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INVENTORY MANAGEMENT WITH REFERENCE TO EXIDE INDUSTRIES

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A B S T R A C T

Inventory proportionality is the goal of demand-driven inventory management. The primary optimal outcome is to have the same number of days' worth of inventory on hand across all products so that the time of run out of all products would be simultaneous. The secondary goal of inventory proportionality is inventory minimization. By integrating accurate demand forecasting with inventory management, replenishment inventories can be scheduled to arrive just in time to replenish the product destined to runout first, while at the same time balancing out the inventory supply of all products to make their inventories more proportional, and thereby closer to achieving the primary goal. Accurate demand forecasting also allows the desired inventory proportions to be dynamic by determining expected sales out into the future; this allows for inventory to being proportion to expected short-term sales or consumption rather than to past averages, a much more accurate and optimal outcome. Integrating demand forecasting into inventory management in this way also allows for the prediction of the "can fit" point when inventory storage is limited on a per-product basis.

Inventory Management System is important to ensure quality control in businesses that handle transactions revolving around consumer goods. Without proper inventory control, a large retail store may run out of stock on an important item. A good Inventory Management System will alert the retailer when it is time to reorder. The Inventory Management System is also an important means of automatically tracking large shipments. For example, if a business orders ten pairs of socks for retail resale, but only receives nine pairs, this will be obvious upon inspecting the contents of the package, and error is not likely. On the other hand, say a wholesaler orders 100,000 pairs of socks and 10,000 are missing. Manually counting each pair of socks is likely to result in error. An automated Inventory Management System helps to minimize the risk of error. In retail stores, an Inventory Management System also helps track theft of retail merchandise, providing valuable information about store profits and the need for theft-prevention systems. Automated Inventory Management System work by scanning a barcode on the item. A barcode scanner is used to read the barcode, and the information encoded by the barcode is read by the machine. This information is then tracked by a central computer system. For example, a purchase order may contain a list of items to be pulled for packing and shipping. The Inventory Management System can serve a variety of functions in this case. It can help a worker locate the items on the order list in the warehouse, it can encode shipping information like tracking numbers and delivery addresses, and it can remove these purchased items from the inventory tally to keep an accurate count of in-stock items. All this data works in tandem to provide businesses with real-time inventory tracking information. Inventory Management System make it simple to locate and analyse inventory information in real-time with a simple database search.

Keywords: Inventory, Cost, Stock, Goods, Products, Classification, Safety, Reserve, Supply, Demand, Consumer, Profit, Sales, Customer

1. Introduction

Inventory management refers to the raw materials, work in progress finished goods which are maintained in the organization to have continuous production and sales. It is one of the components of working capital; more than 60% of the working capital will be invested in inventory. An efficient inventory management system directly contributes to the growth of profitability of the business concern. In some companies it may go higher, either having too much or too low inventory will result a lot of problems. The scientific process of implementing inventory management provides inventory at the right time, from the right source and at the right price and involves the steps that are to be taken regarding storage and supervision of these materials. The main objective of inventory management is to reduce order placing, receiving and inventory carrying cost and wastages.

The inadequate supply of raw materials directly disturbs the normal functioning of the business unit whereas excess inventory leads to idle investments, high inventory carrying cost and wastages. Inadequate inventory directly affects the production process. Therefore, scientific principles and techniques are to be adopted to manage the inventory system. To avoid all these problems, in Japan, JIT Concept (Just in Time) has been introduced. It refers to the supply of raw materials to the production department directly by the suppliers. The agreement will normally be made with the supplier of materials on such terms. So, the supply of raw materials must be made without any interruption to the normal productive activities. The success of the arrangements mainly depends on the sound infrastructure facility viz., communication system, transportation system and availability of raw materials.

