

A STUDY ON INVENTORY MANAGEMENT IN INDIAN STEEL INDUSTRY

Submitted in partial fulfillment of the requirements for the award of

Master of Business Administration

by

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SCHOOL OF BUSINESS ADMINISTRATION

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

**Accredited with Grade "A" by NAAC | 12B Status by UGC | Approved by AICTE
Jeppiaar Nagar, RAJIV GANDHI SALAI, CHENNAI - 600 119**

APRIL - 2021



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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of Mr. Sachin kumar.S (39410242) who has done the Project work entitled ,"**A Study On Inventory Management In Indian Steel Industry**" under my supervision from December 2020 to February 2021.

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Submitted for Viva voce Examination held on_____.

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DECLARATION

I, **Sachin Kumar.S, (39410242)** hereby declare that the Project Report entitled, “**A Study On Inventory Management In Indian Steel Industry**” done by me under the guidance of Dr. R.Thamilselvan M.com.,M.B.A.,M.phil.,B.Ed.,Ph.D is submitted in partial fulfillment of the requirements for the award of Master of Business Administration degree.

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SACHINKUMAR.S

ABSTRACT:

A Study on Inventory management in JSW Steels Ltd. was chosen for the study because best-practice inventory management is essential to success in the competitive metals-manufacturing market for any organization. JSW Steels, being a company in the top quartile of inventory turnover tend to have no more than three to four days of raw materials on hand. A rigorous analytical approach to inventory management can be established on the basis of robust, reliable data of four years. This is done by establishing a firm grip on raw materials, work in process (WIP), and finished goods so that JSW Steel Ltd.

KEYWORDS:

ABC Analysis, EOQ Analysis, Inventory Management, Material, Steel Industry

CONTENTS

CHAPTER	TITLE	PAGE NUMBER
	ABSTRACT	i
	LIST OF FIGURES	iv
	LIST OF TABLES	v
I	INTRODUCTION 1.1 Types of inventory 1.2 Types of inventor management techniques 1.3 Industry profile 1.4 Company profile 1.5 Statement of the problem 1.6 Objectives of the study 1.7 Scope of the study 1.8 Limitation of the study	1
II	LITERATURE REVIEW 2.1 Review of literature 2.2 Theoretical review 2.3 Need for inventory control	29
III	RESEARCH METHODOLOGY 3.1 Sources of Data 3.2 Period of study 3.3Tools for analysis	48
IV	DATA ANALYSIS 4.1 ABC analysis 4.2 Economic order quantity	50
V	FINDINGS,SUGGESTIONS AND CONCLUSION 5.1 Findings 5.2 Suggestions 5.3 Conclusion	82
	REFERENCES	85

LIST OF FIGURES

Fig. No	Title	Pg.NO
1.1	Types of inventory	3
1.2	ABC analysis	5
1.3	JIT method	7
1.4	MRP system	15
2.1	Operating cycle of inventory management	38
4.1	ABC analysis (2015-2016)	51
4.2	ABC analysis (2016-2017)	52
4.3	ABC analysis (2017-2018)	53
4.4	ABC analysis (2018-2019)	54

LIST OF TABLES

Table. No	Title	Pg. NO
4.1	ABC analysis steel during	51

	(2015-2016)	
4.2	ABC analysis steel during (2016-2017)	52
4.3	ABC analysis steel during (2017-2018)	53
4.4	ABC analysis steel during (2018-2019)	54
4.5	ABC analysis steel during (2015-2016) Step-1 Step-2	55
4.6	Step-3	56
4.7	Step-4	57
4.8	Step-5	58
4.9		59
4.10	ABC analysis steel during (2016-2017) Step-1 Step-2	60
4.11	Step-3	61
4.12	Step-4	62
4.13	Step-5	63
4.14		64
4.15	ABC analysis steel during (2016-2017) Step-1	65
4.16	Step-2	66
4.17	Step-3	67
4.18	Step-4	68
4.19	Step-5	69
4.20	ABC analysis steel during (2018-2019) Step-1	70
4.21	Step-2	71
4.22	Step-3	72
4.23	Step-4	73
4.24	Step-5	74

4.25	EOQ during (2015-2016)	75
4.26	EOQ during (2016-2017)	77
4.27	EOQ during (2017-2018)	78
4.28	EOQ during (2018-2019)	80

CHAPTER-I

INTRODUCTION

1. INTRODUCTION:

Inventory management is a systematic approach to sourcing, storing, and selling inventory both raw materials (components) and finished goods (products). In business terms, inventory management means the right stock, at the right levels, in the right place, at the right time, and at the right cost as well as price. Inventory management involves the control of assets being produced for the purpose of sale in the normal course of the company's operations. Inventories include raw materials inventory, work in process inventory and finished goods inventory. The goal of effective inventory management is to minimize the total costs direct and indirect those are associated with holding inventories. However, the importance of inventory management to the company depends upon the extent of investment in the inventory. Steel Industry in India is on an upswing because of the strong global and domestic demand. India's rapid economic growth and soaring demand by sectors like infrastructure, real estate, and automobiles, at home and abroad, has put the Indian steel industry on the global map. According to the latest report by the International Iron and Steel Institute (IISI), India is the tenth largest steel producer in the world. The Indian steel industry is organized in to three categories i.e., main producers, other major producers, and secondary producers. The main producers are Tata Steel, SAIL, and RINL, while the other major producers are ESSAR, ISPAT and JVSL.

The secondary sector is dispersed and consists of:

1. Backward linkage from about 120 sponge iron producers that use iron ore and non-coking coal, providing feedstock for steel producers.
2. Approximately 650 mini blast furnaces, electric arc furnaces, induction furnaces and energy optimizing furnaces that use iron ore, sponge iron and melting scrap to produce steel
3. Forward linkage with about 1,200 re-rollers that roll out semis into finished steel products for consumer use.

1.1 TYPES OF INVENTORY:

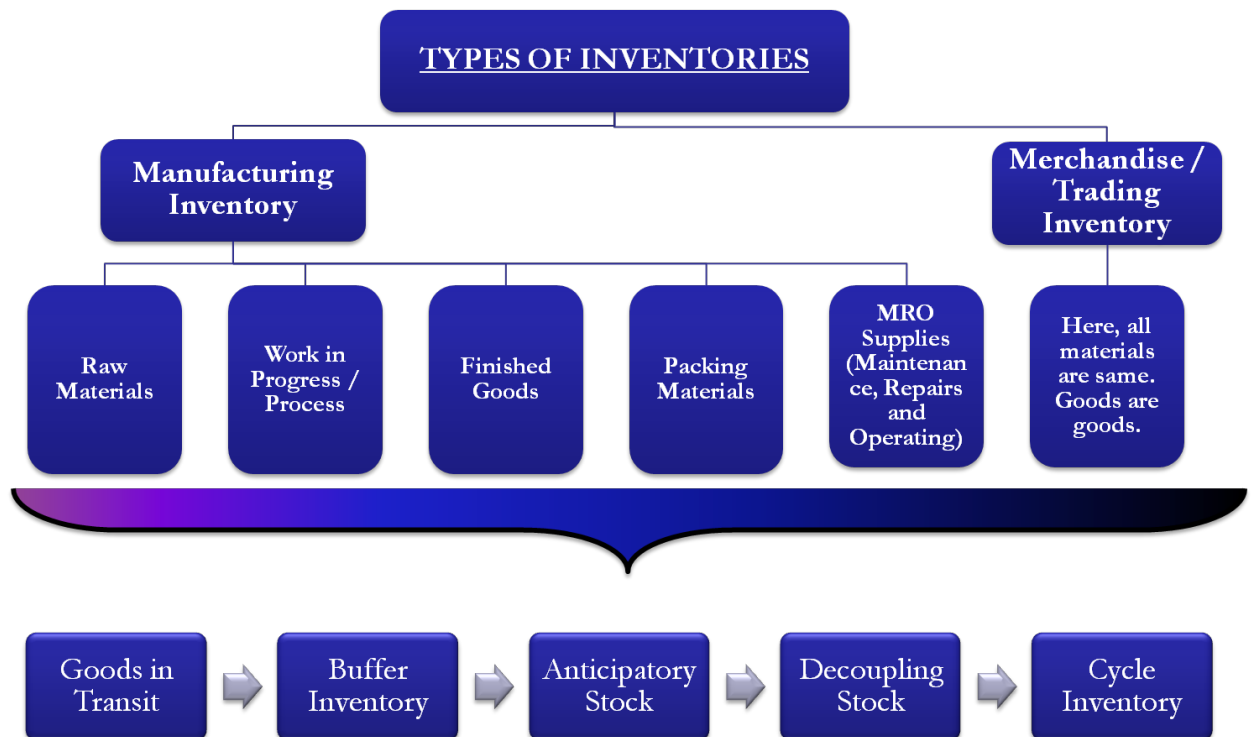


Fig:1.1

1.1.1 MANUFACTURING INVENTORY:

Manufacturing inventory, or production inventory, is all of the supplies and materials on hand meant for the manufacturing of products. Retailers and wholesalers have inventories that include only items ready to sell, or merchandise inventory. But a manufacturing company's inventory consists of goods in multiple stages of production. From raw materials on up to finished products ready to ship.

For that reason, a manufacturing company's balance sheet has three categories for its inventory: raw materials, work-in-process, and finished goods inventory.

1.1.2 RAW MATERIAL:

Raw materials inventory is all the most basic materials needed in production inventory management. Things like produce, individual food ingredients, metal, plastic, stone, chemicals, and everything else that gets worked into finished goods.

1.1.3 WORK-IN-PROCESS:

Work-In-Process inventory is whatever inventory is past the raw material stage but not yet a finished product. Work has gone into developing the raw materials, but there's still some boxes left to check before the product is ready for sale.

1.1.4 FINISHED GOODS:

Finished goods are the end of the line. They made it all the way through production and are ready to leave the nest. When a product is ready for sale and shipment, it's a finished good.

These three types of inventory are the parts that make up the whole of manufacturing inventory. But there is another type of inventory not traditionally considered part of the big three of manufacturing inventory. That's inventory packaging.

1.1.5 PACKAGING MATERIALS:

Inventory packaging is the physical inventory used to package finished goods products in preparation for their journey up the supply chain. That may be the next manufacturer, a wholesaler, or a retailer.

Packaging inventory management and packaging control are important because inventory packaging cost can quickly spin out of control. Here's how to get good at packaging control: Outsource your packaging inventory management. Using a VMI (vendor managed inventory) agreement with your packaging supplier is ideal

for most businesses. That's because most businesses are experts at managing their manufacturing inventory, not packaging inventory. By outsourcing your packaging inventory management to a third party, you spend virtually zero time managing what you're not intimately familiar with. Let someone else monitor, anticipate, and meet your fluctuating needs within agreed-upon levels.

1.1.6 MRO SUPPLIES:

MRO refers to Maintenance, repair and operation supplies. These are materials, equipment and supplies used in the production process at a manufacturing plant but are not part of the finished goods being produced.

1.2 TYPES OF INVENTORY MANAGEMENT TECHNIQUES:

- 1.ABC Analysis
- 2.Just In Time(JIT)Method
- 3.Material requirements planning(MRP)Method
- 4.Economic order quantity(EOQ)Method
- 5.Minimum safety stocks
- 6.VED analysis
- 7.Fast,slow&Non moving(FSN) Method

1.2.1 ABC ANALYSIS:

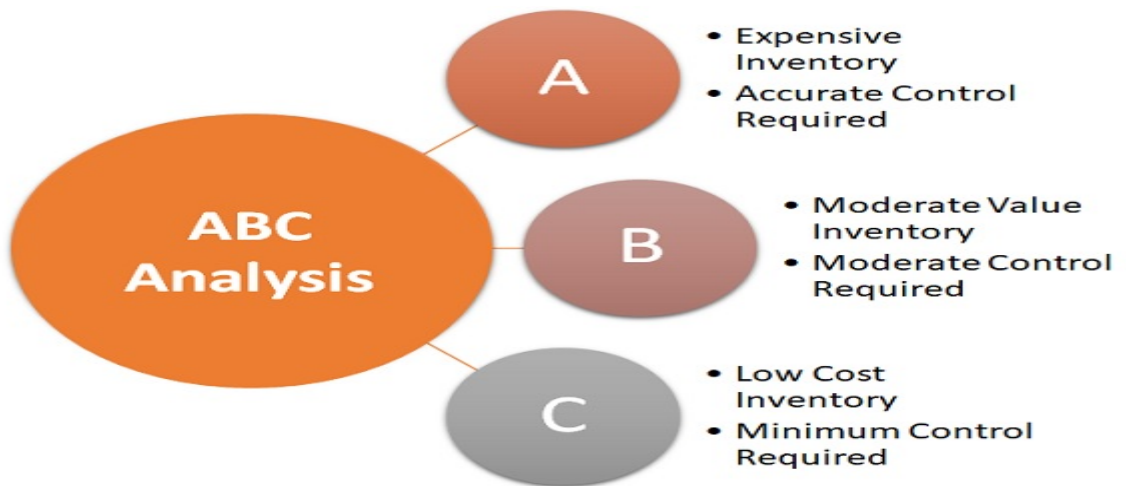


Fig:1.2

- The ABC method is an analytical method of stock control, which aims at concentrative efforts on those items where attention is needed most. It is based on the premise that a small number of the items in inventory may typically represent the bulk money value of the total materials used in production process. While a relatively large number of items may represent a small portion of the money value of stores used and that small number of items should be subject to the greatest degree of continuous control. Under this system, the materials stocked may be classified into a number of categories according to their importance i.e., their value and frequency of replacement during a period.
- The first category, we may call it the group of 'an' items, may consist of only a small percentage of total items handled but its combined value may be a large portion of the total stock value.
- The second category, naming it as group of 'B' items, may be relatively less important.
- The third category consisting of 'c' items, all the remaining items of stock may be included which are quite large in number but their value is not high.

Categories of ABC analysis In ABC analysis the items are classified in three main categories based on their respective consumption value.

1. **Category 'A' items:** The items, which are most costly and classified as 'A' nearly 10% of the total number of items stored will account for 70% of total value of all items stocked.

2. **Category 'B' items:** The items having average consumption value are classified as 'B' nearly 20% of total value. Statistical sampling is general useful to control them.

