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A STUDY ON INVENTORY MANAGEMENT WITH REFERENCE TO LEADING AUTOMOBILE INDUSTRY

NANDINI RAVICHANDRAN
II MBA Student, School of Management, SASTRA University,
Thirumalai Samudram, Thanjavur, Tamil Nadu, India

ABSTRACT

This project was undertaken to analyze the inventory management of Ashok Leyland Ltd. It included the complete study to conduct Ratio Analysis, ABC and VED Analysis for inventory**.** This deals about the entire activities of purchase and stores department to suggest the suitable technique to the company to have improved control over the inventory. It was found that in the firm's master data was not maintained properly on SAP which was the major reason behind the unmatched sets of parts and excess buying of materials. Also it was found that due to this the production process was affected in the company. It was suggested that the management of the plant should incorporate Total Quality Management, particularly in all departments of production to ensure better sales and reduce the inventory of finished products. While ABC Analysis has shown that the management must have more control on C items than that on A & B items, because C class constitutes more of higher in numbers. This is done through maintaining low safety stock levels, continuous check on schedules & ordered frequently in inventories, in order to avoid over investment of working capital.

KEYWORDS: Total Quality Management, SAP, ABC Analysis, VED Analysis

INTRODUCTION

There are three basic types of inventory: raw materials, work-in-progress and finished goods. Raw materials are the items purchased by firms for use in production of finished product. Work-in-progress consists of all items currently in the process of production. These are actually partly manufactured products. Finished goods are goods that have completed the manufacturing process but have not yet been sold or distributed to the end user.

Inventory constitutes one of the important items of current assets, which permits smooth operation of production and sale process of a firm. Inventory management is that aspect of current assets management, which is concerned with maintaining optimum investment in inventory and applying effective control system so as to minimize the total inventory cost.

MEANING & DEFINITION

The term inventory refers to the goods or materials used by a firm for the purpose of production and sale. It also includes the items, which are used as supportive materials to facilitate production.

Inventory is an idle stock of physical goods that contain economic value, and are held in various forms by an organization in its custody awaiting packing, processing, transformation, use or sale in a future point of time.

Inventory management refers the overseeing and controlling of the ordering, storage and use of components that a company will use in the production of the items it will sell as well as the overseeing and controlling of quantities of finished products for sale.

RESEARCH VARIABLES

- To find out the cost involved in the entire inventory management process.
- To ensure that the supply of raw material & finished goods will remain continuous so that production process is not halted and demands of customers are duly met.
- To minimize carrying cost of inventory.
- To keep investment in inventory at optimum level.
- To reduce the losses of theft, obsolescence & wastage etc.
- To make arrangement for sale of slow moving items.
- To minimize inventory ordering costs.

STATEMENT OF THE PROBLEM

A study of inventory management at leading Automobile Company is undertaken in order to know the inventory performance and position of the company and to know the strength and weakness and to assess the profitability of the company. Inventories constitute most significant part of assets of large majority of the companies in India. Inventory a double edged sword is usually an asset of an organization, if not used properly it will become liability. It is therefore absolutely very important to manage inventories efficiently and effectively in order to overcome unnecessary investment. And “To identify the problems/challenges involved in the Inventory Management process at this company.”

OBJECTIVES OF THE RESEARCH

- To analyze the inventory management of this company.
- To conduct ABC and VED Analysis for inventory
- To analyze the entire activities of purchase and stores department
- To suggest the suitable technique to the company to have improved control over the inventory.

LIMITATIONS OF THE RESEARCH

- Time restriction was only 6 weeks for research in the organization.
- The information, which was needed, could not be made public by the organization.
- The study is related to the only one leading Automobile Industry only.
- The finding and suggestion cannot be generalized.
- The study covered a wide concept hence wide collection and coverage of information was not easily possible.

RESEARCH METHODOLOGY

- Primary data- The primary data is collected by personal interviews with officials.
- Secondary data- Files, annual reports, periodicals, manuals and text book. Which have already been passed through the statistical process are the secondary data used.

- Field work- This was under taken individually to collect information regarding the study by visiting following sections.
    - Stores department- Information regarding stocking of materials receipts and issues to workshops. Inventory control procedures in various wards inside the department were obtained.
    - Accounts department- Remaining all the information was obtained from accounts department through personal interviews with section officials.