2. Tools of Inventory Management [9]

2.1. Fixation of Levels: It is a tool through which the inventories are maintained by fixing different levels. Fixing stocks in different levels to avoid over stocking of any materials, at the same time to ensure follow-up sufficient materials to production process. The main purpose of finding levels is to control investing in inventories. This tool made by considering different factors i.e., nature of raw materials, cost availability lead time, storage space and cost etc.,

•**Maximum Level**: It is a level set for materials beyond which it should not be stored. If materials are stored beyond the maximum level creates several financial and managerial problems to the firm.
Maximum level = reorder quantity – [minimum consumption x minimum Reorder Period]

• **Re-order level**: It is a level fixed for the materials to indicate the urgency of processing them from the market. This level is fixed by considering the rate of consumptions of raw materials, lead time and availability of raw materials. Once the material reaches this level the store controller places his request to purchase the materials so that he can maintain storage of such items to maximum levels.
Reorder level = maximum consumption x maximum reorder period

• **Minimum level**: It is also known as safety stock below which the storing of materials leads to severe consequences. It is a level at which the store controller takes immediate action in procuring the materials.
Minimum level = reorder level – average consumption x reorder period

• **Danger level**: It is a level beyond which storage of materials should not fall. It also indicates the necessity to arrange for quick purchase of materials otherwise business firms have to stop the products of major plants.
Danger level = minimum consumption x reorder period
• Average stock level: It is a stock level between minimum level and maximum level of stock. Average stock level = (maximum level + minimum level)/2

2.2. ABC Analysis: [Always Better Control]:
Under this method the materials are managed by giving importance to its value classification are being made by grading the materials as ABC.

GRADE A: Materials are costly, high in value but less in number and are supervise and controlled closely. It comprises of 15% - 20% (terms of value)
GRADE B: Materials are moderated in value and in moderate number of items are maintained with moderate control. It could account for 60% of the total cost of inventory.
GRADE C: Materials are cheap in value but greater in quantity and less attention is given in monitoring their items. It takes care of many items which have relatively insignificant value.

2.3.EOQ Analysis: (Economic Order Quantity):
Economic order quantity is that quantity of materials to be ordered where it will have least or minimum order placing and carrying cost. It is also called the size of materials to be purchased most economically this technique adopted in order to minimize ordering and causing costs.
EOQ = 2AS/ I

Ordering Cost – are the cost which are associated with the purchasing or ordering of materials.
Carrying Cost – There are the costs for holding the inventory their cost will not be incurred of inventory are not carried.

2.4. Perceptual Inventory System:
It refers to continuous stock checking under this system different registers are maintained for materials, entries are made and when the materials are received and issued, hence it is identified as a costly technique of inventory control through it is costly technique, but the benefits enjoyed by management are many.

2.5. VED Analysis: (Vital Essential Desirable)
It is another tool adopted by inventory management. It is most suitable for automobile industries specially to maintain spare parts; all parts are classified into Vital Essential Desirable.

VITAL: Parts for the manufacturing of a product will be closely monitored in adequate supply of these parts may substantially damage the productive activities.

ESSENTIAL: Essential are the type of materials, there are no doubt that they are essential, but its level of stocks is moderately low.

DESIRABLE: Desirable components may or may not be maintained non availability of D type of spares do not damage the normal functioning of industry.

2.6. FSN Analysis: (Fast moving – Slow moving – Non-moving):
Fast-moving are grouped according to the movement and close watches on the movement of such items are kept.
Slow moving items are frequently needed by the production department accordingly the moderate quantity and moderated supervision will be maintained.
Non-moving: items are rarely required for the production department hence a small number of materials are kept in stock and less importance is given.

2.7. Periodical Inventory Analysis:
Under this system inventory valuation with checking will be carried out at different intervals generally twice/thrice in a year during the period of stock checking normal functioning of the organization will be closed for one or two days and complete stock verification and valuation will be done accordingly.

2.8. Budgetary Control Systems:
It is an important technique of inventory control under this system inventory budgeting are prepared and then the budgeting figures are compared with

actual consumption figures and necessary corrective steps are taken if there are significant verification between the budgetary figures and actual inventory consumption figures.

3. Company Profile: Exide Industries

For more than seven decades, Exide has been one of India's most reliable brands, enjoying unrivalled reputation and recall. Our constant emphasis on innovation, extensive geographic footprint, strong relationship with marquee clients and steady technology upgradations with global business partners have made us a distinct frontrunner in the lead-acid storage batteries space for both automotive and industrial applications. Exide designs, manufactures, markets, and sells the widest range of lead acid storage batteries in the world from 2.5Ah to 20,600Ah capacity, to cover the broadest spectrum of applications. Using the latest technological inputs, we manufacture batteries for the automotive, power, telecom, infrastructure projects, computer industries, as well as the railways, mining, and defence sectors [1].