3. **Category 'C' items:** The items having low consumption value are put in category "C" nearly 70% of total number as items will account for 10% total value. Generally, these items are slow and non-moving items in the stores, which are frequently used for production process but with more quality

1.2.2 JUST-IN-TIME METHOD:

Just-in-time also known as JIT is an inventory management method whereby labor, material and goods (to be used in manufacturing) are re-filled or scheduled to arrive exactly when needed in the manufacturing process.

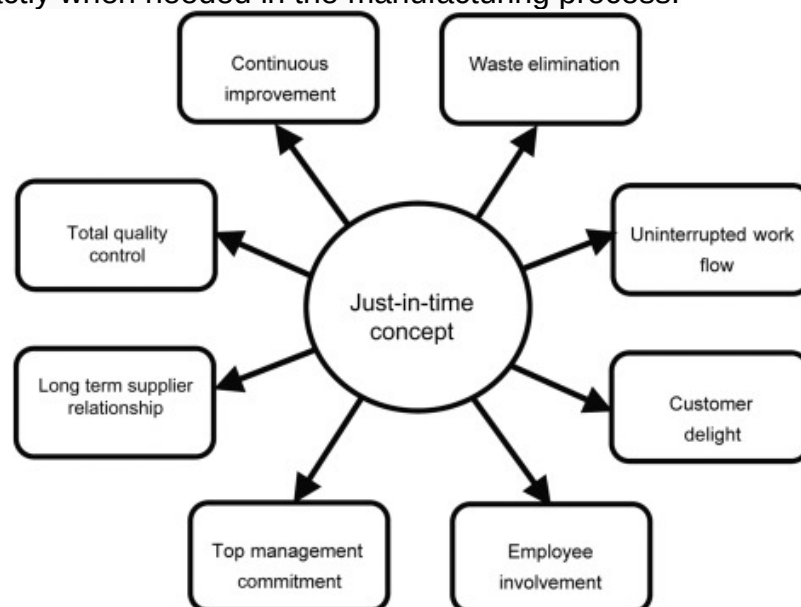


Fig:1.3

1.2.2.1 ELIMINATING WASTE:

There are seven types of waste:

- Waste from product defects
- Waste of time.
- Transportation waste.
- Inventory waste.
- Waste from overproduction.
- Processing waste.

Waste minimization is one of the primary objectives of Just In Time system. This needs effective inventory management throughout the whole supply chain. Initially, a manufacturing entity will seek to reduce inventory and enhance operations within its own organization. In an attempt to reduce waste attributed to in effective inventory management

JIT principles focus on the elimination of waste by deploying tools such as total quality management, continuous quality improvement, focused factory, reducing setup times, flexible resources, group technology layout, and pull production system

1.2.1.2 JIT PRINCIPLES:

- Reduce buffer inventory
- Try for zero inventory
- Search for reliable suppliers
- Reduce lot size and increase the frequency of orders
- Reduce purchasing cost
- Improve material handling.

Advantages of Adopting Just-In-Time include:

- Just-in-time approach keeps stock holding costs to a minimum level.
- The just-in-time approach helps to eliminate waste. Chances of expired or out of date products; do not arise at all.
- By following JIT greater efficiency and High-quality products can be derived.

- Better relationships are fostered along the production chain under a JIT system.
- Higher customer satisfaction due to continuous communication with the customer.
- Just In Time adoption result in the elimination of overproduction.

Disadvantages of Adopting JIT Systems:

- JIT approach states ZERO tolerance for mistakes, making re-work difficult in practice, as inventory is kept to a minimum level.
- A successful application of JIT requires a high reliance on suppliers, whose performance is outside the purview of the manufacturer.
- Chances are quite high of not meeting an unexpected increase in orders as there will be no excess inventory of finished goods.
- Transaction costs would be comparatively high depending upon the frequency of transactions.
- JIT may have certain negative effects on the environment due to the frequent deliveries as the same would result in higher use and cost of transportation, which in turn would consume more fossil fuels.

1.2.3 MATERIAL REQUIREMENT PLANNING:

A Material Requirements Planning (MRP) system is a planning and decision-making tool used in the production process which analyses current inventory levels Vs production capacity and the need to manufacture goods, based on forecasts. MRP schedules production as per bills of materials while minimizing inventory. The technique is computerized and looks at requirements within a fixed period.

1.2.3.1 Objectives of MRP:

1. Inventory reduction:

MRP determines how many components are required when they are required in order to meet the master schedule. It helps to procure the materials/ components as and when needed and thus avoid excessive buildup of inventory.

2. Reduction in the manufacturing and delivery lead times:

MRP identifies materials and component quantities, timings when they are needed, availabilities and procurements and actions required to meet delivery deadlines. MRP helps to avoid delays in production and priorities production activities by putting due dates on customer job order.

3. Realistic delivery commitments:

By using MRP, production can give marketing timely information about likely delivery times to prospective customers.

4. Increased efficiency:

MRP provides a close coordination among various work centers and hence help to achieve uninterrupted flow of materials through the production line. This increases the efficiency of production system.

1.2.4 MRP SYSTEM:

The inputs to the MRP system are:

- A master production schedule,
- An inventory status file and
- Bill of materials (BOM).

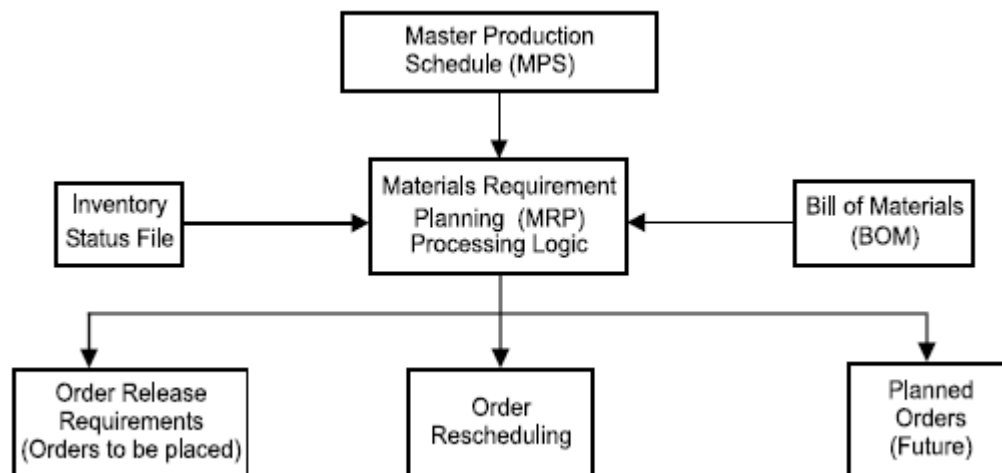


Fig:1.4

1.2.4.1 MASTER PRODUCTION SCHEDULE (MPS)

MPS is a series of time phased quantities for each item that a company produces, indicating how many are to be produced and when. MPS is initially developed from firm customer orders or from forecasts of demand before MRP system begins to operate. The MRP system whatever the master schedule demands and translates MPS end items into specific component requirements. Many systems make a simulated trial run to determine whether the proposed master can be satisfied.

1.2.4.2 INVENTORY STATUS FILE

Every inventory item being planned must have an inventory status file which gives complete and up to date information on the on-hand quantities, gross requirements, scheduled receipts and planned order releases for an item. It also includes planning information such as lot sizes, lead times, safety stock levels and scrap allowances.

1.2.4.3 BILL OF MATERIALS (BOM)

BOM identifies how each end product is manufactured, specifying all subcomponents items, their sequence of buildup, their quantity in each finished unit and the work centers performing the buildup sequence. This information is obtained from product design documents, workflow analysis and other standard manufacturing information.

Advantages of MRP:

- Inventory control. Inventory management is crucial to realizing manufacturing efficiency.
- Purchase planning.
- Production planning.
- Work scheduling.
- Resource management.
- Data management and documentation.
- Economic purchasing.

- Time-saving.

Disadvantages of MRP:

- Inaccurate or partial Bill of Materials listing from the engineering firm.
- Engineering requisition issues.
- Purchase order revisions and inaccuracies.
- Shipping and receiving errors causing inaccurate inventory levels.
- Inaccurate material inventory counts.
- Inventory adjustments.

1.2.5 ECONOMIC ORDER QUANTITY METHOD:

Economic order quantity (EOQ) is the ideal order quantity a company should purchase to minimize inventory costs such as holding costs, shortage costs, and order costs.

$$\diamond Q=\sqrt{2DS/H}$$

Q=EOQ units

D=Demand in units

S=Order Cost (Per purchase order)

H=Holding Costs (Per unit, per year)

1.2.5.1 HOLDING COSTS (H):

Holding costs are those associated with storing inventory that remains unsold. These costs are one component of total inventory costs, along with ordering and shortage costs. A firm's holding costs include the price of goods damaged or spoiled, as well as that of storage space, labor, and insurance.

1.2.5.2 ANNUAL DEMAND (D):

The annual inventory cost, otherwise known as the carrying cost, is the cumulative annual cost of holding inventory. The annual inventory cost includes the cost of the inventory's storage space, taxes paid, insurance premiums paid, bad inventory, handling and the opportunity cost of the money invested in inventory.

1.2.5.3 ORDER COSTS(S):

Ordering costs are the expenses incurred to create and process an order to a supplier. These costs are included in the determination of the economic order quantity for an inventory item.

1.2.6 MINIMUM SAFETY STOCKS:

Safety stock inventory, also known as buffer stock, is the extra inventory you order. It's the stock you need for when the inevitable happens. Whenever demand is greater than expected or there's a delay from your supplier, safety stock ensures a customer doesn't walk out the door empty-handed and disappointed.

Safety Stock= (Maximum Daily Usage x Maximum Lead Time Days)-(Average Daily Usage x Average Lead Time Days)

1.2.6.1 Primary reasons for carrying safety stock:

- Protect against unforeseen variation in supply
- Compensate for forecast inaccuracies (only when demand exceeds the forecast)
- Prevent disruptions in manufacturing or deliveries. ...
- Avoid stock outs to keep customer service and satisfaction levels high.

Advantages of safety stock:

- Wholesale pricing
- Fast fulfillment
- Low risk of shortages
- Increased Customer Satisfaction

Disadvantages of safety stock:

- Obsolete Inventory
- Potential Insurance Costs and Loss
- Tying Up Capital

1.2.7 VED ANALYSIS:

❖ V=VITAL

❖ E=ESSENTIAL

❖ D=DESIRABLE

VED analysis is an inventory management technique that classifies inventory based on its functional importance. It categorizes stock under three heads based on its importance and necessity for an organization for production or any of its other activities.

VITAL:

- “Vital” category includes inventory, which is necessary for production or any other process in an organization.
- If any such inventory is unavailable, entire production may stop.
- Therefore, order for such inventory should be beforehand.

ESSENTIAL:

- The essential category includes inventory, which is next to being vital.
- Loss due to their unavailability may be temporary, or it might be possible to repair the stock item or part.
- Ensure optimum availability and maintenance.

DESIRABLE:

- The desirable category of inventory is the least important among the three.
- Unavailability may result in minor stoppages in production
- Moreover, the easy replenishment of such shortages is possible in a short duration of time

1.2.7.1 IMPORTANCE OF VED ANALYSIS:

It is of utmost importance to any organization to maintain an optimum level of inventory. Maintaining inventory has its costs, and hence, this analysis bifurcates inventory in three parts to help in managerial decisions on inventory maintenance.

There are four types of costs to maintain stock which are:

ITEM COST:

This is the cost or price of the inventory items. It is the actual purchase value of holding stock. Therefore, it will be high with more inventory and vice-versa.

ORDERING / SET-UP COST:

The purchase of inventory involves certain costs. These may include transportation charges, packing charges, etc.

HOLDING COSTS:

After the purchase of inventory items, there are a few costs too. These may be related to storage, insurance charges of stock or inventory, labor costs associated with the handling of stock, etc. Moreover, it includes any damage, leakage, or pilferage of the stock in hand.

STOCK OUT COST:

- These costs are the result of an inventory item running out of stock. It includes loss of production due to a spare part getting out of stock. Moreover, this may delay the product sale. Also, the product itself may get out of stock. Such losses are a part of the stock out cost.
- VED analysis is a crucial tool to understand and categorize inventory according to its importance. Because of it, the management can optimize costs by investing more in the vital and essential categories of stock and lesser in the desirable category of inventory.

Advantages of Ved analysis:

- It is useful for monitoring and control of stores and spares inventory by classifying them into three categories
- Determine the critically of an item and its effect on production and other services
- It is useful for controlling and maintain the stock of various types

Disadvantages of Ved analysis:

- This method is not suitable when thousands of items are used in production.
- Vital items are purchased in bulk and hence get piled-up sometime and increases cost.

1.2.8 FAST, SLOW AND NON-MOVING (FSN)METHOD:

FSN stands for fast-moving, slow-moving and non-moving items. Essentially, this segments inventory into three classifications. It looks at quantity, consumption rate and how often the item is issued and used. Fast-moving items are items in your inventory stock that are issued or used frequently.

1.2.8.1 FAST MOVING INVENTORY:

Fast Moving Inventory which moves in and out of stock fastest and most often. It comprises less than 20% of total inventory.

1.2.8.2 SLOW MOVING INVENTORY:

Slow moving inventory moves slowly in comparison to fast moving. it comprises of 35%of the total inventory.

1.2.8.3 NON-MOVING INVENTORY:

Nonmoving inventory is the least moving portion of inventory and is dead stock. It has high as 55%-60% of the total inventory.

IMPORTANCE AND USAGE OF FSN ANALYSIS

- FSN analysis helps the management to make informed and accurate inventory decisions. It helps in the optimum utilization of scarce resources and guides the management to make the best use of money, time, and space available.
- It helps to identify the “dead stock.” The management needs to invest only as per the actual stay and consumption of that product and not make extra purchases. Also, it can identify which item is not moving at all and dispose of it at discounted rates.
- FSN analysis also helps in space management effectively. Slow-moving and non-moving category of goods can be bought only in limited quantities

to avoid jamming of storage space. Also, fast-moving goods can be stored at locations near to entry and exit points of go downs or warehouses that have clear access all the time. It would help in saving time and labor.

- This analysis can be an excellent buying guide in the case of seasonal products. The management will have a clear picture of the time of the year when a product turns into a fast-moving one from a slow or non-moving category. As a result, it can time its purchase accordingly.
- FSN analysis helps to effectively allocate monetary resources to items that are fast-moving and beneficial for the organization. As a result, it helps to avoid blocking money in the slow-moving or non-moving category of goods.

