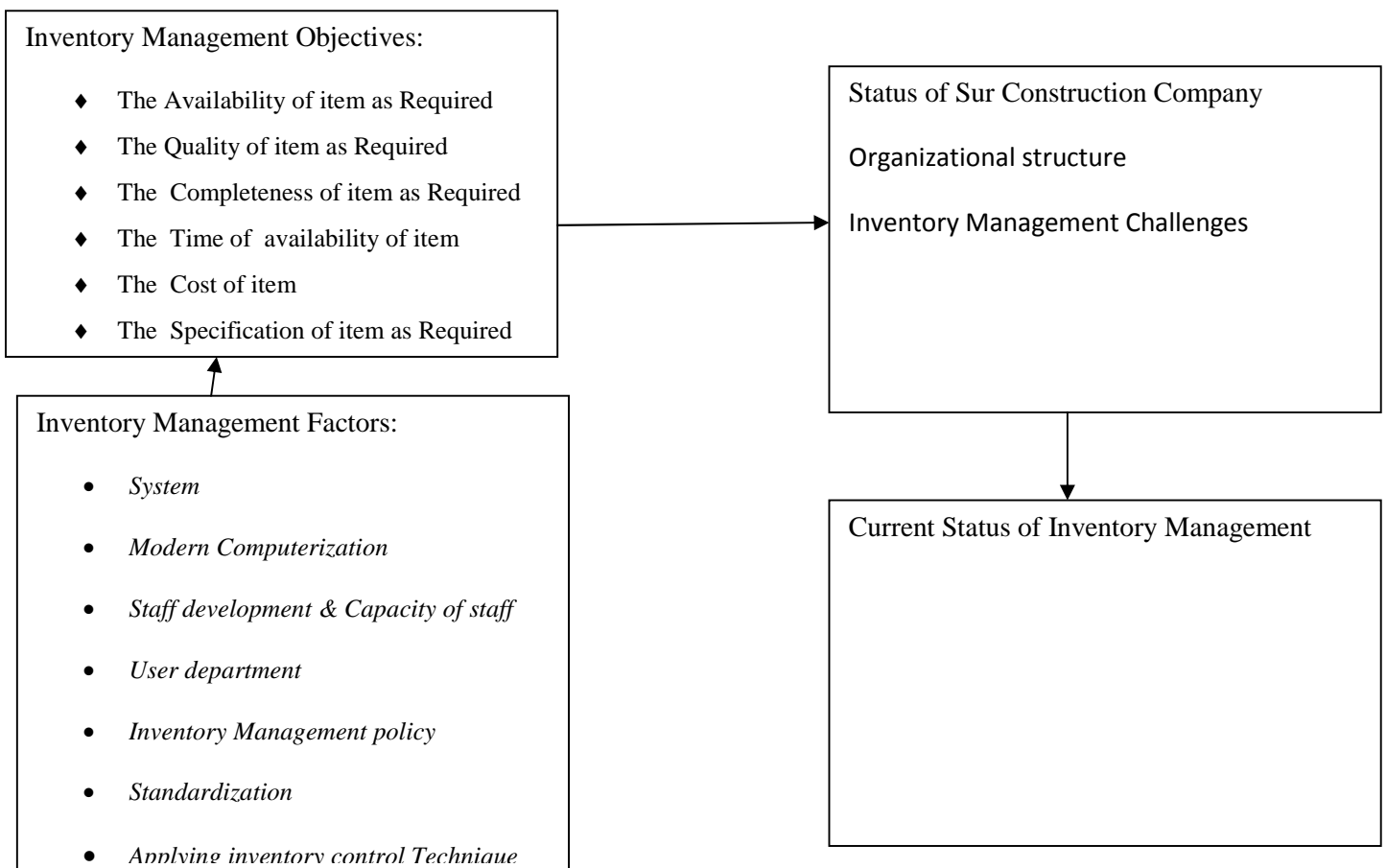
Hence, the inventory management effectiveness can be evaluated considering the following elements in satisfying the demand requirements (Magad and Amos, 1999:117; Gopalakrishman and Banerji, 1997: 236; Saxena, 2003:199).

1. The Availability of item as Required
2. The Quality of item as Required
3. The Completeness of item as Required
4. The Time of availability of item
5. The Cost of item
6. The Specification of item as Required

To satisfy the demand requirements considering the above the elements, the following variables are important.

- a) System including procedure for Review Period, checking & Approval items(Winston and Albright,2009:741)
- b) Modern Computerization/Information Technology adopted in inventory operation
- c) Staff development & Capacity of staff and management involved in inventory operation (Magad and Amos, 1999:48)
- d) User department in ordering or planning ahead their requirements
- e) Inventory Management policy(Wild, 1997:10-15)
- f) Standardization including classification, specifications and interchangeable(Dobler and Burt, 1996:178; Saxena, 2003:183-196).
- g) Applying inventory control Technique such as Min-Max, safety stock, Economic order quantity.

### ***Conceptual Framework (Study)***



# CHAPTER THREE

## RESEARCH METHODOLOGY

### 3.1 Introduction

Research is thorough search, investigation and experimentation of particular events or situations in order to get new facts, information, knowledge or findings. Research was undertaken to solve business problems, to develop new methods or strategies, to gain competitive advantage, to provide information, to enhance operational effectiveness.

Research methodology is the steps to follow for studying or investigation systematically solve the research problem using various research methods. This is the research process which incorporate formulating the research topic, critically reviewing the literature, understanding the philosophy & approach, designing the research, collecting data through primary data and secondary data collection methods, analyzing data using either quantitative or qualitative tools, and presenting the findings and findings (Saunders, Lewis and Thornhill, 2009:11).

Accordingly, this part presents the procedures that used in carrying out the research including research design, population and sampling techniques, and data collection methods and data analysis tools.

## **3.2 Research Design Approach and process**

This research adopted both explanatory and descriptive view because it requires assessing and analyzing the existing conditions and problems of the company. This research apply mixed approach in analysis because of the data is both quantitative and qualitative nature.

### **3.2.1 Population and sample Procedure**

The target population for this research was Sur Construction Private Limited company management and staff members. The researcher took preliminary survey data about the staff who involve directly in inventory management operation.

Accordingly, active participants in the inventory management operation among staff considering those who have high school certificate and above academic level mainly from logistics, finance, maintenance and construction department working at head office and Mekelle branch are 250. These persons are expected by the researcher to have inventory management practices in the company and capable of giving ideas about inventory management practices applied in the company.

Therefore, considering the above issues and due to budget and time constraints, purposive sampling technique was used.

## **3.3 Data Collection Methods**

In this research various sources of data and methodology was used because it adopts case study research approach to assess and investigate particular company issue and problems. In principle, multiple source of evidence is possible for case study research (Gillham 2000). This is research uses both qualitative and quantitative approach as applied research part since it concern with perceptions, attitudes and experience of staff as well using quantitative data to asses inventory control system. The data collection instruments were questionnaire, interview guide, and document analysis guide.