GENERAL PROBLEMS OF INVENTORY

- To maintain a large size inventories for efficient and smooth production and sales operation.
- To maintain only a minimum possible inventory because of inventory holding cost and opportunity cost of funds invested in inventory.
- Control investment in inventories and keep it at the optimum level.

SCOPE OF THE STUDY

- This study is to find the facts and opinions of inventory management and control at the Automobile plant.
- In accordance with the present trends it aims mainly at finding out the inventory control procedures.
- This study gives the brief information about the inventory management of the
- The study was done by using annual reports, inventory manual…etc.

LITERATURE REVIEW

- According to Lieberman, Marvin B; Demeester, Lieven (1999) in his article titled “Inventory reduction and productivity growth: Linkages in the Japanese automotive industry” published in Management Science has said that JIT production suggests a causal link between work-in-progress inventory and manufacturing productivity. Such a connection has been described in numerous case studies but never tested statistically. Historical data for 52 Japanese automotive companies are used to evaluate the inventory-productivity relationship. It is found that firms increased their productivity rank during periods of substantial inventory reduction. More detailed tests suggest that inventory reductions stimulated gains in productivity.
- Moon, Ilkyeong (2001) The authors Moon & Ilkyeong published their paper in Interfaces titled “Inventory Management and Production Planning and Scheduling” which is the third version of Decision Techniques for Stock Control and Manufacturing Preparing released in 1979 and 1985. Bob Pyke became a coauthor for this version and performed a key part in composing significant up-dates of several sections, such as those on supply-chain management, multi-echelon stocks, just in time, and ERP (enterprise source planning). In addition, the writers have included worksheet applications for each section as additional components to improve the audience and usefulness for learners in business applications, and for experts.
- As per the authors Jackson, Duncan (2004), “TradeBeam and Global eXchange Services Partner to Provide Collaborative Inventory Management and Interoperability for Automotive Industry”, in Business Wire says that TradeBeam is a Global Trade Management software and services company providing solutions that streamline global trading processes for enterprises and their partners. TradeBeam's solutions provide import and export

compliance, inventory management, shipment tracking, supply chain event management and global trade finance solutions such as open account and letter of credit management. TradeBeam has over 3000 customers with users in over 100 countries worldwide.

- Krishna, L Sivarama; Janardhan, G Ranga; Rao, C S P (2009) in their article "Web Integrated Decision Support System for Machine Scheduling and Inventory Management", was published in IUP Journal of Operations Management tells about stock management symbolizes the process of managing stocks of completed products, semi-finished products and raw elements by a company so as to reduce the total stock cost. The first level contains the development of a organizing program with make span minimization as the primary objective. The second level contains the development of the stock management program and creating it with the organizing program. The third level contains creating the program web permitted, so that it provides the flexibility of assigned creating choices to your selection makers.

- According to Snehalgavi (2010) in her article titled "It Outsourcing in Indian Automobile Industry" in Business & Economy says Outsourcing is the act of delegating an organization's internal activities and to some extent the right to decisions to the third party (service vendors) as per specified in the contract. Outsourcing is a tool, in which the vendor is responsible for certain jobs outsourced by a company, in return of a price for the goods or service provided by it. This option is exercised majorly because to cut operation costs of a company and focus on its core competencies. It is basically a contract between two companies or concern in which one is getting its business process outsourced from another company offering such services.

- According to Martin, Benjamin Robert (2010) in his article titled "Findlay Automotive group selects first look for pre- owned inventory management needs", in PR Newswire With 15 brands including Toyota, Honda, Chevrolet, Cadillac, Saturn, Land Rover, Saab and Volkswagen, Findlay will utilize the First Look product suite to guarantee the right balance between pre-owned inventory and demand, and ensure that trades are given the best appraisals. In addition to the inventory management tool, and trade analyzer, Findlay will use the First Look Search Engine to allow its dealers to instantly search more than 30 online marketplaces to identify the best vehicles that meet that dealerships pre-owned inventory needs.

- As per Koumanakos, Dimitrios P. (2008) in Business Wire titled "Hitachi Automotive Improves Efficiency and Inventory Control with Geac's System 21" says that Hitachi America, Ltd. has streamlined production, reduced accounting costs and improved supply chain management using Geac's System21 software solution. Hitachi Automotive implemented three System21 modules in 1998 - financials, manufacturing, and customer service and logistics - across its three locations in Kentucky, Detroit and Los Angeles. In September 2002, the company will renew its maintenance contract with Geac(R) for three years.