1.3 INDUSTRY PROFILE

- Steel is versatile and indispensable item. Iron and steel comprise one of the most important inputs in all sources of economy. This industry is both a basic and a core industry. The economy of any nation depends on a strong iron and steel industry in that nation history has shown that countries having a strong potentiality for iron steel products have played a predominant role in the advancement of civilization in the world. The great investment that has gone in to the fundamental research in iron and steel industry has helped both directly and indirectly many modern fields of today's science and technology.
- The rapid growth and development of steel capacity is indeed a logical corollary of any program of rapid industrialization. Steel forms the backbone of the economy, especially of any industrial country. It has backward and forward linkages, which makes steel indispensable. The vital role, which steel industry play in the growth and development of nation's economy, is undeniable.

- The importance of steel in economic activities cannot be overemphasized. Besides, steel provides large employment directly and its acknowledgement that for every direct steel employee, 15 thousand opportunities are indirectly in the linkage industries.
- Steel, a core sector industry, emerged as the backbone for industrialization in most of the countries. The index for steel production and for capita consumption of steel in a country has become measuring scales of economic growth and reconstruction of a nation.
- Steel occupies strategic position in efforts to attain a solid and self-reliant industry base. In spite of the iron and steel industry being a capital, labor energy intensive industry, subjected to rapid, up-gradations the astonishing fact is that, 85% of the metals produced in the world, is accounted by steel alone. Hence, steel is identified as an international industry, with global focus on steel making and steel technologies, emphasizing quality, production, and cost reductions.

1.3.1 FUTURE DEMAND

- Indian steel industry plays a significant role in the country's economic growth. The major contribution directs the attention that steel is having a stronghold in the traditional sectors, such as infrastructure & construction, automobile, transportation, industrial applications etc. moreover, steel variant stainless steel is finding innovative applications due to its corrosion resistive property. India is the fifth largest steel producer at the global front and struggling to become the second producer in the coming years
- **Indian steel industry outlook to 2020"** is an outcome of extensive research and conceptual analysis of the Indian steel industry. The report provides detail information on steel industry in India. The report also presents an insight into the future outlook of

various vertical industry segments, including automotive, aerospace, margin, consumer durables, power, railways, telecom, and housing. The report classifies the finished steel product market into two categories- Alloy and Non-Alloy. The report also covers information on industry-wise steel demand, overall Steel consumption, production, and trading market. Besides, it provides industry forecast for different market segment.

- Steel authority of India (SAIL)LTD has planned to enhance its hot metal production capacity from the level of 13.82 million tons per annum (MTPA) to 23.46 MTPA under its current phase of expansion and modernization to be which is expected to be completed by financial year 2019-2020
- SAIL would increase its capacity further to 26.18 MTPA. The indicative investment for current phase is about US\$ 13.28 billion. Additionally, approximately US\$ 2.21 billion has been earmarked for modernization and expansion of sail mines.
- The steel consumption in the country will surge at a CAGR of around 7% during FY 2019- 2020.
- The government has a fixed objective of increasing rural consumption of steel from the current 19.6 kg/per capita to 38kg/per capita by 2030-31.as per Indian steel association, steel demand will grow by 7.2% in 2019-20 and 2020-21.

1.3.2 GLOBAL STEEL SCENARIO:

- It is interesting to note that the world's total crude steel production grew at a much slower rate during the first half of the century and the growth rate picked up at a significance rate after II World War, with a meager production level of 28.3 MT in 1900, the production crossed the first hundred mark in 1927 (101.8 MT). The production in 1943 was 159.6 MT

and then it sharply fell to 111.6 MT in 1946. Then the growth 529.8 MT in 1968, 650.7 MT in 1972, 703.8 MT in 1974 and the highest ever production of 764.4 MT in 1979. During the 70's it witnessed one of the most severe economic crisis on account of petroleum oil. This had a pronounced impact on overall economy of the world and particularly steel industry. The world production of steel started declining to 644.4 MT in 1982. The production improved to 683.7 MT in 1983, 710.2 MT in 1984, 719.1 MT in 1985, and 714.2 MT in 1986.

- Among the top steel producing countries of the world, the USA maintained the position as the biggest steel producer until 70's, when the erstwhile USSR taken over the USA and has remained on the top of the world since then. In the process Japan also developed its steel Industry significantly and took over the USA to become the first biggest producer in the world.

1.3.2.1 GLOBAL PERSPECTIVE IN STEEL:

World Demand:

- Total demand for steel in the world is expected to grow at an annual rate of 1.7% between 1935 and 2000 according to a study by chase econometrics. According to this estimate, total demand in the year 2000 is expected to be 913 MT of crude steel. The world growth rate of 1.7% per annum disguises dramatic differences in steel demand growth. Within the non-socialistic world, steel demand in advance industrial countries at a whole are expected to grow at 0.6 % annual rate following a 2.2% annual rate between 1974 and 1984. Steel demand in less developed countries as a whole is expected to grow at a 5.5% annual rate up to 2000 following a 3.1% annual growth rate between 1974 and 1984. Within the centrally planned economies category, the Eastern Europe erstwhile USSR region may have a 0.3% annual steel demand growth during the period 1974–84. Steel Demand rate up to the end of this century after a 7.8% per annum growth during 1974 – 84.

1.3.3 THE INDIAN STEEL SCENARIO

- Steel consumption in India has gone up during the past decade from the level of 10 MT (1993-94). Similarly pig iron consumption has gone up from 1.4 MT to about 1.8 MT. The past decade was not significant only for higher growth rate of iron and steel consumption has gone up from 1.4 MT to about 1.8 MT. The past decade was not significant only for higher growth rate of iron and steel consumption in the country compared to previous few decades (during 1960-61 steel consumption in the county has gone up from 3.6 MT to 8.9 MT only), but some vital events have also taken place which brought an overall change in the Indian Steel Scenario.
- During the 80's decade, all main steel producers have taken a number of steps to modernize the technology and products of their steel plants. A number of major secondary products have entered in the integrated steel production activities in a big way. Some of them have also entered into sophisticated production area of higher quality cold rolled sheets and coated sheets. The recent policy of the government of India for liberalizing the Indian iron and steel sector from age- old control and equalized freight system has changed the basis structure of the industry.
- Thoroughly. The policy of liberalized import has also put the Indian steel industry open to global competition.

1.3.4 DEVELOPMENT OF STEEL INDUSTRY IN INDIA:

- The development of steel industry in India should be viewed in conjunction with the type and system of government that had been ruling the country. The production of steel in significant quantity started after 1900. The growth of steel industry can be conveniently studied by dividing the period into pre and post-independence era

(or before 1950 and after 1950). The total installed capacity during the pre-Independence era was 1.5 MT/ year, which has risen to about 9 MT of ingot by the 70's. This is the result of the bold steps taken by the government to develop the sector.

1.3.5 SWOT ANALYSIS OF INDIAN STEEL INDUSTRY:

STRENGTHS:

- India has been bestowed with high reserves of basic raw materials for steel making. The country has about 12 BT of iron ore; 25 BT of cooking coal; 11.6 BT of manganese ore; 9.75 MT of flux grades limestone and 1.7 BT of dolomite. Except high ash content in coal, all minerals are of most suitable quality and hence then India has been comfortably placed when compared to any other country in the world India has large number of qualified and experienced metallurgists, engineers and technicians, who can engineer, adopt and assimilate cost effective technologies for making and shaping of steel Maintaining an edge in cost and quality competitiveness in the export markets, low labor cost (15% of the steel) and well trained human resource as well as good quality inputs, is one of the major strengths of the Indian Steel Industry.

WEAKNESSES:

- High capital, labor and energy intensive. Industry establishment involves long gestation period.
- Slow growth rate in domestic as well as international demand..
- Total dependence of scrap, resulting in hug scrap imports further up trend in scrap prices to reduce profitability
- Poor capacity utilization of steel units due to inadequate infrastructure facilities and inadequate short term and long-term planning
- High and rising power costs and low availability of power are becoming a burden to steel- industry.

OPPORTUNITIES:

- Per capita consumption of steel in India is less than 30 kg, which is less than one fifth of the world average, this means huge potential for steel consumption as well as latent demand.
- Presently the sector is almost entirely open with no licensing, pricing distribution and import control. There are no restriction on capacities
- The government has made changes in the industrial policy. Steel production which has earlier restricted for public sector also. Further there are no restrictions on capacities.
- Huge export potential to South East Asian Countries, Gulf and neighboring countries exist being cost and quality competitive

THREATS:

- World steel industry is ploughed by recession due to the following reason: matured markets for used industries like automobiles, appliance, and continuous effort to cut costs, capacities, jobs and striving for more corporate exports.
- Severe threat of technical obsolesces due to rapid development in secondary steel making technologies, exists in Indian steel industry.
- Diseconomies of scale of operation by various mini steel plants and inadequate investment opportunities for modernization and up gradation due to high cost of inflation and rising interest and financing rate posing a major threat to the industry as a whole.

1.3.6 TYPES OF STEEL PLANTS IN INDIA:

The major types of steel plants:

1. Integrated Steel Plants.
2. Mini Steel Plants.
3. Re-rolling Steel Plants.
4. Alloy & Special Steel Plants.

CONCLUSION:

Overall industrial development of the country will necessarily call for a sound infrastructure development particularly in the area in transport, communication, and civil construction etc., this call for substantial consumption of steel, particularly non-flat products.

1.4 COMPANY PROFILE:

JSW steel ltd, the flagship company of the jsw group, is an integrated steel manufacturer in India with an installed steel-making capacity of 18 million tonnes per annum(MTPA).

JSW GROUP:

The constituent companies of the Group are:

- JSW steel ltd
- JSW energy ltd
- JSW cement ltd
- JSW Ispat steel
- JSW holdings ltd
- JSW infrastructure& logistics ltd

Vision, mission and values:

- JSW steel limited believes in creating sustainable growth while balancing utilization of natural resources and social development in its business decisions.

- It also believes in pursuing its business objectives ethically, transparently and with accountability to its stakeholders across the value chain.
- JSW is commitment to promote integrated responsible behavior and value for social and environmental well-being.
- JSW'S commitment to do business responsibly is built into the core values of the company to conduct every aspect of business responsibly and sustainably.

It relies on;

- A dynamic leadership
- Adherence to core values
- A well –articulated Enterprise Risk Management framework.

Inherent Strengths:

- Survived through turbulent times of industry.
- BIS Standard compliance quality products.
- Strong core technical team and low employee turnover.
- Capacity for flexible designs and small batch sizes.
- Efficient use of infrastructure.

Opportunities:

- Market value added products through innovation and development.
- Good growth prospects for galvanized towers for power transmission and telecom.
- A strong growth in infrastructure industry.
- Growth in housing sector expected to continue.
- Increased export demand for galvanized products and reduction of tariff barriers.

Strategies:

Taking advantages of liberalization policies, the group has devised strategies to

- Identify the thrust areas and steels and bearings
- Diversify into infrastructure areas
- Add and expand its existing plant capacities.
- Maintain its global standards of excellence.
- Emerge as a key player both in domestic and international markets.

OBLIGATIONS:**Towards Shareholders:**

- To ensure growth projection are matched by performance to build confidence and goodwill.
- To ensure a reasonable annual dividend commensurate with company's performance profits and future plans for investments

Towards Customers and Dealers:

- To provide a quality product and spread awareness amongst them for competitive selling in buyers market backed by world class customer service.

Towards Employees:

- To develop and upgrade their skills through in – house and external training programs enabling careers progressions and advancement.
- The inputs for upgrading managerial and operational skills are provided to meet present and future challenges.

Towards the community:

- To ensure environmental protection in and around plant operational areas and promote development of community by participating in several activities.

1.3.1 AN EXTENSIVE PRODUCT RANGE:

The products of JSW steel Products

- Hot Rolled
- Cold Rolled
- Galvanized
- Galvalume
- Color coated products
- Neo steel TMT bars
- Wire rods
- Special steel

1.3.2 NEED TO HOLD INVENTORIES

Martin and Miller identified three general motives for holding inventories

TRANSACTION MOTIVE:

- This refers to the need of maintaining inventory to facilitate smooth production and sales .

PRECAUTIONARY MOTIVE:

- Precautionary motive for holding inventory is to provide a safeguard when the actual level of activity is different than anticipated. This inventory serves when there is unpredictable changes in the demand and supply forces.

SPECULATIVE MOTIVE:

- This motive influences the decision to increase or decrease the levels of inventory to take the advantage of price fluctuations.

1.5 STATEMENT OF THE PROBLEM

- The steel industries are affected by so many problems such as, High cost of inventory, consistent stock outs, low rate of inventory turnover, High amount of obsolete inventory, High amount of working capital, High cost of storage, Spreadsheet data entry errors and lost customers.
- The purpose of this study is to research what are the factors influencing inventory management in steel company.

1.6 OBJECTIVE OF THE STUDY

- To study about the inventory management pattern of JSW Steel
- To analyse its inventory management methods with help of ABC analysis.
- To study about the ordering levels for the important components of inventory.
- Almost 90% of the working capital of a business is invested in inventories. The management should do proper planning on how to purchase, handle, store, and account with inventory management software.
- To avoid both over stocking and under stocking of inventory.
- To eliminate duplication in ordering stock.

1.7 SCOPE OF THE STUDY

- Inventory management is a simple concept-don't have too much stock and don't have too little. Since there can be a substantial cost involved in staying above and below the optimal range, careful inventory management can make a huge difference in the right balance can be quite a complex and time-consuming task without the right technology.
- Inventory management is very important for "JSW steel ltd". It enables the business to meet or exceed expectations of the customers by making the products readily available.

- The scope of the study includes the ABC Analysis of Raw Materials, work in progress and finished goods for four financial years.
- This study provides insight to the management of high value items and also brings attention of management towards movement of 'A' class items over period of 4 years.

1.8 LIMITATIONS OF THE STUDY

- To analyze A, B, C and EOQ
- Detail study about all the material was not possible because of time limit.
- Inventory value of plant& stores.
- The study of receiving process of material, issue process, dispatch process inventory controls the process for all items.