The first research methodology used in collecting primary data is using interview and questionnaire tools by addressing the management, senior user and technical personnel of company.

In questionnaire data collection instruments, Structured and well-defined questions are developed carefully and delivered to the respondents by mail, internet and physically contact directly and by researcher representative at specific location.

Accordingly, 120 questionnaires were distributed to staff that were available at their office and volunteer to give data. From these questionnaires, 98 is responded which is 82% response rate while the rest 24 person did not responded due to unknown reason.

Interviewing consisting of both structured and unstructured questions was undertaken by the researcher using telephone and physically contact for selected seven management and technical staff with applying purposive and convenience sampling procedure. In addition, Secondary data was collected by assessing the company's report and electronic data sources including internet.

### **3.4 Methods of Data Analysis**

Descriptive statistics in the form of frequencies and percentages were used for analysis in the study. Micro soft excel software is used to present data in charts, graphs and tables in order to display the summary of questionnaires, interview and secondary data. The data obtained from questionnaire were coded and summarized on the excel table.

Qualitative data were analyzed using Content Analysis techniques that thematic contents was formulated and master list of themes were developed based on the research questions. The background information of the respondents such as education, age, working unit and others are included to portray their ability of respondents to give genuine and quality data for reliability and validity purpose.

### 3.5 Validity, Reliability and Ethical Issues

In this research maximum effort has been made to avoid researcher's bias and respondents answer without clearly understanding the questions by developing clear instruction on the questions, and preliminary question testing and repeatedly reframing the questions. In addition, the researcher tried to contact closely the respondents for any unclear issues using contact persons, telephone and electronic mail.

The researcher tried to triangulate the data obtained using a number of various questions directly and indirectly. In addition, secondary data from reports and interview questions are used to triangulate the result for achieving validity.

To affirm ethical issues, respondents are informed about the purpose of study, not to mention their name in responding questions and to get the response result or the copy of study, to answer the questions fully or partially. Therefore, confidentiality of personal data was kept accordingly. Moreover, the researcher was tried to acknowledge all materials and sources of data used in this research.

## CHAPTER FOUR

### FINDING AND DISCUSSIONS

The data obtained from the questionnaire, interview and secondary sources were presented and analyzed with descriptive statistics to provide answers for the research questions.

#### 4.1 General Information of Respondent

The general information of respondents include age, gender, education qualification, profession, working unit in the company, position hold in the company, employment type, whether project worker or not, and the type of services using frequently major categories in the inventory management practices.

According to the data collected from general questions in the questionnaire, management holders represent 9%, 17% were project staff and 98% of represent permanent employees. In addition, general item and spare parts category service user was 91% and 69% of respondents.

Mostly permanent employees are influencing factor of inventory management system. The management and project staff ideas are included, and this can show that the data collected from questionnaires are reliable. The detail finding is discussed in the following part.

##### 4.1.1 Age Distribution

**Table 4-1 Age Distribution of Respondents**

| Age      |           |            |        |
|----------|-----------|------------|--------|
| Range    | Frequency | Percentage | Remark |
| 18 – 30  | 12        | 12%        |        |
| 31-40    | 38        | 39%        |        |
| 41-50    | 32        | 33%        |        |
| Above 50 | 16        | 16%        |        |
| Total    | 98        | 100%       |        |

*Source: Own Survey, 2016*

According to this table, there are respondents in all working age group that can increase the reliability of the collected data.

In addition, the above table data show that most respondents are between age 31 and 40 which accounts 72% in sum that can be deduced as productive age. According to this table, more than 88% are above age 30 that they can understand the inventory management complex process and operations.

#### 4.1.2 Gender Distribution

**Table 4-2 Gender Distribution**

| Gender |           |            |        |
|--------|-----------|------------|--------|
| Type   | Frequency | Percentage | Remark |
| Male   | 77        | 79%        |        |
| Female | 21        | 21%        |        |
| Total  | 98        | 100%       |        |

*Source: Own Survey, 2016*

This table data demonstrate 79% of respondents are male and female 21%. However, in preliminary survey period in visiting offices, more than 50% of staff are female in logistics department, especially inventory and store as well as finance department.

According to the interviewee results, female staff was preferred in material management activities claiming that they are better for service rendering, security issue and for more frequent clerical jobs which is assumed in the inventory management operation. However, this argument requires further investigation and research.

### 4.1.3 Academic Qualification of Respondents

**Table 4-3 Academic Qualification of Respondents**

| Educational Qualification:                   |           |            |        |
|--|-----------|------------|--------|
| Level  | Frequency | Percentage | Remark |
| Up to High school Graduate                   | 4         | 4%         |        |
| Diploma Graduate                             | 57        | 59%        |        |
| First Degree                                 | 31        | 32%        |        |
| Masters and Above Degree                     | 3         | 3%         |        |
| Other(TVET, Vocational diploma, certificate) | 2         | 2%         |        |
| Total  | 98        | 100%       |        |

*Source: Own Survey, 2016*

In academic education diploma holders take the lion share which is 59%, followed by degree graduates which account 32%. This shows that the majority of employee involving inventory management operations is diploma and above, nearly 91%.

This can be implied that they strong educational background to participate in inventory management practices. According to the data collected from interview, however demonstrates that there was high turnover of skill personnel.

In addition, until recently, majority employees in logistics department were diploma graduate. This might influence to undertake inventory control duty that demands extensive academic and skill background.

#### 4.1.4 Profession Distribution

| Type                | Frequency | Percentage | Remark |
|---------------------|-----------|------------|--------|
| Engineering         | 19        | 19%        |        |
| Finance             | 17        | 17%        |        |
| Purchase and Supply | 23        | 23%        |        |
| Management          | 35        | 36%        |        |
| Other               | 4         | 4%         |        |
| Total               | 98        | 100%       |        |

