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A STUDY ON THE INVENTORY CONTROL AND VALUATION OF LUCAS-TVS LTD

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KUMARAGURU COLLEGE OF TECHNOLOGY

COIMBATORE

BONAFIDE CERTIFICATE

Certified that this project report titled **"A STUDY ON THE INVENTORY CONTROL AND VALUATION OF LUCAS-TVS LIMITED"** is the bonafide work of **Ms. U.ASWINI (71206631006)** who carried out the research under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

Faculty Guide

Director

Evaluated and vice-voce conducted on .....

Examiner I

Examiner II

DECLARATION

I, hereby declare that this project report entitled as "a study on the inventory control and valuation of LUCAS-TVS limited", has undertaken for academic purpose submitted to Anna University in partial fulfillment of requirement for the award of the degree of Master of Business Administration. The project report is the record of the original work done by me under the guidance of Prof. N. Jothilingam during the academic year 2007-2008.

I, also declare hereby, that the information given in this report is correct to the best of my knowledge and belief.

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EXECUTIVE SUMMERY

This project "To study the **Inventory Control and Valuation** for **LUCAS- TVS"** is a critical aspect of a successful management. It requires continuous decision making. Corporate managers can increase the probability of making good inventory management decisions by using fundamental inventory management strategies implemented as apart of organized plant with high carrying cost; companies cannot afford to have any money tied up in excessive inventories.

The objectives of good customer service & efficient production must meet at minimum inventory levels. This is true even though inflation causes finished goods inventories to increase in value. Putting inventory on shelf ties up money, and to minimize the amount tied up, a company must match the timing of demands and supply so that the money tied up is minimum.

The major tool used to analyze the data collected is ABC analysis and VED analysis which is a widely used management accounting technique.

ACKNOWLEDGEMENT

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CHAPTER - 1

INTRODUCTION

1.1. BACKGROUND:

Inventories constitute the most significant part of current assets of large majority of companies. Because of large size of inventories maintained by firms, a considerable amount of funds is required to be committed to them. It is therefore absolutely imperative to manage inventories efficiently and effectively in order to avoid unnecessary investment. A firm neglecting inventory management is jeopardizing its long run profitability and may fail ultimately. The reduction in excessive inventories carries a favorable impact on companies' profitability.

1.1.2. NATURE OF INVENTORIES:

Inventories are stocks of the product of a company which it is manufacturing for sale and components that make up the product. The various forms in which inventories exist in a company are: raw materials, work-in-progress & finished goods.

- **Raw Materials** are those basic inputs that are converted into finished product through the manufacturing process. Raw materials inventories are those units which have been purchased and stored.
- **Work in process** inventories are semi finished products and components which require further processing to do a finished product or a component.
- **Finished Goods** inventories are those completely manufactured products or a component which are ready for sale. Products or component are,
    - Raw material – in stores
    - components – in stores
    - Raw material and components at s/c end.
    - Work in progress – at shop floor
    - Finished goods – at warehouse.

Chapter I
Introduction

1.1.3. NEED TO HOLD INVENTORIES:

Maintaining inventories involves tying up of company's funds and incurrence of storage handling costs. There are three motives for a company to hold inventories in spite of these costs.

- **Transaction Motive** emphasis the need to maintain inventories to facilitate smooth production and sales operations.
- **Precaution Motive** necessitates holding of inventories to guard against the risk of unpredictable changes in supply and demand forces and in other forces.
- **Speculative Motive** influences the decision to increase or reduce inventory levels to take advantage of price fluctuations.

A company should maintain adequate stock of materials for a continuous supply to the factory for an uninterrupted production. It is not possible for a company to procure raw material whenever it is needed. A time lag exists between demand for material and its supply. Also, there exists uncertainty in procuring raw materials in time on many occasions. The procurement of materials may be delayed because of such factors like transport disruption, or short supply and other unexpected factors like natural calamities, strike, etc. Therefore the firm should maintain sufficient stock of raw materials at a given stream line production.

Work in process inventory builds up because of the production cycle. Production cycle is the time span between introduction of raw materials into production and emergence of finished product at the completion of production cycle. Till production cycle completes, stock of work in process has to be maintained. The way to reduce this inventory is to make production cycle shorter by improving the production cycle shorter by improving the production techniques.

Stock of Finished goods has to be held because production and sales are not instantaneous. A firm cannot produce immediately when goods are demanded by customers. Therefore to supply finished goods has also to be maintained for sudden demand from customers. Failure to supply products to customers when demanded would mean loss of the firms sales to competitors.

1.1.4. TYPES OF INVENTORY:

Cycle Inventory:

Created when we order in batches and place orders less frequently. The longer the cycle, the bigger the LOT SIZE (Q). A larger Q can help with customer service, ordering cost, setups, transportation rated and purchasing cost.

Safety Stock Inventory:

Created by placing an order sooner that typically needed. The replenishment order most likely will arrive ahead of time, protecting against three uncertainties: Demand, Lead time, & Supply.

Anticipation Inventory:

Created by overproducing during slack season or overbuying before a price increase or capacity shortage. Helps absorb uneven rates in demand and supply.

Pipeline (transit) Inventory:

Created by the time spent to move and produce inventory. Sum of all schedule receipts (i.e., open orders) which are that have been placed but not yet received.

Out–of-stock situations:

Operations mostly depend on stock. Raw material shortage in manufacturing means halting production, rescheduling to make something that has raw materials or quick action to secure alternative supply. Obviously average inventory for a stock item is represented by half the stock. A replenishment delivery is received (Q) and is added to already to outstanding orders.

Cost of Inventory:

Cost are tied up in the inventory itself in the form of ordering and carrying cost.

Holding Cost:

- Expressed as a % of stock value and may be 15-30% per annum.

- Cost of capital tied up in inventory (the opportunity cost of money)
- Storage costs: space, equipment, warehouse & stores staff, warehouse & stores insurance, service etc often 5-10% of stock value per annum.
- Stock losses/wastage. Theft, accident damage, stock exceeding its shelf-life, and obsolescence and write-offs.

Ordering Cost:

Cost arise ordering/acquiring goods regardless of the actual value of the goods. In both making to stock and making to order, stock acquisition cost are incurred. Replenishment and purchasing administration paid for. It may take a skilled operator an hour to set up equipment for a new order or schedule batch. Material may be wasted in the set up process. On completion of the job, equipment must be cleaned and tools put away.

The **purchasing order processing costs** include receiving the goods, delivery for large or small orders and invoice processing . Precise costs per ordered unit are often elusive, but the staff and overhead costs are significant. It is expressed in terms of cost per order.

Ad hoc purchasing must be compared with **long-term contracts** involving regular deliveries perhaps with just-in-time supply or amounts that the operation can "call off" from a supply agreement over, say, a quarter.

1.1.5. Factors influencing inventory:

An important step in inventory management is the determination of investment in each component of inventory such as raw materials, work-in-progress and finished goods. Some important factors which influence the level of each component are:

Raw material inventory:

- To avoid interruption in the process of production the quantity representing safety stocks
- Economy in the matter of purchases
- Anticipated fluctuations in the prices of materials in the future

- Expected quantity of consumption
- Management's efficiency in the purchases and control of the materials
- Carrying costs
- Funds available for investment in raw materials

Work –in-process inventory:

Investment in work-in-process consists of the cost of raw materials and the direct expenses connected with production and allocation of proportionate overhead expenses. It should be noted that the investment in the goods in the process of manufacture is influenced by the period taken in the production process. The volume of production is an important determinant of work-in-process. If there is increase or decrease in production the investment in work-in-process also increases or decreases. Production should therefore coincide with sales. The amount of funds tied up in the work-in-process will also directly fluctuate with sales levels. The cost of raw materials used, wages and other direct expenses included in work-in-process are the factors that generally influence the investment in work-in-process.

Finished goods inventory:

- Finished goods inventory are generally maintained to the minimum by producing only to orders
- Policy of producing for anticipated order and stock keeping
- Goods required for the purpose of minimum and safety stocks
- Sales policies of the firm
- Price fluctuations for the product

1.1.6. INVENTORY CONTROL:

Inventory control is the technique of maintaining stocks of different categories of goods at adequate levels with minimum investment. Inventories are essential for keeping

the production wheels moving. Inventories keep the market going and distribution system intact. They serve as lubrication and spring for production distribution system.