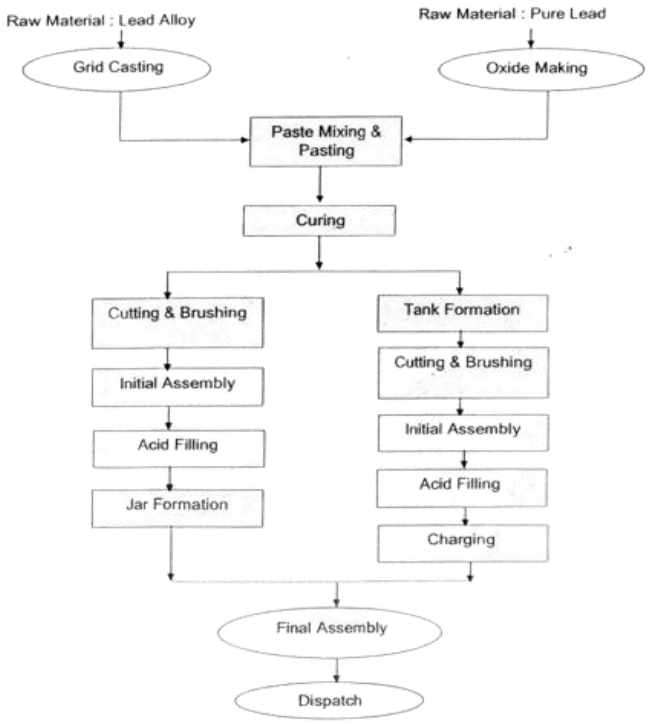

Figure 3.1: Workflow model of EXIDE Industries [1]

3.1 Nature of Business carried out:

Exide HOSUR plant is the fourth factory for Exide industry with a turnover of 6900 crores in the year 2015-16. It was founded in 1997.It has a total land area of 74.5 of which 42% is green zone. HOSUR Exide plant is the more productive unit. It has been the two productive plants like Auto and VRLA type batteries [2].

Auto plant batteries are used for car, truck, and tractor.

VRLA plant batteries are used for railways, ship.

Exide uses the latest world class manufacturing technology to produce batteries for the above applications. Its factories have all the modern equipment necessary to manufacture world class products [2]. It also sources its components from the best battery component in the world. The various batteries are:

• Automotive Batteries

In the domestic market, the Company sells its products under EXIDE, SF, SONIC, and Standard Furukawa Brands. 'EXIDE' and 'SF" are its flagship brands. In the international market the products are sold mainly under the DYNEX, INDEX & SONIC brands. The Company supplies batteries to almost all the car and two-wheeler manufacturers in the country [4].

The Company has a distribution network comprising over 4000 dealer outlets. These outlets are supported by 4 regional offices and 28 branch offices [4]. The Company also exports batteries to the Middle East, Japan, and CIS countries.

The Company has a market share of 72% [4] in the case of Automotive OEM and 70% [4] in the case of Organized Retail. The Company also manufactures submarine batteries.

• Industrial Batteries

The Company designs and manufacture its industrial batteries in a wide range from 2.5 Ah to 20,600 Ah in conventional flooded and Valve Regulated Lead Acid (VRLA) design. In the domestic market, the Company sell its products mainly under EXIDE, INDEX, SF, CEIL & POWER SAFE brands and in the international markets mainly under CEIL, CHLORIDE, and INDEX brands. Lead acid and Nickel-Cadmium batteries. Industrial batteries are of three types, Conventional lead acid batteries, VRLA (Valve regulated both organized and unorganized players compete in the OEM and retail industrial battery markets. Industrial batteries cater mostly to the infrastructure sector such as railways, telecom, power plants, solar cells, and other industrial segments such as uninterrupted power supply, inverters, and traction batteries [4].

Exide's INVA tubular batteries for Inverter applications were introduced in 2000 and Tele tubular for Telecom Sector introduced in the year 2007 has created volume growth. The Company also manufacture industrial batteries for niche segments such as miners' cap lamp batteries and submarine batteries.