- According to Cachon, Gérard P; Olivares, Marcelo (2010), "Drivers of Finished-Goods Inventory in the U.S. Automobile Industry", in Management Science says Automobile manufacturers in the U.S. supply chain exhibit significant differences in their days of supply of finished vehicles. The objective in this research is to measure for this industry the effect of several factors on inventory holdings. We find that two factors, the number of dealerships in a manufacturer's distribution network and a manufacturer's production flexibility, explain essentially all of the difference in finished-goods inventory between Toyota and three other manufacturers: Chrysler, Ford, and General Motors.

- As per Moozakis, Chuck (2001), "Honda Automates Web Financing -- Network will let dealers apply for funds online and will eventually support inventory management" in Internet Week says that financing unit of American Honda Motor Co. next month will begin rolling out its Dealer Financial Information Network (DFIN), a Web system that will help its 3,000 dealers obtain financing for inventory in real time. Currently, dealers purchasing inventory from Honda need to apply for financing through American Honda Finance Corp. or another bank. Typically, approvals take several days.

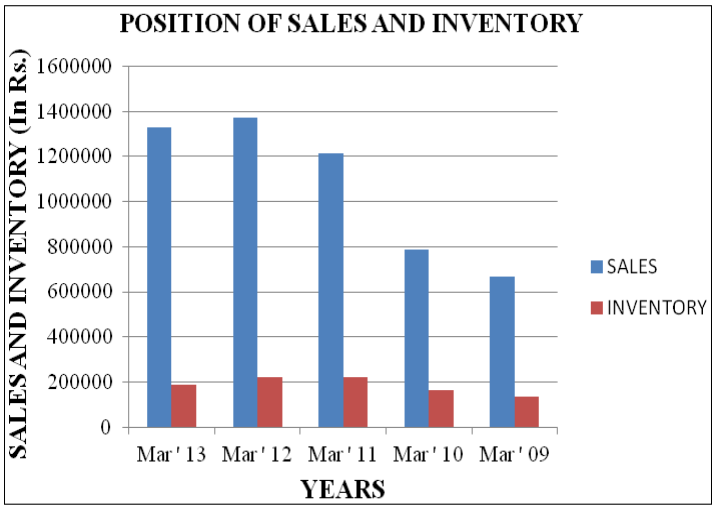
- According to the aticle "Study of vendor-managed inventory practices in Indian industries" by Borade, Atul B; Bansod, Satish V. (2010) in Journal of Manufacturing Technology Management says that in the global economy, vendor-managed inventory (VMI) is gradually becoming an important element of supply chain management strategy of organizations. Recently, Indian industries, both large and small, have started adopting VMI for their supply chains. The purpose of this paper is to investigate apparent differences among large and small industries in terms of objectives, drivers, obstacles and impacts of VMI in Indian context. A survey was conducted to examine organizational objectives, strategic drivers, obstacles and affected operations pursuant to VMI adoption.

- According to Matson, Jack E; Matson, Jessica O (2007), in "Just-in-time implementation issues among automotive suppliers in the southern USA" published in Supply Chain Management speaks that Purpose - The purpose of this paper is to provide insight into the major supply chain issues of the automotive manufacturing industry in the southern USA. Design/methodology/approach - This paper is based on the results of a survey of automotive suppliers in Tennessee and Alabama. The survey focused on supply chain issues and demographics, specifically on 20 JIT-related problems and 100 company characteristics. Findings - Identifies the extent of JIT implementation in Tennessee's and Alabama's growing automotive industry and the general characteristics of the companies that use JIT.