Meaning of Inventory Control:

Inventory control can be defined as a tool of management, which is used to maintain the economic minimum investment in materials and products for the purpose of obtaining a maximum financial returns from the investments and at the same time ensuring to avoid unduly large or small stocks and prevent over and under stocking in the future. In brief, inventory control acts as a potent anti-coagulant by preventing capital from getting frozen in the form of excessive raw materials, ancillary goods, stocks in the warehouse and pipeline and releasing it for more productive uses. Inventory control refers to a planned method of purchasing and storing the materials at the lowest possible cost without affecting the production and distribution schedule.

Definition of Inventory Control:

Inventory control refers to "the process whereby the investments in materials and parts carried in stock is regulated within pre-determined limits set in accordance with inventory policy established by the management".

Features of a good Inventory policy:

1. There should be proper accounting and physical controls.
2. The inventory should be stored properly to avoid the losses like breakage, pilferage, spoilage, wastage, damage, deterioration, etc.
3. Fixation of inventory levels like minimum, maximum and re-order levels to ensure the optimum level of stock.
4. Proper care should be taken to avoid stock-out situation.
5. Continuous supply of material should be optimized by avoiding over stocking.
6. Regular monitoring of stock movements and reduce the investment in slow moving stocks.

Objectives of Inventory Control:

1. Ensuring that no activity, particularly production, suffers from interruption for want of materials and stores.
2. Procuring all the materials and stores at he lowest possible price without degrading the required quality of consistent supplies.
3. Minimization of the total cost involved, both for acquiring and holding stocks.
4. Avoidance of unnecessary losses and wastage that may arise from deterioration in quality due to defective or long storage or from obsolescence.
5. Maintenance of proper records to ensure that reliable information is available for all items of materials and stores that not only helps in detecting losses, pilferages but also facilitates proper production planning.

1.1.7. INVENTORY VALUATION:

Materials issued from stores are debited to the work in progress account . This work in progress is credited when the materials move out of manufacturing on completion of process as finished goods to warehouse. The balance lying at the work in progress account will represent the stock of semi finished goods at the shop floor.

The value includes

1. The invoice price less trade discount if any,
2. The freight, cartage, octroi and insurance on incoming materials.

1.2. LITERATURE REVIEW:

Erwin van der Laan, Marc Salomon, Rommert Dekker, Vol. 45, No. 5 (May, 1999)[1] said, "Production planning and inventory control in systems where manufacturing and remanufacturing operations occur simultaneously. Typical for these hybrid systems is, that both the output of the manufacturing process and the output of the remanufacturing process can be used to fulfill customer demands. Here, they consider a relatively simple hybrid system, related to a single component durable product. For this system, they present a methodology to analyse a PUSH control strategy (in which all returned products are remanufactured as early as possible) and a PULL control strategy (in which all returned products are remanufactured as late as is convenient). The main contributions of this paper are (i) to compare traditional systems without remanufacturing to PUSH and to PULL controlled systems with remanufacturing, and (ii) to derive managerial insights into the inventory related effects of remanufacturing.

Johanna Småros, Juha-Matti Lehtonen, Patrik Appelqvist, Jan Holmström, Vol: 33, pp: 336 - 354[2],Said, "Information sharing practices such as vendor-managed inventory (VMI) give manufacturers access to more accurate demand information, e.g. customer sales data, than before.. In this paper, discrete-event simulation is used to examine how a manufacturer can combine traditional order data available from non-VMI customers with sales data available from VMI customers in its production and inventory control and what impact this has on the manufacturer's operational efficiency. The simulation model is based on a real-life VMI implementation and uses actual demand and product data. The key finding is that even for products with stable demand a partial improvement of demand visibility can improve production and inventory control efficiency, but that the value of visibility greatly depends on the target products' replenishment frequencies and the production planning cycle employed by the manufacturer.

[1] Erwin van der Laan, Marc Salomon, Rommert Dekker Luk Van Wassenhove , "Inventory Control in Hybrid Systems with Remanufacturing " *Management Science*, Vol. 45, No. 5 (May, 1999), pp. 733-747
[2] Johanna Småros, Juha-Matti Lehtonen, Patrik Appelqvist, Jan Holmström, "The impact of increasing demand visibility on production and inventory control efficiency", International Journal of Physical Distribution & Logistics Management, Vol: 33, Issue:5(2003), pp. 336 - 354

Sven Axsater, Kaj Rosling, Vol.39, No.10 (Oct., 1993), pp.1274-1280[3] said, this paper compares installation and echelon stock policies for multilevel inventory control. The major results are for serial and assembly systems. For (Q, r)-rules, echelon stock policies are, in general, superior to installation stock policies. A Kanban-policy is identified as a restricted type of installation stock (Q, r)-policy.

Teunter, Ruud H, 06/15/2001, Vol. 39, Issue 9, pp: 2023-2035[4] said, they propose a method for valuing new, recoverable, and recovered assemblies (products, components, parts, etc.) in production systems with reverse logistics. Values of assemblies influence their opportunity holding cost rates and are hence essential for comparing *inventory* strategies in average cost models. They argue that the proposed method is 'correct' from a discounted cash flow (DCF) point of view. They refer to some previous results on valuing assemblies in systems without disassembly of returned products that seem to confirm this. Furthermore, they test the method for a specific example with disassembly of returned products. The simulation results indicate that the method indeed leads to (nearly) DCF optimal *inventory* strategies.

Tapiero, Charles. S, 04/15/2000, Vol. 38, Issue 6, pp: 1397-1406[5]said, Classical *inventory control*, using an ex-ante optimization approach and tending to recommend large stockholdings, has been criticized over recent decades. As a result, just in time (JIT) based *inventory* systems, which exhibit sensitivity to customer requests (rather than production plans based on demand forecasts) are increasingly recommended. In such *inventory control* schemes, orders are made once the demand is revealed. As a result, ex-ante classical and ex-post JIT *inventory* schemes can be compared and analysed through: (a) the *valuation* and the management of demand uncertainty and (b) the time phasing of information and its relationship to the (*inventory*) *control* policy. The purpose of this paper is to elaborate and compare such approaches and devise an approach to *inventory control* based on regret decision making. Examples are used to show how we may be able to value flexibility explicitly in supplies and construct robust *inventory* policies which can respond to

[3] Sven Axsater, Kaj Rosling, "Installation vs. Echelon Stock Policies for Multilevel Inventory Control" *Management Science*, Vol. 39, No. 10 (Oct., 1993), pp. 1274-1280
[4] Teunter, Ruud H., "A reverse logistics valuation method for inventory control" International Journal of Production Research, 06/15/2001, Vol. 39, Issue 9, p2023-2035
[5] Tapiero, Charles S. "Ex-post inventory control" International Journal of Production Research, 04/15/2000, Vol. 38, Issue 6, p1397-1406

predictable and unpredictable demands (such as using options in *inventory control* and increased reactivity through JIT *controls*).

Baldenius, Tim, Reichelstein, Stefan., Jul2005, Vol. 51 Issue 7, pp: 1032-1045, 14p[6] said, this paper examines *inventory* management from an incentive perspective. We show that when a manager has private information about future attainable revenues, the residual income performance measure based on historical cost can achieve optimal (second-best) incentives with regard to managerial effort as well as production and sales decisions. The LIFO (last-in--first-out) *inventory* flow rule is shown to be preferable to the FIFO (first-in--first-out) rule for the purpose of aligning incentives. Our analysis also finds support for the lower-of-cost-or-market *inventory-valuation* rule in situations where the manager receives new information after the initial contracting stage.

[6] Baldenius, Tim; Reichelstein, Stefan, "Incentives for Efficient Inventory Management" Management Science, Jul2005, Vol. 51, Issue 7, p1032-1045, 14p

1.3. OBJECTIVES OF THE STUDY:

- To study the method of valuation of inventory in various forms in Lucas-TVS.
- To study the material accounting system followed in the Organization.
- To study the inventory control procedures through various techniques as below:

1. Just In Time
2. ABC Analysis
3. VED Analysis
4. Inventory Turnover Ratio
5. Material Cost Reports.

1.4. STATEMENT OF THE PROBLEM:

In the study, efforts have been made to conduct a detailed analysis of inventory control and valuation functions in Lucas –TVS. For this purpose, detailed research has been conducted such as :

- Existing system of inventory control adopted by the company.
- New Inventory control technique applied to improve the efficiency of material management department and to reduce cost of inventory.
- Detail organization structure of stores control was studied. Inventories held in stores, their receiving, issuing procedures, techniques of stores control adopted by the company.