*Source: Own Survey, 2016*

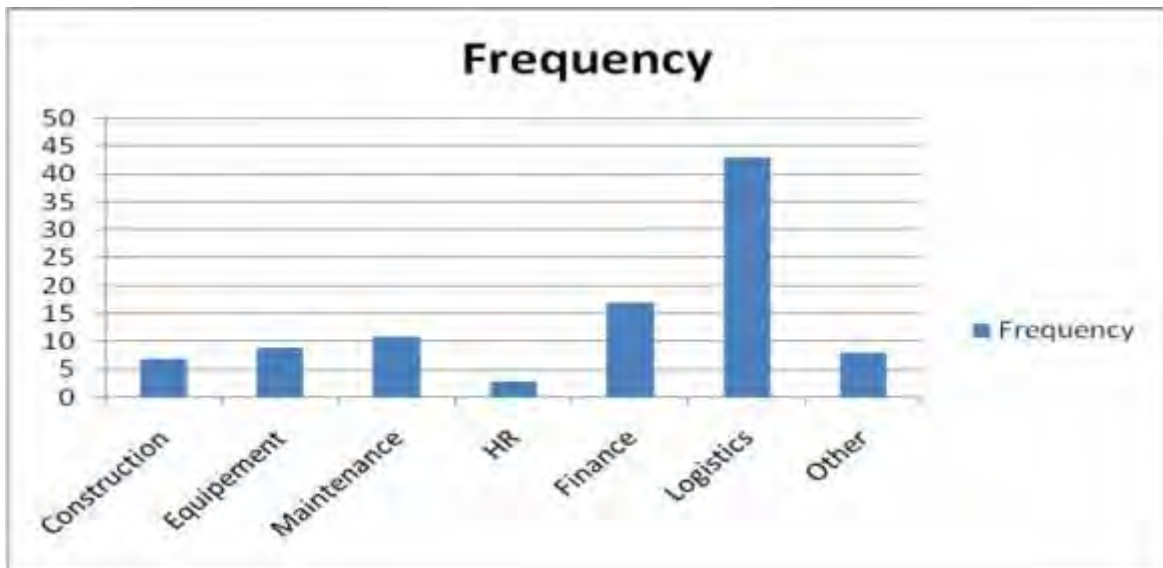
The data in this table show that there participants of the inventory management operation both social and engineering science. This strengthens credibility of the response result.

The most common profession in the company's is management that accounts 35%, followed by purchase and supply that shows 23%. Accounting holders are 17%. The three categories of profession that have together 75% are expected to have inventory management knowledge in academic discipline. Due to this reason, the respondent can deliver valid and rational opinion about inventory management operation of the company. This data is supported by interviewee results.

#### 4.1.5 Working Department

The departments they work and role of respondents is depicted below.

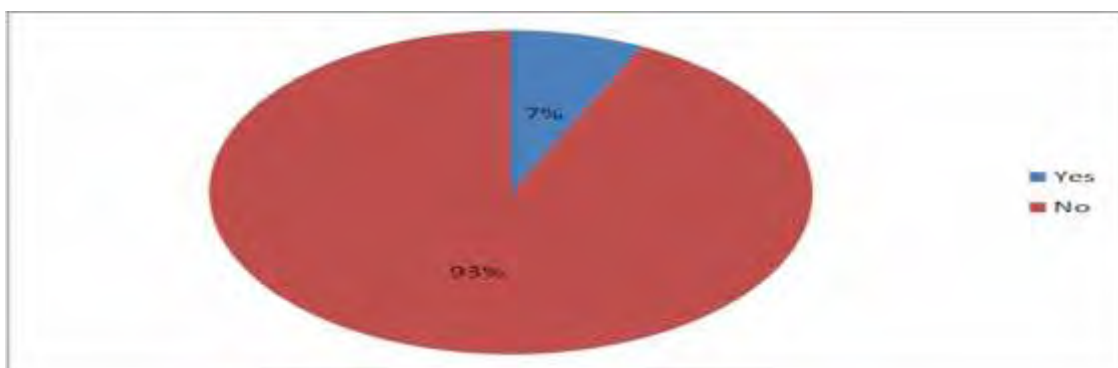
| Type         | Working Department |            | Remark |
|--------------|--------------------|------------|--------|
|              | Frequency          | Percentage |        |
| Construction | 7                  | 7%         |        |
| Equipement   | 9                  | 9%         |        |
| Maintenance  | 11                 | 11%        |        |
| HR           | 3                  | 3%         |        |
| Finance      | 17                 | 17%        |        |
| Logistics    | 43                 | 44%        |        |
| Other        | 8                  | 8%         |        |
| Total        | 98                 | 100%       |        |



**Figure4-1 Working Department**

According to the figure above, the highest respondents are staff from the logistic department, which is represented by 44%, followed by finance by 17%, and 11% of maintenance departments. This shows that the main functional units of inventory management operations can be these departments. The interview data ascertain a main actor of major construction material was the construction department, while for other categories are logistics and user departments.

#### 4.1.6 Material and Inventory Management Training taken



**Figure 4-2 Material and Inventory Management Training taken**

The above figure shows that 93% of the staff did not take any material and inventory management training. Most respondents are those involved in the inventory management operation, and their skill in inventory control techniques is doubtful. This inventory management was ascertained by interview results and inventory reports found as a secondary report.

## 4.2 Inventory Management Practices

This section presents answer for the first question that is:

What are the inventory management practices of the company?

Therefore, the detail narration is discussed in the following parts.

### 4.2.1 Background of the organization

According to secondary data sources, SUR Construction Private Limited Company is engaged in Construction industry since established in 1992 as business entity with an initial capital of Birr 108 million undertaking its business in road, building, airfield and dam construction. It accomplished more than seventy projects having 8 billion birr constructions and it has more than 16800 employees and 1132 construction equipments in undertaking more than seven projects with worth seven billion birr with one billion annual turnovers.

The company is governed by board and managed by one general manager assisted by three deputy general manager and ten department and service managers. The supply chain was organized as logistics department, and inventory planning and control division was structured as one of its divisions under this logistics department.

The company's vision, mission and quality policy is enumerated as follows.

Vision:

“Committed to be the center of excellence for the local construction industry”

Mission:

- ◆ Have an extra ordinary role in supporting the economic development endeavor of the nation.
- ◆ Provide efficient and effective construction services and meet customers' expectation to higher level.
- ◆ Ensure sustainable profitability and wealth growth of the company.

Various stakeholders performed the inventory management operation. Construction material demanded by each project nature that can be specific to those projects are determined and managed by material requirement planning strategy under construction department.

Inventory management unit and construction working unit using enterprise resource planning system manage construction materials required commonly by most or all projects dually.

Spare parts and general items of inventory stocking system were determined in dual management by inventory management and maintenance working unit.

Generally, demand or requirements are generated from user departments and the availability will be checked by inventory personnel. Store personnel will issue the inventory items when the item is available. Otherwise, purchase request will be generated.

According the data obtained from interviewee and questionnaire, excess stock mostly non-moving items are available; there was no formal inventory management policy and procedure for stock level decision using maximum-minimum level and economic order quantity technique. On other way, there are classifications of items, database such as enterprise resource planning and supplies management system that manage consumption.