CHAPTER-II

REVIEW OF LITERATUR

2.1 REVIEW OF LITERATURE

Prem Kumar & Asit K Ghosh (1991) has viewed that inventories are basically stock of resources held for the purpose of future production or sales. Inventories may be regarded as an idle resource which has an economic value. Better management of inventories would help in the release of capital for use elsewhere, productively.

Sudhindra Bhat (2008) in his book 'Financial Management' explains inventory management as an important area of working capital management, which plays a crucial role in economic operation of the firm. Maintenance of large size inventories by a firm required a considerable amount of funds to be invested on them. Inventory management has to be efficient and effective in order to avoid unnecessary investment and inadequate investment.

Udhaya Kumar T S (2010) explains that by managing inventory it becomes easier for the organization to meet the profit goals, help shorten the cash cycle, avoid inventory shortage and avoid excessive carrying costs for unused inventory. According to his study, companies need to get smart about inventory. Boosting financial performance is an added benefit that tends to come from better inventory management practices.

Srinivas Rao Kasisomayajula (2014) An analytical study was conducted on "Inventory Management in Commercial Vehicle Industry In India". In his study, he concluded that all the units in the industry have significant relationship between Inventory and Sales. Proper management of inventory is important to maintain and improve the health of an organization. Efficient management of inventories will improve the profitability of the organization.

Tyagi (2014) Inventory management is considered as major concerns of every organization. In inventory holding, many steps are taken by managers that result a cost involved in this row. This cost may not be constant in nature during time horizon in which perishable stock is held. To investigate on such a case, proposes an optimization of inventory model where items deteriorate in stock conditions.

Esmaeili (2014) says In this paper, based on a real-world case study for a municipal district in Tehran, a multi objective mathematical model is developed for the location-distribution problem. The proposed model considers the role of demand in an urban area, which might be affected by neighbor wards. Integrating decision making

process for a disaster helps to improve a better relief operation during response phase of disaster management cycle.

Chatterjee and Chakraborty (2014) say This paper deals with the application of six most potential preference ranking methods for selecting the best FMS for a given manufacturing organization., it is observed that although the performances of these six methods are almost similar, ORESTE method slightly outperforms the others.

Ulrich and Pearson (1998) It is particularly applicable to those situations where the decision maker is unable to provide crisp evaluation data and attribute weight. Introduce approaches for the integration of the Quality Function Deployment method as well as feedback with system components for computer aided product development. The integration is based on information models representing product, process and factory information.

Pastore and Martin (2012) study was to examine students' perceptions of designing and developing mobile based instructions by interviewing and surveying of graduate students. Results of the survey and qualitative data analysis indicated that usability was a key issue on the mobile device. Users enjoyed quick access, good organization, user control, single column layouts, and large links/buttons. These findings contribute to the literature base on the design and development of mobile based instruction.

Norman E (2012) discusses, while existing factors identified in the literature were found to be present in the context of today's design program, the critical perspective of this study recontextualized these factors, along with the identification of new or underrepresented factors.

Gray (2013) A design literature discusses the role of the studio and its related pedagogy in the development of design thinking. Scholars in a variety of design disciplines pose a number of factors that potentially affect this development process, but a full understanding of these factors as experienced from a critical pedagogy or student perspective is lacking. In this study, explains the experiences of six first-year design students were examined as they evolved in their conceptions of design.

Angelo and Fernandes(2012) aims to analyze, through a case study called Researching the Value of Project Management, the relations of the constructs of this

conceptual model and to show how they interfere with the organizational values, possibly in programs conducted by a government agency, from the perspective of the senior management directly involved.

Halaweh M (2013) The term emerging technology (ET) has been frequently used by IT professionals and academics. However, little research has shed light on this term and specified its characteristics and what it means aims to define and conceptualize the characteristics of ET.

Strub and et al (2013), Today's industry projects and extensive literature suggest the importance of customer integration for companies' innovation success. In this exploratory study, build on established customer role concepts to study the status quo of customer integration in industry, as well as reservations against the roles and negative experiences from customer integration projects. The study reveals a gap between reservations and actual negative experiences in losing know-how, as well as a positive effect of experience in customer integration on perceived benefits for the company.

Antonelli and et al (2013) aims to identify Information Technology benefits in individual work. With technologies fully implemented, greater satisfaction was observed for all constructs of the survey, with statistically significant differences. When comparing age, it was found that younger users were more satisfied with the benefits of technology. Concerning the number of employees, small business users were less satisfied with Information Technology

Alderete (2013) presents an econometric model to determine whether an SME (Small and Medium Sized Enterprise)'s probability of outsourcing depends on their levels of innovation and information and communication technology use. The model predicts that the level of innovation of an SME will significantly influence its probability of outsourcing. Besides, it stresses the negative incidence of the information and communication technologies (ICT) access on the outsourcing decision.

Didonet and Díaz, (2012) explains, the supply chain management studies have verified that integration and collaboration in the supply chain can provide important benefits to the companies involved. Among these benefits are added value, the creation of efficiencies and client, which are represented by the reduction in

inventories, improvements in service delivery and quality and shorter product development cycles.

Zabala (2012) investigates whether decisions considered as common in new product development literature are also valid in a region characterized by traditional industries. The author aims to link the theoretical and empirical fields in the context of new product development and product innovation management.

Leber (2014) reports the results of a survey on the use of innovation management techniques with the potential to improve effectiveness of new product development, and customer satisfaction. Failure mode and effects analysis was found as the most applied IMT in Slovene firms with the highest perceived utility potential to reduce development costs and improve customer satisfaction.

Nezhad (2013) employed the decision on belief (DOB) approach for fault detection in univariate process control. The concept of DOB and its application in decision making problems were introduced, and then methodology of modeling fault detection in statistical process control by DOB approach was discussed.

Dou (2014) paper is committed to design a logistics industry development policy model based on system dynamic to simulate the policy measures which promote region economic and logistics efficiency. The interaction between logistic industry development policy and economy needs to be investigated and the influence degree of logistic efficiency affected by industry policy needs to be identified too.

Jha (2012) presents an overview of new approaches in rapid product development in production networks from design points of view. Due to evolution of production networks, it has become possible to obtain the mass production within a key short time, using emerging technology that affect the speed and efficiency of product development.

Cheng (2013) proposes a multi-objective production planning optimization model based on the point of view of the integration of production planning and control, in order to achieve optimization and control of enterprise manufacturing management.

Babazadeh(2012) studies a multi-period, multi echelon and multi-product integrated forward-reverse logistics network under uncertainty. First, an efficient complex mixed-integer linear programming (MILP) model and then stochastic counterpart of the

proposed MILP model. Internal rate of return (IROR) method as a decision-making tool receives widespread use and acceptance in economic analysis.

Ahmad and Khaldoun (2011) research aim at presenting a realistic approach for resolving the multiple rate of return (MROR) problem. The key advantage of the proposed approach is that it reflects real life opportunities and its decisions are consistent with worth methods as well as with other approaches.

Mandahawiand et al (2012) presents a process improvement study applied at a local paper manufacturing company based on customized Lean Six Sigma methodologies. The DMAIC (Define, Measure, Analyze, Improve, and Control) project management methodology and various lean tools are utilized to streamline processes and enhance productivity.

Heskett(2009) examines the influence of major economic theories in shaping views of what constitutes value as created by design system. Its focus on markets and prices as set by market forces are believed to solve all problems if left free from government interference.

Kim and Kang (2008), identifies the critical factors of cross-functional cooperation for design teams in new product development. The empirical research available defines eleven critical success factors for the achievement of effective cross-functional teamwork with design teams in NPD and provides evidence of the positive relationships of these factors with cooperative work performance.

Vendanand Sakthidhasan (2010) addresses the application of lean manufacturing concepts to the continuous production sector with a focus on the motor manufacturing industry. The goal of this research is to investigate how lean manufacturing tools can be adapted from the discrete to the continuous manufacturing environment.

Berrah and François (2012) paper deals with the wide issue of overall performance expression of a system made of interacting entities. Supply chain being a network o interconnected business entities, it is proposed to consider it as a system of systems. Because system behavior depends on process dynamics, the performance of any company of the SC highly depends on the performance of its processes.

Finger S and Dixon (1990) says that formal design research seems to have begun in the 1960's, with so-called "first generation" models used to attempt to find generic

optimization routines that could be applied to any type of problem. The architectural models tended to include cognitive processes, while engineering models attempted to define stages in the design process.

Forlizzi (2008) introduces Product Ecology as a theoretical design framework to describe how products evoke social behavior, to provide a roadmap for choosing appropriate qualitative research methods and to extend design culture within by allowing for flexible, design-centered research planning and opportunity-seeking. This product-centered framework is illustrated as a method for selecting a set of design research methods and for working with other research approaches that study people in naturalistic settings.

2.2 Theoretical review

2.2.1 MEANING OF INVENTORY

- Inventory is a list for goods and materials, or those goods and materials themselves, held available in stock by a business. It is also used for a list of the contents of a household and for a list for testamentary purpose of the possessions of someone who has died. In accounting inventory is considered an asset

2.2.2 STORES & SPARES

- The level of four kind of inventory depends upon the nature of the business. Supplies include office and cleaning materials like soap, brooms, oil, light, blubs etc. these materials do not directly enter production, but are necessary for production process.

2.3 NEED FOR INVENTORY CONTROL

2.3.1 Transaction motive:

- Every firm has to maintain some level of inventory to meet the day-to-day requirement of sales, production process, customer demand etc. In the finished goods as well as raw material are kept as inventories for smooth production process of the firm.

2.3.2 Precautionary motive:

- A firm should keep some inventory for unforeseen circumstances also like loss due to natural calamities in a particular area, strikes, lay outs etc so the firm must have some finished goods as well as raw-materials to meet circumstances.

2.3.3 Speculative motive:

- The firm may be made to keep some inventory in order to capitalize an opportunity to make profit due to price fluctuations.

2.4 BASIC REASONS TO KEEPING AN INVENTORY:

There are three basic reasons for keeping an inventory:

1.TIME:

The time lags present in the supply chain, from supplier to user at every stage, requires that you maintain certain amount of inventory to use in this “lead time”.

2. UNCERTAINTY:

Inventories are maintained as buffers to meet uncertainties in demand, supply and movement of goods.

3.ECONOMIES OF SCALE:

Ideal condition of “one unit at a time at a place where user needs it, when he needs it “principle tends to incur lots of costs in terms of logistics. So bulk buying, movement and storing bring

2.4.1 Inventory management involves:

- Inventory management is the active control program which allows the management of sales purchases and payment.
- System and processes that identify inventory requirements, set targets, provide replenishment techniques and report actual and projected inventory status.
- Inventory management helps providing a good understanding ground and the capacity to control financial costs.
- The Inventory management will control operating costs and provide better understanding.

2.4.2 OPERATING CYCLE OF INVENTORY MANAGEMENT

- Operating Cycle is the time duration to convert sales after the conversion of resources into
- invention, into sales there is difference between current assets and fixed assets. A firm required many years to recover initial invests in fixed assets such plant and machinery or land buildings or furniture and fixtures etc which in usually less than a year.

- The operation cycle can be said to be the heart of the working capital. The need for
- working capital or current assets cannot be over emphasized as already observed. The main
- motive of many business firms is to achieve maximum profits, which can be earned depending
- upon the magnitude of the sales among other things. However, sales do not convert in to cash
- instantly. There is invariable time lag between sale of goods and receipts of cash. Therefore, the need of working capital in the form of current assets to deal with the problem arising good sold.
- Therefore, sufficient working capital requires sustaining sales activity. Technically this is referred to as the operating the cash cycle. The continuous flow form cash to supplies to inventory to accounts receivable and back into cash what is called operating cycle.

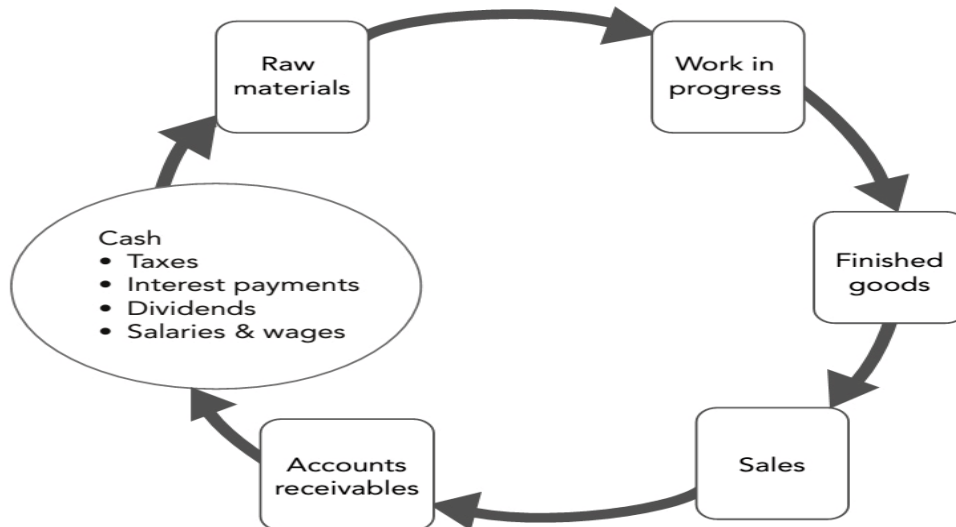


Fig:2.1

2.4.2.1 The operating cycle of manufacturing company has three phases namely

1. Acquisition of resources

2. Manufacturing products

3. Sale of product

Acquisition of resources:

- In the phase first operating cycle, include phases of raw materials, fuel & power etc., which are totally required or manufacturing product

Manufacturing products:

- In the phase 2 of the operating cycle includes conversion of raw material in to work-in progress and the work in progress is converted into finished goods.

Sale of product:

- In the phase 3 of the operating cycle may sale the product either for credit is made to customers.

2.4.3 REASONS AND BENFITS OF INVENTORY:

- The optimal level to maintaining inventory is subjective matter and depends upon the features of a particular firm.

2.4.3.1 Trading firm

- In case of a trading firm there may be several reasons for holding inventories because of sales activities that should not be interrupted more over it not always possible to procure the good whenever there is a sales opportunity there is always a time gap required between purchase and sale of goods. Thus trading concern should have some stock of finished goods in order to undertake sales activities independent of the procurement schedule.
- Similarly, a firm may have several incentives being offered in terms of quantity discounts or lower price etc. by the supplier of goods. There is trading concern inventory helps in a de-linking between sales activity and

also to capitalize a profit of opportunity due to purchase made at a discount will result in lowering the total cost resulting in higher profits for the firm

2.4.3.2 Manufacturing firm

- A manufacturing firm should have inventory not only of the finished goods, but also of raw materials and work-in-progress for following reasons.