1.5. SCOPE OF THE STUDY:

The present study is confined to the analysis and interpretation of published financial statement. The technique employed for the purpose of the study is ABC Analysis, VED Analysis. The study is meant to throw the light on the inventory control and valuation of LUCAS-TVS Limited.

1.6. RESEARCH METHODOLOGY:

1.6.1. MODE OF COLLECTION:

Data is the recorded measure of phenomenon. The collection of data can be done through two ways:-

Primary Data:

Primary data refers to the fresh information and collected for the first time. Thus, these information are happen to be original in chapter. These information are gathered through the interaction.

Some of the primary data used in the collection of information in the study are:

1. Discussion with the finance, production and stores officers.
2. The store office was visited initially to study the basic functions and procedures adopted for the control of the materials.
3. Observation of the activities and operation under taken at the production, purchase and stores department .

Secondary Data:

On the other hand, the secondary data are those information which have already been collected by someone else and recorded. These information are those have already been passed the statistical process. The secondary information that are collected for the study are:-

1.6.2. RESEARCHE DESIGN:

The research problem having been formulated in clear in terms, the research will be required to prepare a research design i.e. research design i.e. researcher will have to state the conceptual structure with which research would be conducted. The preparation of such a design facilities research to be as efficient as possible yielding maximal information.
The function of research design is to provide for the collection of relevant evidence with minimal expenditure of the effort, time, and money.

1.6.3. Area of the study:

The study has been taken up in **LUCAS-TVS,** Chennai on the topic "Inventory Control and Valuation".

1.6.4. Sources of the data:

The data has been collected by observing the activity that takes places in the company and by reviewing various records maintained by the stores department.

1.6.5. Tools for Analysis:

The study has been analyzed using ABC analysis and VED analysis in order to categorises the various types of stock, to have a control over the flow of material.

1.6.6. Descriptive Research:

Descriptive research includes fact-finding enquiries of different kind. The major purpose of descriptive research is the description of the state of affairs, as it exist at the present. Descriptive research does not involve the formulation of the hypothesis rather it deals with an investigate study of an exiting situation.

In a descriptive study the first step is to specify the objective with sufficient precision to ensure that the data collected are relevant. If this is not done carefully, the

study may not provide the desired information. The research design adopted for the study was descriptive in nature. This descriptive research helps in anlysing the various records and so it enables to come to a conclusion of fixing up the stock levels.

1.7. LIMITATIONS:

The study is based on the secondary data. So the reliability of the data may not be accurate.

1.8. CHAPTER SCHEME:

The FIRST CHAPTER is introductory in nature. This chapter tells about the objectives and scope of the study and its limitations.

The SECOND CHAPTER conveys about the history of the LUCAS-TVS LTD., highlights the origin and development, objectives and production, financial and working of the company, development programmes and collaboration with foreign countries of the company.

The THIRD CHAPTER gives the macro and micro scenario with respect to the auto component industry.

The FOURTH CHAPTER presents the data analysis and interpretation.

The FIFTH CHAPTER gives summary of findings and concludes the study with relevant suggestions.

Chapter II
Organization Profile

CHAPTER - 2

ORGANISATION PROFILE

2.1. HISTORY OF THE ORGANISATION:

TVS Group was established in 1911 by T.V.Sundram Iyengar, one of the visionaries of the Indian industry. His ideas were years ahead of their times. Three years before World War I, when the automobile was still seen as some kind of intimidating "horse-less carriage", he had the vision to set up South India's first ever rural bus service and over the years, this transport company became the largest of its kind in the country, legendary for its punctuality and service. In fact, the rules and regulations laid down by him later became the blue print for the Motor Vehicles Act. The importance given by the founder to Trust, Value and Service - TVS, are the basic tenets of the TQM framework even today. T.V.Sundram Iyengar's philosophy of business reflected the kind of man he was - simple and stern. It was based rigidly on four concepts - Quality, Service, Reliability and a Sense of Ethics. The TVS Group is the largest manufacturer and distributor of automotive components in India, with a turnover in excess of 2.7 billion US dollars and a family of over 25,000 members.

The Group has a product range that includes auto electrical equipment, diesel fuel injection system, braking system, automotive wheels and axles, fasteners, powder metal components, radiator caps, two wheelers and computer peripherals, to mention a few. TVS is the market leader in every one of these fields and is backed by five service and distribution companies with branches and dealer network across the length and breadth of the country.

The TVS Group has had a steady growth path, and currently comprises of 30 companies.

MISSION

To be a respected supplier in the global auto industry, by developing innovative products and solutions of value to customers through creative skill and involvement of employees, suppliers and dealers and use of contemporary technology.

VISION

- **To be the Supplier of Choice of all leading vehicle manufacturers in India.**
- **To be a recognized Original Equipment Supplier in Asia Pacific and Middle East markets**
- **To achieve global recognition for innovative approach to products and solutions.**
- **And, by 2010, to sell Rs. 2000 Crores (USD 430 million) of products and solutions.**

Lucas-TVS was established in 1961 as a joint venture between Lucas Industries, UK and the TVS group. It is a leading manufacturer of auto electrical products and diesel fuel injection equipment in India. It reaches out to all segments of the automotive industry such as passenger cars, commercial vehicles, tractors, jeeps, two wheelers and off-highway vehicles, as well as for stationary and marine applications. Lucas-TVS was for sometime a part of Varity, the Anglo American company formed by the merger of Lucas Industries of UK and Varity Corporation of US. Now Lucas-TVS is fully owned by the TVS Group.

Lucas-TVS has grown progressively along with the automotive industry in the country. The company's policies have recognized the need to respond to changing needs, helping to propel it to a position of leadership.

The milestones in the journey of Lucas-TVS as it has emerged today are listed.

- Lucas-TVS today has emerged as a total automobile electrical system supplier, operating from four plants located at Chennai, Pondicherry, Pune, and Rewari in Haryana.

- The electrical division of Lucas-TVS manufactures a complete range of auto electrical products - namely starters, alternators, wipers, and distributors, making it a "one-stop shop" for the automotive industry.
- Currently the company produces over 2.5 million starters and alternators per annum, and has plans to double the volume.
- The Delphi-TVS Fuel Injection Equipment (FIE) division makes state-of-the-art rotary pumps, thus providing a competitive supply option for this vital component.

2.2. LUCAS-TVS GROUP COMPANIES:

- Delphi TVS.
- Lucas Indian Service.
- Indian Nippon Electricals Ltd.
- India Japan Lighting.

Delphi TVS is a joint venture between Delphi Automotive Systems, USA and T V Sundram Iyengar and Sons, India manufacturing diesel fuel equipment for passenger and commercial vehicles. Lucas Indian Service was established in 1930 as a specialist organization in sales and service of "Lucas-TVS" auto Electricals and "Delphi-TVS" diesel fuel injection equipment. LIS also manufactures automotive products like ignition coils and solenoid switches in Chennai, marketed under the brand name Lucas. INEL is situated in the industrial town of Hosur. Established in 1985 as a manufacturer of electric ignition systems for two wheelers and portable gensets, INEL is a joint venture of Lucas Indian Service, India and Kokusan Denki Co. Ltd., Japan. India Japan Lighting was incorporated in December 1996. It is a joint venture between Lucas-TVS Limited, Chennai and Koito Manufacturing Company Limited, Japan. IJL is a manufacturer of automotive lighting equipment.

2.3. OUALITY POLICY:

At Lucas-TVS, quality is built into the system, and thereby into the product, through a comprehensive understanding of changing customer needs. Our quality assurance measures stand on the foundation of a solid belief that quality begins and ends with the customer. We have adopted a prevention-oriented quality policy, thus departing from traditional ideas of quality control. Hence it is actively practiced individually and as a team, in all aspects. It is maintained through an effective quality control system and the Small Group Activity, which has played a significant part in continuously improving the levels of quality. The various quality assurance methods employed in the company are Total Quality Management, Statistical Process Control, TAC Management System, Total Productive Maintenance, Product Grading and Producer Control.

Supporting all these activities is an entire array of sophisticated measuring equipment like the Zeiss 3 co-ordinate machine. Lucas-TVS has obtained ISO 9001 certification in 1993, QS 9000 certification in 1997 and TS16949 Certification in 2003 from BVQI for quality management in design, development, production and servicing of automotive electrical equipment. The company operates on a self-certification basis with most customers.