#### 4.2.2 Perception of Inventory Management

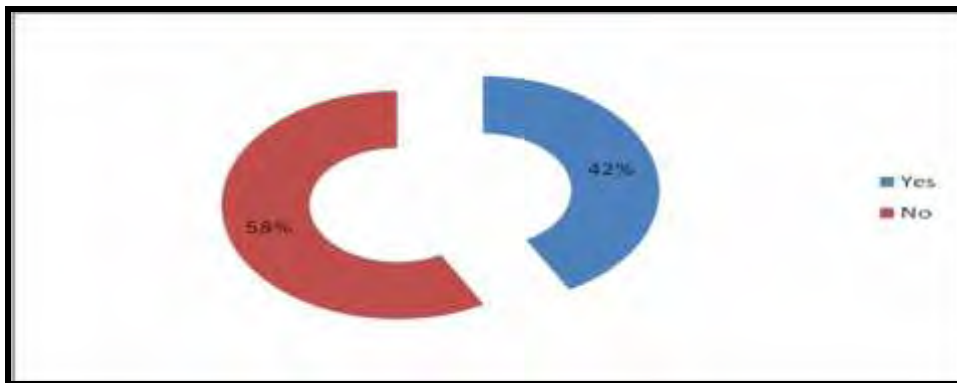
All most all people whether in day to day life or in any organization are actors in Material management, specifically inventory management operation because it involves material requirements which are natural part of human beings' demand. The difference is its perception and the way we manage it effectively. The perception can affect inventory management practiced adopted. For this purpose, the following question was included in the questionnaire.

Do you agree inventory management is important?

The response was for this question was as follows.

| Is Inventory Management is important |          |            |        |
|--------------------------------------|----------|------------|--------|
| Answer                               | Response | Percentage | Remark |
| Yes                                  | 41       | 42%        |        |
| No                                   | 57       | 58%        |        |
| Total                                | 98       | 100%       |        |

Accordingly, the perception about inventory management importance for the company was measured and depicted below.



**Figure 4-3: Inventory Management Perception**

According to the above diagram, the perception of staff and management about the importance of inventory management in the company is in dilemma. Among the respondents, 58% do not agree on the importance of inventory management.

The response data seems to concede to the qualitative data obtained from the questionnaire and interview, arguing that calculating lead-time, determining inventory cost is difficult and not critical since inventory management is operated by using preventive maintenance and fast moving strategy under maintenance. The construction department handles construction materials. The rest of some items are managed by the inventory control division by using annual consumption data.

One of the arguments found in the interview instrument and reports collected informally from the logistics department ascertain that maintenance management, construction planning and top management decision is a vibrant influencing factor, rather than an inventory management unit.

### **4.3 Inventory systems and technique Application**

This section discusses to answer research question two. The question was presented as follows.

How are inventory management systems and techniques applied?

According to the interview and secondary data from the report, operational practice in inventory is summarized in the following.

### 4.3.1 Classification and Standardization

The company created classification system based on the nature of inventory items. The company has seven major categories of inventory items which are construction materials, fixed asset, tire & battery, fuel and related, general items, tools and spare parts. It has also sub category and classification as indicated below.

**Table 4-5 Major Category of Inventory in the Company**

| Sno. | Major Category   | Subcategory | Percentage Share |
|------|--|-------------|------------------|
| 1    | Construction Materials   | 13          | 12%              |
| 2    | Fixed Asset  | 1           | 1%               |
| 3    | Fuel Oil and Lubricant   | 3           | 3%               |
| 4    | General Item(Bolt with nut, Cleaning, House hold, Medicine, other materials, Safety, and stationary) | 7           | 7%               |
| 5    | Spare Parts  | 75          | 70%              |
| 6    | Tools  | 4           | 4%               |
| 7    | Tire, Tube, Battery and Flap   | 4           | 4%               |
|      | <b>Total category</b>  | <b>107</b>  | <b>100%</b>      |

Under these categories, more than 30000 line items of inventories were available and managed with 107 subcategories of items.

According to the above table, 70% of class items are spare parts which have 75 subclasses based on their brand and model. The major operation consumed among other was by this category. However, according to secondary data and interview results there are interchangeability complex for spare parts.

### 4.3.2 Stocking, Ordering and Demand Determination

Stock requirements in the company were identified in three directions. The most common stock requirements arise from classical user instantly. This is especially for stationery and general item. The second sources of demand requirement determination were undertaken by equipment maintenance team. This is usually Preventive maintenance (PM) and overhaul maintenance spare parts using manufacturer specification and recommendation.

The other main stock requirement determination was using statistical data usually annual consumption. This consumption was analyzed with ABC analysis. A item category will be monitored weekly, even daily for fuel and bitumen, B category items reviewed every three, and 3-6 requirements will be ordered and stocked. For C class items, annual consumption data was taken and stocked for year consumption.

### **4.3.3 Inventory system and Modernization**

These inventory management operations were performed by manually and database. Two types of database and automation system was used one the oldest version customized from Microsoft Access and has limited capability, and other new system ERP which is more powerful than the oldest software package. Stock items which were managed by projects were managed both head office and project team by communicating by reports weekly and quarterly depending on the circumstances.

These demand management was undertaken by Inventory Planning and Control team which has been structured under logistics department.

## **4.4 Inventory Management Challenges**

This section discusses to answer research question three defined as the following.

What inventory management challenges are confronted in the organization?

In the conceptual framework, the following inventory management objectives for determined to evaluate inventory management effectiveness considering as a challenged.

- ◆ The Availability of item as Required
- ◆ The Quality of item as Required
- ◆ The Completeness of item as Required
- ◆ The Time of availability of item
- ◆ The Cost of item
- ◆ The Specification of item as Required

Accordingly, respondents were asked to reflect their satisfaction level on the above variables and their responses were summarized as follows.



**Figure 4-4 Inventory Management effectiveness Non Satisfaction**

These figure shows that the availability of item as demanded, the time taken to satisfy the demand and completeness of item at delivery are 88%, 81% and 80%. High number of respondents agrees that inventory operation regarding stock availability and its promptness of delivery at complete kit is not satisfactory and effective.

The response rate for the cost of getting and quality of items delivered to customers are 39% and 51% respectively. This implies no significance challenges were observed in cost and quality of inventory delivered to customer. Most interviewee also agreed on this argument.

We can deduce that the availability of inventory items with time at complete delivery are major inventory operation challenges.

According to this data, overall inventory management practice is not effective addressing its unsatisfactory level of 86%.

According to secondary data and interview results, there are large amount of non-moving items are stocked for years without any action and holding huge amounts of money and space.

#### 4.5 Major contributing factors for inventory management inefficiency

This section presents for the research question four that is: Which is the major contributing factor for inventory management inefficiency?

Inventory management practice was ineffective, thereby increasing slow moving and other inventory for long period of time. For this ineffectiveness, various factors were identified as reason for stock malpractice. The following variables were identified during preliminary survey in the company and the following results were obtained by the respondents by assessing in questionnaire.



**Figure4-3 Inventory Management Influencing Factors**

According to the figure above the major contributing factors and challenges for inventory management ineffectiveness are practical inventory technique inapplicability, staff development and capacity, standardization and classification including interchangeability complex representing 93%, 82%, and 70% respectively.