2.4.3.3 Uninterrupted production schedule

- Every manufacturing firm must have sufficient stock of raw materials in order to have the regular and uninterrupted production schedule. If there is stock out of raw materials in order to have the regular and uninterrupted production schedule. If there is stock out of raw material at any stage of production process then the whole production may come to a halt. This may result in customer dissatisfaction as the goods cannot be delivered in time more over the fixed cost will continue to be incurred even if there is no production.
- Further work-in-progress would let the production process run smooth. In most of manufacturing concerns the work in progress is a natural outcome of the production schedule and it also helps in fulfilling when some sales orders, even if the supply of raw-materials have stopped.

2.4.4 ESSENTIALS OF INVENTORY CONTROL

- The important requirements of inventory control are:
- A firm needs inventory control system to effectively manage its inventory.
- Proper classification of materials with codes, material standardization and simplification.
- The operation of a system of internal check to ensure that all transactions involving material and equipment are checked by properly authorized and independent persons.
- The operation of a system of perpetual inventory so that it is possible to determine at any time, the amount and value of each kind of material in stock.

- A suitable method of valuation of materials is essential because it affects the cost of jobs and the value of closing stock of material.

Advantages of Inventory Control

- ❖ The following are suggested advantages:
- ❖ Eliminates wastages in use of material.
- ❖ It reduces the risk of loss from fraud and theft.

Disadvantages of Inventory Control

Every firm has to maintain optimal level of inventories. It not the following will be the result in form of losses.

- ❖ **Opportunity cost:**

Every firm has to maintain inventory for that some investment is needed known as opportunity cost and handle the investment in inventory are more the funds are blocked up with inventory.

- ❖ **Excessive inventories:**

It will lead to firm losses due to excessive carrying costs the risk of liquidity. It is also referred as danger level.

- ❖ **Inadequate Inventory:**

It is another danger which results in production hold-up and failure to meet delivery commitments. Inadequate raw materials and work-in-process inventories will result in frequent production interruptions. If finished goods are not sufficient customers may shift to competitors.

- ❖ **Danger due to physical deterioration:**

It is one of the reasons with the inventories due to maintaining stocks at high levels they will be deteriorated due to passage of time, sometimes due to mishandling or improper storage facilities

2.4.5 Costs involved in Inventory

Every firm maintains inventory depending upon requirement and other features of firm for holding such inventory some cost will be incurred there are as follows.

2.4.5.1 Carrying Cost

- This is the cost incurred in keeping or maintaining an inventory of one unit of raw materials, work-in-process or finished goods. Here there are two basic cost involved.

2.4.5.2 Cost of Storage

- It includes cost of storing one unit of raw materials by the firm. This cost may be for the storage of materials. Like rent of spaces occupied by stock, stock for security, cost of infrastructure, cost of insurance, and cost of pilferage, warehousing costs, handling cost etc

2.4.5.3 Cost of Financing

- This cost includes the cost of funds invested in the inventories. It includes the required rate of return on the investments in inventory in addition to storage cost etc. The carrying cost include therefore both real cost and opportunity cost associated with the funds invested in the inventories.
- The total carrying cost is entirely variable and rise in directly proportion to the level of inventories carried.
- $\text{Total carrying cost} = (\text{carrying cost per unit}) \times (\text{Average inventory})$

2.4.5.4 Cost of Ordering

- The cost of ordering includes the cost of acquisition of inventories. It is the cost of preparation and execution of an order including cost of paper work and communicating with the supplier.
- The total ordering cost is inversely proportion to annual inventory of firm. The ordering cost may have a fixed component, which is not affected by the order size: and a variable component, which changes with the order size.

- $\text{Total Ordering Cost} = (\text{No of orders}) \times (\text{cost per order})$.

2.4.5.5 Cost of Stock out

- It is also called as hidden cost. The stock out is the situation when the firm is not having units of an item in stores but there is a demand for that item either for the customers or the production department. The stock out refers to zero level inventories. So, there is a cost of stock out in the sense that the firm faces a situation of lost sales or back orders. The stock outs are quite often expensive.
- Even the good will of firm also be affected due to customers dissatisfaction and may lose business in case of finished goods, whereas in raw materials or work in process can cause the Production process to stop and it is expensive because employees will be paid for the time not spent in producing goods.
- The carrying cost and the ordering cost are opposite forces and collectively. They determine the level of inventories in a firm.
- $\text{Total Cost} = (\text{Cost of items purchased}) + (\text{Total Carrying and ordering cost})$.

2.4.5.6 Valuation of Inventory

- The methods of valuing inventory are combination of the actual cost and replacement cost plans. The chief advantage of the cost or net realizable value rule is that it is conservative. Hence the methods of valuation of inventory are quite independent of system of pricing.
 - In balance sheet closing stock is shown under current assets and it also credited to manufacturing or trading accounts. The inventories are valued on the basis as follows:
- ❖ **Cost of raw materials** in stock may include freight charges and carrying cost. But such cost should not exceed market price.

- ❖ **Work - in - process** is generally valued at cost, which includes cost of materials, labor. And the proportionate factory overhead, as it is reasonable according to degrees of completion
- ❖ **Cost of finished goods** would normally to the total or full cost it includes prime cost-plus appropriate amount of the overhead. Selling and distribution cost is deducted on the other hand work in progress may be valued at work in progress may be valued at work cost, marginal cost, prime cost or, even at direct materials.

Purchase & stores procedure:

- In inventory management the purchase department store department plays a major role to be the effective inventory there must be cooperation of various departments such as purchase receiving and inspection stores production and stock control departments.
- The methods of valuing inventory are combination of the actual cost and replacement cost plans. The chief advantage of the cost or net realizable value rule is that it is conservative. Hence the methods of valuation of inventory are quite independent of system of mincing. In balance sheet closing stock is shown under current assets and it also credited to manufacturing or trading account.

The main functions of each department are as follows:

Purchase Department:

- It is responsible for purchase of all necessary goods of proper quality to produces, without interruption to supply the finished goods.
- It receives purchase requisitions.
- Invites quotations or tenders from suppliers with desired quality.
- Issue purchase orders to the selected supplier.
- Certify the quality and quantity of order received in specified tim

Material Cost:

- Materials cost of a job or cost unit can be ascertained by multiplying the quantity consumed for the job or cost unit by the price of the materials. For ascertaining the quantity consumed for each job or cost unit we have devised material requisition which will indicate the quantity required for the job and the job number against which the material cost will be charge directly.
- For indirect material issued the material requisition will not indicate the job number but the cost center number will be indicated for charging to relevant cost center as indirect materials.

Thus in order to ascertain material cost.

- Make valuation of purchase.
- Make use of proper valuation of material issue and closing stock following different method such as, FIFO, LIFO WEIGHTED AVG. Etc.
- The purchase price of material is directly obtained from the suppliers receives and have to be issued to production before the invoice of materials is received.
- The rate per unit, total price of the item as shown in the purchase order plus sundry charges such as delivery and forwarding charges sales tax, duty etc, may be borne by suppliers, governments-controlled prices by notifications, suppliers, catalogues and circulars may be valuable guides for obtaining rates of materials.
- Delivery charges may be estimated with reference to the kind of transport with charges incurred. The price may also include sales tax, excise duty, freight etc., so the total cost and rate per unit can

be computed and entered in the stores received registered and posted to stores ledger for the issue of material to production.

- In some cases material needs adjustment for any discount allowed charges for transport containers etc.
- Discounts may be like trade discounts quantity discount, cash discounts etc. Transportation and storage costs may not include the cost of air, sea on land transport and other stores costs, where the purchaser has to bear the costs. Cost of containers with regarded may not make a separate charge because of non refundable and also sales tax, excise duty, insurance etc., all the items are added to Purchase price.

Receiving and Inspection Department

- Receiving all raw materials and other supplies from various suppliers.
- Verify items by count, weight etc., and report any shortage Inspect materials and supplied as to quality by analyzing them suitably.
- Inform the purchasing department and accounts department all facts that may require adjustment with vendor.
- Analyze and give them the code depending up on the type of materials.

Stores keeping Department

- Check and accept all materials form the received department.
- Identity each material received with the stock list, check the code number and place in the respective bins.
- Issue materials and supplies for use upon presentation of authorized requirement.
- Record quantities received and issued on bin lards or stock ledger cards consisting the perpetual inventory records.

Production Department:

- Make out materials requirement note i.e. requisition of requisite quantity and quality of materials at the right moment so the all materials may be available without delay on production.

- Check and verify that the materials of requisite quantity and quality have been received and charged to production.
- Keep proper records of materials received and their progress through different operations or progress.
- Prepare materials return note for excess materials.
- Prepare materials transfer note to cover any transfer of materials.
- Prepare report on scrap for reporting to management.

Inventory Control Department

- It may be a subdivision of the cost accounting department, although in many concerns, it is a part of the stores keeping department.
- It keeps perpetual inventory records.
- Adjust the stock on receipt of the properly authorized adjustment notes.
- Prepare weekly or monthly, statement of receipts, issue, balance and average consumption of materials both in terms of quantity and value.

CHAPTER-III
RESEARCH METHODOLOGY

3.RESEARCH METHODOLOGY:

3.1 SOURCES OF DATA:

The study is based on secondary data. Secondary data has been collected from various sources like research papers, reports published by India Brand Equity Foundation and from annual reports of the sample unit and to supplement the data different publications, various books, journals and different websites related to steel industry have been used for better reliability.

3.2 PERIOD OF THE STUDY:

The study period covers from Jan 2015 to December 2019

3.3 TOOLS FOR ANALYSIS

- ❖ ABC analysis
- ❖ EOQ

3.1.1 ABC ANALYSIS:

- ❖ ABC analysis is an inventory categorization technique.
- ❖ A-items with very tight control and accurate records.
- ❖ B-items with less tightly controlled and good records
- ❖ C-items with the simplest controls possible and minimal records

3.1.2 ECONOMIC ORDER QUANTITY:

EOQ is the ideal order quantity a company should purchase to minimize inventory costs such as holding costs, shortage costs, and order costs.

CHAPTER-IV
DATA ANALYSIS AND INTERPRETATION

4.1ABC ANALYSIS FOR STEEL DURING 2015-2016

Table 4.1

CLASS	QUANTITY	%OF QUANTITY	%OF VALUE
A	295562	77%	78%
B	64299	11%	12%
C	22276	12%	10%

Source: Published Annual Reports of JSW Steel Ltd

ABC analysis GRAPH-1

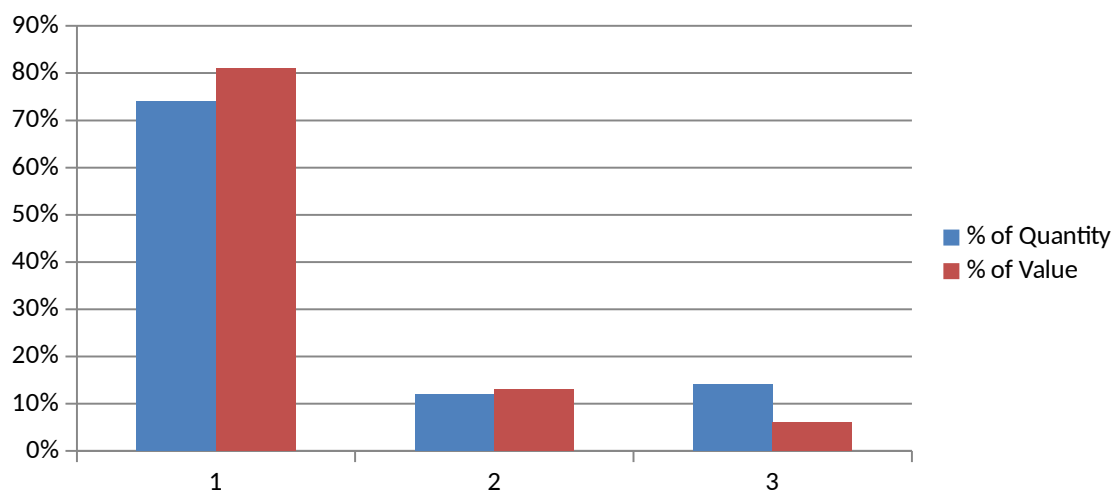


Fig.no:4.1

INTERPRETATION: The above graph shows the quantity and value of the material. A items value and quantity are the nearly same (quantity-77% & value-78%), B items value is high (value-12 and c item value is low and quantity is high compared to the B items).

4.1.2 ABC ANALYSIS FOR STEEL DURING 2016-2017

Table 4.2

CLASS	QUANTITY	%OF QUANTITY	%OF VALUE
A	319093	74%	81%
B	48575	12%	13%
C	57864	14%	6%

Source: Published Annual Reports of JSW Steel Ltd

ABC ANALYSIS GRAPH-2

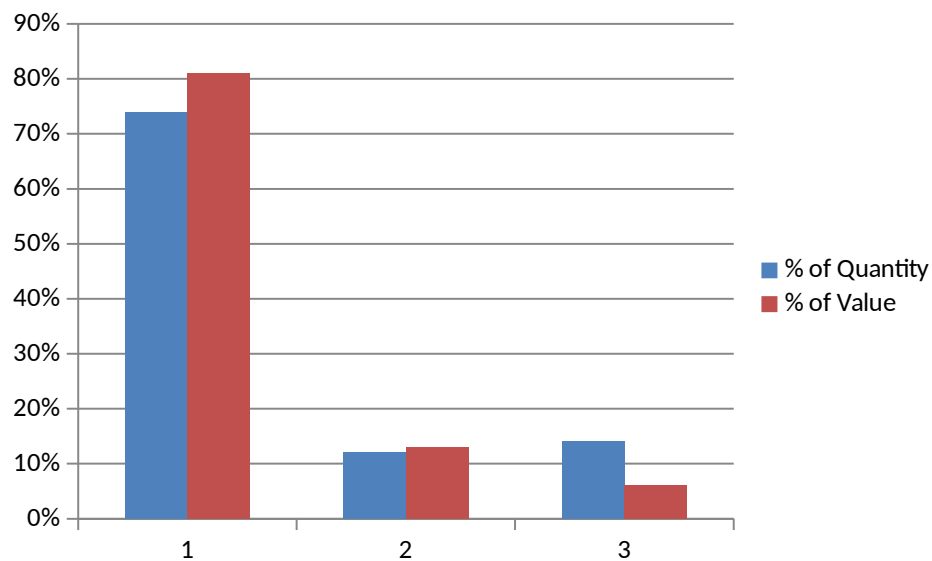


Fig .no:4.2

INTERPRETATION: The above graph shows the quantity and value of the material. A value is high, B value and quantity are nearly same and C value is low and quantity is high compared to the B items.