DATA ANALYSIS & DISCUSSIONS

Table 1: Position of Sales and Inventory (in Lakhs)

YEAR	Mar ' 13	Mar ' 12	Mar ' 11	Mar ' 10	Mar ' 09	Average
Sales	1329856	1372081	1215300	787260	666664	1074232.2
Inventory	189602	223063	220890	163824	133001	186076

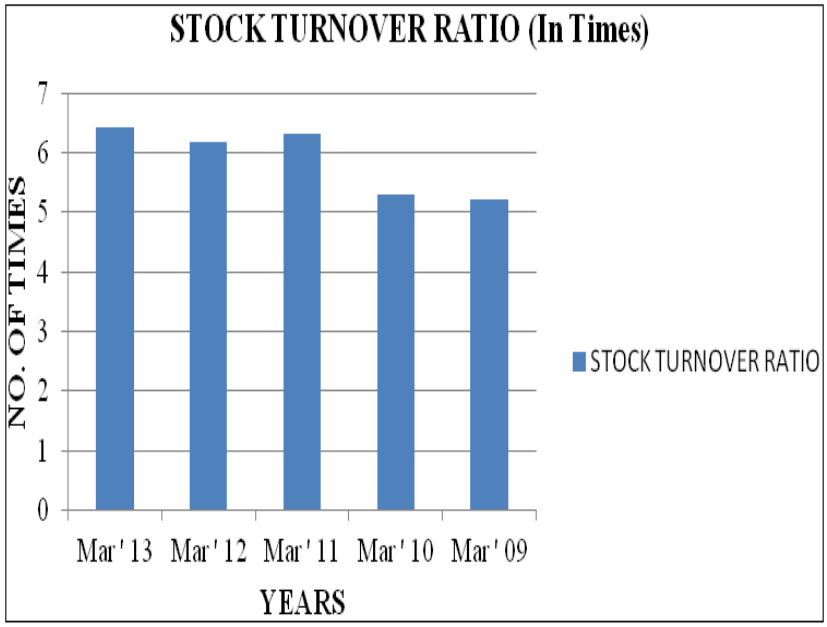


Source: Secondary Source

Figure 1

Table 2: Stock Turnover Ratio (in Times) (in Lakhs)

Year	Net Sales	Average Inventory	Stock Turnover Ratio
Mar ' 13	1329856	206332.5	6.45
Mar ' 12	1372081	221976.5	6.18
Mar ' 11	1215300	192357	6.32
Mar ' 10	787260	148412.5	5.30
Mar ' 09	666664	127696	5.22



Source: Secondary Source

Figure 2

Table 3: Stock Holding Ratio (in Days)

Year	Mar ' 13	Mar ' 12	Mar ' 11	Mar ' 10	Mar ' 09	Average
Stock Turnover Ratio (Times)	6.45	6.18	6.32	5.3	5.22	5.894
Stock Holding Ratio (Days)	57	59	58	69	70	62

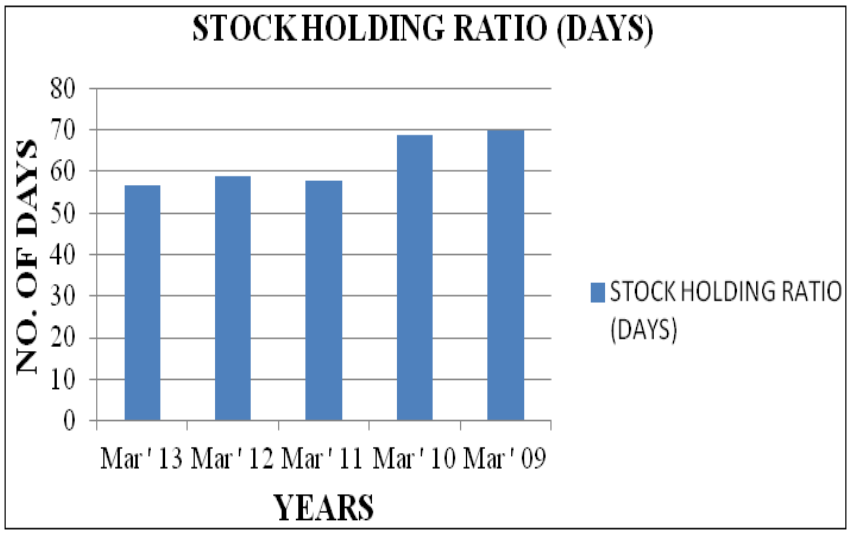


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Figure 3

Table 4: Cost Based Raw Material Turnover Ratio and Holding Days (in Lakhs)