According to secondary data sources, the major challenges were applying fully inventory control technique. This involves determine lead time and inventory cost such as carrying cost, ordering cost, stock out cost. However, moderately ABC classification and inventory control technique exercised. Some items such as fuel, explosive are categorized as vital or critical and monitored accordingly.

The minimum-maximum, economic order quantity and other techniques implementation were not observed. These arguments are supported obtained by interview. On top of that, data obtained from all of three sources (questionnaire, interview and reports) verified that there are ample amount of non-moving and dead stock items, especially in the spare part category where its original construction equipments were sold and/or removed from the company.

## 4.6 Staff Management and Capacity in managing inventory

### 4.6.1 Skill Gap

Staff capacity in managing inventory is very important. The staff should have depth knowledge and skill to undertake inventory planning and control operation. This can be attained from extensive academic exercises and training. The motivation and empowerment of staff is decisive. These issues are examined by interview, questionnaire and document review of the company.

Among the 98 respondents, 79 respondents believe that skill gap regarding inventory management is available. These data is depicted graphically below.



**Figure 4-4 Skill Gap in staff**

The graph shows that 81% of staff as having skill gap. Most respondents, nearly 89% of the respondent recommended inventory technique and related trainings. This implies that most staff in inventory management operation has no technique to adopt inventory management principles that seriously affect inventory management ineffectiveness.

## 4.6.2 Staff Motivational Factor

The staff motivational scheme for those involved in inventory management operation was vital to manage huge stocks and inventory effectively. In view of that, motivational scheme developed in the company for inventory management operation staff was evaluated as follows.



**Figure 4-5 Staff Motivation Satisfaction Percentage**

The above data take from interview depicts that 75% of respondents agreed no motivational scheme in the company. This implies there is no motivational factor for those staff working the inventory management operation.

According to the data obtained from interview, performance related payment adopted at actual construction site was not fully applied for those involved in the inventory management operation because of most operation was undertaken out of the fleet mainly at office usually at head quarter and at Mekelle branch.

### 4.6.3 Manpower shortage



Figure 4-6 Manpower Shortage

According to the data depicted in the diagram 72% of staff agreed that there is shortage in material management function. This implies that most staff involved in this operation tend to do the routine work to cover manpower shortage at operation instead of undertaking professional undertakings to manage inventory effectively.

## 4.7 Qualitative Data Findings

Various qualitative data are obtained from interviews and open-ended questions from questionnaires. These data are summarized using content analysis by developing themes.

### 1. Major Theme found on interview

Females are high in number and they could not involve in detailed mathematical analysis so that they did not want to apply inventory techniques that have extensive mathematical calculations.

Female staff is better for front service rendering, security issues, and clerical works.

No qualified staff to implement inventory control techniques, most of us are diploma holders for long years and difficult to adopt inventory techniques by diploma level.

Since females are going much for personal leave permission, there is a shortage of manpower.

There is a high turnover of skill personnel.

Supply management systems and enterprise resource planning are used.

---

There are number of social science, especially management area profession to easily cope up with inventory control technique.

The major actors in inventory management are logistics department and user department. However, maintenance departments are the major stakeholder for spare parts, and construction department decides construction materials.

Some staff under logistics department took inventory control training while no formal training was delivered other departments.

Inventory management by itself is important. However, applying strictly minimum-maximum, safety stock, economic order quantity is not necessary because calculating lead-time, determining inventory cost is difficult.

There are high stocks outs and non-moving, obsolescence items, rush ordering, unplanned and urgent purchasing items. Dead stocks are due to removed equipments. High interchangeability is available

## ***2. Comment given in open-ended question part of questionnaire***

Implementing minimum-maximum, and applying economic order quantity by evaluating lead-time and inventory cost is not critical. This is because Inventory management is operated by using preventive maintenance and fast moving strategy under maintenance. Construction department handles construction materials. The rest some items are managed by inventory control division by using annual consumption data.

## ***3. Non moving and/dead stock items by category***

The following categories of dead and / or non-moving items by equipment model are available

- ◆ Cat, Mercedeses, Afrotruck, Bomag, Fiathitachi

## ***4. The training recommended by respondents are the following***

- ◆ inventory control technique, EOQ Determination and Lead time analysis
- ◆ store management, purchasing management, Logistics strategy
- ◆ parts identification
- ◆ computer application and operation including current software
- ◆ Statistics, Peachtree and sun software

## CHAPTER FIVE

### CONCLUSION AND RECOMMENDATION

#### 5.1 Conclusion

According to data analysis shows, the company has some progressive action in recognizing the importance of inventory management operation in establishing planning units such as inventory planning and control unit, preventive maintenance requirement determination unit and construction material requirement planning unit.

According the secondary sources from reports found and in the inventory management practices discussed at section 4.2, the company tried to manage using customized software, especially goes to drive to implement Enterprise Resource Management (ERP) is promising. The items used frequently are categorized, ABC classification and some critical items close monitoring is exercised moderately. Preventive maintenance requirements are determined annually based on the manufacturer's manual recommendation. Some demand requirements are exercised to determine by consumption data. These operational activities can be considered as good inventory management practices.

However, major inventory management techniques such as minimum-maximum level, safety level, lead-time analysis, and inventory cost decision and economic order quantity are not applied in the company.

The research finding shows that overall inventory management practice is not satisfactory and effective. The major challenges in this inventory operation are the availability of inventory as required, the time of delivery and acquiring in complete set of items. In addition, large numbers of items with huge high value of stock are available.

Major inventory control techniques such as lead-time analysis, establishing minimum-maximum, economic ordering not applied and highly affects inventory management effectiveness. High numbers of interchangeability are available in the stock that contributes for excess inventory.

According to this scenario, inventory control technique is the significant contributing factor. However, this inventory management technique requires extensive knowledge, skill and motivation to implement effectively.

The research finding also depicts that staff are in dilemma to the importance of inventory control techniques, and have a skill gap in the inventory management operation. On top of that, staff motivation for those involving in this operation is not attractive.

Therefore, it can be deduce that inventory control technique application problem existed owing to the staff capacity due to skill gap and lack of motivation.

Hence, researcher concludes that the main contributing factor for inventory management ineffectiveness to the construction company, which results in high stocks outs and non-moving obsolescence items, rush ordering, unplanned and urgent purchasing items, , is the staff development and capacity incompetence.

## 5.2 Recommendation

### 5.2.1 To the company

The major challenges in the organization are availability and prompt delivery of stock items as required. Excessive non-moving spare parts, most of which were stocked for disposed construction equipment and machineries, are available in the stores for long time. One of the contributing factors is staff capacity.

Staff and management capacity development from top management to the bottom staff is recommended. This can be achieved through intensive training and awareness. Best practice from the same and other industries locally and internationally can also improve the exposure of staff. Integrated motivation scheme considering investments and revenues of the company is also essential.