4.1.3 ABC ANALYSIS FOR STEEL DURING 2017-2018

Table 4.3

CLASS	QUANTITY	%OF QUANTITY	%OF VALUE
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A	379768	78%	81%
B	40422	8%	17%
C	66130	14%	2%

Source: Published Annual Reports of JSW Steel Ltd

ABC ANALYSIS GRAPH-3

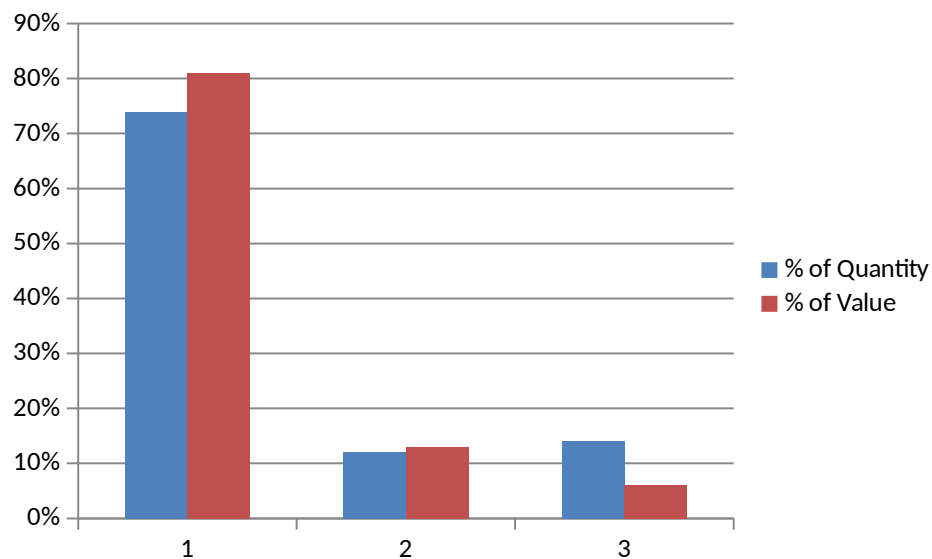


Fig .no:4.3

INTERPRETATION: The above graph shows the quantity and value of the material, A items value is high (72%) ,B items value and quantity are nearly same(quantity-10% & value-14%) and C items value is low and quantity is high(quantity-40% & value-14%) compared to the B items.

4.1.4 ABC ANALYSIS FOR STEEL DURING 2018-2019

Table 4.4

CLASS	QUANTITY	%OF QUANTITY	%OF VALUE
A	332353	50%	72%

B	70289	10%	14%
C	254136	40%	14%

Source: Published Annual Reports of JSW Steel Ltd

ABC ANALYSIS GRAPH-3

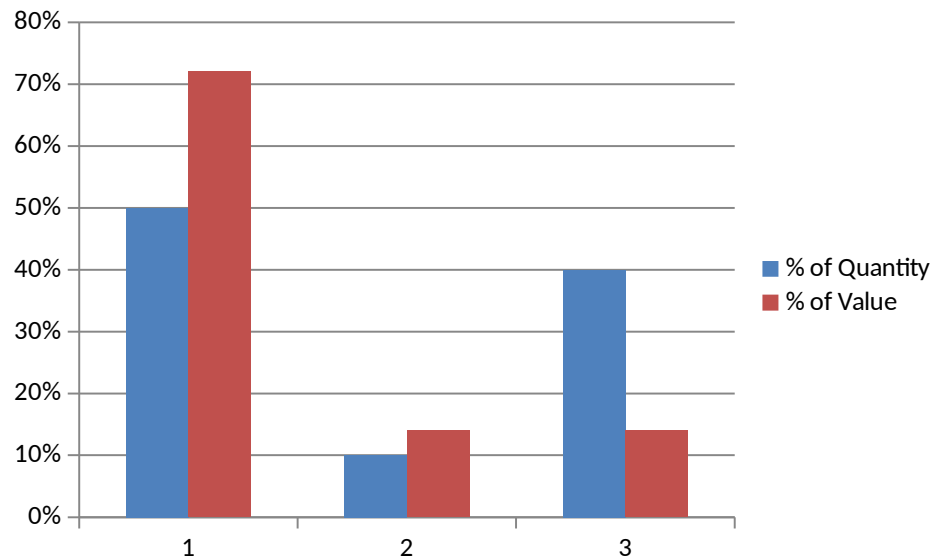


Fig.no:4.4

INTERPRETATION: The above graph shows the quantity and value of the material, A items value is high (81%), B items value is high (17%) and C items quantity is high and value is too low (quantity-14% & value-2%).

4.1.1 ABC ANALYSIS FOR STEEL DURING 2015-2016

S. No	ITEM	Annual number of units sold	Cost per unit	Annual consumption value
1	POLYPROPYLENE	2,21,157	62.25	1,37,67,023

	COMPOLYMER (RAD- MSP-035)			
2	Lead Antimony (3.1) Alloy	3,86,174	81.54	3,14,88,627
3	12.25 Copper Wire	62,052	371.64	2,30,61,005
4	RECYCLED PPCP PELLETES (OTHER THAN B & W)	1,65,019	53.02	87,49,307
5	Antimony Trioxide (INDSTARRG)	22,830	317.05	72,38,251
6	DECO-BROMIDE	45,661	188.32	86,86,130
7	RUNNERS SCRAP- PPC BLACK	53,731	66.35	35,65,051
8	20 x 2mm COPPER FLATS	10,568	333.07	35,19,883
9	Poly Carbonate Resin (XENOY)	14,391	222.52	32,02,285
10	50sqmm elastomeric black color sccc	7,885	368.08	29,02,310

Table 4.5

Source: Published Annual Reports of JSW Steel Ltd

2.List the products in descending order based on their annual consumption value.

Table 4.6

S.NO	ITEM	Annual number of units sold	Cost per unit	Annual consumption value
1	Lead Antimony (3.1) Alloy	3,86,174	81.54	3,14,88,627
2	POLYPROPLYENE COMPOLYMER (RAD- MSP-035)	2,21,157	62.25	1,37,67,023

3	12.25 Copper Wire	62,052	371.64	2,30,61,005
4	RECYCLED PPCP PELLETES (OTHER THAN B & W)	1,65,019	53.02	87,49,307
5	DECO-BROMIDE	45,661	188.32	86,86,130
6	Antimony Trioxide (INDSTARRG)	22,830	317.05	72,38,251
7	RUNNERS SCRAP-PPC BLACK	53,731	66.35	35,65,051
8	20 x 2mm COPPER FLATS	10,568	333.07	35,19,883
9	Poly Carbonate Resin (XENOY)	14,391	222.52	32,02,285
10	50sqmm elastomeric black color sccc	7,885	368.08	29,02,310

3.Total up the number of units sold and the annual consumption value.

Table 4.7

S.NO	ITEM	Annual number of units sold	Cost per unit	Annual consumption value
1	Lead Antimony (3.1) Alloy	3,86,174	81.54	3,14,88,627
2	POLYPROPLYENE COMPOLYMER (RAD- MSP-035)	2,21,157	62.25	1,37,67,023
3	12.25 Copper Wire	62,052	371.64	2,30,61,005
4	RECYCLED PPCP PELLETES (OTHER THAN B &	1,65,019	53.02	87,49,307

	W)			
5	DECO-BROMIDE	45,661	188.32	86,86,130
6	Antimony Trioxide (INDSTARRG)	22,830	317.05	72,38,251
7	RUNNERS SCRAP- PPC BLACK	53,731	66.35	35,65,051
8	20 x 2mm COPPER FLATS	10,568	333.07	35,19,883
9	Poly Carbonate Resin (XENOY)	14,391	222.52	32,02,285
10	50sqmm elastomeric black color sccc	7,885	368.08	29,02,310
	Total	9,89,468		10,61,79,872

4. Calculate the cumulative percentage of items and cumulative percentage of the annual consumption values using the totals.

Table 4.8

S.N O	ITEM	Annual number of units sold	Cost per unit	Annual consumption value	%of annual units sold	%of annual consumption value
1	Lead Antimony (3.1) Alloy	3,86,174	81.54	3,14,88,627	39.0%	29.65%
2	POLYPROPYLENE COMPOLYMER (RAD- MSP-035)	2,21,157	62.25	1,37,67,023	22.3%	12.96%
3	12.25 Copper Wire	62,052	371.64	2,30,61,005	6.27%	21.71%
4	RECYCLED PPCP PELETES (OTHER THAN BW)	1,65,019	53.02	87,49,307	16.6%	8.24%
5	DECO-BROMIDE	45,661	188.32	86,86,130	4.6%	8.18%
6	Antimony Trioxide (INDSTARRG)	22,830	317.05	72,38,251	2.30%	6.81%

7	RUNNERSSCRAP- PPC BLACK	53,731	66.35	35,65,051	5.4%	3.35%
8	20 x 2mm COPPER FLATS	10,568	333.07	35,19,883	1.06%	3.31%
9	Poly Carbonate Resin (XENYO)	14,391	222.52	32,02,285	1.45%	3.01%
10	50sqmm elastomeric black color sccc	7,885	368.08	29,02,310	0.79%	2.73%
	Total	9,89,468		10,61,79,872		

5.Determine the thresholds for splitting the data into A, B and C categories.

Table 4.9

Clas s	ITEM	Annual number of units sold	Cost per unit	Annual consumption value	%of annual units sold	%of annual consumpti on value
81%	Lead Antimony (3.1) Alloy	3,86,17 4	81.54	3,14,88,627	39.02%	29.65%
	POLYPROPLYENE COMPOLYMER (RAD- MSP-035)	2,21,15 7	62.25	1,37,67,023	22.35%	12.96%
	12.25 Copper Wire	62,052	371.64	2,30,61,005	6.27%	21.71%
	RECYCLED PPCP PELLETES (OTHER THAN B & W)	1,65,01 9	53.02	87,49,307	16.67%	8.24%
	DECO-BROMIDE	45,661	188.32	86,86,130	4.6%	8.18%
	Antimony Trioxide (INDSTARRG)	22,830	317.05	72,38,251	2.30%	6.81%

13%	RUNNERS SCRAP- PPC BLACK	53,731	66.35	35,65,051	5.4%	3.35%
	20 x 2mm COPPER FLATS	10,568	333.07	35,19,883	1.06%	3.31%
6%	Poly Carbonate Resin (XENOY)	14,391	222.52	32,02,285	1.45%	3.01%
	50sqmm elastomeric black color sccc	7,885	368.08	29,02,310	0.79%	2.73%
	Total	9,89,46 8		10,61,79,87 2		

4.1.2.1 ABC ANALYSIS FOR STEEL DURING 2016-2017

Table 4.10

S.NO	ITEM	ANNUAL NUMBER OF UNIT SOLD	COST PER UNIT	ANNUAL CONSUMPTIO N VALUE
1	Lead Antimony (3.1) Alloy	4,15,880	83.25	3,46,22,010
2	12.25 Copper Wire	66,826	372.34	2,48,81,992
3	POLYPROPLYENE COMPOLYMER (RAD- MSP-035)	2,55,182	67.02	1,71,02,297
4	RECYCLED PPCP PELLETES (OTHER THAN B & W)	1,91,713	54	1,03,52,502
5	DECO-BROMIDE	49,173	189.01	92,94,188
6	Antimony Trioxide (INDSTARRG)	24,586	318.18	78,22,773
7	RUNNERS SCRAP- PPC BLACK	57,864	66.89	38,70,522
8	20 x 2mm COPPER FLATS	11,381	335	38,12,635
9	Poly Carbonate	15,498	223.79	34,68,297

	Resin (XENYO)			
10	50sqmm elastomeric black color sccc	8,491	368.74	31,30,971

Source: Published Annual Reports of JSW Steel Ltd

2. List the products in descending order based on their annual consumption value

Table 4.11

S.NO	Item	Annual number of units sold	Cost per unit	Annual consumption value
1	Lead Antimony (3.1) Alloy	4,15,880	83.25	3,46,22,010
2	12.25 Copper Wire	66,826	372.34	2,48,81,992
3	POLYPROPLYENE COMPOLYMER (RAD- MSP-035)	2,55,182	67.02	1,71,02,297
4	RECYCLED PPCP PELLETES (OTHER THAN B & W)	1,91,713	54	1,03,52,502
5	DECO-BROMIDE	49,173	189.01	92,94,188
6	Antimony Trioxide (INDSTARRG)	24,586	318.18	78,22,773
7	RUNNERS SCRAP-PPC BLACK	57,864	66.89	38,70,522
8	20 x 2mm COPPER FLATS	11,381	335	38,12,635
9	Poly Carbonate Resin (XENYO)	15,498	223.79	34,68,297
10	50sqmm	8,491	368.74	31,30,971

	elastomeric black color sccc			
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3. Total up the number of units sold and the annual consumption value

Table 4.12

S.NO	ITEMS	Annual number of units sold	Cost per unit	Annual consumption value
1	Lead Antimony (3.1) Alloy	4,15,880	83.25	3,46,22,010
2	12.25 Copper Wire	66,826	372.34	2,48,81,992
3	POLYPROPYLENE COMPOLYMER (RAD- MSP-035)	2,55,182	67.02	1,71,02,297
4	RECYCLED PPCP PELLETES (OTHER THAN B & W)	1,91,713	54	1,03,52,502
5	DECO-BROMIDE	49,173	189.01	92,94,188
6	Antimony Trioxide (INDSTARRG)	24,586	318.18	78,22,773
7	RUNNERS SCRAP- PPC BLACK	57,864	66.89	38,70,522
8	20 x 2mm COPPER FLATS	11,381	335	38,12,635
9	Poly Carbonate Resin (XENYO)	15,498	223.79	34,68,297
10	50sqmm elastomeric black color sccc	8,491	368.74	31,30,971
	Total	10,96,594		11,83,58,187