Lucas-TVS is a pioneer in manufacturing transformation in the Indian industry (since 1985-90) through a combination of methodology and technology implemented through a series of 'Change Sessions' done through the people and by the employees. In simple terms the Change Programs were focused on: Process Lay-out to Product Lay-out (Cellular concept) - Module system of Shop floor (Customer Centric). Decentralized Organization structure with autonomy to operation / production teams. Nagare Cells in manufacturing areas with auto cycle machines controlling cycle time. And, Single Piece Flow cells in Assembly modules with Large Cells in place (Islands integrated).

Other focal points of the Change programs were: Lead time reduction features like **QCT** (Quick Change Tooling),**Chaku-Chaku** (auto unloading), **Single Piece charging system** (material feeding) dedicated containers, **pull system (2 bin** - C Class for small parts and **Kanban** for A and B parts), **e-Kanban** (communication to suppliers to dispatch)

are in place in all the modules. Quality initiatives like online maker control of Quality, **Cpk** improvements, **SPC**, **Measured Quality**, **Poka-Yoke** (Fool proofing), **SOP** (Standard Operating Procedure), enable to retain or improve Quality performance. Productivity is the combined result of Methodology and Low Cost Automation led by **KMT** (Kaizen Module Team) effort of employees.

We are committed to achieving greater levels of customer satisfaction through constant improvement to the product quality and service, by improving the effectiveness of the Quality Management System. Our endeavor is to increase customer trust and confidence in the label **"Made by Lucas-TVS"**. As a responsible corporate entity, we are committed to protection, preservation and improvement of the environment by continually orienting our activities, products and processes and services so as to: Institutionalize adoption of environment friendly concept while designing our products and processes Conserve resources like copper, energy, varnish, oils, compressed air, and water by applying the concept of **3R** (reduce, reuse and recycle). Minimize generation of inevitable wastes like - waste oil, used coolant, and the like. Improve working environment through good house keeping, taking pro active measures for the health and safety of our employee and development of our greenery. Comply with all relevant legal and other requirements. Spread awareness about the importance of the environmental protection throughout the organization as well as among our business associates such as suppliers, dealers and customers.

2.4. OTHER INFORMATIONS:

We are equipped with state-of-the-art facilities for tool making to support manufacturing modules - broadly grouped as new tool teams, services teams and common module. Tool planning decides upstream with respect to make / buy decisions, process flow etc. Wire cut EDM, Jig Grinding, Jig Boring, Spark Erosion etc., are the key machines supporting common modules in Tool room. Tool makers are from reputed institutes in India.

Even with revolutionary changes in model and design, Lucas-TVS products continue to fit the needs of the automotive industry. Three out of four vehicles in the Indian auto industry continue to fit Lucas TVS products. The secret lies in ability of Lucas-TVS to respond to changing needs swiftly, effectively and consistently. For several years now, Lucas-TVS has been in the forefront of technological development. The company's in-house engineering centre has been the key driving force in the design and development of new products. Equipped with the finest facilities and governed by the latest techniques, it has helped engineer many a breakthrough in technology and process. More over it has brought the company recognition from the Department of Science and Technology, Government of India

Lucas-TVS has invested extensively in laboratories, machine tools, testing and measuring equipment, prototype shop and CAD. A team of highly qualified scientists, engineers and technicians keep in constant touch with customers and new technological development and raise the technology levels of our products through innovative approach. This explains why 50% of the current turnover comes from new products developed by Lucas-TVS. It also answers the query why key customers continue to rely on Lucas-TVS for the development of products to meet the needs of their new generation vehicles. In addition to proven in-house capabilities, Lucas-TVS has strong alliance with leading International Manufacturers. This has further enabled the company to provide its customers products incorporating the most contemporary technology.

Lucas-TVS has been the recipient of numerous awards from different agencies in recognition of outstanding achievement in various fields.

Our policy as far as information technology is concerned is to leverage IT and: Improve the efficiency and effectiveness of key business processes. Build a flexible, scalable, and integrated real-time information architecture in a cost efficient manner. And use sustainable hardware and software technologies compatible with the needs of our customers.

The key business processes and systems that have been computerized at Lucas-TVS are: Customer Order Processing, Purchase Order Processing, Material Accounting and

Inventory, Costing, Payroll, Employee Welfare System, Financial Accounting System, Excise and Taxation related System, Quality Information System and Warranty, Engineering Information System, Attendance Recording System, Equipment Maintenance System, Gauge Information System, and Training Information System. These systems have been developed in-house. Critical applications are server based, while some single user systems are PC based.

Lucas-TVS products are marketed and sold to customers. Lucas-TVS products and services reach customers, vehicle manufacturers as well as vehicle users, through a network of 72 branches, run by its subsidiaries Lucas Indian Service, Sundaram Motors, and India Motor Parts and Accessories. These companies, between them, have the backing of over 700 sales and service outlets which dot the entire country. They not only provide easy access to an entire range of spares, but also offer warranty and post-warranty service. Besides, they conduct regular training programmes and service campaigns for dealers, their staff, fleet operators, and transport corporation and vehicle users. The extensive Lucas network available worldwide enables Lucas-TVS to reach its overseas customers

A very unique practice in Lucas-TVS wherein employees voluntarily organize themselves as teams and focus on 5S in shop floor, 5S in office, TPM, Supplies, Safety, Energy and Environmental issues. They participate in these activities during their off time (holidays), select the area pertaining to them and implement 5S, TPM, Safety and Environment. Quality Improvement Team (QIT) is a cross-functional team activity involving engineers and officers. The team takes up problems of higher importance while also focusing on customer requirements and providing effective improvements. The department head reviews the progress of the team.

2.5. PRODUCTS:

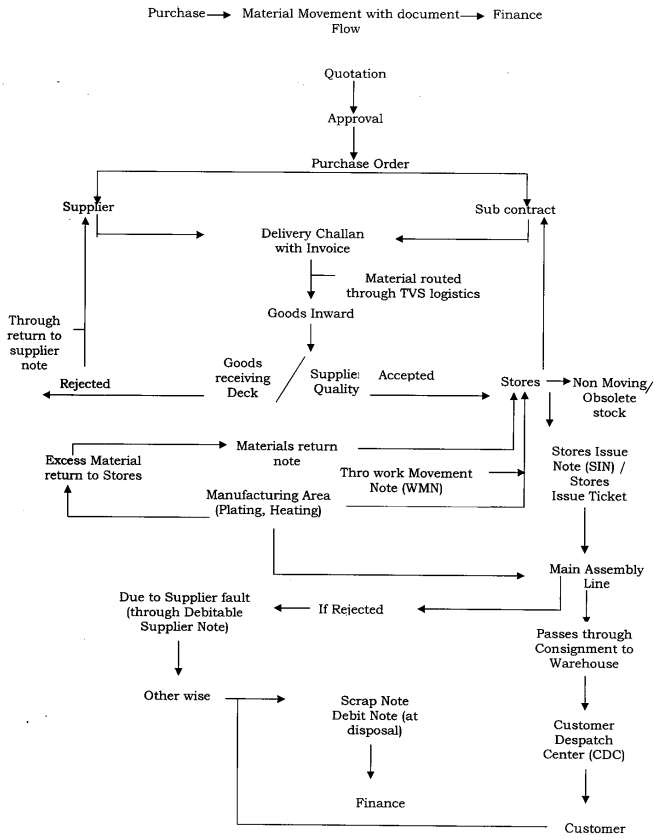
Lucas-TVS manufacture the most comprehensive range of Auto Electrical Components in the country. A range which continues to set standards in the industry. The products are designed to meet the demands of vehicle manufacturers both in India and worldwide. With the emission standards in India becoming increasingly stringent, Lucas-TVS has ensured that each of its products is manufactured to meet global standards.

Lucas-TVS products ranges in the Indian market are:

- Starters
- Alternators
- Distributors
- Wiper motor,
- Fan motor,
- Blower motor,
- Small motor,
- Distributors
- Ignition coils
- Relay.

CHART-2.1

CHART NO 1 SHOWING MATERIAL FLOW OF LUCAS-TVS LTD



Chapter III
Macro Micro Analysis

This flow chart explains the flow of materials inside the factory starting from preparing purchase order up to delivering the finished goods to the customers. This chart shows how materials undergo various processes i.e. the process of how raw materials or a component gets converted into finished goods.