In addition, formally structured inventory management policy and procedure which strengthen empowerment is recommended. This will create capable staff to implement effective inventory control technique to solve inventory challenges existed in the company.

The existing inventory management database system and team work as participatory approach from major user department of spare parts and construction material is taken as worthy practice and recommended to continue in integrity.

The slow and non-moving spare parts identified and available in the warehouse shall be dispose immediately by selling or donating to other since it overcrowded the store and challenges processing time of inventory operation.

### 5.2.2 Future to the industry and researcher

How Inventory management practice and techniques influence the general performance and revenue of construction industries requires further detail research.

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## ***ANNEXES***



## *Annex I Questionnaires*

**Addis Ababa University**  
**College of Business and Economics**  
**Department of Management**

### **QUESTIONNAIRE FOR SUR CONSTRUCTION MEMBERS**

This questionnaire is to be filled by members of the SUR Construction staff. The questionnaire is to collect primary data regarding material and stock management of the company for case study research purpose. The research is conducted to fulfill the partial requirements of the Executive Master of Business Administration (EMBA) degree program at the Addis Ababa University.

#### **General Instructions**

- There is no need of writing your name
- In all cases where answer options are available please put “✓” or “x” in the appropriate space.
- For questions that demand your opinion, please try to honestly describe as per the questions on the space provided
- If you need further explanation, you can contact me through my  
Mobile phone 0931-248698 Or 0911430134

Email:

[begashu20@gmail.com](mailto:begashu20@gmail.com)

[begashu@Yahoo.Com](mailto:begashu@Yahoo.Com)

***N.B. KINDLY REQUEST to FILL AND FOREWARD IMMEDIATELY by the above address or drop physically to representative!!!***

Thank you very much in advance for your generous time, honest, and prompt responses which will be very instrumental for the study!!!

---

**1. General Information**

**1.1. Age:**

- 18 – 30 years of age                       31 – 40 years of age  
 41 – 50 years of age                       above 50 years of age

**1.2. Gender:**

- Male                       Female

**1.3. Educational Qualification:**

- Up to Highschool Graduate                       First Degree  
 Diploma Graduate                       Masters Degree  
 Other (please specify) \_\_\_\_\_

**1.4. Type of profession/education**

- Engineering                       Finance  
 Purchase and supply                       management  
 Other (please specify) \_\_\_\_\_

**1.5. Your working department** \_\_\_\_\_

**1.6. Your position in the company :**

- Managerial                       non-managerial

**1.7. Type of employment;**

- Permanent                       contract  
 Consultancy                       Temporary
- 
-

Other (please specify) \_\_\_\_\_

1.1. Are you project staff

Yes  No

1.1. Which Type of service you render frequently from inventory/store unit

stationary & general items  spareparts, tire, fuel  
 Construction material  other (please specify) \_\_\_\_\_

1.7 Have you took any material or inventory management training

Yes  No

If so please specify the type of training you took and its duration \_\_\_\_\_

1.8 Do you agree inventory management is important?

**2. Inventory management challenges and effectiveness**

**2.1. Do you think Inventory management is very effective and efficient in the following services?**

| Questions                              | Strongly Agree | Agree | Neither | Disagree | Strongly Disagree |
|--|----------------|-------|---------|----------|-------------------|
| The Availability of item when Required |                |       |         |          |                   |
| The Quality of item as Required        |                |       |         |          |                   |
| The Completeness of item as Required   |                |       |         |          |                   |
| The Time of item when Required         |                |       |         |          |                   |
| The Cost of item                       |                |       |         |          |                   |
| The Specification of item as Required  |                |       |         |          |                   |
| In overall total inventory             |                |       |         |          |                   |



|                    |  |  |  |  |  |
|--------------------|--|--|--|--|--|
| management Service |  |  |  |  |  |
|--------------------|--|--|--|--|--|

**2.2. Is the inventory management inefficiency and ineffectiveness resulted from**

| Questions  | Strongly agree | agree | Neither | disagree | Strongly disagree |
|--|----------------|-------|---------|----------|-------------------|
| System(Procedure, manual, Review Period, etc) inefficiency                                       |                |       |         |          |                   |
| Modern Computerization and Information Technology(including network and hardware infrastructure) |                |       |         |          |                   |
| Staff development and Capacity Problem   |                |       |         |          |                   |
| User department (may be negligence in ordering or planning problem, Specifications)              |                |       |         |          |                   |
| Management policy and capacity   |                |       |         |          |                   |
| Standardization, classification, interchangeable, etc  |                |       |         |          |                   |
| Applying and Implementing inventory control Technique(Min-Max, EOQ, ROP, safety stock, etc)      |                |       |         |          |                   |

**3. Management and Staff Development, capacity enhancement and policy issues**

**3.1.** Is there any skill gap for the staff who involves and participate in the inventory management including supply, finance, and maintenance or project management, etc?  
 Could you please mention any skill gap

\_\_\_\_\_.

**3.2.** How is the motivation of supply & inventory staff?

**3.3.** Is there manpower shortage in those involves in inventory management?

    `In which area \_\_\_\_\_

**3.4.** Have you observed any Policy issue or challenges in relate to materials and inventory management?

3.4.1. Branding and Purchasing of the construction equipment

3.4.2. Manual and procedure

3.4.3. Ordering level, period and quantity

3.4.4. Maintenance management

3.4.5. Accountability and responsibility of inventory and Logistics departments/units



3.4.6. Other \_\_\_\_\_

**3.5. Data Issues and Inventory management Techniques**

3.5.1. Is there automated system to manage all items inventory?

How is its effectiveness?

3.5.2. Is there any difference between database record and the physical location (bin card) value?

3.5.3. Is the location, shelf and warehouse number clearly identified and coded?

3.5.4. Is there security issue in the database and physical inventory?

3.5.5. Is there any stock out event and analysis in the company for the past five years?

Comments \_\_\_\_\_

3.5.6. Is there any type of non moving items in your project/branch/company?

Would you list some items? \_\_\_\_\_

What do you think the reasons for high inventory and dead stock?

\_\_\_\_\_

3.5.7. Are there any spare parts or items for which parent equipment or machinery not available in the company

**4. Any Comments and Suggestions**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

I thank you very much for your patience and Kindly Response.



## *Annex II Interview*

**Addis Ababa University**  
**College of Business and Economics**  
**Department of Management**

### **INTERVIEW FOR SUR CONSTRUCTION MEMBERS**

This Interview is to be filled by members of the SUR Construction staff. The Interview is to collect primary data regarding material and stock management of the company for case study research. The research is conducted to fulfill the partial requirements of the Executive Master of Business Administration (MBA) degree program at the Addis Ababa University.