4. Calculate the cumulative percentage of items and cumulative percentage of the annual consumption values using the totals

Table 4.13

S.N O	ITEM	Annual number of units sold	Cost per unit	Annual consumption value	%of annual units sold	%of annual consumption value
1	Lead Antimony (3.1) Alloy	4,15,880	83.25	3,46,22,010	37.9%	29.25%
2	12.25 Copper Wire	66,826	372.34	2,48,81,992	6.09%	21.02%
3	POLYPROPYLENE COMPOLYMER (RAD- MSP-035)	2,55,182	67.02	1,71,02,297	23.2%	14.44%
4	RECYCLED PPCP PELLETES (OTHER THAN B & W)	1,91,713	54	1,03,52,502	17.4%	8.74%
5	DECO-BROMIDE	49,173	189.01	92,94,188	4.48%	7.85%
6	Antimony Trioxide (INDSTARRG)	24,586	318.18	78,22,773	2.24%	6.6%
7	RUNNERS SCRAP-PPC BLACK	57,864	66.89	38,70,522	5.27%	3.2%
8	20 x 2mm COPPER FLATS	11,381	335	38,12,635	1.03%	3.22%
9	Poly Carbonate Resin (XENOY)	15,498	223.79	34,68,297	1.41%	2.93%
10	50sqmm elastomeric black color sccc	8,491	368.74	31,30,971	0.77%	2.64%

5. Determine the thresholds for splitting the data into A, B and C categories.

Table 4.14

clas s	ITEM	Annual number of units sold	Cost per unit	Annual consumption value	%of annua l units sold	%of annual consumptio n value
81%	Lead Antimony (3.1) Alloy	4,15,880	83.25	3,46,22,010	37.9%	29.25%
	12.25 Copper Wire	66,826	372.3 4	2,48,81,992	6.09%	21.02%
	POLYPROPLYEN E COMPOLYMER (RAD- MSP-035)	2,55,182	67.02	1,71,02,297	23.2%	14.44%
	RECYCLED PPCP PELLETES (OTHER THAN B & W)	1,91,713	54	1,03,52,502	17.4%	8.74%
	DECO-BROMIDE	49,173	189.1	92,94,188	4.48%	7.85%
13%	Antimony Trioxide (INDSTARRG)	24,586	318.1 8	78,22,773	2.24%	6.6%
	RUNNERSSCRAP -PPC BLACK	57,864	66.89	38,70,522	5.27%	3.2%
	20 x 2mm COPPER FLATS	11,381	335	38,12,635	1.03%	3.22%
6%	Poly Carbonate Resin (XENOY)	15,498	223.7 9	34,68,297	1.41%	2.93%
	50sqmm elastomeric black color sccc	8,491	368.7 4	31,30,971	0.77%	2.64%
	Total	10,96,59 4		11,83,58,18 7		

4.1.3.1 ABC ANALYSIS FOR STEEL DURING 2017-2018

Table 4.15

ITEM	Annual number of units sold	Cost per unit	Annual consumption value
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POLYPROPYLENE COMPOLYMER (RAD- MSP-035)	2,72,194	68.75	18713337
Lead Antimony (3.1) Alloy	475291	83.39	39872161
12.25 Copper Wire	76372	373.64	28535634
RECYCLED PPCP PELLETES (OTHER THAN B & W)	219100	55.00	12050500
Antimony Trioxide (INDSTARRG)	28098	319.20	8968881
DECO-BROMIDE	56198	183.45	10309523
RUNNERS SCRAP- PPC BLACK	66130	68.75	4546437
20 x 2mm COPPER FLATS	13006	390.94	5084565
Poly Carbonate Resin (XENYO)	17712	224.65	3979000
50sqmm elastomeric black color sccc	9704	370.46	3594943

Source: Published Annual Reports of JSW Steel Ltd

2. List the products in descending order based on their annual consumption value

Table 4.16

S.NO	ITEM	Annual number of units sold	Cost per unit	Annual consumption value
1	Lead Antimony (3.1) Alloy	4,75,291	83.39	3,98,72,161
2	12.25 Copper Wire	76,372	373.64	2,85,35,634

3	POLYPROPYLENE COMPOLYMER (RAD- MSP-035)	2,72,194	68.75	1,87,13,337
4	RECYCLED PPCP PELLETES (OTHER THAN B & W)	2,19,100	55.00	1,20,50,500
5	DECO-BROMIDE	56,198	183.45	1,03,09,523
6	Antimony Trioxide (INDSTARRG)	28,098	319.20	89,68,881
7	20 x 2mm COPPER FLATS	13,006	390.94	50,84,565
8	RUNNERS SCRAP- PPC BLACK	66,130	68.75	45,46,437
9	Poly Carbonate Resin (XENOY)	17,712	224.65	39,79,000
10	50sqmm elastomeric black color sccc	9,704	370.46	35,94,943

3. Total up the number of units sold and the annual consumption value

Table 4.17

S.NO	ITEM	Annual number of units sold	Cost per unit	Annual consumption value
1	Lead Antimony (3.1) Alloy	4,75,291	83.39	3,98,72,161
2	12.25 Copper Wire	76,372	373.64	2,85,35,634
3	POLYPROPYLENE COMPOLYMER (RAD- MSP-035)	2,72,194	68.75	1,87,13,337
4	RECYCLED PPCP PELLETES (OTHER	2,19,100	55.00	1,20,50,500

	THAN B & W)			
5	DECO-BROMIDE	56,198	183.45	1,03,09,523
6	Antimony Trioxide (INDSTARRG)	28,098	319.20	89,68,881
7	20 x 2mm COPPER FLATS	13,006	390.94	50,84,565
8	RUNNERS SCRAP- PPC BLACK	66,130	68.75	45,46,437
9	Poly Carbonate Resin (XENOY)	17,712	224.65	39,79,000
10	50sqmm elastomeric black color sccc	9,704	370.46	35,94,943
	Total	12,33,805		13,56,54,981

4. Calculate the cumulative percentage of items and cumulative percentage of the annual consumption values using the totals

Table 4.18

ITEM	Annual number of units sold	Cost per unit	Annual consumption value	%of annual units sold	%of annual consumption value
Lead Antimony (3.1) Alloy	4,75,291	83.39	3,98,72,161	38.5%	29.39%
12.25 Copper Wire	76,372	373.64	2,85,35,634	6.18%	21%
POLYPROPLYENE COMPOLYMER (RAD- MSP-035)	2,72,194	68.75	1,87,13,337	22.06%	13.79%
RECYCLED PPCP PELLETES (OTHER THAN B & W)	2,19,100	55.00	1,20,50,500	17.75%	8.88%
DECO-BROMIDE	56,198	183.45	1,03,09,523	4.55%	7.59%
Antimony Trioxide (INDSTARRG)	28,098	319.20	89,68,881	2.27%	6.61%

20 x 2mm COPPER FLATS	13,006	390.94	50,84,565	1.05%	3.74%
RUNNERS SCRAP- PPC BLACK	66,130	68.75	45,46,437	5.35%	3.35%
Poly Carbonate Resin (XENOY)	17,712	224.65	39,79,000	1.43%	2.93%
50sqmm elastomeric black color sccc	9,704	370.46	35,94,943	0.78%	2.65%

5. Determine the thresholds for splitting the data into A,B and C categories.

Table 4.19

Clas s	ITEM	Annual number of units sold	Cost per unit	Annual consumptio n value	%of annual units sold	%of annual consumptio n value
80%	Lead Antimony (3.1) Alloy	4,75,29 1	83.39	3,98,72,161	38.5%	29.39%
	12.25 Copper Wire	76,372	373.6 4	2,85,35,634	6.18%	21%
	POLYPROPLYEN E COMPOLYMER (RAD- MSP-035)	2,72,19 4	68.75	1,87,13,337	22.06 %	13.79%
	RECYCLED PPCP PELLETES (OTHER THAN B & W)	2,19,10 0	55.00	1,20,50,500	17.75 %	8.88%
	DECO-BROMIDE	56,198	183.4 5	1,03,09,523	4.55%	7.59%
14%	Antimony Trioxide (INDSTARRG)	28,098	319.2 0	89,68,881	2.27%	6.61%
	20 x 2mm COPPER FLATS	13,006	390.9 4	50,84,565	1.05%	3.74%

	RUNNERS SCRAP-PPC BLACK	66,130	68.75	45,46,437	5.35%	3.35%
6%	Poly Carbonate Resin (XENOY)	17,712	224.6 5	39,79,000	1.43%	2.93%
	50sqmm elastomeric black color sccc	9,704	370.4 6	35,94,943	0.78%	2.65%

4.1.4.1 ABC ANALYSIS FOR STEEL DURING 2018-2019

Table 4.20

S.NO	ITEM	Annual number of units sold	Cost per unit	Annual consumption value
1	POLYPROPLYEN E COMPOLYMER (RAD- MSP-035)	28,92,637	67.30	19,46,74,470
2	Lead Antimony (3.1) Alloy	3,33,295	83.39	2,79,60,117
3	12.25 Copper Wire	80,033	381.23	3,05,10,980
4	RECYCLED PPCP PELLETES (OTHER THAN B & W)	2,54,136	55.12	1,40,07,976
5	Antimony Trioxide (INDSTARRG)	28,510	319.85	91,18,923
6	DECO-BROMIDE	55,949	183.94	1,02,91,259
7	RUNNERS SCRAP-PPC BLACK	1,66,095	69.15	1,14,85,469
8	20 x 2mm COPPER FLATS	22,291	390.94	87,14,443
9	Poly Carbonate Resin (XENOY)	35,424	324.69	1,15,01,818
10	50sqmm	14,340	267.11	38,30,357

	elastomeric black color sccc			
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2. List the products in descending order based on their annual consumption value

Table 4.21

S.NO	ITEM	Annual number of units sold	Cost per unit	Annual consumption value
1	POLYPROPYLENE COMPOLYMER (RAD- MSP-035)	28,92,637	67.30	19,46,74,470
2	12.25 Copper Wire	80,033	381.23	3,05,10,980
3	Lead Antimony (3.1) Alloy	3,33,295	83.39	2,79,60,117
4	RECYCLED PPCP PELLETES (OTHER THAN B & W)	2,54,136	55.12	1,40,07,976
5	Poly Carbonate Resin (XENOY)	35,424	324.69	1,15,01,818
6	RUNNERS SCRAP-PPC BLACK	1,66,095	69.15	1,14,85,469
7	DECO-BROMIDE	55,949	183.94	1,02,91,259
8	Antimony Trioxide (INDSTARRG)	28,510	319.85	91,18,923
9	20 x 2mm COPPER FLATS	22,291	390.94	87,14,443
10	50sqmm elastomeric black color sccc	14,340	267.11	38,30,357

3. Total up the number of units sold and the annual consumption value

Table 4.22

S.NO	ITEM	Annual number of units sold	Cost per unit	Annual consumption value
1	POLYPROPYLENE COMPOLYMER (RAD- MSP-035)	28,92,637	67.30	19,46,74,470
2	12.25 Copper Wire	80,033	381.23	3,05,10,980
3	Lead Antimony (3.1) Alloy	3,33,295	83.39	2,79,60,117
4	RECYCLED PPCP PELLETS (OTHER THAN B & W)	2,54,136	55.12	1,40,07,976
5	Poly Carbonate Resin (XENOY)	35,424	324.69	1,15,01,818
6	RUNNERS SCRAP-PPC BLACK	1,66,095	69.15	1,14,85,469
7	DECO-BROMIDE	55,949	183.94	1,02,91,259
8	Antimony Trioxide (INDSTARRG)	28,510	319.85	91,18,923
9	20 x 2mm COPPER FLATS	22,291	390.94	87,14,443
10	50sqmm elastomeric black color sccc	14,340	267.11	38,30,357
	Total	38,82,710		32,20,95,812

4. Calculate the cumulative percentage of items and cumulative percentage of the annual consumption values using the totals

Table 4.23

S	ITEM	Annual	Co	Annual	%of	%of
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class	ITEM	Annual number of units sold	Cost unit per	Annual consumpti on value	annu al	annual consu
1	POLYPROPYLENE COMPOLYMER	28,92,6 of units 37 sold	67. unit 30	19,46,74, on value 470	74% units sold	60.43% on value
79%	(RAD-MSP-035) 12.25 Copper Wire COMPOLYMER	28,92, 80,033 637	67. 381 30 .23	19,46,74, 3,05,10,9 470 80	74% 2%	60.43% 9.47%
3	(RAD-MSP-035) Lead Antimony (3.1) 12.25 Copper Wire Alloy	3,33,29 80,03 5	83. 381 39	2,79,60,1 3,05,10,9 17	8% 2%	8.6% 9.47%
4	RECYCLED PPCP Lead Antimony (3.1) PELLETES (OTHER Alloy	2,54,13 3,33,2 6 95	55. 83. 12 39	1,40,07,9 2,79,60,1 76 17	6% 8%	4.34% 8.6%
5	RECYCLED PPCP Poly Carbonate PELLETES (OTHER Resin (XENOY) THAN E & W)	2,54,1 35,424 36	55. 324 12 .69	1,40,07,9 1,15,01,8 76 18	6% 1%	4.34% 3.57%
6	THAN E & W RUNNERS SCRAP- Poly Carbonate PPC BLACK Resin (XENOY)	1,66,09 35,42 5	69. 324 15	1,14,85,4 1,15,01,8 69	4.27 1% %	3.56% 3.57%
7	DECO-BROMIDE RUNNERS SCRAP- PPC BLACK Antimony Trioxide	55,949 1,66,0 95	183 69. .94 15	1,02,91,2 1,14,85,4 59 69	1% 4.27 %	3.19% 3.56%
8	DECO-BROMIDE (INDSTARRG)	28,510 55,94	319 183 .85 94	91,18,923 1,02,91,2 59	1.7% 1% %	2.83% 3.19%
9	20 x 2mm COPPER Antimony Trioxide FLATS (INDSTARRG)	22,291 28,51 0	390 319 .94 25	87,14,443 91,18,923 267	1.5% 1.7% %	2.70% 2.83%
10	50sqmm 20 x 2mm elastomeric COPPER FLATS black color sccc	14,340 22,29 1 14,34	267 390 .11 .94	38,30,357 87,14,443	1.36 1.5% %	1.8% 2.70%
8%	elastomeric black color sccc	0	.11		%	