2.6. MATERIAL FLOW PROCESS:

Firstly a **Purchase order** is prepared by the purchasing department to the supplier or to sub contractor to supply a specified quantity of raw materials or components & acceptance of purchase order is obtained from the supplier. The **Local supplier's** or **Local sub-contractors** in turn prepares **Delivery Chellan** & deliver the goods to the TVS logistics & through TVS logistics goods is brought to the factory.

Goods inward (GI) is raised & accepted, then the goods are brought to goods receiving deck for quality checking .After checking if the quality is not ok, a **Return to suppliers note (RSN)** is prepared & the goods is returned back to the supplier. If it is ok the goods is sent to **RM/Components stores & Stores Issue Notice (SIN) / Stores Issue Ticket (SIT)** is prepared.

If the component manufacture involves subcontracting, the material is sent to subcontractor through **Sub-contract Delivery Note.** Otherwise sent to the concerned line.

The component from various manufacturing lines are sent to the final assembly, where the final product is assembled and sent to warehouse through a **Consignment to Warehouse** is made .Then goods which are ready for delivery is sent to **Customer Delivery Center** & an **Invoice Cum Delivery Chellan** is finally prepared and finally the goods are delivered to the **Customers**.

CHAPTER - 3

MACRO-MICRO ANALYSIS

The Macro & Micro analysis of Auto parts industries in economic growth, competitive strength, career growth, opportunities etc in domestic and foreign countries is given below.

3.1. Macro And Micro Analysis:

The auto parts industry directly influences the economies of the United States and the world. In a typical year, The U.S. auto parts industry generates around 17 percent of manufacturers' shipments of durable goods (products designed to last at least three years). Auto parts production consumes large amounts of iron, steel, aluminum, and natural rubber. The automobile industry also consumes more copper, glass, zinc, leather, plastic, lead, and platinum than any other U.S. industry. In 1997, U.S. retail sales of auto parts exceeded $284 billion, 3.5 percent of the nation's gross domestic product.

The U.S. auto parts industry has experienced strong job growth. In 1996, the auto parts industry accounted for 9 percent of all U.S. jobs producing durable goods, the highest level since 1979. Auto parts production workers earned compensation totaling $13.4 billion—a nearly 50 percent increase since 1990—and equal to 14 percent of the total paid by all manufacturers of durable goods. Sales of U.S. auto parts to Americans are expected to remain near the same level in the future, with about 1 to 2 percent growth per year, while foreign markets are expanding at rates that are two, three, and even ten times faster. Because exports will be essential to expanding the auto and auto parts industries, U.S. trade officials have negotiated trade agreements such as the Memorandum of Understanding with Korea (1993), the North American Free Trade Agreement (NAFTA, 1994), and the U.S. –Japan Automotive Framework Agreement (1995). These and other agreements have increased auto parts and other exports to Japan, Mexico, and Korea many times over.

In 1994, the United States successfully promoted the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), which helped American auto export potential because it improved access to both major and developing markets. These

initiatives have helped the U.S. Automotive industry achieves the highest level of exports on record. Between 1993 and 1996, Shipments abroad of motor vehicle increased 36 percent, and U.S. automotive parts exports increased 28 percent. The value of motor vehicle and parts exports reached $47.4 billion in 1996, up 7 percent from the previous year.

3.1.2. Future Macro Economic Drivers:

- High GDP growth rate
- India's huge geographic spread –Mass Transport System
- Increasing Road Development, Golden Quadrilateral
- Increasing disposable income with the service / rural agriculture sectors
- Cheap & easy financing schemes
- Replacement of aging passenger and commercial vehicles
- Graduating from motorcycles to passenger vehicles
- Growing Concept of Second Vehicle in Urban Area

3.1.3. Standing tall:

The auto component sector is on a growth trajectory as is evident by the fact that auto components have been designated as a "Thrust Sector" by the Government of India under the EXIM Policy. The Indian Department of Commerce is now set to aggressively promote export of auto components through a specific sectoral strategy. The size of the global auto component industry is $1.2 trillion with most of it located in high cost countries. Global purchases of components by international vehicle manufacturers are currently estimated to be $45 billion. However, the role of outsourcing is constantly

increasing. Furthermore, the problem of high rejection rates which plagued the domestic auto ancillary industry has been overcome. This is reflected in the number of overseas deals concluded by the domestic industry amidst stiff competition from other Asian countries. The government has extended various fiscal incentives and policy measures which too has helped the industry.

3.1.4. Trends of Automobile Components:

Critically, outsourcing of automobile components that have relatively high engineering and design content from suppliers in low cost countries like India, is rapidly gaining momentum. It is estimated that in the next 10 years the auto components industry will reach $33-40 billion. Going by the current trends in the domestic automotive industry and as stated above, it is expected that the indigenous demand for auto components will also reach $13-15 billion in the next 10 years and about USD 20-25 billion would be exported. To meet the combined demand from domestic and international customers the industry will have to make significant incremental investment.

Hence, the Indian auto component industry is poised to achieve a prominent position in the global market and will in all probability be a major driver of growth and employment in the domestic economy. Considering the recent figures, whereby domestic demand is increasing by about 15 per cent over the previous year and exports by over 25 per cent, the above estimates, while undoubtedly challenging, appear achievable.

To, conclude, the auto-components sector in India appears well revved up to speed on from here on the success-track.

3.1.5. Opportunity to source from India:

- There is a growing demand for auto components.
- Total production '2004: Approx. $ 6.73 billion
- Exports '2004: Approx. $1.4 billion. (CAGR of 19% -last 6 yrs)
- In the next 10 years the auto components industry will reach $33-40 Billion. (Estimate)
- Indigenous Demand : $13-15 billion
- Export Demand : $20-25 billion

Chapter IV
Data Analysis & Interpretations

CHAPTER – 4

DATA ANALYSIS AND INTERPRETATION

4.1. JUST IN TIME:

Just in time philosophy is dedicated to elimination of waste. In the context of JIT, waste is anything that does not add value. In ideal JIT system throughput time is exactly equal its processing time. Throughput time is the interval between the first stage of production and the point at which the finished product comes out of production line. This is unattainable but it sets target by which process can be measured. When JIT philosophy is implemented throughput time is minimized. Inventory holding costs are almost eliminated and large gains are realized by improvement of quality and productivity. Throughput time is the aggregate of processing time, inspection time and waiting. As per Japanese manufacturers the equation of throughput time is as follows:

Throughput Time=Added Value Time + Non Added Value Time

Value Added Time is the time during which is actually performed on the product. The non-value added time represents the time in waiting , being inspected. The non-value added time can be considered as waste time since no value is added to consumer when product is not being processed. The time has been wasted by inefficiencies in manufacturing process. In JIT inventory is viewed as a form of production inefficiency.

4.1.2Just in Time Purchasing:

Just in time purchasing in purchase of materials &supplies in such a manner that delivery immediately precedes the demand of use. This will ensure that stocks are low as possible. JIT purchasing is implemented by developing closer relationship with supplier for more frequent deliveries of smaller quantities of materials so that each deliver is just sufficient to meet immediate production requirements. Thus are stock are cut to minimum.

4.1.3 Just in Time Production:

JIT is a system in which each component on a production line is produced immediately as needed by the next step in the production line. It has the following features

- Production line is run on a demand pull basis.
- Emphasis is placed on minimizing the throughput time of each unit.
- The production line is stopped if parts are absent or defective work is discovered.
- JIT production leads to a total simplification of production process so that only essential activities are conducted.

4.1.4 Benefits of Just-In-Time inventory:

- The right quantities are purchased or produced at the right time.
- The cost effective production or operation of correct services, as and when required.
- The achievement of higher – quantity standards and better levels of customer service both to internal and external customers.
- The minimization of inventory work-in-progress and work.
- The systematic identification of operation problem and the development of, technology based tools for correcting identified problems.
- The production of goods meet exactly the needs of the customer, as per demand.

INTERPRETATION:

In Lucas-TVS, Two bin system of inventory for small items is followed where in there will be two trays kept at the shopfloor with designated quantity, the moment one tray becomes empty, that needs to be replaced by another tray with designated stock. This is enabled by system control whereby the supplier has access to Lucas-TVS schedules based on which he makes the supply. There is also another system in which the buyer swipes the

card at Lucas-TVS and the schedule is released to supplier based on which he makes the supply in no time.