Year	RM Consumed	Avg. Stock of RM	Ratio	Holding Days
Mar ' 13	74,089.20	76538.68	0.97	376
Mar ' 12	78,988.15	86914.8	0.91	401
Mar ' 11	94,841.45	76723.99	1.24	294
Mar ' 10	58,606.54	55931.99	1.05	348
Mar ' 09	53,257.43	47775.16	1.11	329

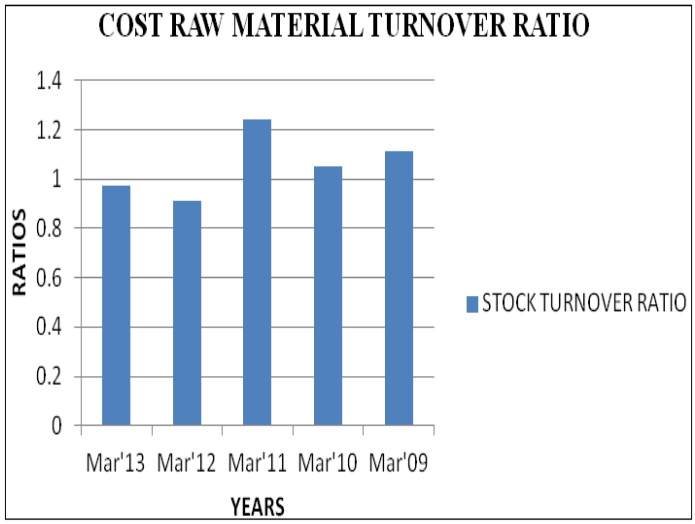

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Figure 4

Table 5: Work in Progress Turnover and Holding Days

Year	Factory Cost	Average Stock of WIP	WIP Ratio	Holding Days
Mar ' 13	12,095.13	14662.54	0.82	445
Mar ' 12	17,229.95	21756	0.79	462
Mar ' 11	26,282.03	30469.14	0.86	424
Mar ' 10	34,656.26	22032.25	1.57	232
Mar ' 09	9,408.24	20812.94	0.45	811

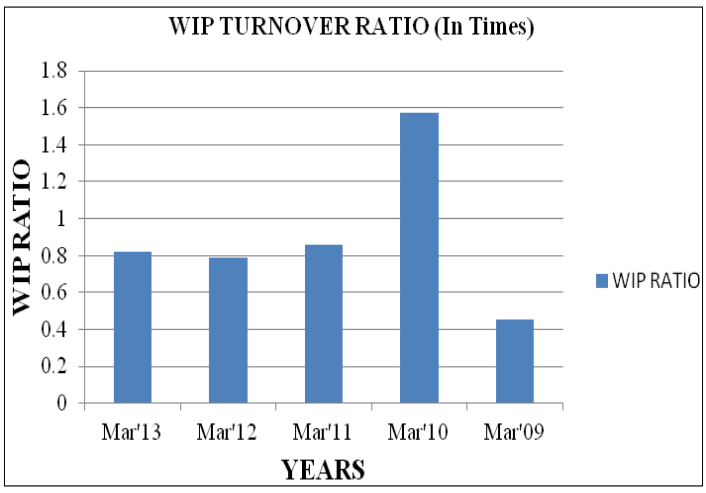

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Figure 5

Table 6: Stores and Spares Turnover Ratio and Holding Days (in Lakhs)

Year	Consumed	Average Stock	Ratio	Holding Days
Mar ' 13	9143.39	9458.50	0.97	376
Mar ' 12	9773.60	9512.26	1.03	354
Mar ' 11	9250.91	6445.78	1.44	253
Mar ' 10	3640.68	3644.09	1.00	365
Mar ' 09	3647.49	3915.41	0.93	392