5.Determine the thresholds for splitting the data into A, B and C categories

Table 4.24

4.2 ECONOMIC ORDER QUANTITY:

4.2.1 EOQ DURING 2015-2016

The firm requires below given units of material for manufacturing steel. The following are the details of their operation during 2015-2016

PARTICULARS	
Billets/blooms	28,889 Qty(mt)
Ordering cost per order	RS.2000
Carrying cost1	10%
Purchase price per unit	400

ECONOMIC ORDER QUANTITY DURING 2015-2016

Table 4.25

Ordering cost	34,000
Carrying cost	14,45,000
Total annual cost	14,79,000
EOQ	1699.67

INTERPRETATION:

The above details showing EOQ during Jan 2015- Dec 2016. The industry spending carrying cost is high ,its affected the total cost. The EOQ during 2015-2016 (1699.67)

1.Calculation of EOQ:

Total units required (A)=28889

The Ordering Cost Per Order (O)=RS.2000

CARRYING COST PER UNITI=10%

(i.e.) 10% of RS.400=RS.40

$$EOQ = \sqrt{2AO/C}$$

$$= \sqrt{2 \times 28889 \times 2000 / 40}$$

$$= \text{Rs.}1699.67$$

2. Number of orders for the year = A/EOQ

$$= 2889 / 1699.67$$

$$=16.99 \sim 17 \text{ orders}$$

3. Total annual cost = carrying cost + ordering cost

$$= 1445000 + 34000$$

$$= \text{Rs.}1479000$$

➤ **Carrying cost** = order size * average inventory •

❖ **order size** = A/no of orders

$$= 28889 / 17 = 1699.67$$

❖ **Average inventory** = order size / 2

$$= 1700 / 2 = \text{Rs.}850 \bullet$$

❖ **Carrying cost** = 1700 * Rs.850

$$= \text{Rs.}1445000 \bullet$$

❖ **Ordering cost** = cost per order * no of orders

$$= 2000 * 17$$

$$= \text{Rs.}34000$$

4.2.2 EOQ DURING 2016-2017

The firm requires below given units of material for manufacturing of steel. The following are the details of their operation during 2007-2008.

PARTICULARS	
Billets/blooms	123596 Qty(Mt)
Ordering cost per order	2200
Carrying cost1	10%
Purchase price per unit	RS.420

ECONOMIC ORDER QUANTITY DURING 2016-2017

Table 4.26

Ordering cost	77,000
Carrying cost	62,44,669
Total annual cost	63,22,669
EOQ	3598.35

INTERPRETATION:

The above details showing EOQ during Jan 2016- Dec 2017. The industry spending carrying cost is high(compared to the previous year) ,its affected the total cost. The EOQ during 2016-2017 (3598.35)

1. Calculation of EOQ:

Total units required (A) =123596mt

The ordering cost per order (O) = Rs.2200

Carrying cost per unit (C) = 10%

(i.e.) 10% of Rs.2000 =Rs.42

EOQ = $\sqrt{2AO/C}$

$$= 2*123596*2200/42$$

$$= \text{Rs.}3598.354$$

2.Number of orders for the year

$$= A/\text{EOQ}$$

$$= 123596/3598.354$$

$$= 34.79 \sim 35 \text{ orders}$$

3. Total annual cost = carrying cost + ordering cost

$$= 6245669 + 77000$$

$$= \text{Rs.}6322669$$

➤ Carrying cost = order size average inventory

- order size = A/no of orders**

$$= 123596/35$$

$$= 3531.31$$

- Average inventory = order size/2**

$$= 3531.1/2$$

$$= \text{Rs.}1768.655$$

- Carrying cost = 3531.31*1768.655**

$$= \text{Rs.}6245669$$

- **Ordering cost = cost per order no of orders**

$$= 2200 * 35$$

$$= \text{Rs.}77000$$

4.2.3 EOQ DURING 2017-2018

The firm requires below given units of material for manufacturing of steel. The following are the details of their operation during 2017-2018

PARTICULARS	
Billets/blooms	106,066 Qty(mt)
Ordering cost per order	RS.2400
Carrying cost1	10%
Purchase price per unit	RS.440

ECONOMIC ORDER QUANTITY DURING 2017-2018

Table 4.27

Ordering cost	76,800
Carrying cost	54,93,154
Total annual cost	55,69,954
EOQ	3401.59

INTERPRETATION:

The above details showing EOQ during Jan 2017- Dec 2018. The industry spending carrying cost is low (compared to the previous year). The EOQ during 2017-2018(3401.59)

1.Calculation of EOQ:-

Total units required (A) =106066mt

The ordering cost per order (O) = Rs.2400

Carrying cost per unit (C) = 10%

(i.e.) 10% of Rs.2000 =Rs.44

$$\text{EOQ} = \sqrt{2AO/C}$$

$$= 2 * 106066 * 2400 / 44$$

$$= \text{Rs.}3401.59$$

2. Number of orders for the year = A/EOQ

$$=106066/3401.59$$

$$=31.18 \sim 32 \text{ orders}$$

3.Total annual cost = carrying cost + ordering cost

$$= 5493154 + 76800$$

$$= \text{Rs.}5569954$$

➤ **Carrying cost = order size * average inventory**

• **Order size = A/no of orders**

$$= 106066/33$$

$$= 3314.56$$

• **Average inventory = order size/2**

$$= 3314.56/2$$

$$= \text{Rs.}1657.28$$

• **Carrying cost = 3314.56*1657.28**

$$= \text{Rs.}5493154$$

• **Ordering cost = cost per order * no of orders**

$$= 2400 * 32 = \text{Rs.}76800$$

4.2.4 EOQ DURING 2018-2019

The firm requires below given units of material for manufacturing of steel. The following are the details of their operation during 2018-2019.

PARTICULARS	
Billets/blooms	1,84,661 Qty(mt)
Ordering cost per order	3000
Carrying cost1	12%
Purchase price per unit	RS.500

ECONOMIC ORDER QUANTITY DURING 2018-2019

Table 4.28

Ordering cost	1,17,000
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Carrying cost	1,12,09,639
Total annual cost	1,13,26,639
EOQ	4707.37

INTERPRETATION:

The above details showing EOQ during Jan 2018- Dec 2019. The industry spending carrying cost is very high (compared to the previous year), its affected the total annual cost. The EOQ during 2018-2019(4707.37)

1.Calculation of EOQ:

Total units required (A) =184,661mt

The ordering cost per order (O) = Rs.3000

Carrying cost per unit (C) = 12%

(i.e.) 12% of Rs.500 =Rs.50

EOQ = $\sqrt{2AO/C}$

$$= 2 \times 184,661 \times 3000 / 50$$

$$= \text{Rs.}4,707.37$$

2.Number of orders for the year = A/EOQ

$$= 184661 / 4707.37$$

$$= 39.23 \sim 39 \text{ orders}$$

3.Total annual cost = carrying cost + ordering cost

$$= 11209639 + 117000$$

$$= \text{Rs.}11326639.64$$

➤ Carrying cost = order size* average inventory

- Order size = A/no of orders

$$= 184661 / 39$$

$$= 4734.90$$

- Average inventory = order size/2

$$= 4734.90 / 2$$

$$= \text{Rs.}2367.45$$

- Carrying cost = 4734.90 *2367.45

$$= \text{Rs.}11209639$$

- Ordering cost = cost per order* no of orders

$$= 3000 \times 39$$
$$= \text{Rs.}117000$$

CHAPTER-V

FINDINGS & SUGGESTIONS

& CONCLUSION

5.1 FINDINGS:

- IT was found that the company is consuming same raw material as per ABC classification as 'A' class items 'B' class items and 'C' class items.
- Basically, the company was running on the basis of job work so, inventory management is not given that much importance.
- Even the carrying cost is high which constant for 4 years as it had a greater impact on inventory maintenance cost.
- In general, when orders increase automatically EOQ decreases which inversely proportional. EOQ for the past 4 years shows that the company is going for few orders.

- Generally, it is a known fact that the annual consumption of raw materials increases year by year as companies grow. In such a way annual consumption from 2015-2016 to 2018-2019 has also increased.

5.2 SUGGESTIONS:

- As the company converted into own sales it should have its own inventory policy which can produce better results by minimizing costs.
- The company has to implement a ABC analysis, which literally reduces inventory cost.
- As of company is going for wide expansion in JSW steel-1 and JSW steel-2, it should pay much more attention to research and development.
- Even though inventory conversion the period is moderately good, still there are a lot of scopes to improve it.

5.3 CONCLUSION:

Optimum inventory is the goal of every organization. Over inventory and under inventory, both cause financial impact and health of the business as well as effective business opportunities. The steel industry is always an important part of the national economy in our country, which is the leading industry to realize speeding up industrialization. Most countries that have implemented industrialized in the world are almost putting priorities to develop basic industries including the steel industry. Our country also invests a large number of money through a variety of financing channels, in order to improve the competitiveness of the steel industry. The company is following inventory management techniques like EOQ, ABC analysis can increase its profits. By supplying the finished products at

reasonable prices to the customers and thus increase its period of existence in the market. It can be concluded from the analysis that the company inventory position is up to some extent satisfactory. The Indian steel industry plays a significant role in the country's economic growth. The major contribution directs the attention that steel is having a strong hold in the traditional sectors, such as infrastructure & construction, automobile, transportation, industrial applications, etc.

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APPENDIX -1

Economic order quantity :

EOQ DURING 2015-2016:

1.Calculation of EOQ:

Total units required (A)=28889

The Ordering Cost Per Order (O)=RS.2000

CARRYING COST PER UNITI=10%

(i.e.) 10% of RS.400=RS.40

$$\begin{aligned}\text{EOQ} &= \sqrt{2AO/C} \\ &= \sqrt{2 \times 28889 \times 2000/40} \\ &= \text{Rs.1699.67}\end{aligned}$$

2. Number of orders for the year = A/EOQ

$$\begin{aligned}&= 2889/1699.67 \\ &= 16.99 \sim 17 \text{ orders}\end{aligned}$$

3. Total annual cost = carrying cost + ordering cost

$$\begin{aligned}&= 1445000 + 34000 \\ &= \text{Rs.1479000}\end{aligned}$$

➤ **Carrying cost** = order size * average inventory •

❖ **order size** = A/no of orders

$$= 28889/17 = 1699.67$$

❖ **Average inventory** = order size/2

$$= 1700/2 = \text{Rs.850} \bullet$$

❖ **Carrying cost** = 1700 * Rs.850

$$= \text{Rs.1445000} \bullet$$

❖ **Ordering cost** = cost per order * no of orders

$$= 2000 \times 17$$

$$= \text{Rs.34000}$$

EOQ DURING 2016-2017:

1. Calculation of EOQ:

Total units required (A) = 123596mt

The ordering cost per order (O) = Rs.2200

Carrying cost per unit (C) = 10%

(i.e.) 10% of Rs.2000 = Rs.42

$$\text{EOQ} = \sqrt{2AO/C}$$

$$= 2 \times 123596 \times 2200 / 42$$

$$= \text{Rs.} 3598.354$$

2. Number of orders for the year

$$= A / \text{EOQ}$$

$$= 123596 / 3598.354$$

$$= 34.79 \sim 35 \text{ orders}$$

3. Total annual cost = carrying cost + ordering cost

$$= 6245669 + 77000$$

$$= \text{Rs.} 6322669$$

➤ Carrying cost = order size average inventory

- order size = $A / \text{no of orders}$

$$= 123596 / 35$$

$$= 3531.31$$

- Average inventory = order size / 2

$$= 3531.31 / 2$$

$$= \text{Rs.} 1768.655$$

- Carrying cost = 3531.31×1768.655

$$= \text{Rs.} 6245669$$

- Ordering cost = cost per order no of orders

$$= 2200 \times 35$$

$$= \text{Rs.} 77000$$

EOQ DURING 2017-2018:

1. Calculation of EOQ:-

Total units required (A) = 106066mt

The ordering cost per order (O) = Rs.2400

Carrying cost per unit (C) = 10%

(i.e.) 10% of Rs.2000 = Rs.44

$$\text{EOQ} = \sqrt{2AO/C}$$

$$= 2 \times 106066 \times 2400 / 44$$

$$= \text{Rs.} 3401.59$$

2. Number of orders for the year = A/EOQ

$$= 106066 / 3401.59$$

$$= 31.18 \sim 32 \text{ orders}$$

3. Total annual cost = carrying cost + ordering cost

$$= 5.493154 + 76800$$

$$= \text{Rs.} 5569954.62$$

➤ **Carrying cost = order size * average inventory**

• **Order size = $A/\text{no of orders}$**

$$= 106066 / 32$$

$$= 3314.56$$

• **Average inventory = order size/2**

$$= 3314.56 / 2$$

$$= \text{Rs.} 1657.28$$

• **Carrying cost = 3314.56×1657.28**

$$= \text{Rs.} 5493154$$

• **Ordering cost = cost per order * no of orders**

$$= 2400 \times 32 = \text{Rs.} 76800$$

EOQ DURING 2018-2019

1. Calculation of EOQ:

Total units required (A) = 184,661 mt

The ordering cost per order (O) = Rs. 3000

Carrying cost per unit (C) = 12%

(i.e.) 12% of Rs. 500 = Rs. 50

$$\text{EOQ} = \sqrt{2AO/C}$$

$$= 2 \times 184,661 \times 3000 / 50$$

$$= \text{Rs.} 4,707.37$$

$$\text{2. Number of orders for the year} = A/\text{EOQ}$$

$$= 184661/4707.37$$

$$= 39.23 \sim 39 \text{ orders}$$

$$\text{3. Total annual cost} = \text{carrying cost} + \text{ordering cost}$$

$$= 11209639 + 117000$$

$$= \text{Rs.} 11326639.64$$

➤ **Carrying cost = order size * average inventory**

- **Order size = A/no of orders**

$$= 184661/39$$

$$= 4734.90$$

- **Average inventory = order size/2**

$$= 4734.90/2$$

$$= \text{Rs.} 2367.45$$

- **Carrying cost = 4734.90 * 2367.45**

$$= \text{Rs.} 11209639$$

- **Ordering cost = cost per order * no of orders**

$$= 3000 * 39$$

$$= \text{Rs.} 117000$$