Mobile phone 0931-248698 Or 0911430134

Email: [begashu20@gmail.com](mailto:begashu20@gmail.com), [begashu@Yahoo.Com](mailto:begashu@Yahoo.Com)

#### **1. Inventory and Company level information**

- 1.1.1. Is there any working capital problem in the past five years?
  - 1.1.2. What is the service level of inventory in your company?
  - 1.1.3. What is the down time of equipments, especially construction equipment?
  - 1.1.4. What are the old equipments or machineries for construction?
  - 1.1.5. How old equipments are they?
  - 1.1.6. How frequent new models of equipments are purchased by the company?
  - 1.1.7. What are they?
  - 1.1.8. Are there any spare parts or items for which parent equipment or machinery not available in the company?
  - 1.1.9. How many line items exist in the company?
  - 1.1.10. It there any item totally eliminated in the past 3 or 5 years?
  - 1.1.11. Do you believe inventory management in the company is efficient and effective?
  - 1.1.12. What do you think the inventory management inefficiency causes/Reasons?
-

## **2. Staff Development/capacity enhancement**

- 2.1.1. Is there any skill gap for the staff who involves/participate in the inventory management including supply, finance, and maintenance or project management, etc?
- 2.1.2. How is the motivation of supply & inventory staff?
- 2.1.3. Did you use inventory data/experience/history for future inventory decision?
- 2.1.4. What type of training you recommend? (Computer /database/application, Inventory management, Warehouse, Material handling ,etc)

## **3. Policy, System and technology issues**

### **3.1. Policy**

Is there policy and manual procedure regarding Branding, Outsourcing, Maintenance PM, Stocking (including Min-Max, EOQ, Lead time, ordering period, etc)

### **3.2. Standardization**

- 3.2.1. How do you classify items? How often improved/modified? What factors influence the list?
- 3.2.2. Did you use the classification system consistently?
- 3.2.3. Does the item classification such as general item, stationery, spare parts, etc challenging for you?

### **3.3. Database Networking and communication infrastructure**

- 3.3.1. Is there automated system to manage all items inventory? How is its effectiveness?
  - 3.3.2. How frequent is the difference between database/record and the physical location/bin card?
  - 3.3.3. Is the database/automation up to date to the globe(OS), the demand of the company, items available, speed, report, ordering?
  - 3.3.4. Is there adequate staff for technical database & network administration for head office, branch and all projects?
  - 3.3.5. Is the master file and codification used by all user departments and supply chain staffs?
  - 3.3.6. Is the location, shelf and warehouse number clearly identified and coded?
  - 3.3.7. Is there security issue in the database and physical inventory?
-

3.3.8. Does it Connecting every department and projects by software and technology

#### **4. Inventory management technique**

- 4.1. How frequent is the difference between database/record and the physical location/bin card?
  - 4.2. Is physical inventory is done annually for all items?
  - 4.3. How frequent periodic review is performed?
  - 4.4. What is the base for Ordering of items(User requirement Or Consumption)
  - 4.5. Did warehouse/store problems faced? How is the discrepancy for the database/records? Why?
  - 4.6. How much of the revenue/sales considered inventory including materials, spare parts, stationery, fuel, oil & lubricants, tire, etc per year?
  - 4.7. Is there any classification of inventory? Why?
  - 4.8. How do you manage each inventory item?
  - 4.9. Is there automated system to manage all items inventory? How is its effectiveness?  
Storage method contribution for misplace, pilferage, obsolete, excess stock
  - 4.10. Did evaluation system of inventory management effectiveness?
  - 4.11. Is there any stock out event and analysis in the company in the past five years?
  - 4.12. If then how much cost due to stock out in equipments, construction, etc?
  - 4.13. How did you calculate/identify dead stocks/
  - 4.14. Who identify dead stocks? How long stay as dead stock?
  - 4.15. What do you think the reasons for high inventory and dead stock? How did remove dead stock?
  - 4.16. Which item groups are most venerable to dead stock?
  - 4.17. Are there any spare parts or items for which parent equipment or machinery not available in the company Is there safety stock? If so how is determined?
  - 4.18. Is there any type of non moving items in your project/branch/company? How much? How long? Would you list some items?
  - 4.19. What problems observed in inventory/parts management?
  - 4.20. How much is the lead time for each item locally and internationally?
  - 4.21. Are you tried to fetch from other projects? On other way did you inform other projects about the availability of slow/non moving items, especially spare parts?
-

- 4.22.** Did you have integrated inventory information for all projects? How did you update that data? (Tools, means, frequency of time, by whom?)
- 4.23.** How do you replenish inventory?
-



## ***ANNEXES***

## *Annex I Questionnaires*

**Addis Ababa University**  
**College of Business and Economics**  
**Department of Management**

### **QUESTIONNAIRE FOR SUR CONSTRUCTION MEMBERS**

This questionnaire is to be filled by members of the SUR Construction staff. The questionnaire is to collect primary data regarding material and stock management of the company for case study research purpose. The research is conducted to fulfill the partial requirements of the Executive Master of Business Administration (EMBA) degree program at the Addis Ababa University.

#### **General Instructions**

- There is no need of writing your name
- In all cases where answer options are available please put “√” or “x” in the appropriate space.
- For questions that demand your opinion, please try to honestly describe as per the questions on the space provided
- If you need further explanation, you can contact me through my

Mobile phone 0931-248698 Or 0911430134

Email:

[begashu20@gmail.com](mailto:begashu20@gmail.com)

[begashu@Yahoo.Com](mailto:begashu@Yahoo.Com)

***N.B. KINDLY REQUEST to FILL AND FOREWARD IMMEDIATELY by the above address or drop physically to representative!!!***

Thank you very much in advance for your generous time, honest, and prompt responses which will be very instrumental for the study!!!

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**1. General Information**

**1.1. Age:**

- 18 – 30 years of age                       31 – 40 years of age  
 41 – 50 years of age                       above 50 years of age

**1.2. Gender:**

- Male                       Female

**1.3. Educational Qualification:**

- Up to Highschool Graduate                       First Degree  
 Diploma Graduate                       Masters Degree  
 Other (please specify) \_\_\_\_\_

**1.4. Type of profession/education**

- Engineering                       Finance  
 Purchase and supply                       management  
 Other (please specify)
- 

**1.5. Your working department** \_\_\_\_\_

**1.6. Your position in the company :**

- Managerial                       non-managerial

**1.7. Type of employment;**

- Permanent                       contract  
 Consultancy                       Temporary  
 Other (please specify)
- 