Items covered under TWO BIN System:

1. Washer
2. Steel Bolt
3. Screw
4. Bolt
5. Nut
6. Pressure pad
7. Spring clip
8. Con & Bush Assembly
9. Felt Washer
10. Ferrule
11. Lable
12. Switch Unit
13. Final Gear Assembly
14. Bearing Bush
15. Magnet.

4.2. PARETO ANALYSIS/ ABC ANALYSIS:

Pareto analysis (sometimes referred to as the 80/20 rule and as ABC analysis) is a method of classifying items, events, or activities according to their relative importance. It is frequently used in inventory management where it is used to classify stock items into groups based on the total annual expenditure for, or total stock taking cost of, each item. Organization can concentrate more detailed attention on the high value/important items. Pareto analysis is used to arrive at this prioritization.

Taking inventory as an example , the first step in the analysis is to identify those criteria , which make a significant level of control important for any item . Two possible factors are the usage rate for an item and its unit value.

Close control is more important for fast moving items with a high unit value. Conversely for slow moving items, low unit value items the cost of stock control system may be gained and simple methods of control should be substituted.

The steps in doing the ABC analysis are:

a) Determining annual quantity usage of each item.
b) Multiply the annual quantity usage of each item by the cost of the item to obtain the total annual usage value of each item.
c) Add the total usage value of all items to get the aggregate annual dollar inventory expenditure.
d) List the items in rank order by percentage of aggregate usage.
e) Review annual usage distribution & classify items as A, B or C.

Advantages of ABC Analysis:

- A strict control is exercised on the items, which represent a high percentage of the material costs.
- Investment in inventory is reduces to the minimum possible level.
- Storage cost is reduced as a reasonable quantity of material which account for high percentage of value of consumption will be maintained in the stores.
- With the introduction of the ABC analysis the management time is saved because attention is required to be paid only to some of the items rather than on all items.
- It is the most effective and economical method as it is based on selective approach.
- This method produces rewarding results; at the same time it involves minimum control.

TABLE – 4.2.1

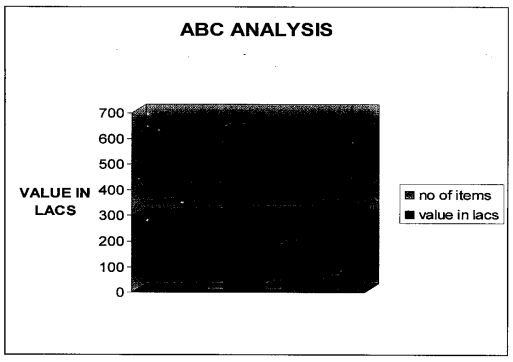
TABLE SHOWING THE ANNUAL USAGE VALUE OF WIPER MOTOR

SNO	DESCRIPTION	ANNUAL USAGE(in lakhs)	% OF USAGE
1	Spindle unit assembly(1)	65.50	7.52
2	Brush, plate, plug, switch, cover, assembly	35.00	4.01
3	Cover assembly	94.54	10.83
4	Spindle unit assembly(2)	42.50	4.87
5	Gear boxing	37.07	4.25
6	Mounting Bracket assembly	80.25	9.19
7	Wiping System	142.01	16.26
8	Assembly bracket	32.23	3.70
9	Wheel Box Assembly	25.36	2.91
10	Link End Assembly	21.50	2.46
11	Limit Switch	16.00	1.83
12	Shaft Link & Pin assembly	17.50	2.00
13	Bundy Tube	12.50	1.43
14	Brush Plate	18.00	2.06
15	Brush Plate Cover	25.52	2.92
16	Primary Tube assembly	14.89	0.00
17	Gear box assembly	23.90	2.74
18	Ball bearing	13.80	1.58
19	Thermal cut	14.52	1.67
20	Shaft assembly	14.28	1.64
21	Brush Plating assembly	24.85	2.85
22	Rear Mounting Bracket	16.16	1.85

23	Washer	0.41	0.04
24	Steel Ball	0.63	0.07
25	Screw	0.31	0.35
26	Bolt	0.99	0.11
27	Nut	0.48	0.05
28	Pressure Pad	0.18	0.02
29	Spring clip	0.16	0.01
30	Con & Bush assembly	0.57	0.07
31	Felt Washer	0.12	0.013
32	Ferrule	1.96	0.22
33	Label	0.65	0.007
34	Switch unit	0.64	0.073
35	Final gear assembly	3.40	0.39
36	Bearing Bush	3.11	0.35
37	Magnet	4.51	0.516
38	Pole	5.90	0.675
39	Commutator	1.56	0.17
40	Primary Link assembly	2.72	0.311
41	Carbon Brush	1.10	0.13
42	Rotatory Link	4.80	0.54
43	Bearing Pin	2.62	0.30
44	Rubber Pad	1.43	0.16
45	Armature Insul	1.21	0.14
46	Bundy Tube with Nut	5.00	0.57
47	Crank Pin	1.22	0.13

48	Crank plate	2.61	0.30
49	Spindle	6.14	0.73
50	Needle bearing	6.09	0.69
51	Plug Moulding	3.99	0.46
52	Nozzle Holder	1.09	0.12
53	Self tap Screw	1.00	0.11
54	Screw cover plate	0.16	0.02
55	Lock nut	0.48	0.05
56	Spring Washer	0.535	0.06
57	Circlip	0.635	0.07
58	Rivet	0.4625	0.05
59	Seal	0.94	0.11
60	Protective Cover	0.605	0.07
61	Breather plug	0.50	0.05
62	Thrust Screw	0.975	0.11
63	Gasket	1.685	0.19
64	Trust Pad	0.265	0.03
65	Yoke	32.5892	1.87
66	Bundy tube with nut	5.00	0.57
	TOTAL	877.00	100.00

CHART-4.2.1



UNDER ABC ANALYSIS

TABLE-4.2.2

TABLE SHOWING A CLASS ITEMS

S NO	DESCRIPTION	VALUE (In lakhs)	%Age
1	Spindle unit assembly (1)	65.64	7.52
2	Brush, Plate, Plug, switch assembly	35.00	4.01
3	Cover Assembly K 200 M	95.54	10.83
4	Spindle Unit Assembly	42.50	4.87
5	Gear Boxing (Hyundai)	37.07	4.25
6	Mounting bracket assembly	80.25	9.19
7	Wiping system (Indica)	142.01	16.26
8	Assembly bracket	32.23	3.70
9	Wheel box Assembly	25.36	2.91
10	Brush Plate Assembly	25.52	2.92
11	Gear Box Assembly	23.90	2.74
12	Brush Plating Assembly	24.85	2.85
	TOTAL	628.77	72.00

TABLE-4.2.3

TABLE SHOWING B CLASS ITEMS

SNO	DESCRIPTION	VALUE (in lakhs)	Percentage
1	Link End Assembly	21.50	2.46
2	Limit Switch	16.00	1.83
3	Shaft Link& Pin Assembly	17.50	2.00
4	Bundy Tube AMB	12.50	1.43
5	Brush Plate	18.00	2.06
6	Primary Tube Assembly	14.89	1.71
7	Ball Bearing	13.80	1.58
8	Thermal Cut	14.52	1.67
9	Shaft Link Pin Assembly	14.28	1.64
10	Yoke	16.29	1.87
11	Rear Mounting bracket	16.16	1.85
	TOTAL	**175.00**	**20.00**

TABLE-4.2.4

TABLE SHOWING C CLASS ITEMS

SNO	DESCRIPTION	VALUE (inlakhs)	Percentage
1	Washer	0.14	0.04
2	Steel Bolt	o.63	0.07
3	Screw	0.31	0.35
4	Bolt	0.99	0.11
5	Nut	0.48	0.05
6	Pressure Pad	0.18	0.02
7	Spring Clip	0.16	0.01
8	Con& Bush Assembly	0.57	0.07
9	Felt Washer	0.12	0.013
10	Ferrule	1.96	0.22
11	Label	0.0651	0.007
12	Switch Unit	0.64	0.073
13	Final Gear Assembly	3.40	0.39
14	Bearing Bush	3.11	0.35
15	Magnet	4.51	0.516
16	Pole	5.90	0.675
17	Communtator	1.56	0.17
18	Primary Link Assembly	2.72	0.311
19	Carbon Brush	1.10	0.13
20	Rotatory Link	4.80	0.54
21	Bearing Pin	2.62	0.30
22	Rubber Pad	1.43	0.16
23	Armature Insul	1.21	0.14
24	Bundy tube with Nut	5.00	0.57

25	Crank Pin	1.22	0.13
26	Crank Plate	2.61	0.30
27	Spindle	6.41	0.73
28	Needle Bearing	6.09	0.69
29	Plug Moulding	3.99	0.46
30	Nozzel Holder	1.09	0.12
31	Self Tap Screw	1.00	0.11
32	Lock Nut	0.48	0.02
33	Spring Washer	0.535	0.05
34	Circlip	0.635	0.06
35	Rivet	0.4625	0.07
36	Seal	0.94	0.05
37	Protective Cover	0.605	0.11
38	Breather Plug	0.50	0.07
39	Thrust Screw	0.975	0.05
40	Gasket	1.685	0.11
41	Thrust Pad	0.265	0.19
42	Screw Cover Plate	0.33	0.03
	TOTAL	**73.52**	**8.00**

INTERPRETATION:

The above raw material has been categorized as "A" class material and should be kept under rigorous control as the Investment in the inventory constitute more than 70% value of the total investment made in raw material inventory.