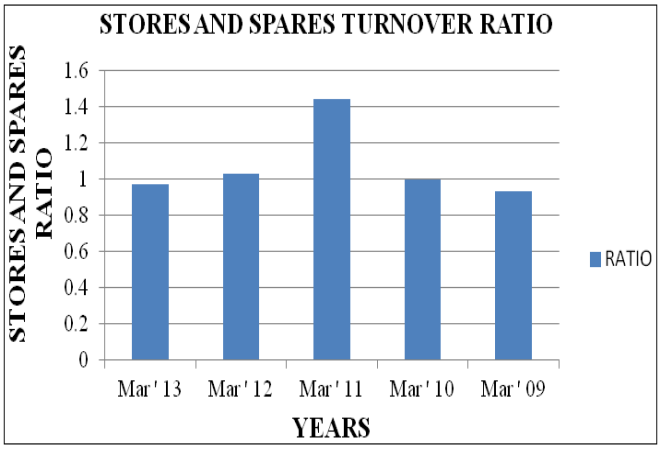

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Figure 6

Table 7: Inventory to Sales Ratio

year	Mar ' 13	Mar ' 12	Mar ' 11	Mar ' 10	Mar ' 09	Average
Sales	1329856	1372081	1215300	787260	666664	1074232.2
Inventory	189602	223063	220890	163824	133001	186076
Inventory to Sales Ratio	0.142573331	0.162572764	0.181758	0.2080939	0.1995023	0.17
ISR*100	14.25733312	16.25727636	18.17576	20.8093895	19.9502298	17.32

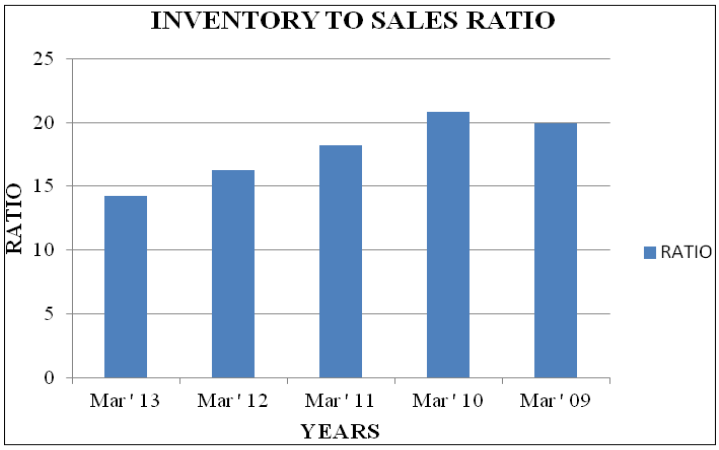

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Figure 7

Table 8: Operating Cycle Analysis

Year	DSI	DSO	OC
Mar ' 13	57	39	96
Mar ' 12	59	33	92
Mar ' 11	58	35	93
Mar ' 10	69	47	116
Mar ' 09	70	52	122

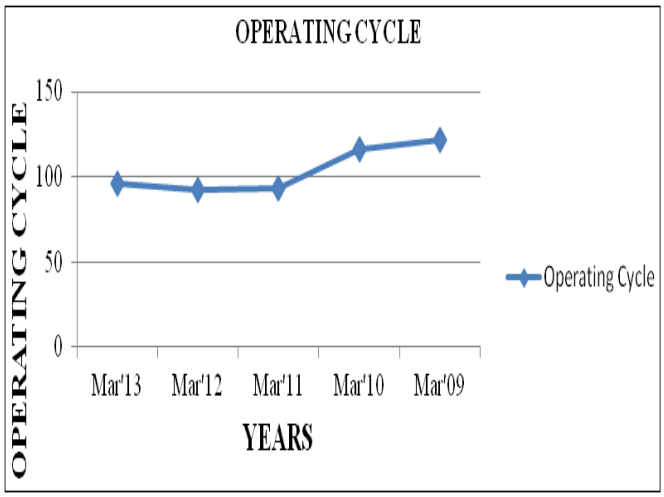

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Figure 8

Table 9: Cash Conversion Cycle Analysis

Year	DSI	DSO	DPO	CCC
Mar ' 13	57	39	57	39
Mar ' 12	59	33	70	22
Mar ' 11	58	35	83	10
Mar ' 10	69	47	140	-24
Mar ' 09	70	52	159	-37