**1.1. Are you project staff**

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Yes

No

**1.1. Which Type of service you render frequently from inventory/store unit**

stationary & general items

spareparts, tire, fuel

Construction material

other (please specify) \_\_\_\_\_

1.7 Have you took any material or inventory management training

Yes

No

If so please specify the type of training you took and its duration \_\_\_\_\_

1.8 Do you agree inventory management is important?

**2. Inventory management challenges and effectiveness**

**2.1. Do you think Inventory management is very effective and efficient in the following services?**

| Questions  | Strongly Agree | Agree | Neither | Disagree | Strongly Disagree |
|--|----------------|-------|---------|----------|-------------------|
| <b>The Availability of item when Required</b>        |                |       |         |          |                   |
| <b>The Quality of item as Required</b>               |                |       |         |          |                   |
| <b>The Completeness of item as Required</b>          |                |       |         |          |                   |
| <b>The Time of item when Required</b>                |                |       |         |          |                   |
| <b>The Cost of item</b>                              |                |       |         |          |                   |
| <b>The Specification of item as Required</b>         |                |       |         |          |                   |
| <b>In overall total inventory management Service</b> |                |       |         |          |                   |



**2.2. Is the inventory management inefficiency and ineffectiveness resulted from**

| Questions  | Strongly agree | agree | Neither | disagree | Strongly disagree |
|--|----------------|-------|---------|----------|-------------------|
| System(Procedure, manual, Review Period, etc) inefficiency                                       |                |       |         |          |                   |
| Modern Computerization and Information Technology(including network and hardware infrastructure) |                |       |         |          |                   |
| Staff development and Capacity Problem   |                |       |         |          |                   |
| User department (may be negligence in ordering or planning problem, Specifications)              |                |       |         |          |                   |
| Management policy and capacity   |                |       |         |          |                   |
| Standardization, classification, interchangeable, etc  |                |       |         |          |                   |
| Applying and Implementing inventory control Technique(Min-Max, EOQ, ROP, safety stock, etc)      |                |       |         |          |                   |

**3. Management and Staff Development, capacity enhancement and policy issues**

**3.1.** Is there any skill gap for the staff who involves and participate in the inventory management including supply, finance, and maintenance or project management, etc?  
 Could you please mention any skill gap  
 \_\_\_\_\_.

**3.2.** How is the motivation of supply & inventory staff?

**3.3.** Is there manpower shortage in those involves in inventory management?  
 `In which area \_\_\_\_\_

**3.4.** Have you observed any Policy issue or challenges in relate to materials and inventory management?

3.4.1. Branding and Purchasing of the construction equipment

3.4.2. Manual and procedure

3.4.3. Ordering level, period and quantity

3.4.4. Maintenance management

3.4.5. Accountability and responsibility of inventory and Logistics departments/units

3.4.6. Other \_\_\_\_\_

**3.5. Data Issues and Inventory management Techniques**

3.5.1. Is there automated system to manage all items inventory?

How is its effectiveness?

3.5.2. Is there any difference between database record and the physical location (bin card) value?

3.5.3. Is the location, shelf and warehouse number clearly identified and coded?

3.5.4. Is there security issue in the database and physical inventory?

3.5.5. Is there any stock out event and analysis in the company for the past five years?

Comments \_\_\_\_\_

3.5.6. Is there any type of non moving items in your project/branch/company?

Would you list some items? \_\_\_\_\_

What do you think the reasons for high inventory and dead stock?

\_\_\_\_\_

3.5.7. Are there any spare parts or items for which parent equipment or machinery not available in the company

**4. Any Comments and Suggestions**

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I thank you very much for your patience and Kindly Response.



## *Annex II Interview*

**Addis Ababa University**  
**College of Business and Economics**  
**Department of Management**

### **INTERVIEW FOR SUR CONSTRUCTION MEMBERS**

This Interview is to be filled by members of the SUR Construction staff. The Interview is to collect primary data regarding material and stock management of the company for case study research. The research is conducted to fulfill the partial requirements of the Executive Master of Business Administration (MBA) degree program at the Addis Ababa University.

Mobile phone 0931-248698 Or 0911430134

Email: [begashu20@gmail.com](mailto:begashu20@gmail.com), [begashu@Yahoo.Com](mailto:begashu@Yahoo.Com)

#### **1. Inventory and Company level information**

- 1.1.1. Is there any working capital problem in the past five years?
  - 1.1.2. What is the service level of inventory in your company?
  - 1.1.3. What is the down time of equipments, especially construction equipment?
  - 1.1.4. What are the old equipments or machineries for construction?
  - 1.1.5. How old equipments are they?
  - 1.1.6. How frequent new models of equipments are purchased by the company?
  - 1.1.7. What are they?
  - 1.1.8. Are there any spare parts or items for which parent equipment or machinery not available in the company?
  - 1.1.9. How many line items exist in the company?
  - 1.1.10. It there any item totally eliminated in the past 3 or 5 years?
  - 1.1.11. Do you believe inventory management in the company is efficient and effective?
  - 1.1.12. What do you think the inventory management inefficiency causes/Reasons?
-

## **2. Staff Development/capacity enhancement**

- 2.1.1. Is there any skill gap for the staff who involves/participate in the inventory management including supply, finance, and maintenance or project management, etc?
- 2.1.2. How is the motivation of supply & inventory staff?
- 2.1.3. Did you use inventory data/experience/history for future inventory decision?
- 2.1.4. What type of training you recommend? (Computer /database/application, Inventory management, Warehouse, Material handling ,etc)

## **3. Policy, System and technology issues**

### **3.1. Policy**

Is there policy and manual procedure regarding Branding, Outsourcing, Maintenance PM, Stocking (including Min-Max, EOQ, Lead time, ordering period, etc)

### **3.2. Standardization**

- 3.2.1. How do you classify items? How often improved/modified? What factors influence the list?
- 3.2.2. Did you use the classification system consistently?
- 3.2.3. Does the item classification such as general item, stationery, spare parts, etc challenging for you?

### **3.3. Database Networking and communication infrastructure**

- 3.3.1. Is there automated system to manage all items inventory? How is its effectiveness?
  - 3.3.2. How frequent is the difference between database/record and the physical location/bin card?
  - 3.3.3. Is the database/automation up to date to the globe(OS), the demand of the company, items available, speed, report, ordering?
  - 3.3.4. Is there adequate staff for technical database & network administration for head office, branch and all projects?
  - 3.3.5. Is the master file and codification used by all user departments and supply chain staffs?
  - 3.3.6. Is the location, shelf and warehouse number clearly identified and coded?
  - 3.3.7. Is there security issue in the database and physical inventory?
  - 3.3.8. Does it Connecting every department and projects by software and technology
-

#### **4. Inventory management technique**

- 4.1. How frequent is the difference between database/record and the physical location/bin card?
  - 4.2. Is physical inventory is done annually for all items?
  - 4.3. How frequent periodic review is performed?
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  - 4.19. What problems observed in inventory/parts management?
  - 4.20. How much is the lead time for each item locally and internationally?
  - 4.21. Are you tried to fetch from other projects? On other way did you inform other projects about the availability of slow/non moving items, especially spare parts?
  - 4.22. Did you have integrated inventory information for all projects? How did you update that data? (Tools, means, frequency of time, by whom?)
  - 4.23. How do you replenish inventory?
-