The company should direct its most of the inventory control efforts to the items included in the category.

Although the number of items which constitutes "B" & "C" category is not fairly large investment in these category is less than 30% and which warrant the minimum attention.

During the discussion and clarification with the executives of the company controlling production and stores they explained that the raw material which were grouped under "B" & "C" category even though critical to the production process were available easily.

While making the analysis utmost care was taken not to include critical raw material essential for production process which is not available easily in the market even though it involves small investment in "B" & "C" category.

4.3. VED ANALYSIS:

VED analysis is of nature of ABC analysis though it is generally used in case of spare parts. The parts are classified into three categories Vital (V), Essential (E), Desirable (D), depending upon their requirements.

Vital items are kept in stock in sufficient quantity to ensure uninterrupted operation of the plant. They are vital because their non-availability at the required time may cause stoppage of production.

Essential items are also kept in stock in adequate quantity. However the firm may take a reasonable risk as regards these types of items.

Desirable items are those which are readily available in the market and hence the firm may not keep these items in stock except to provide for the lead time.

VED classification can be done in consultation with the department because they know their items better. For this study an extensive consultation has been made with all the departments and according to their feedback the items are classified as Vital, Essential, Desirable categories.

VED ANALYSIS OF WIPER COMPONENTS

TABLE-4.3.1

TABLE SHOWING VITAL ITEMS OF A CATEGORY

SNO	Description	Annual usage(in lakhs)	% of Usage
1	Brush, plate, switch, plug assembly	35	4.01
2	Spindle assembly(1)	42.5	4.87
3	Gear boxing	37.07	4.25
4	Gear box assembly	23.09	2.74
5	Brush plating assembly	24.85	2.85
6	Spindle Unit Assy (1)	65.64	7.52
	TOTAL	**228.86**	**26.29**

TABLE-4.3.2

TABLE SHOWING VITAL ITEMS OF B CATOGERY

SNO	Description	Annual usage(in lakes)	% of usage
1	Shaft Link& Pin assembly	14.28	1.64
2	Ball bearing	13.80	1.58
3	Shaft Pin assembly	17.5	2.00
	TOTAL	**45.58**	**5.22**

TABLE-4.3.3

TABLE SHOWING VITAL ITEMS OF C CATEGORY

SNO	Description	Annual usage(in lakes)	% of usage
1	Crank Pin	1.22	0.13
2	Pole	5.90	0.675
3	Commentator	1.56	0.17
4	Spindle	6.41	0.73
5	Needle Bearing	6.09	0.69
6	Magnet	4.51	0.516
7	Spring Clip	0.61	0.01
8	Bearing Pin	2.62	0.30
9	Rivet	0.4625	0.05
10	Primary Link Assy	2.72	0.311
	TOTAL	**32.10**	**3.582**

TABLE-4.3.4

TABLE SHOWING ESSENTIAL ITEMS OF A CATEGORY

SNO	Description	Annual usage(in lakes)	% of usage
1	Cover assemblyK-200M	95.54	10.83
2	Wheel Box Assembly	25.36	2.91
3	Assembly bracket	**32.23**	**3.70**
	TOTAL	**153.13**	**17.44**

TABLE-4.3.5

TABLE SHOWING ESSENTIAL ITEMS OF B CATEGORY

SNO	Description	Annual usage(in lakhs)	% of usage
1	Bundy Tube AMB	12.5	1.43
2	Brush Plate	18	2.00
3	Primary tube assembly	14.89	1.71
	TOTAL	**45.39**	**5.2**

TABLE-4.3.6

TABLE SHOWING ESSENTIAL ITEMS OF C CATEGORY

SNO	Description	Annual usage(in lakhs)	% of usage
1	Switch unit	0.64	0.073
2	Final Gear Assembly	3.4	0.39
3	Circlip	0.635	0.07
4	Lock Nut	0.48	0.05
5	Self Tap Screw	1.00	0.11
6	Plug Moulding	3.99	0.46
7	Screw	0.31	0.35
8	Bolts	0.99	0.11
9	Nut	0.48	0.05
	TOTAL	**11.925**	**1.663**

TABLE-4.3.7

TABLE SHOWING DESIRABLE ITEMS OF A CATEGORY

SNO	Description	Annual usage(in lakhs)	% of usage
1	Mounting bracket assembly	80.25	9.19
2	Wiping system	142.01	16.26
3	Brush Plate assembly	25.52	2.92
	TOTAL	**247.78**	**28.37**

TABLE-4.3.8

TABLE SHOWING DESIRABLE ITEMS OF B CATEGORY

SNO	Description	Annual usage(in lakhs)	% of usage
1	Link End Assembly	21.5	2.46
2	Limit Switch	16	1.83
3	Yoke	16.29	1.87
4	Thermal cut	14.52	1.67
5	Rear mounting bracket	16.16	1.85
	TOTAL	**74.22**	**7.83**

TABLE-4.3.9

TABLE SHOWING DESIRABLE ITEMS OF C CATEGORY

SNO	Description	Annual usage(in lakhs)	% of usage
1	Washer	0.41	0.04
2	Steel Bolt	0.63	0.07
3	Pressure Pad	0.18	0.02
4	Con & Bush Assembly	0.57	0.07
5	Felt Wash	0.12	0.013
6	Ferrule	1.96	0.22
7	Label	0.0651	0.007
8	Bearing Bush	3.11	0.35
9	Carbon Bush	1.10	0.13
10	Rotatory Link	4.8	0.54
11	RubberPad	1.43	0.16
12	Armature Link	1.21	0.14
13	Crank Plan	2.61	0.30
14	Nozzel Holder	1.09	0.12
15	Screw Cover Plate	0.16	0.02
16	Protective Cover	0.605	0.07
17	Breather Plug	0.5	0.05
18	Thrust Screw	0.975	0.11
19	Gasket	1.685	0.19
20	Thrust Pad	0.265	0.03
21	Spring Washer	0.535	0.06
22	Seal	0.94	0.11
	TOTAL	**24.95**	**2.82**

TABLE-4.3.10

TABLE SHOWING ABC/VED ANALYSIS OF WIPER COMPONENTS

	A			B			C			TOTAL		
	Annual Usage (lakhs)	% of usage	NO	Annual Usage (lakhs)	% of usage	NO	Annual Usage (lakhs)	% of usage	NO	Annual Usage (lakhs)	% of usage	NO
V	228.86	26.29	6	45.58	5.22	3	32.10	3.58	10	306.24	35.09	19
E	153.13	17.44	3	45.39	5.2	4	24.93	2.23	10	223.45	24.87	17
D	247.78	28.37	3	74.22	7.83	5	24.95	2.82	22	347.2	39.02	30
TOTAL	629.77	72.1	12	165.19	18.25	12	81.98	8.63	42	877	100	66

INTERPRETATION:

About 70.0% of annual expenditure was on 12 items, 20.0% on 12 items and 10.0% on 42 items. Items belonging to A category should be controlled carefully and ordered frequently. The VED analysis showed that 35.09% (19 items) are vital items, 24.87% (17 items) are essential items, and 39.02% (30 items) are desirable items.

In Lucas TVS, **Weighted Average Method** is followed in valuing the material issues.