• Submarine Batteries

The Company also manufactures high-end submarine batteries (Type 1, 2 & 3). The Company manufactures two to three submarine batteries a year to meet the country's defence requirements. The Company is one of the five companies in the World which has the capability to make submarine batteries for both Russian and German types. With the government's permission, in recent years, the Company has exported to Algeria. [4]

3.2 Vision:

Providing credible value addition to customers, employees and shareholders while simultaneously being recognized by society as a responsible corporate citizen. In addition, achieving operational excellence while addressing and taking steps towards environmental protection [3].

3.3 Mission:

Strive to carefully balance the interest of all stakeholders; to fulfil the aspirations of the employees and to passionately pursue excellence without deviating from our core values [2].

4. Process outline of manufacture of Lead acid Batteries and Automotive Batteries

The basic raw material for manufacturing a lead acid battery & automotive battery (a captive rechargeable source of energy) is lead. The essential steps for manufacture are as follows.

Alloy Blending

Lead or lead base alloys are mixed in the molten state with controlled amounts of metallic additives. The blended alloys are used for a variety of components in the battery (at Hosur) blended alloys are procured from external source and partly from in house [2].

Grid costing & Ageing

Blended alloys of specified composite are machine cost by gravity flow into grids (structured lattices). These serve as conductive pathway for the current to and from the active material. They also act as a supporting framework. Grids costs are aged before subsequent processing to reach sufficient hardness levels [6].

Oxide Manufacturing

Lead is partly oxidized to form grey oxide, a finely divided admixture of the metal and its monoxide. This is carried out through attrition in ball mills, super micron mills for industry and Lishan ball mail for auto [7].

Paste Mixing, Pasting and Curing

Grey oxide is mixed with specified quantities of additives, acid, and water to form a pliable paste. Positive and negative plates are made by machine pasting the paste onto the grids. The paste plates are quickly dried (for better handling) and stored in worm and humid cubicles to convert the paste largely to tri-basic lead sulphate, which enhances adhesive and cohesive properties and facilities the next step of formation [5].

Forming

Cured positive and negative plates are arranged alternatively in tanks containing dilute sulphuric acid and subjected to the passage of a specified duration When the positive materials are converted largely to lead dioxide and the negative to spongy lead [6].

Drying

The formed plates are dried at elevated temperature in a stream of hot air [8].

Plate parting and Lug Brushing (Plate Cleaning or Plate Finishing)

Plates, if processed in multiple configurations, are separated into individual ones, their lugs (top protrusions for connections) are brushed clean [2].

Assembly

The finished plates of each type positive and negative are assembled into groups by fusing their lugs top a common group bar and vertical strap. This process is carried out manually using a Jig positive and negative groups are interleaved separated by separators in the form of glass fibre mats. The elements so formed are inserted into individual cell boxes or cell compartment of the battery. The cell/battery is finally done by the correct sequence of inter cell connector terminal burning and lid sealing operations [8].

Charging

After lid sealing operation, each battery is filled with dilute sulphuric acid and then battery charging process is carried out as per the process specification for a specific duration. At the end of charging schedule only passed batteries go to successive operation [8].

Final Assembly

The passed charged batteries are sent to final assembly after fixing the safety value tests for internal resistance and high-rate discharge and ultrasonic welding process take place. 39 | P a g e Cosmetics are also checked at the point. After screen printing, all batteries go to the dispatch yard: batteries are packed and shipped to customers [8].

5. Conclusion and Future Research

The inventory comprises raw materials, work in process, finished goods, spares and other stock to meet an unexpected demand distribution in the feature. The study was conducted on inventory management at EXIDE INDUSTRIES Ltd. to find out about their existing inventory management system and their effectiveness.

The main objective of the study is to determine the efficiency of inventory management and to study various components of inventory at EXIDE. With the help the ratio analysis to analyse the performance of the inventory management at Exide industries Ltd over the period of five years and to determine the management of the inventory, account receivables accounts payables, accruals, and other means of short-term financing, it is found that the inventory turnover ratio of the company is fluctuating year by year.

The raw materials turnover ratio is also fluctuating year by year. The amount of inventory to current assets ratio is sufficient and the inventory growth is fluctuating so that, the company must take necessary steps to control and to manage the inventory efficiency and to adopt new techniques to increase production and scales.

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