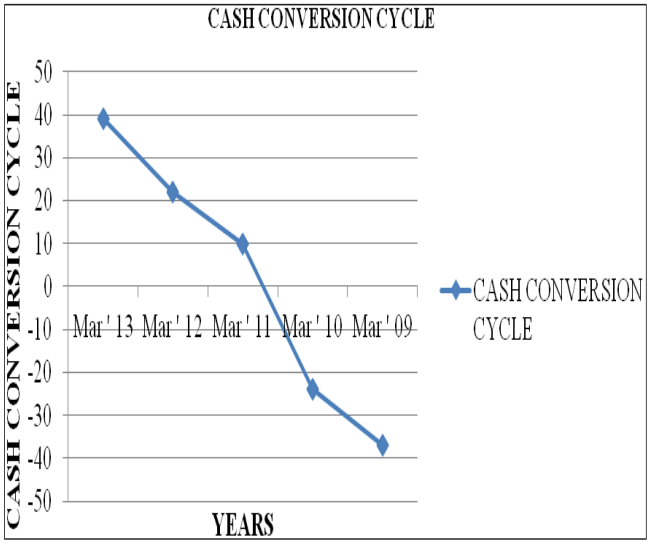

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Figure 9

According to the firms Policy the ABC analysis includes a D classification also, and the categorization is done as follows:

Table 10: ABC Analysis

Category	Rate (in Rupees)
A	>10000
B	>2500-9999
C	>40-2499
D	<40

Table 11

Material	Material Description	Val. Stock	Val. Stock	Rate	Cate gory
L1050608	3/8"BSFX1" BOLT	14.87	1,487.00	0.01	D
04784433W	SHAFT-C	0.01	1	0.01	D
A-U999-G-50111-029	BELT,FLAT,ENDLESS,NYL,540X30X1.5	38	1	38	D
X1101613	MUD SHIELD-FCT	124.8	2	62.4	C
F1241622	DISTANCE PIECE	7,681.35	123	62.45	C
X7477000	ALTERNATOR	218,993.02	97	2,257.66	C
F8320900	POWER STG PUMP - 4018	20,202.56	8	2,525.32	B
F8334000	STARTER MOTOR 3.2KW	2,544.83	1	2,544.83	B
G01GS221002	SPLINE PLUG GAUGE	5,000.00	0.5	10,000.00	B
A9275500	HA4CTI3S -4CTI BS 3	195,191.33	1	195,191.33	A
B7500818	ARTICULATION UNIT COMPLETE	1,809,242.91	9	201,026.99	A
A9800300	FOR EURO4 240kW 6 CYLINDER 8.	2,672,338.16	2	1,336,169.08	A

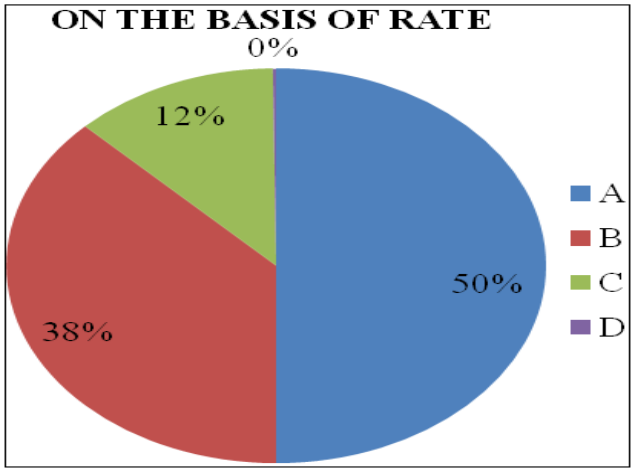

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Figure 10

Table 12: On the Basis of No. of Items

Category	No. of Items	Value in %
D	5746	28.485029
C	11673	57.867341
B	1864	9.2405314
A	889	4.4070989
	20172	**100**