4.4. WEIGHTED AVERAGE PRICE:

"A Price which is calculated by dividing the total cost of materials by the total quantity of materials in that stock." The rate of closing stock and the rate at which the materials are issued to the shopfloor are one and the same.

Advantages of WAM:

1. This method is rational, systematic and not subject to manipulation.
2. It recovers the cost of materials from production.
3. It maintains the issue prices as near to the market price as possible.
4. It eliminates the necessity for adjustments in stock valuation.

In periods of heavy fluctuations in the price of materials, the average price method give better results because it tends to smooth out fluctuations in prices by taking the average of prices by taking the average of prices of various lots in stock

TABLE-4.4.1

TABLE SHOWING STORES LEDGER FOR THE 2007(WAM)

Doc	Doc No	Receipts details			Issue details		C/B details	
		Rate (in Rs/unit)	Qty	Value (in Rs)	Qty	Value	Qty	Value
O/B		46.931					600	28158.65
S01	D49096	36.9100	450	16,609.50				
S01	D49157	34.0300	600	20418.00				
S01	D49176	34.8100	300	10443.00				
S01	D49194	34.8100	600	20886.00				
S22	746306	37.8491			900	34064.17		
S22	746307	37.8491			750	28386.81		
S22	752163	34.8491			450	17032.09		
S22	752164	34.8491			450	17032.09		
C/B		34.8491	1950	68356.50	2550	96515.15	0	0.00
Part closing balance		34.8491						0.00

4.5. MATERIALS (INVENTORY) COST REPORTS:

The objective of materials cost reporting is to help the management in exercising effective material control and taking appropriate decisions. Material cost reports serve as means of communications usually in the written form of facts relating to materials which should be brought to the attention of the various levels of management who can use them to take suitable action for the purpose of material control. Proper design of materials cost reports is essential to achieve these purposes of material control.

Following are the material cost and control reports in Lucas TVS

1. 3% variation report
2. 5% variation report
3. Product wise primecost and sales summary
4. Material cost Vs Selling price graphs
5. Inventory Reports

TABLE-4.5.1

TABLE SHOWING PRIME COST 3% VARIATION REPORT LISTING FOR THE MONTH JUNE, 2007 OF LUCAS-TVS LTD

S.no	Description	Previous month rate	Current month rate	Difference (Rs./ unit)	Difference (in %)
1.	Seal	110.40	133.30	22.90	20.74
2.	Spindle Assy	532.45	822.10	289.64	54.69
3.	Gear box Assy	4990.73	4813.36	-177.37	-3.55
4.	Rotary link & pin Assy	21.81	19.66	-2.14	-9.82
5.	Gear box & BRG Assy	4999.69	4821.26	-178.44	-3.57
6.	Spindle & Bush Assy	2985.53	3180.16	194.63	6.52
7.	Armature Assy	9354.54	9855.77	321.23	3.37
8.	Yoke & BRG Assy	5153.32	4969.32	-184.00	-3.57
9.	Mounting Bracket Assy	2027.84	1727.42	-300.43	-14.81
10.	Crank plate & pin Assy	853.82	781.24	-72.58	-8.50
11.	Yoke & Bearing Assy	5140.88	4956.84	-184.04	-3.58
12.	Cover & Brush Assy	2924.97	3178.12	253.15	8.65
13.	Main Assy 17W	1031.35	930.11	-101.24	-9.82
14.	Armature winding	9745.54	100046.15	300.61	3.08
15.	Gasket	147.98	140.26	-7.72	-5.22

TABLE-4.5.2

TABLE SHOWING RATE VARIATION OVER 5% REPORT OFLUCAS – TVS LTD (COMPONENTS)

Product code	Description	STD Rate	PVA Rate	CVA Rate	% Variation
1	Pressure pad	0.259	0.3634	0.3311	9.77
2	Label 17W	0	0	0.7571	-100
3	Carbon Brush	2.4099	2.3301	2.1946	6.17
4	Ball bearing	63.4138	20.5157	22.5568	-9.05
5	Brush plate Assy	43.1462	0	43.1462	-100
6	Spindle	11.0032	0	12.2371	-100
7	Grommet	1.648	0	1.6474	-100
8	Seal	2.3266	0	2.3475	-100
9	Rotary link Assy	6.7952	0	3.204	-100
10	Thermal cutout	25.8766	17.3929	15.8467	9.76
11	Cover plate & Brush plate Assy	179.8538	184.3546	211.7792	-12.95
12	Crankpin	0	3.2688	2.5429	28.55
13	Lucar	1.47	0	1.5834	-100
14	Housing	7.3304	0	12.6684	-100
15	Connector housing	14.6156	0	11.0424	-100

TABLE-4.5.3

TABLE SHOWING INVENTORY REPORT (STOCK AS ON 30.04.2007) **OF LUCAS-TVS LTD**

S.NO	DESCRIPTION	PRODUCT A April – March		PRODUCT B April - March		PRODUCT C April - March	
1	Materials On Hand	4.15	1.60	0.00	0.00	2.57	0.00
2	Materials On Bond	0.00	0.00	0.00	0.00	1.96	0.00
3	MAI – IMPORTS	3.13	3.37	0.00	0.00	0.71	0.13
4	RM Stores – IMP	14.17	13.28	4.15	4.15	2.99	4.56
5	Components Stores – IMP	45.57	38.70	0.00	0.00	11.33	14.88
6	Total IMP Stores	67.02	56.95	4.15	4.15	19.56	19.57
7	MAI – Local	12.94	19.88	0.48	0.18	8.87	7.24
8	RM Stores - Local	25.14	21.39	3.02	5.37	19.42	21.57
9	Process Stores	8.11	5.45	2.49	1.67	7.21	4.84
10	Components Stores – Local	12.63	14.65	2.46	1.93	13.48	12.38
11	Sub Contract Stock	60.45	61.69	2.74	2.55	25.39	25.29
12	WIP – Stores	1.08	0.91	0.29	0.31	13.06	19.42
13	WIP – Shopfloor	92.50	105.50	12.29	8.36	124.69	130.50
14	Warehouse – Finished units	95.69	112.69	6.00	8.97	135.76	131.81
15	Warehouse – Spares	37.18	40.40	2.46	2.99	28.43	43.08
16	Indirect Materials	20.76	20.76	8.39	8.39	26.12	26.12
17	TOTAL	433.50	460.27	44.77	44.87	421.99	441.82
18	Sales – For the month	973.86	1130.88	7.61	11.84	678.83	779.81
19	Sales – YTD	973.86	11781.71	7.61	151.23	678.83	8488.55
20	Sales – annualized	12799.30	12406.50	100.02	159.25	8921.77	8938.70
21	Stock Turnover Ratio	29.50	27.0	2.2	3.5	21.1	20.2

Chapter V
Conclusions

CHAPTER – 5

CONCLUSIONS

5.1. FINDINGS & SUGGESTIONS

Findings:

The following findings were noticed in the company:

1. ABC Analysis:

From the ABC Analysis it is inferred that A class items (12items) should be kept under rigorous control as the Investment in the inventory constitute more than 70% value of the total investment made in raw material inventory.

Although the number of items which constitutes "B"(12 items) & "C"(42 items) category is not fairly large investment in these categories are less than 30% and which warranting the minimum attention.

2. VED Analysis:

About 70.0% of annual expenditure was on 12 items, 20.0% on 12 items and 10.0% on 42 items. Items belonging to A category should be controlled carefully and ordered frequently. The VED analysis showed that 35.09% (19 items) are vital items, 24.87% (17 items) are essential items, and 39.02% (30 items) are desirable items.

3. There is proper inventory management system in company.
4. The company procures raw material & components according to demand and subject to availability of funds.
5. There is proper inventory check – physical check inventory control.
6. The company audits stock once in there months i.e. physical inventory.
7. The company Imports necessary components & raw material from other countries like USA, Japan, Singapore, Europe etc.

Suggestions:

The following suggestions can help to save money while stocking inventory:

- Substitution of less costly materials without imparting required quality.
- Improvement in quality or changes in specifications that would lead to savings in process time or other operating services.
- Developing new source of supply.

5.2. CONCLUSION

The importance of inventory control in a manufacturing company where there are multilocational stock points and larger number of items dealt with had been well understood on observing the systems followed in the company.

Added to the theoretical knowledge, the observations at the shopfloor and stores have enabled clear understanding of the system and fulfillment of aim of this project.

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