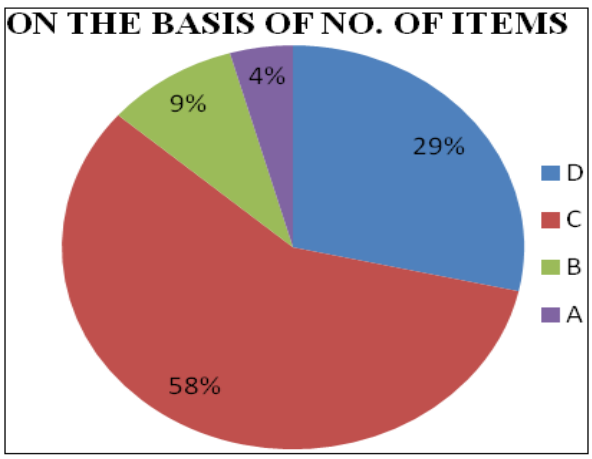

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Figure 9

RESEARCH FINDINGS AND DISCUSSIONS

- During the first four years i.e. in Financial Year 2008-09 to 2011-12. During the above four years the inventory level increased from 133001 lakhs to 223063 lakhs. It indicates a positive growth rate of 67.71%. But in the Financial Year 2012-13 inventory level decreased to 189602 lakhs which was about 17.64% of the inventory value as maintained in the Financial Year 2011-12. The analysis suggests that the company invested more funds in inventories during the first four years of study period but in the previous year it has invested less i.e. in year 2012-13.
- The Inventory Turnover Ratio increased from 5.22 to 6.45 with an average of 5.89 this is considered as unsatisfactory position.
- There has been an increasing trend holding days from 2009- 2011 after which it has again declined and started increasing from the year 2012.
- The Raw Material Turnover based on Cost ranges from 1.11 to 0.9. The days of Raw Material Inventory Holding Period gives the time period of holding inventory. It implies high carrying cost. But in the year 2012-2013 the company has tried to reduce the holding days and it indicates the reduction of carrying cost which proves the effectiveness of a system of inventory management.
- The Work in Progress Inventory turnover and of inventory holding. We can observe that the firm's average WIP turnover ranges from 0.45 to 0.82. The company has to work more on the work in progress as the holding days are more.
- The firms Stores and Spares Turnover ranges to 0.97 and also the holding days indicate management has to reduce the holding days to a huge extent.
- **Inventory to Sales Ratio:** The percentage of inventories the company currently has on hand to support the current amount of sales. A decreasing Inventory to Sales ratio in the Financial Year 2013 indicates a positive sign.
- **Operating Cycle Analysis:** It has been decreasing trend in Operating Cycle. There has been a significant decrease in the operating cycle from 2009 to 2013. The Operating Cycle is same in the year 2011 and 213, compared to which the financial year 2013 requires a greater working Capital.
- **Cash Conversion Cycle Analysis:** The firm needs to get goods 57 days before it will actually sell the resulting goods. The first 57 days of that time, it will not yet have paid its suppliers. But that leaves 0 days (57-57) that it will have to hold inventory that has already been paid for but that has not yet been sold. Then, after making the sale it will have to wait for another 39 days before it can collect the cash from its own customers. The total is 39 days that the company must be able to operate without the cash its operations will eventually generate.
- **ABC Analysis:** This firm also has a D Category items apart from AB & C items. It has to buy more of C Category items rather than AB and D but at the same time it has to keep a close watch on Focused goods that is high valued goods as it is kept in low volume but a close assistance is given since value of these goods is high.

RESEARCH RECOMMENDATIONS

- Under the ABC analysis, the management must have more control on C items than that on A & B items, because C class constitutes more of higher values. There should not be tight control exercised on stock levels, to avoid deterioration. This is done through maintaining low safety stock levels, continuous check on schedules & ordered frequently in inventories, in order to avoid over investment of working capital.
- The past data shows increase in inventory the company is expecting more inventories for the future period i.e. 2014. The management is required to maintain the same trend in the forth coming year also.
- The company has to keep the master data that is SAP data timely updated so as there are no unmatched sets and excess of the unwanted buying of the same time of material parts.
- The inventory turnover ratio indicates whether investment in inventory is within proper limit. It also measures how quickly inventory is sold. It requires maintaining a high turnover ratio than lower ratio. A high turnover ratio implies that good inventory management and timely the inventories are being replenished, also reflects efficient business activities.
- The management of the plant should incorporate TQM (Total Quality Management), particularly in all departments of production to ensure better sales and reduce the inventory of finished products.

CONCLUSIONS

In this study, a better inventory management will surely be helpful in solving the problems the company is facing with respect to inventory and will pave way for reducing the huge investment or blocking of money in inventory. Inventory is the physical asset of a company that can create problem if there is shortage, while in production and also if it's in excess even after production. Inventory is constantly changing as quantities are sold and replenished.

Since the Inventory Turnover Ratio shows the increasing trend, there will be more demand for the products in the future periods. If they could properly implement and follow the norms and techniques of inventory management, they can enhance the profit with minimum cost. From the study it is predicted that future sales have to be achieved and inventory level have to be maintained. The company has to periodically review the inventory to avoid production loss. Hence it can be understood that efficient inventory management can take the company to new heights and inefficient inventory management can ruin the company.

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